



## Trimod HE®

EN

ENGLISH

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## 1. Introduction



### CAUTION

The instructions in this manual are intended for an OPERATOR (paragraph 2.2.2)

### 1.1 Overview

Congratulations on your LEGRAND Trimod HE UPS purchase.

Thanks to this UPS, your critical equipment will always be protected by a constant and reliable electricity supply.

LEGRAND is specialized in designing and producing UPS. Trimod HE is unique in its kind: it is modular, redundant and belongs to the last generation of high power UPS.

High reliability, low running costs and excellent electrical performance are some of its characteristics. The high quality standard of LEGRAND in design and production allows Trimod HE to pass the strictest quality tests.

The UPS has been designed in compliance with the existing European Union directives, with the technical standards that include their requirements and with the eco-design guidelines.

The equipment is produced at an ISO14001 certified factory.

This publication, simply defined "user manual" herein, contains all the information for the use of the Trimod HE UPS, also referred to as "equipment" in this manual.

The contents of the user manual are intended mainly for an operator (see paragraph 2.2.2) or for people, generically defined as "users", who have the need and/or obligation to provide instructions or work directly on the equipment for their assigned tasks.

These people can be the following:

- managers;
- heads of operating areas;
- department heads;
- direct private users.

### 1.2 Purpose of the manual

The purpose of this manual is to provide the operator with instructions for safely using the equipment after the installation performed by a skilled technician.

Extraordinary maintenance operations are not dealt with in this manual because they are the sole preserve of the LEGRAND Technical Support Service.

The reading of this manual is essential but does not substitute the skill of technical personnel who must have received adequate preliminary training.

The intended use and configurations envisaged for the equipment as shown in this manual are the only ones allowed by the Manufacturer.

Any other use or configuration must be previously agreed with the Manufacturer in writing and, in this case, the written agreement will be attached to the manuals.

This manual also makes reference to laws, directives and standards that the operator is required to be aware of and consult.

The original text of this publication, drafted in Italian, is the only reference for the resolution of disputes of interpretation linked to translations into other languages.

### 1.3 Symbols in the manual

Some operations are shown in graphic symbols that draw the attention of the reader to the danger or the importance they imply:



### DANGER

This indication shows a danger entailing a high degree of risk that, if not avoided, will lead to death or serious injury or considerable damage to the equipment and things around it.

---

## 1. Introduction



This indication shows a danger entailing a medium degree of risk that, if not avoided, could lead to death or serious injury or considerable damage to the equipment and things around it.



This indication shows a danger entailing a low level of risk that, if not avoided, could lead to minor or moderate injury or material damage to the equipment and things around it.

### **INDICATION**

This symbol indicates important information which should be read carefully.

#### **1.4 Where and how to keep the manual**

This manual must be kept in a safe, dry place and must always be available for consultation.

It is recommended to make a copy of it and file it away.

If information is exchanged with the Manufacturer or the authorised assistance personnel, it is essential to refer to the equipment's rating plate data and serial number.

### **INDICATION**

The manuals provided with the equipment are an integral part of it and must therefore be kept for its entire lifetime. In case of need (for example in case of damage that even partially compromise its consultation) the operator is required to get a new copy from the Manufacturer, quoting the publication code on the cover.

#### **1.5 Update of the manual**

The manual reflects the state of the art when the equipment was put onto the market. The publication conforms with the directives current on that date. The manual cannot be considered inadequate when new standards come into force or modifications are made to the equipment.

Any addition to the manual that the Manufacturer considers appropriate to send to the users, must be kept together with the manual of which they will become an integral part.

The version of the manual updated to its latest release is available on the Internet at <http://www.ups.legrand.com>

#### **1.6 Manufacturer's liability and guarantee**

The skilled technician and the operator shall scrupulously comply with the precautions indicated in the manuals. They must:

- always work within the operating limits of the equipment;
- always carry out constant and careful maintenance through a skilled technician who complies with all the procedures indicated in the installation and maintenance manual.

The Manufacturer declines all indirect or direct responsibility arising from:

- assembly and cabling made by personnel not qualified and authorized by LEGRAND and not fully qualified according to national standards to work on equipment presenting electrical hazards;
- assembly and cabling made without using safety equipment and tools required by national safety standards;
- failure to observe the installation and maintenance instructions and use of the equipment which differs from the specifications in the manuals;
- use by personnel who have not read and thoroughly understood the content of the user manual;
- use that does not comply with the specific standards used in the country where the equipment is installed;
- modifications made to the equipment, software, functioning logic unless they have been authorised by the Manufacturer in writing;
- repairs that have not been authorised by the LEGRAND Technical Support Service;
- damage caused intentionally, through negligence, by acts of God, natural phenomena, fire or liquid infiltration;
- damage caused by the use of batteries and protections not specified in the manuals;
- damage caused by improper unloading and transportation after delivery of the equipment;
- accidents caused by a wrong assembly of the safety protections or due to the lack of application of the safety labels specified in the installation manual.

The transfer of the equipment to others also requires the handing over of all the manuals. Failure to do it will automatically nullify any right of the buyer, including the terms of the guarantee where applicable.

If the equipment is sold to a third party in a country where a different language is spoken, the original owner shall be responsible for providing a faithful translation of this manual in the language of the country where the equipment will be used.

### 1.6.1 Guarantee terms

The guarantee terms may vary depending on the country where the UPS is sold. Check the validity and duration with LEGRAND's local sale representative.

If there should be a fault in the equipment, contact the LEGRAND Technical Support Service which will provide all the instructions on what to do.

Do not send anything back without LEGRAND's prior authorization.

The guarantee becomes void if the UPS has not been brought into service by a properly trained skilled technician (see paragraph 2.2.1).

If during the guarantee period the equipment does not conform with the characteristics and performance laid down in this manual, LEGRAND at its discretion will repair or replace the UPS and relative parts.

All the repaired or replaced parts will remain LEGRAND's property.

LEGRAND is not responsible for costs such as:

- losses of profits or earnings;
- losses of equipment, data or software;
- claims by third parties;
- any damage to persons or things due to improper use, unauthorized technical alterations or modifications;
- any damage to persons or things due to installations where the full compliance with the standard regulating the specific usage applications have not been guaranteed.

### 1.6.2 Extension of the guarantee and maintenance contracts

The standard guarantee can be consolidated in a single extension contract (maintenance contract).

Once the guarantee period has passed, LEGRAND is available for giving a technical assistance service able to meet all requirements, maintenance agreements, 24/7 availability and monitoring.

Please, contact the LEGRAND Technical Support Service for further information.

## 1.7 Copyright

The information contained in this manual cannot be disclosed to any third party. Any partial or total duplication of the manual by photocopying or other systems, including electronic scanning, which is not authorised in writing by the Manufacturer, violates copyright conditions and may lead to prosecution.

LEGRAND reserves the copyright of this publication and prohibits its reproduction wholly or in part without previous written authorisation.

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## 2. Regulatory and safety requirements



**Before carrying out any operation on the equipment, it is necessary to read the entire manual carefully, especially this chapter.**

**Keep the manual in a safe place and consult it repeatedly during the use of the UPS.**

### 2.1 General notes

The equipment has been made for the applications given in the manuals. It must not be used for purposes other than those for which it has been designed or differently from those specified in this manual.

### 2.2 Definitions of "Skilled Technician" and "Operator"

#### 2.2.1 Skilled Technician

The professional figure who will carry out the installation, start-up and ordinary maintenance is called "Skilled Technician". This definition refers to people who have specific technical qualifications and are aware of the methods of installing, assembling, repairing, commissioning and safe use of the equipment.

In addition to the requirements listed in the section below for a general operator, the Skilled Technician is qualified according to national safety standards to work under dangerous electrical voltage and uses the personal protective equipment required by national safety standards for all the operations indicated in this manual (see the examples listed in paragraph 2.3).



The safety manager is responsible for protection and company risks prevention according to what is indicated in the European directives 2007/30/EC and 89/391/EEC regarding safety in the workplace.

The safety manager must ensure that all people working on the equipment have received the instructions included in the manuals with particular reference to those contained in this chapter.

#### 2.2.2 Operator

The professional figure assigned to the equipment for normal use is called "Operator".

This definition refers to people who know how to operate the equipment as described in the user manual and have the following requisites:

1. technical education which enables them to operate according to safety standards in relation to the dangers linked to the presence of electric voltage;
2. training on the use of personal protective equipment and basic first aid interventions.

The company safety manager, in choosing the person (operator) who uses the equipment, must consider:

- the person's work fitness according to the laws in force;
- the physical aspect (not disabled in any way);
- the psychological aspect (mental stability, sense of responsibility);
- the educational background, training and experience;
- the knowledge of the standards, regulations and measures for accident prevention.

He shall also impart training in such a way as to provide thorough knowledge of the equipment and its component parts.

The operator shall consult the user manual at any time. He shall also follow the regulations provided to achieve maximum safety for himself and others during all operating phases.

Some typical activities the operator is expected to carry out are:

- the use of the equipment in its normal functioning state and the restore of the functioning after it shuts down;
- the adoption of the necessary provisions for maintaining the quality performance of the UPS;
- the cleaning of the equipment;
- cooperation with personnel responsible for ordinary maintenance activities (skilled technicians).



### 2.3 Personal Protective Equipment



#### DANGER

The UPS poses a considerable risk of electric shock and a high short circuit current. During use and maintenance operations, it is forbidden to operate without the equipment listed in this paragraph.

People responsible for operating this equipment and/or passing close to it must not wear garments with flowing sleeves, nor laces, belts, bracelets or other metal pieces that might cause a danger.

The following signs sum up the minimum Personal Protective Equipment to wear at all times. Additional requirements may be provided for by the safety regulations in force in the country of installation.



Anti-accident and no-spark shoes with rubber sole and reinforced toe



Safety gloves for protection from mechanical risks



Dielectric gloves for protection from dangerous voltages



Protective clothing for electrical work



Electrical protection helmet and visor



1000 V Insulated tools

### 2.4 Hazard signs in the workplace

The following signs must be exhibited at all points of access to the room where the equipment is installed:



Electric current

This sign indicates the presence of electrical live parts.



Emergency interventions

Do not use water to quench fires but only the extinguishers specifically designed for putting out fires in electrical equipment.



No smoking

This sign indicates that smoking is not allowed in the area.

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## 2. Regulatory and safety requirements

### 2.5 Signs on the equipment

Displayed on the UPS are explanatory plates that can vary depending on the country the equipment is intended for and constructional standards applied.

Safety labels are in English. A set of labels is supplied in several languages. During the installation, it is the responsibility of the skilled technician to replace the labels in English with those in the most understandable language in the country in which the equipment is installed.

Make sure the instructions are adhered to. It is strictly prohibited to remove these plates and to work in a way that differs from what is written there.

The plates must always be clearly read and they must be cleaned periodically.

If a plate deteriorates and/or is no longer legible, even partially, the Manufacturer must be contacted for another one in order to replace it.



#### CAUTION

The plates must not be removed or covered. No other plates may be affixed to the equipment without the Manufacturer's prior written authorisation.



#### WARNING

Potential risks can be drastically reduced by wearing the Personal Protective Equipment listed in this chapter. These protections are indispensable. Always operate with due care around dangerous areas marked by the appropriate warning signs on the equipment.

### 2.6 General warnings



#### DANGER

The UPS works with dangerous voltages. Only SKILLED TECHNICIANS shall perform all installation and ordinary maintenance operations. No part of the equipment can be repaired by the operator.

Extraordinary maintenance operations must be carried out by LEGRAND Technical Support Service personnel.



#### WARNING

A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

- a) remove watches, rings or other metal objects.
- b) use tools with insulated handles.
- c) wear rubber gloves and boots.
- d) do not lay tools or metal parts on top of batteries.
- e) disconnect the charging source prior to connecting or disconnecting battery terminals.
- f) 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 (applicable to equipment and remote battery supplies not having a grounded supply circuit);
- g) never leave live cables uncovered.

Do not dispose of batteries in a fire. The batteries may explode.

Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic. The batteries installed inside the cabinet must be disposed of correctly. For the disposal requirements refer to local laws and relevant standards.



#### CAUTION

The UPS functions with TT and TN systems. It has a pass-through neutral architecture: the status of the output neutral is the same as the input neutral.

When a load needs a different neutral status from the input status, it is necessary to place downstream of the equipment a suitably scaled isolation transformer protected in compliance with the standards in force.

 **CAUTION**

Do not open the battery fuse holders of the external battery units while the UPS is powering the loads in battery mode.

 **WARNING**

To reduce the risk of fire or electric shock, the UPS must work in clean and indoor environments with controlled temperature and humidity. It must be kept away from inflammable liquids and corrosive substances. The room temperature must not be above +40°C (+104°F) and the relative humidity must be a maximum of 95% not condensing.

 **CAUTION**

Trimod HE 10 is a category C2 UPS product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.

All the other Trimod HE models are products for commercial and industrial application in the second environment - installation restrictions or additional measures may be needed to prevent disturbances.

 **CAUTION**

- The equipment must be maintained and used according to the instructions written in the manuals.
- The departmental manager must instruct the operating and maintenance personnel on the safe use and maintenance of the equipment.
- Only specifically-trained, highly skilled personnel are allowed access to the equipment in order to perform maintenance. While the maintenance operation is being carried out, signs saying "Maintenance work in progress" must be affixed in the department in such a way that they can be easily seen from any access area.
- Any intervention on the equipment must be done only after it has been disconnected from the power supply network by means of a switch disconnecter and must be locked with an appropriate padlock.
- The UPS must not be turned on if liquid is leaking from the batteries.
- Depositing flammable material near the equipment is strictly forbidden. The equipment should always be locked, and only specifically trained personnel are allowed access to it.
- Do not disable any safety notification or warning device and do not ignore any alarm or warning message no matter whether they are generated automatically or represented by plates fixed to the equipment.
- Do not run the equipment with fixed protections not installed (panels etc.).
- In case of breaking, buckling or malfunctioning of the equipment or parts of it, repair or replace immediately.
- For no reason can the structure of the equipment, the devices mounted on it, the operation sequence etc, be modified, manipulated or tampered with in any way, without prior consultation with the Manufacturer.
- Keep a register and enter therein the date, time, type, performer's name and any other useful information about each and any routine and extraordinary maintenance operation.
- Do not use oils or chemical products for cleaning because they could scratch, corrode or damage certain parts of the equipment.
- The equipment and workplace must be kept completely clean.
- Upon completion of the maintenance operations, before connecting the power supply, carefully check that no tools and/or material of any kind have been left next to the equipment.

 **CAUTION**

The skilled technician must not leave at the disposal of the operator:

- the keys for opening the UPS door;
- the installation and maintenance manual.

## **2. Regulatory and safety requirements**

### **2.7 How to proceed in an emergency**

The following information are general.

For specific interventions consult the regulations in force in the country where the equipment is installed.

#### **2.7.1 First-aid procedures**

When administering first aid, adhere to the company rules and the usual procedures.

#### **2.7.2 Fire procedures**

Do not use water to quench fires but just the extinguishers specially designed for putting out fires on electrical equipment.

### 3. Technological description

#### 3.1 Trimod HE technology

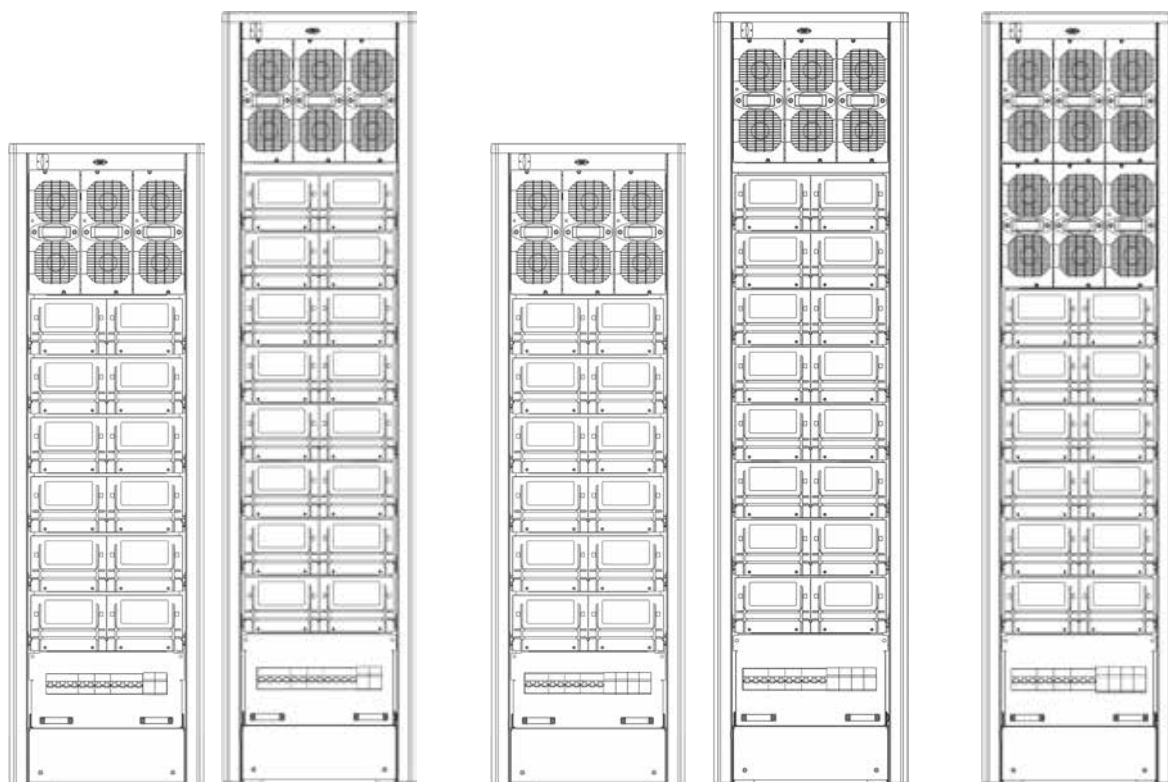
LEGRAND® has developed an innovative project that is the only one of its kind by producing Trimod HE, the uninterrupted power supply able to adapt at any moment to changed demands of the protected loads. The concepts underlying the Trimod HE project are modularity, expandability and redundancy in such a way as to offer maximum reliability and to be the guarantee of considerable savings.

Trimod HE is a modular uninterrupted power supply whose base module is the single phase power type and it can be programmed to obtain the desired input/output configuration. It is thus possible to manage three phase and single phase voltages on input and output to have a choice of the the traditional three phase/three phase, three phase/single phase, single phase/three phase and single phase/single phase. At the same time it is possible to obtain simultaneously single phase and three phase lines on output or two or more single phase lines even with different power.

For every configuration it is possible to have redundancy that is both complete and partial. For example, one normal three phase (or redundant) line can coexist with a redundant single phase (or normal) line on output. The philosophy underlying modularity has also been applied to the batteries that have been supplied in individual drawers that can be extracted and make installation and maintenance easier.

The UPS is controlled by one to four command boards depending on the model.

Both the command boards (CM) and the power modules (PM) are identified by a unique address inside the system, as shown below:



Trimod HE 10

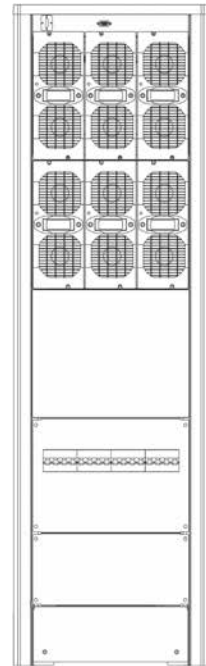
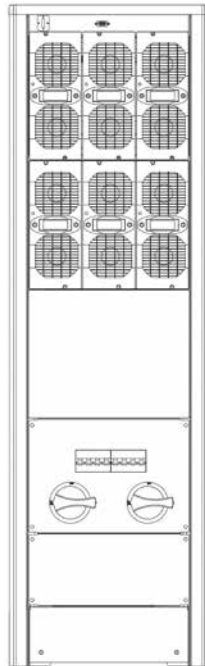
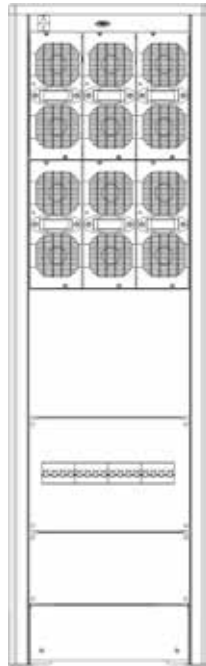
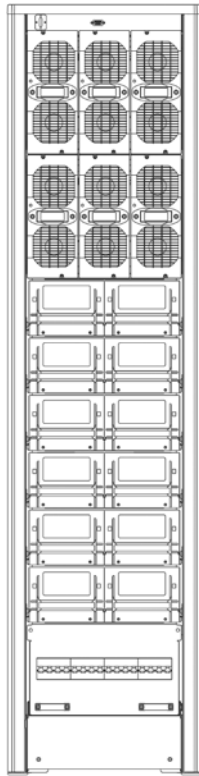
Trimod HE 15-20

Trimod HE 20

CM 0	PM 0	PM 1	PM 2
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CM 0	PM 0	PM 1	PM 2
	PM 3	PM 4	PM 5

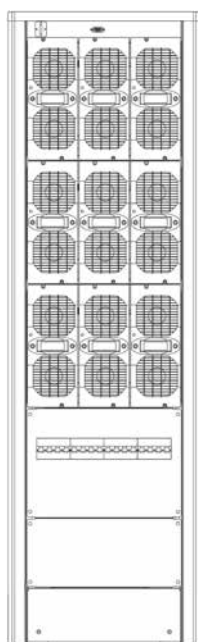
### 3. Technological description



CM 0	PM 0	PM 1	PM 2
CM 1*	PM 3	PM 4	PM 5

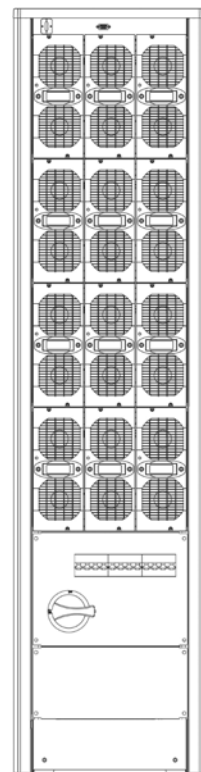
**Trimod HE 30 TT/TM**

**Trimod HE 40**



CM 0	PM 0	PM 1	PM 2
CM 1*	PM 3	PM 4	PM 5
CM 2*	PM 6	PM 7	PM 8

**Trimod HE 60**



CM 0	PM 0	PM 1	PM 2
CM 1	PM 3	PM 4	PM 5
CM 2	PM 6	PM 7	PM 8
CM 3	PM 9	PM 10	PM 11

**Trimod HE 80**

\* for the MULTI CTRL models only

Each command board can manage three power modules. If a command card becomes faulty, only the modules under its control are put into safe mode and turned off, while the UPS continues to function online, without any interruption in the load. It is therefore possible to have redundancy on both the individual phase (power module failure) and in the UPS (command board failure). The replacement of the hot-swap of the power modules is also possible by switching off the relative control and group of modules attached to it, without having to power the load from the bypass with the consequent temporary loss of protection.

The command boards are connected to a control panel with display from which it is possible to verify the status and setups of the UPS and to a communication interface with RS-232 and SNMP connection, dry contacts and logical contacts. It is possible to access all the UPS functions from the control panel and communicate through any of the interfaces present thereby guaranteeing the redundancy of the peripherals as well. In installations with three separate single phase line on output, it is possible to manage each line independently through the software. For example, it is possible to prioritise the autonomy of one of them during battery functioning. A bypass input line separated from that of the mains input makes it possible to supply the bypass with a second power source (the neutral wires of the two lines must be in common).

The technology used in the hardware and the firmware of the UPS represents the current state of the art.

A sophisticated microprocessor-type control optimises the performance of the UPS on the Booster/PFC side and on the output inverter. The recharge curve of the battery has been designed to get the maximum useful life out of the accumulators and have the greatest autonomy possible if the main power goes off. The electronic boards are entirely assembled on LEGRAND automated lines and tested to the highest quality standards. Every device goes through an extended period of operation at full load before being sent to the customer.

### 3.2 Features

#### Modular-redundant architecture

The modular-redundant architecture is the best solution for protecting the nerve centres of a company and has the following advantages:

- there is one control of the devices supplied;
- modular expandability;
- module redundancy;
- easy maintenance;
- low running cost;
- compactness.

#### Efficiency

The Trimod HE UPS concentrate particularly on both the energy absorbed from the mains and the energy provided to the load. They are characterised by high efficiency (up to 96%), PF on input > 0.99, THDi < 3%.

The advantages of a high efficiency are:

- reduction of the power absorbed from the UPS but not supplied to the load and transmitted to the environment as heat;
- less heat loss transmitted to the environment means reducing the need for ventilation or air conditioning systems in the installation site;
- no power factor correction cost and so no increase in charges;
- no need to increase the size of any generator upstream of the UPS.

#### Expandability

Most UPS systems on the market are of the non-modular and non-expandable type thus requiring an initial upscaling of the system to make future expansions possible.

The advantages of an expandable system are:

- optimisation of investments for UPSs, making them adequate for the current requirements without precluding future expansions and avoiding wastes of energy;
- increase in the efficiency of the system thanks to proper sizing.

#### Reliability

To obtain a level of redundancy with traditional UPSs it is necessary to put at least two in parallel thereby doubling the power acquired, the space occupied and the electricity consumed. Trimod HE's modular architecture makes it possible to have redundant configurations within a single cabinet.

The advantages are:

- a UPS with a redundant modular architecture can be configured as an N+X redundant simply by choosing a proper number of power modules to be installed in the UPS cabinet. Even in the case of a fault in a module, the equipment continues to function avoiding any downtime;
- clear indications and a large display make it possible to find the fault more quickly;
- the modular architecture makes it possible to speed up the solution to problems through the simple replacement of the faulty module without interrupting the service;
- high percentage of faults resolved at the first attempt.

### 3. Technological description

#### Dual input

Trimod HE has two input disconnectors, one for the mains and the other for powering the load by means of a bypass line completely independent from the mains. The two lines are interconnected by default and they may be rendered independent during the installation or commissioning of the equipment (the neutral cables of the two lines must be in common).

#### Power module

The high-efficiency single phase module, available in three power sizes of 3400 VA (PM4), 5000 VA (PM6) and 6700 VA (PM7) respectively, is mainly made up of the following functional blocks:

- command and control logic (managed by a microprocessor);
- PFC rectifier/booster;
- inverter;
- battery charger;
- automatic bypass.

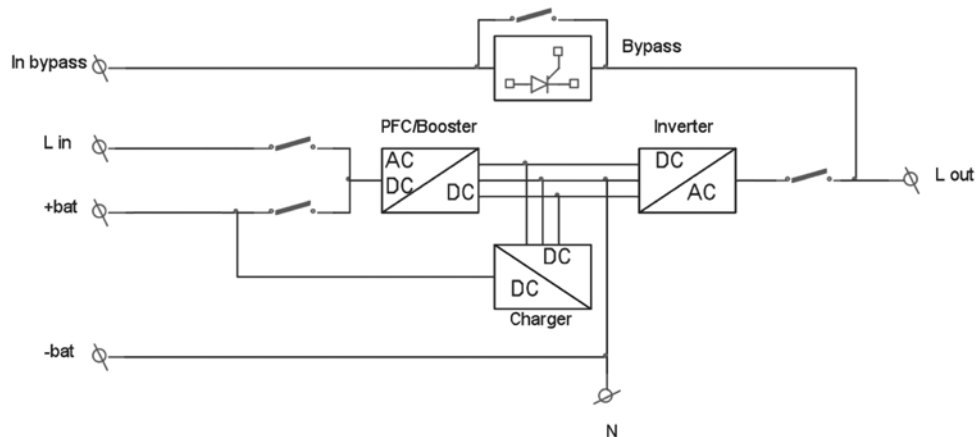
In each power module there is a microcontroller that can oversee the main functions of the individual unit, monitor its correct functioning and flag up any malfunctions.

The power module is Plug & Play to make the power expansion and any maintenance operation easier. Every module is put in parallel with other identical ones until reaching the power of the UPS.

The power modules are independent of each other and can function even if there is a fault in one of them. At the front of the module there is a multicoloured LED with traffic-light code green-yellow-red, making it possible to identify the functioning status of the electronic unit quickly.

The power modules are housed on shelves also called tunnels that can house three modules.

The block diagram of the power module is the following:



#### Batteries

The battery modules are designed for easy insertion into the dedicated cabinet and they do not need any operation for their positioning: their lightness makes them simple to handle and therefore easy to maintain or replace. A drawer consists of five 12 V 7.2 Ah or 9 Ah batteries, connected in series and thanks to the Plug & Play connection it is easy to extract and insert it in the cabinet.

The nominal battery voltage for the Trimod HE is 240Vdc, therefore a complete branch consists of four battery drawers (for a total of twenty 12Vdc batteries) that form what is called KB (Battery Kit).

In order to ensure the maximum level of safety, especially during maintenance, the voltage of each drawer is properly isolated into two branches of 24 V and 36 V and it is only restored when the drawer is completely inserted into its housing. This allows conformity with the standard EN 62040-1 on electrical safety that requires the use of adequate protection and particular care when handling dangerous voltages above 50 Vdc where direct contact is possible.

The autonomy can be further increased by adding more battery drawers in multiples of four, using both the seats in the UPS cabinet if available, and the seats in the additional modular battery cabinets.



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### Digital display and alarm display

Trimod HE is managed by one to four microprocessor-type command cards (according to the version) and it has a backlit LCD alphanumeric display with twenty characters on four lines.

The display is incorporated in the front of the UPS where there is also a high-brightness functioning status indicator with traffic light type green-yellow-red.

Five simple keys situated near the display enable the user to display the functioning data, set the functioning parameters, analyse the status of the individual power modules, select the language in which the messages are to be displayed, start the hot-swap mode and carry out a guided set of functional tests and procedures.

### BCM - Battery Charger Module 3 108 51

The additional battery charger module works in parallel and in sync with the battery chargers in the power modules and it is managed by the same algorithm that governs the recharging cycle. Every power module can provide up to 2.5A of charge current. Every additional battery charger module provides up to 15A of charge current that are added to the current of the battery chargers in the power modules. This guarantees a reduction of the charge time in installations requiring long autonomies and increases the availability of the UPS after a black out. During functioning, the battery charger module takes current from the input phase where it is installed. It is possible to install any quantity of BCMs as long as there is at least one power module and enough empty slots in the UPS cabinet. All the information regarding the functioning status of the BCM is given by the LED on the front of the module and by what is shown on the UPS display. The battery charger module is managed by a microprocessor to optimize performance and reliability. Its use in conjunction with batteries having capacities above 60Ah is recommended.

### ECO MODE

One functioning mode of the Trimod HE UPS is called "eco mode". With this mode it is possible to save energy while guaranteeing uninterruptability of the power supply to the load connected. During the functioning in eco mode, the load is powered directly from the electrical mains through the automatic bypass circuit inside the power modules. This means that the output voltage and frequency are the same as the mains. The advantage obtained in the eco mode is a greater electrical efficiency and consequently a reduction in consumption. If the output voltage leaves the window of tolerance (-20% / +15% of the voltage set on the output), the UPS actuates its inverter stage and powers the load with the energy stored in the batteries. The autonomy during the stored energy mode depends on the configuration of the UPS (nominal power, battery capacity) and on the percentage of load applied. When the mains are back within the tolerance values, the UPS switches automatically back to the eco mode. It is possible to change the functioning mode between on-line and eco mode (and viceversa) both with the UPS on and with the UPS off (in this case entering the Service Mode).

## 4. Unpacking and positioning

### 4.1 Visual check

On delivery of the UPS, carefully inspect the packaging and the product for any damage that might have occurred during transport. Check there is no damage to the indicator on the outer label reading "Shock Watch".

If there is possible or ascertained damage, immediately inform:

- the transporter;
- the LEGRAND Technical Support Service.

Check that the equipment corresponds with the items indicated in the delivery documentation.

Follow the instructions in Chapter 8 when storing the UPS.

#### 4.1.1 Equipment check

The equipment and the relative supplied accessories must be in perfect conditions.

Check that:

- the shipping data (address of the recipient, no. of packages, order no, etc.) correspond to what is contained in the delivery documentation;
- the technical rating plate data on the label applied to the UPS correspond with the material described in the delivery documentation;
- the documentation accompanying the equipment includes the installation and user manuals.

In case of discrepancy, immediately inform the LEGRAND Technical Support Service before commissioning the equipment.

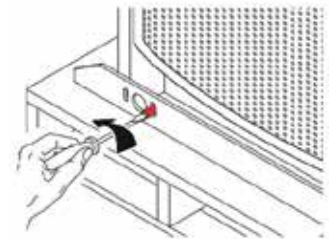
### 4.2 Unpacking

To remove the packaging material, comply with the icons on the outside of the box and observe the following procedure:

1. cut the wrapping material and open the plastic packaging safety holds;
2. open the top of the box;
3. remove the upper protection;
4. remove the four protective corners;
5. remove the packaging container pulling it upwards;
6. remove the pallet and the front/rear bracket from the UPS by undoing the four fixing screws present;
7. examine the UPS for any damage. Immediately inform the shipper and the supplier in the case of apparent damage.

Keep the packaging material for any future shipment.

The package can be fully recycled.



### 4.3 Check of the content

The content of the supply is subject to thorough checking before the shipment; nonetheless it is always advisable to check that it is complete and in order on receiving the material.

The following list is general:

- 1 Trimod HE UPS;
- 1 envelope of accessories containing washers for the contact with the earthing, set of screws for fitting the panels, two eight-pole terminal strips, a serial cable and fuses (the latter are only included on models with internal batteries);
- 1 envelope of accessories containing one or more EC15 connectors according to the model and connecting jumpers for the terminal strip (ONLY for Trimod HE 10, 15, 20 and 30 TM);
- 1 front closing panel;
- 2 base strips for side closing;
- user manual;
- acceptance report;
- quickstart and installation and maintenance manual.

Should there be defects and/or missing material, immediately inform the LEGRAND Technical Assistance Centre before commissioning the equipment.



#### CAUTION

The quickstart and the installation manual must be used and consulted by SKILLED TECHNICIANS only.

#### INDICATION

When purchasing empty cabinets, the power modules and any battery drawers to be installed must be purchased separately.

#### 4.4 Movement



##### WARNING

Move the UPS very carefully, lifting it as little as possible and avoiding dangerous swings or falls. The equipment must always be handled by trained and instructed personnel equipped with the Personal Protective Equipment illustrated in chapter 2.

The Trimod HE UPS has wheels at the back of the cabinet. Before installation and while it is still empty, it can be moved by hand by at least two people.

For any lifting, use a forklift or a transpallet with an adequate carrying capacity, placing the forks in the wooden base and making sure they come out the other side by at least twenty centimetres.

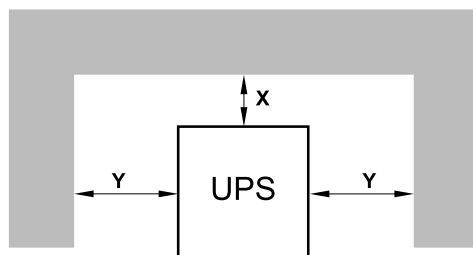


##### WARNING

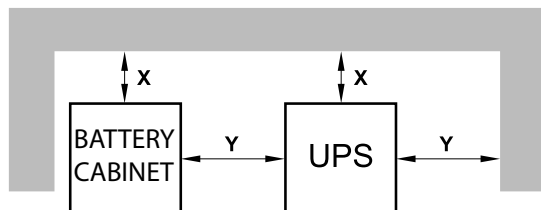
Do not move the UPS after installation or following the insertion of any power module and battery drawer.

#### 4.5 Positioning constraints

Minimum recommended distances for the UPS  
X=100 mm/Y=200 mm



Recommended minimum distances UPS Trimod HE® + Trimod HE® BATTERY  
X=100 mm/Y=200 mm



The UPS must be positioned respecting the following conditions:

- temperature and humidity must be within permitted limits;
- fire regulations must be respected;
- the wiring must be simply made;
- front and rear accessibility must be available for assistance or periodic servicing;
- the cooling flow of air must be guaranteed;
- the air conditioning system must be adequately scaled;
- dust or corrosive/explosive gasses must be absent;
- the premises must be free of vibration;
- the rear and side space must be enough to guarantee an adequate circulation of air for cooling;
- the support surface must be scaled in for the carrying capacity necessary to support the equipment.

To safeguard the batteries as well as possible it is necessary to bear in mind that their average lifetime is strongly influenced by the operating room temperature.

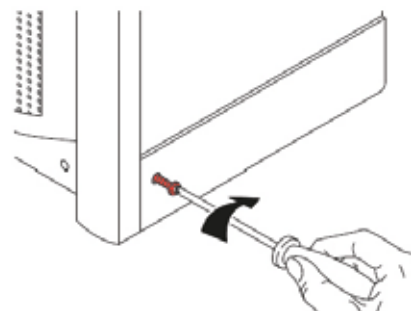
Position the UPS in an environment with a temperature range between +20°C (+68°F) and +25°C (+77°F) to guarantee the optimum life of the batteries.

Before proceeding with the installation operations, make sure that there is enough lighting to clearly see every detail. Provide artificial lighting if the natural lighting does not satisfy the requirements cited.

In the case of maintenance operations in places that are not sufficiently well lit, portable lighting systems must be used, avoiding shadows that prevent or reduce visibility on the point where you intend to work or on the surrounding areas.

#### 4.6 Final operations

Once the UPS has been properly positioned, fit the two base strips and the front one provided in the accessory kit.



## 5. Control panel

### 5.1 Description

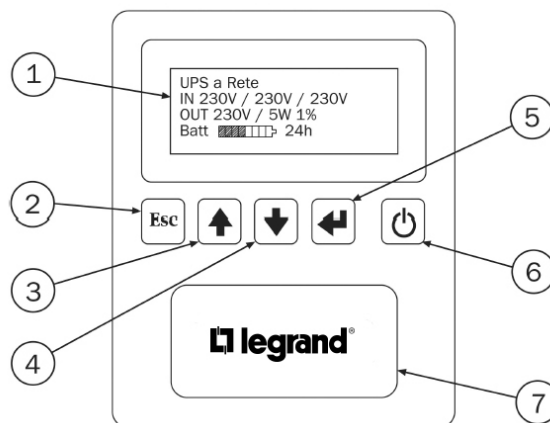


#### WARNING

The control panel allows to access some configuration pages of the UPS menu.

Only a skilled technician (paragraph 2.2.1) is authorized to modify the configuration set during the installation. Wrong settings could lead to injury or material damage to the equipment and the things around it.

The control panel is in the front part of the UPS and consists of an LCD display with 4 x 20 character rows, a backlit multicolour status indicator and a five keys keyboard.



#### LEGEND

##### 1 - 4 line x 20 character LCD display

##### 2 - ESCAPE key

Main functions:

- exit a function without changing it;
- passage from a lower to a higher menu level;
- exit the main menu and return to the status display;
- silence of the buzzer.

##### 3 - ARROW UP key

Main functions:

- selection of the prior function;
- increase of a value within a function;
- selection of a new item within a function (e.g. from DISABLED to ENABLED);
- scroll a menu with more than four lines;
- change of the page of the main screen.

##### 4 - ARROW DOWN key

Main functions:

- selection of the subsequent function;
- decrease of a value within a function;
- selection of a new item within a function (e.g. from ENABLED to DISABLED);
- scroll a menu with more than four lines;
- change of the page of the main screen.

##### 5 - ENTER key

Main functions:

- confirmation of a value;
- access a menu item;
- passage from a higher to a lower menu level;
- it allows access to the Service Mode.

##### 6 - ON/OFF key

Main functions:

- to turn the UPS on and off;
- to enable the hot-swap replacement of the power modules (only for MULTI CTRL models);
- to shut down the output phases individually (only with the UPS set with 3 output independent phases).

##### 7 - multicolour backlit status indicator

## 5.2 Service Mode

This is the functioning mode necessary to make the setup during the installation and to manage the software updating of the command boards and power modules.

To access this mode, press the ENTER key with the the UPS off until the display shows the text "Service Mode..." At the end of the start-up procedure, press the ENTER key to access the navigation menu.

It is possible to choose one of the following languages for the text displayed: Italian, English, German, French, Russian, Spanish, Polish and Portuguese. Follow the path: **UPS Setup** → **Operator Panel** → **Language** and press the ENTER key to confirm the choice.

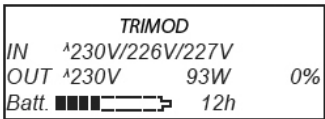
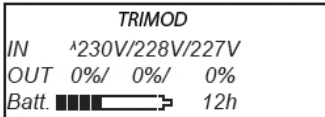
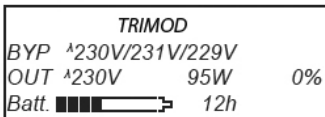
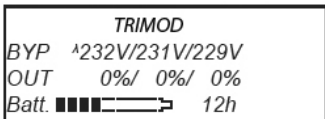
Press the ON/OFF key to exit. Alternatively, the UPS turns off automatically after 20 minutes of not receiving manual or serial commands.

## 5.3 Main screen

The main screen is shown on the display during UPS operation.

Using the ARROW UP and ARROW DOWN keys it is possible to scroll through the different pages. Every page gives several information about the status of the UPS.

The pictures of the different pages of the main screen are shown below:

MAIN PAGE	DATA DISPLAYED
<p><b>1 input - output - battery</b></p>  <pre> TRIMOD IN ^230V/226V/227V OUT ^230V 93W 0% Batt. ■■■■■ 12h </pre>	<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Input voltages</p> <p>3rd line: Voltage set on output, active power absorbed by the load and total percentage of the load applied.</p> <p>4th line: Bar showing remaining battery capacity and the actual time of functioning in case of a power failure.</p>
<p><b>2 input - percentage output - battery</b></p>  <pre> TRIMOD IN ^230V/228V/227V OUT 0%/ 0%/ 0% Batt. ■■■■■ 12h </pre>	<p>1st line: Functioning status of the UPS. if the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Input voltages</p> <p>3rd line: Percentage of the loads on the output phases</p> <p>4th line: Bar showing remaining battery capacity and the actual time of functioning in case of a power failure.</p>
<p><b>3 bypass - output - battery</b></p>  <pre> TRIMOD BYP ^230V/231V/229V OUT ^230V 95W 0% Batt. ■■■■■ 12h </pre>	<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Bypass voltages</p> <p>3rd line: Voltage set on output, active power absorbed by the load and total percentage of the load applied.</p> <p>4th line: Bar showing remaining battery capacity and the actual time of functioning in case of a power failure.</p>
<p><b>4 bypass - percentage output - battery</b></p>  <pre> TRIMOD BYP ^232V/231V/229V OUT 0%/ 0%/ 0% Batt. ■■■■■ 12h </pre>	<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Bypass voltages</p> <p>3rd line: Percentage of the loads on the output phases</p> <p>4th line: Bar showing remaining battery capacity and the actual time of functioning in case of a power failure.</p>

## 5. Control panel

MAIN PAGE	DATA DISPLAYED																
<p><b>5 load availability on output</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4" style="text-align: center;">TRIMOD</th> </tr> </thead> <tbody> <tr> <td>L1o</td> <td>0.4/</td> <td>40kVA</td> <td>1%</td> </tr> <tr> <td>L2o</td> <td>0.5/</td> <td>40kVA</td> <td>1%</td> </tr> <tr> <td>L3o</td> <td>0.5/</td> <td>40kVA</td> <td>1%</td> </tr> </tbody> </table>	TRIMOD				L1o	0.4/	40kVA	1%	L2o	0.5/	40kVA	1%	L3o	0.5/	40kVA	1%	<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Phase L1 - power in kVA or in Watt compared with the nominal power or current compared with the rated or relative percentage</p> <p>3rd line: Phase L2 - power in kVA or in Watt compared with the nominal power or current compared with the rated or relative percentage</p> <p>4th line: Phase L3 - power in kVA or in Watt compared with the nominal power or current compared with the rated or relative percentage</p>
TRIMOD																	
L1o	0.4/	40kVA	1%														
L2o	0.5/	40kVA	1%														
L3o	0.5/	40kVA	1%														
<p><b>6 measurements on output</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4" style="text-align: center;">TRIMOD</th> </tr> </thead> <tbody> <tr> <td>L1o231V</td> <td>1.7A</td> <td>27W</td> <td></td> </tr> <tr> <td>L2o229V</td> <td>1.6A</td> <td>31W</td> <td></td> </tr> <tr> <td>L3o231V</td> <td>1.9A</td> <td>29W</td> <td></td> </tr> </tbody> </table>	TRIMOD				L1o231V	1.7A	27W		L2o229V	1.6A	31W		L3o231V	1.9A	29W		<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Output L1 phase - Voltage, current and active power</p> <p>3rd line: Output L2 phase - Voltage, current and active power</p> <p>4th line: Output L3 phase - Voltage, current and active power</p>
TRIMOD																	
L1o231V	1.7A	27W															
L2o229V	1.6A	31W															
L3o231V	1.9A	29W															
<p><b>7 output line voltages</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">TRIMOD</th> </tr> </thead> <tbody> <tr> <td>L1o-L2o <math>\Delta</math> 400V</td> <td></td> </tr> <tr> <td>L2o-L3o <math>\Delta</math> 399V</td> <td></td> </tr> <tr> <td>L3o-L1o <math>\Delta</math> 396V</td> <td></td> </tr> </tbody> </table>	TRIMOD		L1o-L2o $\Delta$ 400V		L2o-L3o $\Delta$ 399V		L3o-L1o $\Delta$ 396V		<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: line voltage between phase L1 and L2 on output</p> <p>3rd line: line voltage between phase L2 and L3 on output</p> <p>4th line: line voltage between phase L3 and L1 on output</p>								
TRIMOD																	
L1o-L2o $\Delta$ 400V																	
L2o-L3o $\Delta$ 399V																	
L3o-L1o $\Delta$ 396V																	
<p><b>8 measurement on input</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="text-align: center;">TRIMOD</th> </tr> </thead> <tbody> <tr> <td>L1i229V</td> <td>3.4A</td> <td>408W</td> </tr> <tr> <td>L2i228V</td> <td>2.9A</td> <td>162W</td> </tr> <tr> <td>L3i230V</td> <td>2.6A</td> <td>228W</td> </tr> </tbody> </table>	TRIMOD			L1i229V	3.4A	408W	L2i228V	2.9A	162W	L3i230V	2.6A	228W	<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Input L1 phase - Voltage, current and active power</p> <p>3rd line: Input L2 phase - Voltage, current and active power</p> <p>4th line: Input L3 phase - Voltage, current and active power</p>				
TRIMOD																	
L1i229V	3.4A	408W															
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L3i230V	2.6A	228W															
<p><b>9 bypass line voltages</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">TRIMOD</th> </tr> </thead> <tbody> <tr> <td>L1b-L2b <math>\Delta</math> 401V</td> <td></td> </tr> <tr> <td>L2b-L3b <math>\Delta</math> 402V</td> <td></td> </tr> <tr> <td>L3b-L1b <math>\Delta</math> 400V</td> <td></td> </tr> </tbody> </table>	TRIMOD		L1b-L2b $\Delta$ 401V		L2b-L3b $\Delta$ 402V		L3b-L1b $\Delta$ 400V		<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Line voltage between L1 and L2 of bypass line</p> <p>3rd line: Line voltage between L2 and L3 of bypass line</p> <p>4th line: Line voltage between L3 and L1 of bypass line</p>								
TRIMOD																	
L1b-L2b $\Delta$ 401V																	
L2b-L3b $\Delta$ 402V																	
L3b-L1b $\Delta$ 400V																	
<p><b>10 battery status</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="text-align: center;">TRIMOD</th> </tr> </thead> <tbody> <tr> <td>Batt.</td> <td><math>\Delta</math>288V</td> <td>-0,3A</td> </tr> <tr> <td>C 50%</td> <td>R 12h</td> <td>T 24h</td> </tr> <tr> <td>Charging</td> <td colspan="2" style="text-align: center;">- maint.</td> </tr> </tbody> </table>	TRIMOD			Batt.	$\Delta$ 288V	-0,3A	C 50%	R 12h	T 24h	Charging	- maint.		<p>1st line: Functioning status of the UPS. If the text is "TRIMOD", the UPS is functioning properly</p> <p>2nd line: Voltage, charging current (negative value when charging in progress, positive value when the batteries are powering the equipment)</p> <p>3rd line: Battery capacity percentage compared with the nominal percentage, time remaining, total autonomy time</p> <p>4th line: Battery status</p> <ul style="list-style-type: none"> <li>- Battery Stand-by</li> <li>- Discharging</li> <li>- Reserve autonomy</li> <li>- End autonomy</li> <li>- Charging - ph1 - battery recharging status (current limitation)</li> <li>- Charging - ph2 - battery recharging status (voltage limitation)</li> <li>- Charging - maint: Battery recharging in maintenance mode</li> <li>- Charging - float.: Battery charging in floating mode</li> <li>- Testing batteries: Battery test in progress</li> <li>- Equaliz. batteries: Battery equalizing in progress</li> <li>- BATTERY FAULT: battery voltage lower than 100V</li> <li>- MaxTime on Battery: end of the maximum set time for the functioning in battery mode</li> </ul>				
TRIMOD																	
Batt.	$\Delta$ 288V	-0,3A															
C 50%	R 12h	T 24h															
Charging	- maint.																

## 5.4 Main menu and submenu

Press the ENTER key on the main screen of the display to access the menu of the UPS.

The main screen has the following items:

- UPS Status: it allows to check the UPS status in real time;
- UPS Setup: it allows to set all the UPS functions;
- Power Modules: it allows to analyze the status of the individual power modules in real time;
- Events: it allows to display the events memorized in the UPS history;
- Tools: it allows to carry out a series of functional tests on the UPS;
- Log Out: it allows to terminate the password-protected session.

Press the ENTER key to access the relative submenus.

The following table sums up all the menu and submenu pages:

UPS Status (paragraph 5.4.1)	UPS Setup (paragraph 5.4.2)	Power Modules (paragraph 5.4.3)	Events (paragraph 5.4.4)	Tools (paragraph 5.4.5)	Log Out (o) (paragraph 5.4.6)
UPS Info	Options	PM Status	Log View	Battery	-
UPS Cfg	Output	Diagnostics (*)		Signalling test (*)	
Measures	Input	PM SW update (*)		LCD Display Test (*)	
Alarms	Bypass			Assistance	
History Data	Batteries			CM errors recovery	
	Operator Panel				
	Clock Setup				
	Dry contacts				

(\*) Only available in "Service Mode"

(o) Available in password-protected session

The UPS has a menu and relative submenu tree structure, the functions of which are explained in the following paragraphs. On the right of the display, an arrow appears turned downwards or upwards when there are further items to display. Press the ARROW UP and ARROW DOWN keys to display them.

## 5. Control panel

### 5.4.1 UPS Status

<b>UPS Info</b>	Model	Equipment model (TRIMOD)
	SYNC. address	Synchronisation address of the command board
	Number of CM	Number of command boards recognised
	Max VA	Maximum apparent power[kVA]
	Max W	Maximum active power [kW]
	Max Ichg	Maximum current available to charge the batteries [A]
	SW Ver.	Firmware version of the command board
	PM SW Ver.	Firmware version of the power modules
	Boot Ver.	Bootloader version in the command board
	S/N	UPS serial number

<b>UPS Cfg</b>	OUT	Single Phase/ Three Phases 120° / Three Phases indep.
	IN	Single Phase / Three Phases / inv.3 phases / Undefined ( _ _ )
	BYP	Single Phase / Three Phases / inv.3 phases / Undefined ( _ _ )
	X/Y - X/Y - X/Y	X Power modules for each phase managed by the command board Y Power modules for each phase managed by the UPS
	Number BCM	Number of Battery Charger Modules recognised
	Installed KB	Number of KB installed
	Batt. Cap.	Capacity of the batteries installed [Ah]
	Batt.N per KB	Number of batteries in series available in one KB

<b>Measures</b>	Output X	Power	Output active power on phase X [W]
		Appar. Power	Output apparent power on phase X [VA]
		Vrms	Output effective voltage on phase X [V rms]
		Vrms ph-ph	Output effective line voltage [V rms]
		Irms	Output effective current on phase X [A rms]
		Peak Current	Output peak current of phase X [A]
		Frequency	Pure sine output voltage frequency on phase X [Hz]
		I Crest factor	Crest factor for phase X
		Power fact.	Power factor of the load connected to the UPS on phase X
		Max W	Maximum active power on phase X [W]
		Power	Output active power on phase X, expressed as a percentage in relation to the maximum active power available on phase X [%]
		Max VA	Maximum apparent power on phase X [VA]
		Appar. Power	Output apparent power on phase X, expressed as a percentage in relation to the maximum apparent power available on phase X [%]

#### INDICATION

To change the value of X and therefore vary the phase from which the data is read, press the ENTER key after entering the submenu.



<b>Measures</b>	Input X	Power	Absorbed input active power on phase X [W]
		Appar. Power	Absorbed input apparent power on phase X [VA]
		Vrms	Effective input voltage of phase X [V rms]
		Vrms bypass	Effective input voltage of phase X of bypass line of the UPS [V rms]
		Vrms ph-ph	Effective input line voltage [V rms]
		Irms	Absorbed effective input current on phase X [A rms]
		Peak Current	Input peak current of phase X [A]
		Frequency	Pure sine input voltage frequency on phase X [Hz]
		I Crest Factor	Crest factor for phase X
		Power Fact.	Power factor of the load connected to the UPS on phase X

**INDICATION**

To change the value of X and therefore vary the phase from which the data is read, press the ENTER key after entering the submenu.

<b>Measures</b>	Batteries	Voltage	Battery voltage [V]
		Current	Current supplied by the batteries (negative if the UPS is charging the batteries) [A]
		Residual Cap.	Battery charge status, expressed as percentage [0-100%]
		(Status)	Battery charge operating status: - Battery Stand-by - Discharging - Reserve autonomy - End autonomy - Charging - ph1 - Charging - ph2 - Charging - maint. - Charging - float. - Testing batteries - Equaliz. batteries - BATTERY FAULT - MaxTime on Battery
		Total Auton.	Total autonomy the UPS would have with batteries 100% charged
		Resid.Auton.	Residual autonomy of the UPS
		V Res.Th.	Threshold voltage of the string of batteries for autonomy end [V]
		Disch.Count	Total number of complete battery discharges
		Usage	Total number of hours in which the UPS has functioned in battery mode [h]
		Cal.	Day and time of the last calibration. The text "Factory" is displayed if no calibration has yet been made.
		Calibr.count	Total number of calibrations made

<b>Measures</b>	Misc.	Int.Temp	Temperature inside the UPS [°C]
		Pos.H.V.Bus	Voltage on positive DC BUS [V]
		Neg.H.V.Bus	Voltage on negative DC BUS [V]

## 5. Control panel

<b>Alarms</b>	Alarm Log. See chapter 6.
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### INDICATION

To scroll through the list of alarms, press the ARROW UP and ARROW DOWN keys.

<b>History Data</b>	UPS RunTime	Total UPS runtime
	OnBatteryTime	Total UPS untime on battery mode
	This Batt.	Total UPS runtime with the batteries currently installed
	CHG Runtime	Total battery charger runtime
	DrainedOut N.	Total number of complete battery discharges
	Booster Int.	Total number of booster interventions
	BypassInterv.	Total number of bypass interventions
	Batt.calibr.	Total number of battery calibrations
	Chg.cycle N.	Total number of battery charge cycles
	Batt.equal.N.	Total number of battery equalization cycles
	Replace batt.N.	Total number of times the batteries have been replaced
	Load>80% N	Total number of times the load has exceeded 80% of the rated load
	Load>80% T	Total time the load has exceeded 80% of the rated load
	Load>100% N	Total number of times the load has exceeded 100% of the rated load
	Load>100% T	Total time the load has exceeded 100% of the rated load without the overload being signalled

### 5.4.2 UPS Setup

<b>Options</b>	Start-up on Battery	If enabled, it allows the UPS to be started up with no mains supply		
	Auto Restart	If enabled, automatic restarts are permitted		
	Output options (*)	DISABLED	During normal functioning, the output is not powered.	
		ENABLED	During normal functioning, the output is powered.	

(\*) Available in the "Service Mode" only

<b>Output</b>	Voltage	This sets the output voltage value [V]	
	Frequency	Nominal Value (*)	This makes it possible to set the output frequency value (50 Hz or 60 Hz) independently of the input frequency.
		Auto Selection	If enabled, the UPS detects the frequency of the input voltage and synchronises the output to the same value. If disabled, the UPS uses the "Nominal Value".
	Inverter (*)	This sets the output configuration and the applied load: - Single Phase: a unique single phase output - Three Phases 120°: three phase output suited to the supply of three phase loads (e.g. a motor) - Three Phases indep.: three single phase output lines that are independent of each other	
	Phases in startup (**)	L1 phase	This makes it possible to program the start-up status for each output: - Always ON: phase always on during start-up - Always OFF: phase always off during start-up - Last state: phase restored to the status prior to the shut down
L2 phase			
L3 phase			

(\*) Available in the "Service Mode" only

(\*\*) Available with the inverter set up as three independent phases only

**CAUTION**Only a skilled technician is authorized to modify the settings on the **Output** menu

<b>Input</b>	PLL Enable	If enabled, the UPS synchronises the output pure sine with that of the input. If disabled, the output voltage is not synchronised with the input and it is indicated with the status light (green) flashing.
	PLL Range °	This makes it possible to select the frequency range in which the UPS synchronises the output voltage with the input: - NORMAL: synchronization for frequency variations of $\pm 2\%$ of the nominal value - EXTENDED: synchronization for frequency variations of $\pm 14\%$ of the nominal value - CUSTOM: this can be set by the user (see the next menu item)
	Custom PLL Range	This makes it possible to set the customised frequency interval in which the UPS synchronises the output voltage with the input. The value can be selected from a minimum of 0.5 Hz to a maximum of 7.0 Hz with steps of 0.1 Hz.
	Input Dip Enable	This allows the input dip function to be enabled/disabled

° Available with PLL range set in CUSTOMISED mode

**INDICATION**

The PLL function ensures that the output frequency of the UPS is synchronised with that of the input, guaranteeing that passage through zero (zero-crossing) occurs at the same moment. The input-output synchronisation is guaranteed even in case of bypass intervention (e.g. because of overload).

**INDICATION**

By disabling the PLL function, the automatic bypass function is deactivated as well. The UPS turns off in case of an extended overload.

**CAUTION**Only a skilled technician is authorized to modify the settings on the **Input** menu

## 5. Control panel

<b>Bypass</b>	Bypass Enable	If enabled, the UPS manages the bypass intervention automatically. If disabled, the UPS never switches to bypass mode so in the case of an extended overload or in the case of failure and absence of redundancy, the UPS turns off.
	Forced Mode	If enabled, the UPS activates the bypass permanently
	DIP Speed	This makes it possible to vary the sensibility of the switching circuit: - SLOW: indicated for loads not sensitive to voltage variations and that cause peaks of current - STANDARD: normal mode - FAST: for all loads that are extremely sensible to voltage variations
	Off-line Mode	If enabled, the UPS functions in eco mode. During the functioning, the load is powered directly by the automatic bypass circuit. If there is a power failure or the voltage input tolerance is exceeded, the UPS activates the inverter thereby powering the load through the batteries.
	Start-up on Bypass	If enabled, on mains start-up the initial powering of the load occurs via bypass. If disabled, the inrush current is managed by the inverter as in a battery start-up.



### CAUTION

Only a skilled technician is authorized to modify the settings on the **Bypass** menu

<b>Batteries</b>	Threshold values	Reserve Time	This sets the start time of the battery autonomy warning [min]
		MaxTime on Battery	This sets the maximum functioning time in battery mode. Once this time has elapsed, the UPS turns off. Set at OFF to disable the function
	Charger	Standby Charge	If enabled, it activates the battery charge with the UPS off
	Auto Restart	Restart Enable	This enables or disables the restart of the UPS when the mains returns after the total discharge of the batteries
		Min. Autonomy	This sets the percentage charge value of the batteries to be reached with the function of standby charge in order to restart automatically the UPS after a total battery discharge.
	Total KB	This sets the total number of KB installed. The parameter is necessary for the UPS to provide correct values for the autonomy based on the load applied and for a correct battery charge.	
	Capacity (*)	This sets the capacity value of the batteries in the UPS [Ah].	

(\*) Only available in "Service Mode"



### CAUTION

Only a skilled technician is authorized to modify the settings on the **Batteries** menu

<b>Operator Panel</b>	Language	This sets the language on the display
	Buzzer	This enables/disables all the sound signals
	Keyboard Beep	This enables/disables the sound made by key presses
	Locked turn off (*)	If enabled, the password is required to shutdown the UPS
	Display Backlight	This sets the backlighting of the display: - FIXED: always lit - TIMED: the backlighting goes off after one minute of keyboard inactivity - DISABLED: the lighting is always off
	Display Contrast	This sets the display contrast
	Password Change	This sets a password that blocks access to the UPS settings
	Password level	It indicates the level of the password (the default value is USER)

(\*) Only available with the chosen password.

<b>Clock Setup</b>	DD/MM/YY – HH:mm:SS	This sets the date/time of the UPS. By pressing the ENTER key, the value to modify is selected. By pressing the ARROWS UP/DOWN keys, the selected value is increased or decreased. DD: day MM: month YY: year HH: hour mm: minutes SS: seconds
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<b>Dry contacts</b>	Contact 1	Function	This allows the signal to be associated with the contact: - Mains/Battery - Runtime autonomy - Alarm - Overload - Bypass - UPS is working
		Setup	This makes it possible to select: - NORMALLY CLOSED - NORMALLY OPEN
	Contact 2	Function	(see contact 1)
		Setup	
	Contact 3	Function	(see contact 1)
		Setup	
	Contact 4	Function	(see contact 1)
		Setup	
	Contact 5	Function	(see contact 1)
		Setup	
All	Makes it possible to set all the contacts: - NORMALLY CLOSED - NORMALLY OPEN		

## 5. Control panel

### 5.4.3 Power Modules

<b>PM Status</b>	PM Info X	Mod.	Model of power module X	
		SW Ver	Version of the firmware inside power module X	
		HW Ver	Hardware version of power module X	
		S/N	Serial number of power module X	
		Max VA	Maximum apparent power available for power module X [VA]	
		Max W	Maximum active power available for power module X [W]	
		Max Ichg	Maximum current available from the battery charger of power module X [A]	
	PM Measures	Input X	Power	Active power absorbed by power module X [W]
			Appar.Power	Apparent power absorbed by power module X [VA]
			Vrms	Effective input voltage of power module X [V rms]
			Vrms bypass	Effective input voltage for power module X of the bypass line [V rms]
			Vrms ph-ph	Effective input line voltage of power module X [V rms]
			Irms	Effective current absorbed from the mains by the power module X [A rms]
			Peak Current	Input peak current of power module X [A]
			Frequency	Pure sine input frequency voltage of power module X for the bypass line [Hz]
			I Crest factor	Crest factor applied by power module X to the mains
			Power Fact.	Power factor applied by power module X to the mains
		Output X	Power	Active power supplied by power module X [W]
			Appar. Power	Apparent power supplied by power module X [VA]
			Vrms	Effective output voltage of power module X [V rms]
			Vrms ph-ph	Effective output line voltage of power module X [V rms]
			Irms	Effective output current supplied by power module X [A rms]
			Peak Current	Output peak current of power module X [A]
			Frequency	Pure sine output voltage frequency of power module X [Hz]
			I Crest factor	Crest factor of the output current of power module X
			Power Fact.	Output power factor for power module X
			Max W	Maximum active power available from power module X [W]
Power	Active power supplied by power module X, expressed as a percentage in relation to the maximum active power available from power module X [%]			
Max VA	Maximum apparent power available from power module X [VA]			
Appar. Power	Apparent power supplied by power module X, expressed as a percentage in relation to the maximum apparent power available from power module X [%]			

(continues)

<b>PM Status</b>	PM Measures	Battery X	Voltage	Battery voltage detected by power module X [V]
			Current	Current required to the batteries by power module X (negative if the batteries are charging) [A]
			Charger	Status of the battery charger inside power module X
		Misc. X	INV HSink Temp.	Temperature of power module X Inverter heat sink [°C]
			BST HSink Temp.	Temperature of power module X Booster/PFC heat sink [°C]
			Fan Speed	Fan speed of power module X expressed as a percentage [%]
			Pos.H.V.Bus	Voltage on the positive BUS DC of power module X [V]
			Neg.H.V.Bus	Voltage on the negative BUS DC of power module X [V]
	PM History Data	Run Time	Total Runtime	
		Batt.Time	Total runtime on battery mode	
		Chg.Time	Total runtime of the battery charger	
		Bypass int.	Total number of bypass interventions	
		Battery int.	Total number of transfers to battery mode	
		Dumper int.	Total number of dumper interventions	
		Mains High	Total number of times when the tension of the input line has exceeded the maximum value allowed by the power module	
		Overheat N.	Total number of overheating	
		Overload N.	Total number of overloads	
		HVBus Run.N.	Total number of overvoltages on the BUS	
		OutDCLevel N.	Total number of presence of DC output voltages on the power module	

**INDICATION**

Press the ENTER key to change the value of X that represents the power module the data is read from. The value of X starts from 0 that represents the first power module installed in the first tunnel at the top left of the UPS.

<b>Diagnostics (*)</b>	PM errors recovery	This clears the memory of errors detected in the power module. It deletes only with resettable errors.
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<b>PM SW update (*)</b>	Update all PM	This allows the sequential and automatic update of the software in all the power modules present in the UPS. The procedure starts by pressing the ENTER key. If the update is not necessary, a message saying "PM SW Versions updated!" appears on the display. By pressing the ESC key, the procedure ends.
	Single PM SW update	This allows the update of the software in each individual power module. Using the ARROW UP/DOWN keys, it is possible to choose the module that has to be updated ('PM00' indicates the module installed in the first tunnel at the top left). By pressing the ENTER key a comparison is made between the software currently present in the selected module and the new software. The procedure starts by pressing the ENTER key. When the update is complete, a message saying "PM SW Version updated!" appears on the display. By pressing the ESC key, the procedure ends.

(\*) Only available in "Service Mode"



Only a skilled technician is authorized to carry out an update

## 5. Control panel

### 5.4.4 Events

<b>Events</b>	Log View	All	This displays all the events
		Critical	This displays the events that have generated critical alarms
		Warning	This displays the events that have generated non-critical alarms
		Info	This displays the events that have generated simple warnings

### 5.4.5 Tools

<b>Battery</b>	Battery Test	Automatic	This performs a test on the batteries to check their status and performance
	Batt. Calibration	This calibrates the batteries, finding the discharge curve. In order for the UPS to provide precise information regarding the charge status, it is necessary to perform the calibration in the following cases: <ul style="list-style-type: none"> <li>- after installation and before the first start-up;</li> <li>- in case the batteries are replaced;</li> <li>- every six months after the first year of the UPS's life.</li> </ul>	
	Battery cycle	This carries out a battery test and their equalization to check the status, the performance and to maximise the life of the batteries.	

<b>Signalling Test (*)</b>	This carries out the signalling test of the status indicator signal (green, orange and red) and of the acoustic signalling.
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<b>LCD Display Test (*)</b>	This performs the test of the alphanumeric display. When the ENTER key is pressed, all the available characters are displayed.
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(\*) Only available in "Service Mode"

<b>Assistance</b>	Display Identifier	This displays the code to communicate to the technical support service.
	Use code	Insert the code provided by the Technical Support Service.

<b>CM errors recovery</b>	This clears the memory of the errors detected by the command board. It works only with resettable errors.
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### 5.4.6 Log Out


It is possible to set a password to prevent non-authorized personnel to modify the configuration of the UPS. By choosing a password, it is necessary to enter a private session to modify the UPS settings. At the end of the operations use the "Log Out" menu to leave the private session. If the password has been forgotten, it is necessary to contact the LEGRAND Technical Support Service.



### 5.5 POWER ON/OFF menu

When the UPS is on, it is possible to access a menu called POWER ON/OFF by pressing the ON/OFF button for less than 0,5 seconds.

The choices that can be made in this menu are the following:

<b>L1 phase (**)</b>	Press the ENTER key to access the submenu in which it is possible to choose whether to turn phase L1 on or off independently of the others. By pressing the ARROW UP/DOWN keys it is possible to choose the ON or the OFF value. By pressing the ENTER key the value is confirmed; pressing the ESC key you leave the submenu.
<b>L2 phase (**)</b>	Press the ENTER key to access the submenu in which it is possible to choose whether to turn phase L2 on or off independently of the others. By pressing the ARROW UP/DOWN keys it is possible to choose the ON or the OFF value. By pressing the ENTER key the value is confirmed; pressing the ESC key you leave the submenu.
<b>L3 phase (**)</b>	Press the ENTER key to access the submenu in which it is possible to choose whether to turn phase L3 on or off independently of the others. By pressing the ARROW UP/DOWN keys it is possible to choose the ON or the OFF value. By pressing the ENTER key the value is confirmed; pressing the ESC key you leave the submenu.
<b>UPS</b>	Press the ENTER key to access the submenu for shutting down the UPS. By pressing the ENTER key again, the UPS shuts down; by pressing the ESC key you leave the submenu.
<b>Hot swap</b>	Press the ENTER key to access a submenu to make the hot-swap substitution of the power modules.   <b>CAUTION</b> This operation is reserved to a skilled technician and it is possible only for MULTI CTRL models

(\*\*) Available with the Inverter set up with three phases independent only

### 5.6 Switching off the UPS



#### CAUTION

The shut down procedure must only be applied if the load is off or does not need powering by the UPS.

There are two possible ways to shut down the UPS.

It is possible to shut down the UPS from the **POWER ON/OFF** menu or it is possible to perform the following procedure:

1. Keep the ON/OFF key pressed for at least 2 seconds.
2. The display shows the text "Turn off the UPS?". Press the ENTER key.
3. Wait for the shut down operation to complete.

If a prolonged shutdown is planned, do as instructed in chapter 8.

### 5.7 Switching on the UPS

The operator can turn on the UPS by doing the following:

1. Press the ON/OFF key.
2. When the display shows the text "<ENTER> to confirm UPS turn ON", press the ENTER key. If no operation is carried out within 30 seconds, the UPS turns off.  
If the display shows the message "WARNING: different UPS setup! <ENTER> to confirm UPS turn on", the UPS setup is different from the last power up. A skilled technician must check the UPS setup before confirming the power up.
3. Wait for the power up operations to complete. The load is only supplied when the bar with the text "UPS initialize..." displayed reaches the end and the main screen appears.

## 6. Diagnosis

### 6.1 Luminous and audible notifications

The status indicator on the front panel of the UPS and the led on the front of every power module change their colour according to the actual functioning status of the UPS or of the individual power module in accordance with the table shown below.

#### INDICATION

Some luminous notifications can be accompanied by an audible signal. To turn off the audible notification, press the ESC key. On every subsequent press, the notification is silenced or enabled.

#### INDICATION

If it is not possible to solve the problem, contact the LEGRAND Technical Support Service.

STATUS INDICATOR	POWER MODULE LED	AUDIBLE NOTIFICATION	STATUS MESSAGE	UPS STATUS DESCRIPTION AND OPERATING ADVICE
<b>GREEN Steady</b>	<b>GREEN Steady</b>	-	TRIMOD	Normal functioning with mains present and load within the limits
-	-	-	3V Battery Fail	Contact the LEGRAND Technical Support Service
<b>GREEN Steady</b> <b>ORANGE Flashing</b>	<b>ORANGE Flashing</b>	-	Out/phase turned OFF	Phase off in configuration of 3 independent phases output. Check the output setup.
<b>GREEN Steady</b> <b>ORANGE Flashing</b>	-	-	Modules turned off	Command board in hot-swap
<b>GREEN Steady</b>	<b>1 module: ORANGE Steady</b> <b>Remaining modules: GREEN Steady</b>	-	Equalizing Battery	Battery Equalization in progress
<b>GREEN Quick flashing</b>	<b>GREEN Quick flashing</b>	-	-	Mains supply is absent on at least one power module and/or the frequency of the mains is not correct (>68Hz or <43Hz) and/or the input PLL is not synchronised. A skilled technician must check the mains.
<b>GREEN Quick flashing</b>	-	-	-	One or more of the following problems are present: bypass absent, input PLL not synchronised, bypass voltage outside the limits, bypass sequence not correct or reversed, bypass frequency out of tolerance. A skilled technician must check the bypass line.
<b>GREEN Quick flashing</b>	<b>GREEN Quick flashing</b>	-	Bypass line KO	The bypass line cannot be used to power the load
<b>ORANGE Quick flashing</b>	<b>ORANGE Flashing</b>	-	Forced on Bypass UPS on Bypass	Operation in forced bypass mode
<b>ORANGE Steady</b>	<b>ORANGE Steady</b>	500 ms on and 12 s off	UPS on Battery	Stored energy mode
<b>ORANGE Steady</b>	<b>ORANGE Steady</b>	-	Battery Cal...	Battery calibration in progress
<b>ORANGE Steady</b>	-	-	Battery Test...	Battery test in progress

*continues...*

STATUS INDICATOR	POWER MODULE LED	AUDIBLE NOTIFICATION	STATUS MESSAGE	UPS STATUS DESCRIPTION AND OPERATING ADVICE
<b>ORANGE</b> Long intermittent	<b>GREEN</b> Steady	-	Make Maintenance	Contact the LEGRAND Technical Support Service
<b>ORANGE</b> Long intermittent	<b>GREEN</b> Steady	-	Check Batteries	A skilled technician must check the batteries status
<b>ORANGE</b> Quick flashing	<b>ORANGE</b> Flashing	-	Maintenance Bypass	Manual bypass mode
<b>ORANGE</b> Short and double intermittent with pause	<b>ORANGE</b> Steady	Short and double intermittent with pause	RUNTIME RESERVE!	Autonomy reserve during battery mode. Short time left before the load is powered by the bypass line.
<b>RED</b> Steady	<b>RED</b> Steady only on the module with the fault	Quick intermittent	FAULT CHARGER	Battery charger faulty on at least one power module. A skilled technician must replace the faulty module.
<b>RED</b> Steady	<b>RED</b> Steady only on the module with the fault	Quick intermittent	FAULT MODULE	A skilled technician must replace the faulty power module
<b>RED</b> Quick flashing	<b>ORANGE</b> Flashing	Quick intermittent	BATTERIES KO	Batteries faulty or not connected. A skilled technician must check the batteries.
<b>RED</b> Quick flashing	<b>RED</b> Quick flashing	Quick intermittent	BATTERY DISCONNECTED	Batteries faulty or not connected. A skilled technician must check the batteries.
<b>RED</b> Quick flashing	<b>RED</b> Short and double intermittent with pause	Quick intermittent	BATTERY RUNAWAY	Excessive battery voltage. If the alarm persists over time a skilled technician must check the batteries.
<b>RED</b> Quick flashing	<b>RED</b> Short and double intermittent with pause	Quick intermittent	HVBUS RUNAWAY FAIL	Contact the LEGRAND Technical Support Service
<b>RED</b> Quick flashing	<b>RED</b> Steady	Quick intermittent	OUT DC LEVEL FAIL	Reset the power module error from the control panel in Service Mode (paragraph 5.4.3) and turn on the UPS. If the error persists, one or more power modules are faulty and a skilled technician must replace them.
<b>RED</b> Quick flashing	<b>RED</b> Short and double intermittent with pause only on the module in alarm mode	Quick intermittent	OVERHEAT	Overheating of one or more power modules. Check the functioning of the module fans and clean the air intake grilles.
<b>RED</b> Quick flashing	<b>RED</b> Short and double intermittent with pause only on the overloaded module	Quick intermittent	OVERLOAD	Overload on one or more power modules. Check the applied load.
<b>RED</b> Quick flashing	-	Quick intermittent	CM FAILURE	Contact the LEGRAND Technical Support Service
<b>RED</b> Quick flashing	-	Quick intermittent	Reference Error! or Reference Warning	Contact the LEGRAND Technical Support Service
<b>RED</b> Quick flashing	-	Quick intermittent	BACKFEED	Contact the LEGRAND Technical Support Service

## 6. Diagnosis

### 6.2 Messages

This paragraph shows the messages that appear on the control panel display or in the event list (see paragraph 5.4.4) and the probable cause that could have generated them.

#### INDICATION

If it is not possible to solve the problem, contact the LEGRAND Technical Support Service.

#### FIRST ROW OF THE MAIN SCREEN

MESSAGE	MEANING AND OPERATING ADVICE
TRIMOD	The UPS is functioning properly
Service Mode	UPS in Service Mode. The parameters can be modified through the control panel and updates can be made.
UPS initialize...	The UPS is starting-up
CM initialize...	The command board is starting-up all the power modules after the exit from the hot-swap mode
CM turning off...	The command board is turning off all the power modules after entering the hot-swap mode
Service Mode...	The UPS is starting up in Service Mode
Maintenance Bypass	The load is powered directly from the mains by means of the manual bypass.
Forced on Bypass	The UPS has entered the forced Bypass mode through a selection from the control panel.
UPS on Bypass	UPS in bypass mode.
Bypass line KO	A skilled technician must check the bypass line.
EPS in stand-by	Output non powered during normal functioning (with mains present)
Modules turned OFF	Command board in hot-swap. The power modules are no longer powered and ready to be replaced.
Out/phase turned OFF	Phase or output off. Configuration obtained via display or after a UPS malfunctioning.
UPS on Battery	UPS in battery mode. This configuration is due to a fault in the UPS power supply system or a loss of mains.
UPS in off-line	The load is powered directly from the bypass line. In case of a power failure, the UPS transfers to battery mode.
Battery Cal...	The UPS is performing the calibration of the batteries through a command from the control board
Battery Test...	The UPS is carrying out a test on the batteries in order to check their status and proper operation
Equalizing Battery	The UPS is performing battery equalization
Buzzer Muted	The buzzer has been silenced
RUNTIME RESERVE!	The battery charge is low while the UPS is working in battery mode.
FAULT MODULE	One or more more modules are faulty. A skilled technician must replace them.

*continues...*

MESSAGE	MEANING AND OPERATING ADVICE
BACKFEED	A backfeed error has been detected. Contact the LEGRAND Technical Support Service.
FAULT CHARGER	The battery charger circuit of one or more power modules is faulty. A skilled technician must replace them.
BATTERIES KO	Batteries faulty. A skilled technician must check their status and replace them if necessary.
BATTERY DISCONNECTED	The UPS detects a battery voltage inferior to 10 V. A skilled technician must verify the batteries and the cabling.
STRONG OVERLOAD	The load has caused an excessive lowering of the output voltage
OVERLOAD	The total load is more than the nominal power of the UPS
OVERHEAT	The temperature inside the UPS is outside the nominal range. Check the functioning of the module fans and clean the air intake grilles.
OUT DC LEVEL FAIL	Reset the power modules error from the control panel in Service Mode (paragraph 6.4.3) and turn on the UPS. If the error persists, one or more modules are faulty and a skilled technician must replace them.
HVBUS RUNAWAY FAIL	Contact the LEGRAND Technical Support Service
BATTERY RUNAWAY	The voltage of the batteries is out of control. A skilled technician must check the status of the batteries and of the battery charger.
3V Battery Fail	The 3V battery of the command board is dead. Contact the LEGRAND Technical Support Service.
Abnormal batt.drain	Abnormal battery drain. Contact the LEGRAND Technical Support Service.
Check Batteries	A skilled technician must check the status of the batteries
Make Maintenance	Contact the LEGRAND Technical Support Service
Shutdown ongoing...	The UPS is shutting down after being programmed to do so by the user
Charging Battery	The UPS is charging the batteries. The charging mode is indicated next to the message.
UPS EMERGENCY!	Contact the LEGRAND Technical Support Service
LOAD TURNED OFF!	A prolonged excessive load (e.g. a short circuit) has caused a significant lowering of the output voltage for an excessive period and the load is no longer powered or the load has been shut down because of an extended overload in battery mode.
UPS TURNED OFF!	The UPS is turning off due to a command given from the control panel
UPS BLOCKED!	Contact the LEGRAND Technical Support Service
PM FW not updated!	One or more power modules have the software not compatible with the command board. Update the modules before turning on the UPS.
Reference Error!	Synchronisation error among the command boards. Contact the LEGRAND Technical Support Service.
CM FAILURE	Communication error among the command boards. Contact the LEGRAND Technical Support Service.
Reference Warning	Synchronisation error among the command boards. Contact the LEGRAND Technical Support Service.

## 6. Diagnosis

### ALARMS

MESSAGE	MEANING
INVERTER FAIL	Fault detected in the Inverter circuit. One or more power modules are faulty. A skilled technician must replace them.
BOOSTER FAIL	Fault occurred in the Booster/PFC circuit. One or more power modules are faulty. A skilled technician must replace them.
CHARGER FAIL	Fault occurred in the Battery charger circuit. One or more power modules are faulty. A skilled technician must replace them.
OVERHEAT	Overheating. Check the UPS ventilation system.
OVERLOAD	The load is higher than the rated power of the UPS.
HVBUS RUNAWAY	Contact the LEGRAND Technical Support Service
OUTPUT DC LEVEL ERROR	A skilled technician must check that there is not a faulty power module or a voltage backfeed from the output
BATTERY VOLTAGE TOO HIGH	Battery voltage too high. A skilled technician must check the batteries.
MODULE COMMUNICATION FAIL PM -> CM	Fault in the communication with the power modules. Contact the LEGRAND Technical Support Service.
BATTERY WIRING FAIL	Error in the battery connection with the power modules. One or more modules are faulty. A skilled technician must replace them.
MAINS WIRING FAIL	Error in the mains connection with the power modules. One or more modules are faulty. A skilled technician must replace them.
H.V.BUS WIRING FAIL	Error in the DC bus connection with the power modules. One or more modules are faulty. A skilled technician must replace them.
BATTERY DISCONNECTED OR POLARITY INVERTED	The batteries were not connected correctly or the polarity has been inverted
MODULE COMMUNICATION FAIL CM -> PM	Fault in the communication system with the power modules. Contact the LEGRAND Technical Support Service.
UNPROTECTED LOAD	Load not protected
MAKE MAINTENANCE	Contact the Legrand Technical Support Service
CHECK BATTERIES	A skilled technician must check the battery status
REFERENCE ERROR OVER CAN NETWORK!	Synchronisation failure among the command boards. Contact the LEGRAND Technical Support Service.
CM FAILURE ON CAN NET	Synchronisation failure among the command boards. Contact the LEGRAND Technical Support Service.
BACKFEED	A backfeed error has been detected. Contact the LEGRAND Technical Support Service.
ABNORMAL BATTERY DRAIN	Abnormal battery drain. Contact the LEGRAND Technical Support Service.

## SCREEN DISPLAYED ON START-UP OR SHUT DOWN

MESSAGE	MEANING AND OPERATING ADVICE
First Turn ON: Supply Mains!	The UPS has never been turned on. No mains input. Start-up not permitted. Make sure the mains is present before turning on.
Mains not Present! Start-up not Allowed	No mains input. Start-up not permitted. To start the UPS in stored energy mode select this configuration from the control panel (paragraph 5.4.2).
Emergency Power Off!	The Emergency Power Off (EPO) has been activated. The EPO command has been sent by a push-button or a switch on the input line has been opened during the normal functioning of the UPS. Check the emergency push-button.
Incomplete Setup for start-up!	The UPS requires a complete configuration for start-up. Check that the output configuration, bypass enabling, number of KB, number of batteries per KB and output voltage have been inserted properly.
Three Phase Voltage Sequence Invalid!	The three phase sequence is not valid. A skilled technician must check that the input three phase system has been correctly connected.
Invalid PM SW Versions: ← to execute update	The SW versions of some or of all the power modules are not correct. Press the ENTER key to update. At the end of the update, the UPS continues the start-up procedure.
Invalid PM HW Versions!	One or more power modules are not compatible with the UPS. Contact the LEGRAND Technical Support Service.
START-UP Error!	An error has occurred during the start-up procedure of the UPS. Contact the LEGRAND Technical Support Service.
Start-up aborted	The start-up has not been confirmed from the control panel within 30 seconds of the confirmation request of the start-up procedure.
UPS turned off by program!	UPS shut down as programmed via software in a remote controlled system
Incorrect setup turn-off	An error has occurred during the configuration. UPS is shutting down. One or more of the parameters have not been set properly. Check the configuration from the control panel.
Incorrect KB setup turn-off	An error has occurred during the configuration of the number of KB. Set the right number of KB from the control panel (paragraph 5.4.2)
Low Battery TurnOff	UPS shutdown during battery mode because the minimum voltage level of the batteries has been reached
Battery Start up Failed. Check polarity.	The batteries are not connected to the UPS or the BUS is not properly charged. A skilled technician must verify the batteries.
Battery Time Expired	UPS shutdown during battery mode because the maximum battery operating time set from the control panel has been reached (paragraph 5.4.2)
Load turned OFF	The load power has been cut off
Powered from Output	Start-up error. Voltage present on the UPS output. A skilled technician must check the UPS connections.
Turned Off with charged H.V.bus	The UPS has not shutdown properly. Make sure the DC buses are discharged before performing any maintenance operation on the UPS.
Saving NVData error	Error saving some UPS parameters. If the problem persists, contact the LEGRAND Technical Support Service.
Invalid CM SW Versions: Execute update!	The command boards have been programmed with different software versions. The software versions must be aligned by carrying out an update of the command boards through a PC.

## 6. Diagnosis

### MESSAGES DISPLAYED ON START-UP

MESSAGE	MEANING AND OPERATING ADVICE
WARNING: Alarm records in memory!	It is necessary to confirm the turning on of the UPS in presence of alarms in the even list
WARNING: different UPS setup!	The UPS configuration changed from the previous time the UPS was turned on. A skilled technician must verify the configuration before turning on the UPS.
Maintenance Bypass! Open output	Open the output breaker before turning on the UPS to exit the manual maintenance bypass mode.
Turn ON after low battery turn OFF.	The UPS is turned on after a previous end of autonomy in battery mode
<ENTER> to confirm UPS turn ON	Press the ENTER key to turn on the UPS

### CRITICAL EVENTS (paragraph 5.4.4)

MESSAGE	MEANING AND OPERATING ADVICE
Inverter Fail	Fault detected in the Inverter circuit. One or more power modules are faulty. A skilled technician must replace them.
Booster Fail	Fault detected in the Booster/PFC circuit. One or more power modules are faulty. A skilled technician must replace them.
Battery Charger Fail	Fault detected in the Battery charger circuit. One or more power modules are faulty. A skilled technician must replace them.
Overheat	Overheating. Check the UPS ventilation system.
Overload	Overload. Check the load level connected to the UPS.
H.V.Bus Runaway Failure	Contact the LEGRAND Technical Support Service
Output DC Level	A skilled technician must check that there is not a faulty power module or a voltage backfeed from the load
Battery voltage too high	Battery voltage too high. A skilled technician must check the batteries.
Power Module comm. failure	Contact the LEGRAND Technical Support Service
Emergency	Contact the LEGRAND Technical Support Service
Load turned OFF	The load power has been cut off
Irregular TurnOff	UPS shutdown in an anomalous way. The skilled technician must make sure that there is no voltage inside the UPS before performing any maintenance operation.
Overload TurnOff	UPS shutdown due to an extended overload
Emergency Power Off turn-OFF	UPS shutdown due to an Emergency Power Off
Battery KO	Fault in the batteries. A skilled technician must check them.
Power Module battery wiring failure	There is a fault in the connection of the batteries to the power modules. One or more power modules are faulty. A skilled technician must replace them.

*continues...*



MESSAGE	MEANING AND OPERATING ADVICE
Power Module mains wiring failure	There is a fault in the connection of the mains to the power modules. One or more power modules are faulty. A skilled technician must replace them.
Power Module HVBus wiring failure	There is a fault in the connection of the HVBus to the power modules. One or more power modules are faulty. A skilled technician must replace them.
Communication failure between CM	Communication error among the command boards. Contact the LEGRAND Technical Support Service.
Backfeed	A backfeed error has been detected. Contact the LEGRAND Technical Support Service.
Abnormal battery drain	Abnormal battery drain. Contact the Legrand Technical Support Service.

#### NOTIFICATION EVENTS (paragraph 5.4.4)

MESSAGE	MEANING AND OPERATING ADVICE
Low Battery TurnOff	UPS shutdown due to low battery voltage
Invalid sequence turn-OFF	UPS shutdown due to incorrect three phase sequence on input. A skilled technician must check that the input three phase system has been correctly connected.
Battery calibration aborted	Battery calibration interrupted by the user
Battery Time Expired	Shutdown of the UPS because the maximum battery operating time set from the control panel has been reached (paragraph 5.4.2)
StartUP error	Start-up error
Start-up granted with alarms	UPS start-up authorised in the presence of alarms
Start-up granted with new cfg	UPS start-up authorised with new configuration. The number of power modules installed on the UPS has changed.
Incorrect setup turn-off	UPS shutdown because the configuration is wrong. The number of power modules detected by the UPS is not correct for the output configuration set.
PM firmware updated	Power module software updated
Strong overload	Strong overload
Powered from Output	Voltage present on the UPS output. A skilled technician must check the connections.
Turned Off with charged H.V.bus	The UPS has not shutdown properly. The UPS has shutdown without completely discharging the buses.
Make Maintenance	Contact the LEGRAND Technical Support Service
Check Batteries	A skilled technician must check the batteries
Replace batteries	A skilled technician must check the battery status and change the batteries if necessary
Low Battery Emergency	The load is powered directly from the bypass line due to an end of autonomy

*continues...*

## 6. Diagnosis

MESSAGE	MEANING AND OPERATING ADVICE
Charge finished	Faulty functioning of the battery charger. Contact the LEGRAND Technical Support Service.
Battery disconnected or polarity inverted	The batteries were not connected correctly or the polarity has been inverted

### INFORMATIVE EVENTS (paragraph 5.4.4)

MESSAGE	MEANING
User Turn ON	User start-up of the UPS
User Turn OFF	User shutdown of the UPS
Auto turn ON	Automatic UPS start-up
Timed turn OFF	The UPS has been shut down via the delayed shutdown programming (paragraph 5.4.2)
Stand-by battery charge start	The battery charger has started in stand-by mode
UPS on battery	The UPS has transferred to battery mode
UPS on mains	The UPS has transferred to normal mode
Line Out turned OFF	The output is not powered
Battery test executed	Battery testing successfully completed
Battery learning executed	Battery calibration successfully completed
Forced Bypass ON	The forced bypass mode has been enabled
Forced Bypass OFF	The forced bypass mode has been disabled
Maintenance Bypass ON	The load is powered directly from the bypass line
Maintenance Bypass OFF	The load is no longer powered directly from the bypass line
Enter in Hot Swap	The UPS has started-up the hot-swap mode
Exit From Hot Swap	The UPS has exited the hot-swap mode
Event list erased	The event list has been erased
Battery replaced	The batteries have been replaced by the LEGRAND Technical Support Service

## 7. Maintenance



### **DANGER**

**INSTALLATION and ORDINARY MAINTENANCE operations must be carried out only by SKILLED TECHNICIANS (paragraph 2.2.1). EXTRAORDINARY MAINTENANCE operations must be carried out only by LEGRAND TECHNICAL SUPPORT SERVICE.**

### 7.1 Installation



### **DANGER**

The operator is not authorized to install and connect electrically the UPS. These operations are the sole preserve of a skilled technician (paragraph 2.2.1) who must follow the instructions addressed to him in the installation and maintenance manual.

LEGRAND declines all liability for any injury or damage caused by activities carried out differently from the instructions written in this manual or by a skilled technician who doesn't follow the requirements written in the installation and maintenance manual.

### 7.2 Preventive maintenance

The UPS does not contain parts for preventive maintenance by the operator.

The operator must periodically perform:

- a general external cleaning;
- a check to verify the absence of alarms on the display;
- a check to verify the correct functioning of the fans on each power module.

After the first year of life of the UPS, check the batteries every six months through the "battery calibration" function to guarantee the optimal operation and continuous protection of the connected load. With this function, the UPS detects the discharge curve of the batteries in order to provide precise information on the charging state.

Enter the main menu to perform this operation and follow the path: **Tools** → **Batteries** → **Batt. Calibration**

Press the ENTER key to confirm the choice.

Contact the LEGRAND Technical Support Service in case of problems.

### 7.3 Periodical checks

The correct functioning of the UPS unit must be guaranteed by periodical maintenance inspections. These are essential to safeguard the reliability of the UPS.



### **WARNING**

The periodical checks involve operations inside the equipment in presence of dangerous voltages. Only maintenance personnel trained by LEGRAND are authorized to intervene.

### 7.4 Ordinary maintenance checks

Contact a skilled technician if it is necessary to replace or add power modules, battery drawers or external battery cabinets.

### 7.5 Extraordinary maintenance

Contact the LEGRAND Technical Support Service if there are failures that require the access to internal parts of the UPS.

## 8. Warehousing



### **DANGER**

All storage operations must be carried out only by a **SKILLED TECHNICIAN** (paragraph 2.2.1)



### **DANGER**

**A SKILLED TECHNICIAN must check that there is no voltage present before disconnecting the cables. All the battery breakers on the UPS and on the external battery cabinets must be open. The battery drawers of the Trimod HE MODULAR BATTERY (if present) and of the UPS (according to the model) must be removed.**

### **8.1 UPS**

The UPS must be stored in an environment with a room temperature between -20°C (-4°F) and +50°C (+122°F) and humidity less than 90% (not condensing).

### **8.2 Batteries**

It is possible to store batteries without recharging them in the following conditions:

- up to 6 months if the temperature is between +20°C (+68°F) and +30°C (+86°F);
- up to 3 months if the temperature is between +30°C (+86°F) and +40°C (+104°F);
- up to 2 months if the temperature is over +40°C (+104°F).



### **CAUTION**

The battery drawers or the external battery cabinets must never be stored if the batteries are partially or totally discharged. LEGRAND is not liable for any damage or bad functioning caused to the UPS by wrong warehousing of the batteries.

## 9. Dismantling



### DANGER

Dismantling and disposal operations must be carried out only by a SKILLED TECHNICIAN (paragraph 2.2.1). The instructions in this chapter are to be considered indicative: in every country there are different regulations with regard to the disposal of electronic or hazardous waste such as batteries. It is necessary to strictly adhere to the standards in force in the country where the equipment is used. Do not throw any component of the equipment in the ordinary rubbish.

### 9.1 Battery disposal

Batteries must be disposed of in a site intended for the recovery of toxic waste. Disposal in the traditional rubbish is not allowed.

Apply to the competent agencies in your countries for the proper procedure.



Pb



### WARNING

A battery may constitute a risk of electric shock and high short-circuit current. When working on batteries, the prescriptions indicated in chapter 2 must be adhered to.

### 9.2 UPS dismantling

The dismantling of the UPS must occur after the dismantling of the various parts it consists of.

For the dismantling operations, it is necessary to wear the Personal Protective Equipment mentioned in paragraph 2.3 and to consult the instructions and diagrams in the installation and maintenance manual.

Sub-divide the components separating the metal from the plastic, from the copper and so on according to the type of selective waste disposal in the country where the equipment is dismantled.

If the dismantled components must be stored before their disposal, be careful to keep them in a safe place protected from atmospheric agents to avoid soil and groundwater contamination.

### 9.3 Electronic component dismantling

For the disposal of electronic waste like the control panels or the command boards, it is necessary to refer to the relevant standards.



This symbol indicates that in order to prevent any negative effects on the environment and on people, this product should be disposed of separately from other household waste, by taking it to authorised collection centres, in accordance with the EU countries local waste disposal legislations. Disposing of the product without following local regulations may be punished by law. It is recommended to check that this equipment subject to WEEE legislations in the country where it is used.

## 10. Technical data

### Main features

	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 97 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 08 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Nominal power	10 kVA	15 kVA	20 kVA	30 kVA	30 kVA	40 kVA	60 kVA	80 kVA
Active Power	10 kW	15 kW	20 kW	30 kW	30 kW	40 kW	60 kW	80 kW
Technology	online, double conversion Classification according to EN62040-3: VFI-SS-111							
IN/OUT Configuration	Single-phase / Single-phase Single-phase / Three-phase Three-phase / Single-phase Three-phase / Three-phase (may be configured by a skilled technician)				Three-phase / Three-phase			
Dual Input	Available on all models							
Command boards	1			1 2 for the MULTI CTRL models (3 104 68-69-71)		1 3 for the MULTI CTRL model (3 104 72)	4	
UPS architecture	Modular with power modules PF=1 Expandable, redundant N+X							
Neutral system	Neutral passing straight from input to output (not isolated)							
Bypass	Automatic (static and electromechanical) Manual (for maintenance)							

**Input electrical characteristics**

	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 9 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Maximum three-phase/ three-phase current	19.2 A	28.8 A	38.4 A	57.6 A	57.6 A	76.8 A	115.2 A	153.6 A
Maximum three-phase/ single-phase current	19.2 A	28.8 A	38.4 A	57.6 A	-	-	-	-
Maximum single-phase/ three-phase current	57.6 A	86.4 A	115.2 A	172.8 A	-	-	-	-
Maximum single-phase/ single-phase current	57.6 A	86.4 A	115.2 A	172.8 A	-	-	-	-
Nominal input voltage	230 V + 15% - 20% (Single-phase) 400 V + 15% - 20% (Three-phase) (neutral line indispensable)				400 V + 15% - 20% (Three-phase) (neutral line indispensable)			
Input frequency	50 / 60 Hz ± 2% 50 / 60 Hz ± 14 % (autosensing and/or selectable by the user)							
Power factor on input	> 0.99							
Total harmonic distortion of the input current	THDi < 3%							

## 10. Technical data

### Electrical output characteristics (normal mode)

	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 97 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 08 3 104 03 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Maximum three-phase/ three-phase current	14.5 A	21.7 A	29 A	43.5 A	43.5 A	58 A	87 A	116 A
Maximum three-phase/ single-phase current	43.5 A	65.2 A	87 A	130.5 A	-	-	-	-
Maximum single-phase/ three-phase current	14.5 A	21.7 A	29 A	43.5 A	-	-	-	-
Maximum single-phase/ single-phase current	43.5 A	65.2 A	87 A	130.5 A	-	-	-	-
Nominal output voltage	230 V ± 1% (Single-phase) 400 V ± 1% (Three-phase)				400 V ± 1% (Three-phase)			
Nominal output frequency	50 / 60 Hz							
Tolerance on the output frequency	If synchronized with the input frequency: adjustable range from ±1% to ±14% If not synchronized: ± 1%							
Crest factor admitted on the output current	3:1							
Efficiency (AC/AC online)	up to 96%							
Efficiency ECO mode	99% max							
Overload admitted	115% for 10 minutes without automatic bypass intervention 135% for 60 seconds without automatic bypass intervention							

### Electrical output characteristics (battery mode)

	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 97 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 08 3 104 03 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Nominal output voltage	230 V ± 1% (Single-phase) 400 V ± 1% (Three-phase)				400 V ± 1% (Three-phase)			
Output frequency	50 / 60 Hz ± 1%							
Total harmonic distortion of output voltage on non- linear nominal load	< 1%							
Overload admitted	115% for 2 minutes 135% for 30 seconds							



### Batteries and Battery Charger Characteristics

	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 97 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Battery type	Lead-acid sealed without maintenance (VRLA)							
Unitary capacity	Battery drawers for UPS or external modular battery cabinets: 12 Vdc 7.2Ah or 12 Vdc 9 Ah							
Rated battery voltage	240 Vdc (20 x 12 Vdc batteries in series)							
Type of battery charger	High performance PWM, one for each power module							
Recharge curve	Smart Charge, advanced three-stage cycle							
Nominal recharge current battery charger	2.5 A max for every power module installed							

### Features

	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 97 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Signals and alarms	Large four line alphanumeric screen, multicolour status indicator, acoustic notification							
Communications ports	2 x RS 232 ports, 1 relay interface, 1 contact port, 1 SMNP module slot							
Software	Free software for the Windows and Linux environments is available which expands the functions of: - displaying all the functioning and diagnostic data in case of problems; - setup of special functions; - automatic shutdown of all the computers supplied by the UPS (if connected to TCP/IP network) Visit us at <a href="http://www.ups.legrand.com">http://www.ups.legrand.com</a> to download a copy of the software free of charge.							
Protections	Electronics against overloads, short-circuit and excessive battery discharge Block of functions due to the end of autonomy In-rush limiter on start up E.P.O. contact Auxiliary contact for Backfeed protection							

## 10. Technical data

### Mechanical characteristics

	Empty power cabinets						
	3 104 22 10 kVA	3 104 23 15 kVA	3 104 23 20 kVA	3 104 68 3 104 25 30 kVA TM	3 104 24 30 kVA TT	3 104 71 3 104 26 40 kVA	3 104 72 3 104 27 60 kVA
Net weight (kg)	85	90	90	85	80	82	91
Dimensions w x h x d (mm)	414 x 1367 x 628						
Power modules (PM4) 3400VA to be installed	3	-	-	-	-	-	-
Power modules (PM6) 5000VA to be installed	-	3	-	6	6	-	-
Power modules (PM7) 6700VA to be installed	-	-	3	-	-	6	9
Power module net weight (kg)	8,5						
Battery drawer net weight (kg)	13			-	-	-	-

	Empty power cabinets					
	3 104 31 10 kVA	3 104 33 15 kVA	3 104 32 20 kVA	3 104 33 20 kVA	3 104 69 3 104 34 30 kVA TT	3 104 73 80 kVA
Net weight (kg)	98	102	102	102	106	120
Dimensions w x h x d (mm)	414 x 1650 x 628					
Power modules (PM4) 3400VA to be installed	3	-	6	-	-	-
Power modules (PM6) 5000VA to be installed	-	3	-	-	6	-
Power modules (PM7) 6700VA to be installed	-	-	-	3	-	12
Power module net weight (kg)	8,5					
Battery drawer net weight (kg)	13					-

	Power cabinets with PM					
	3 103 96 10 kVA	3 104 08 15 kVA	3 104 14 20 kVA	3 104 18 30 kVA TT	3 104 19 40 kVA	3 104 20 60 kVA
Net weight (kg)	120	120	120	146	146	165
Dimensions w x h x d (mm)	414 x 1367 x 628					
Power modules (PM4) 3400VA installed	3	-	-	-	-	-
Power modules (PM6) 5000VA installed	-	3	-	6	-	-
Power modules (PM7) 6700VA installed	-	-	3	-	6	9
Power module net weight (kg)	8,5					
Battery drawer net weight (kg)	13			-	-	-

	Power cabinets with PM			
	3 103 97 10 kVA	3 104 03 15 kVA	3 104 09 20 kVA	3 104 15 30 kVA TT
Net weight (kg)	155	155	155	181
Dimensions w x h x d (mm)	414 x 1650 x 628			
Power modules (PM4) 3400VA installed	3	-	-	-
Power modules (PM6) 5000VA installed	-	3	-	6
Power modules (PM7) 6700VA installed	-	-	3	-
Power module net weight (kg)	8,5			
Battery drawer net weight (kg)	13			

## 10. Technical data

	UPS (PM + batteries)						
	3 104 42	3 104 43	3 104 44	3 104 45	3 104 46	3 104 47	3 104 48
	10 kVA	10 kVA	10 kVA	15 kVA	15 kVA	20 kVA	20 kVA
Net weight (kg)	167	223	279	220	279	220	279
Dimensions w x h x d (mm)	414 x 1367 x 628						
Power modules (PM4) 3400VA installed	3	3	3	-	-	-	-
Power modules (PM6) 5000VA installed	-	-	-	3	3	-	-
Power modules (PM7) 6700VA installed	-	-	-	-	-	3	3

	UPS (PM + batteries)			
	3 104 02 10 kVA	3 104 07 15 kVA	3 104 13 20 kVA	3 104 17 30 kVA TT
Net weight (kg)	350	350	350	325
Dimensions w x h x d (mm)	414 x 1650 x 628			
Power modules (PM4) 3400VA installed	3	-	-	-
Power modules (PM6) 5000VA installed	-	3	-	6
Power modules (PM7) 6700VA installed	-	-	3	-

**Environmental conditions**

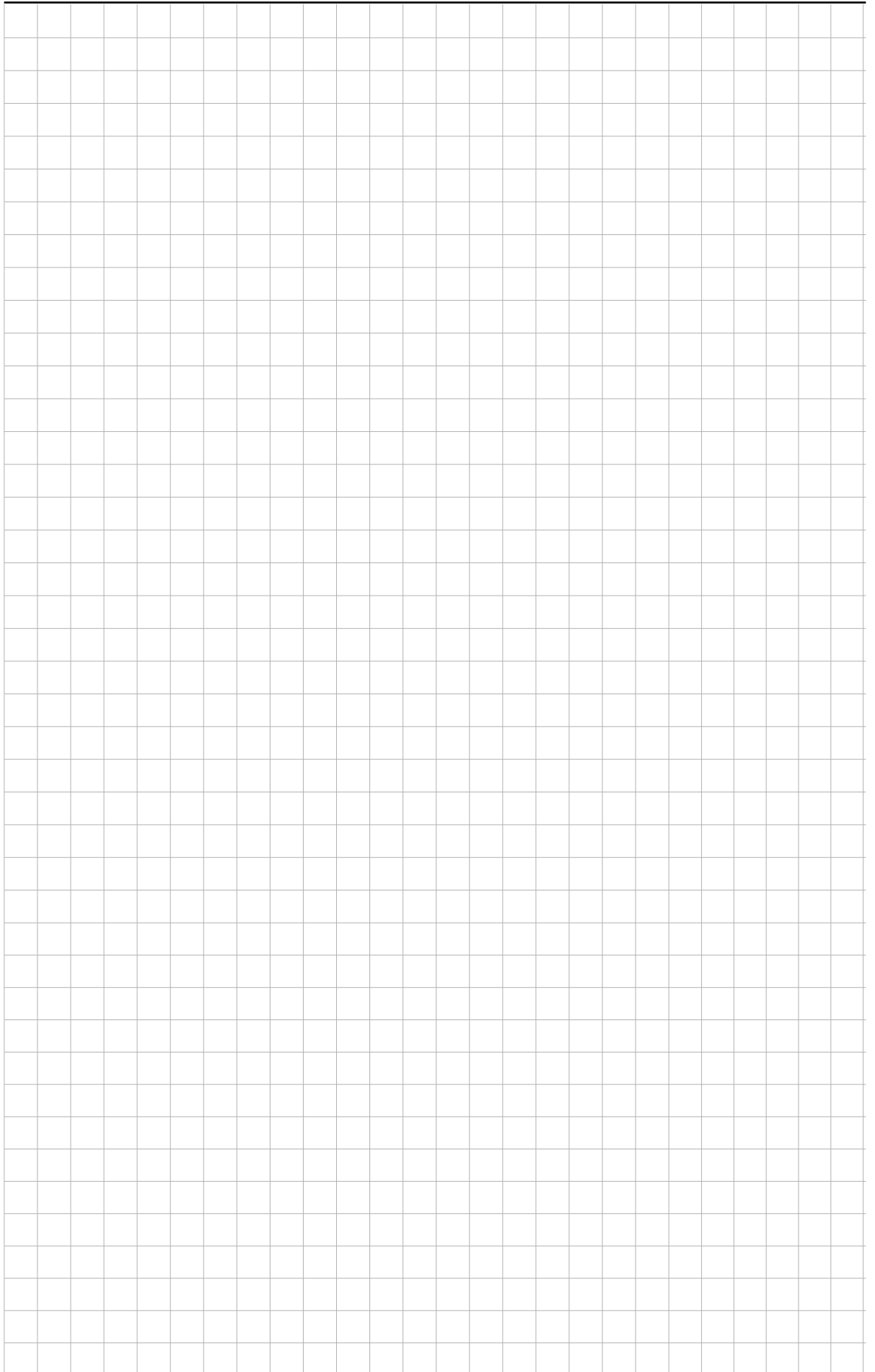
	3 104 22 3 104 31 3 104 42 3 104 43 3 104 44 3 104 02 3 103 96 3 103 97 10 kVA	3 104 23 3 104 33 3 104 45 3 104 46 3 104 07 3 104 08 3 104 03 15 kVA	3 104 23 3 104 32 3 104 33 3 104 47 3 104 48 3 104 13 3 104 14 3 104 09 20 kVA	3 104 25 3 104 68 30 kVA TM	3 104 24 3 104 34 3 104 69 3 104 18 3 104 17 3 104 15 30 kVA TT	3 104 26 3 104 71 3 104 19 40 kVA	3 104 27 3 104 72 3 104 20 60 kVA	3 104 73 80 kVA
Operating temperature	0 ÷ 40 °C							
Relative humidity during operation	0% ÷ 95% non condensing							
Storage temperature	-20°C ÷ 50 °C (excluding batteries)							
Noise level at 1 metre	58 ÷ 62 dBA							
Pollution degree	PD2							
Environmental category (EN 60721-3-3)	3K2							
Protection index	IP 20							
Operating height	up to 1000 metres above sea level without derating							

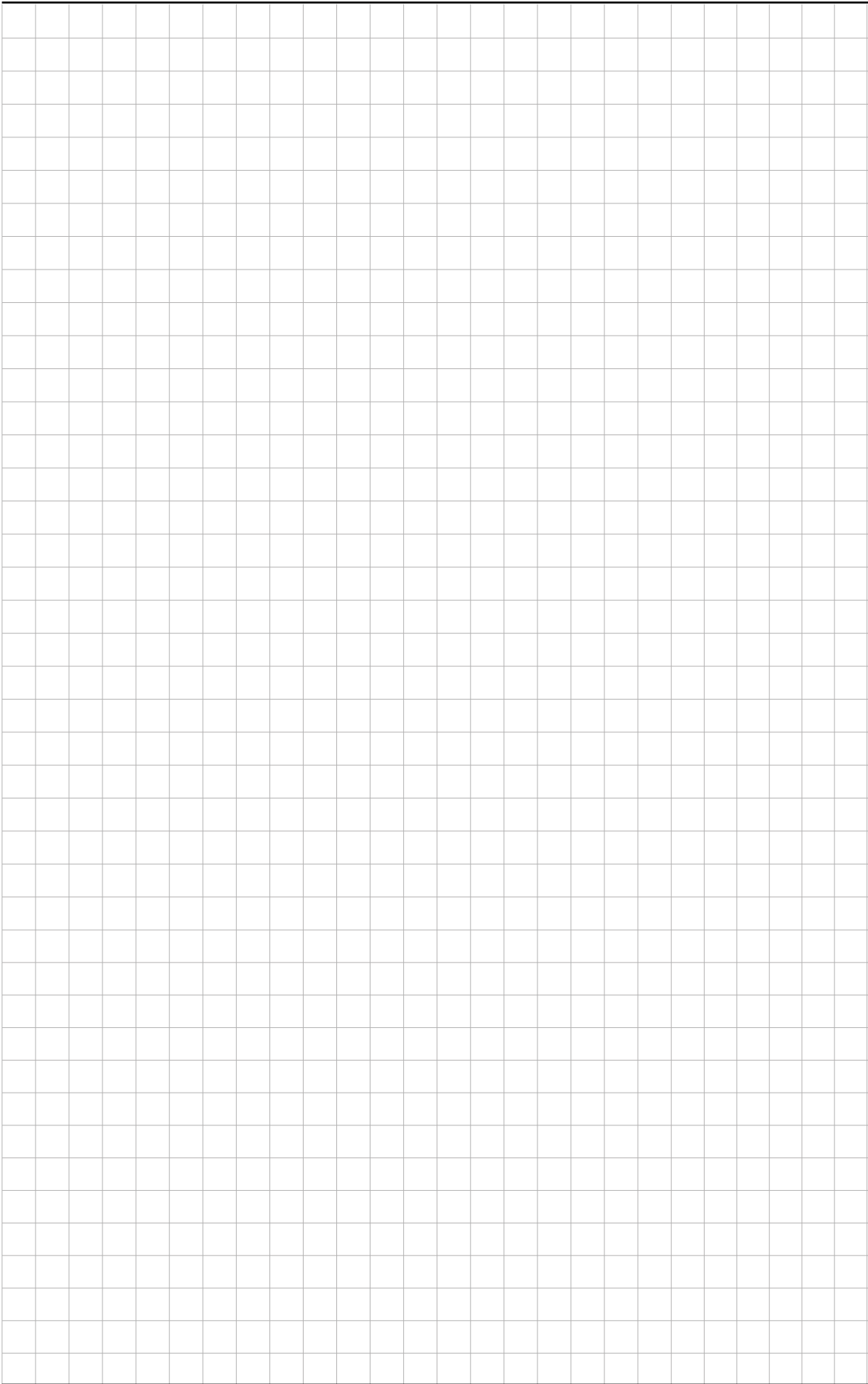
**Trimod HE 3 108 51 battery charger module (BCM) technical specifications**

Nominal input voltage	230 Vac + 15% - 20%
Nominal input voltage	19.3 A
Input power factor	PF > 0.99
Total harmonic distortion of the input current	THDi < 3%
Nominal output voltage	240/252 Vdc
Output voltage in maintenance phase	13.75 Vdc per battery
Nominal input voltage	15 Adc max
AC/DC performance	>93% at max rated output current
Functioning status indications  (signalled by multicoloured LED on module and indications on UPS display)	Yellow LED, fast flashing: recharge phase f1  Green LED, slow flashing: recharge phase and maintenance f2  Green LED steady: standby  Red LED: fault status

**Reference directive and standards**

Marchi	CE, EAC, CMIM
Safety	2014/35/EU Directive EN 62040-1
EMC	2014/30/EU Directive EN 62040-2
Performance and test requirements	EN 62040-3





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