Trimod MCS

User manual

Item LE10960AA-01/19-01 CT

Trimod MCS

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1. Introduction

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

1.1 General information

Congratulations on your LEGRAND TRIMOD MCS EPS purchase.
Thanks to this EPS, your critical equipment will always be protected by a constant and reliable electricity supply.

LEGRAND is specialized in designing and producing EPS. Trimod MCS is unique in its kind: it is modular, redundant and belongs to the last generation of medium power EPS.
High reliability, low running costs and excellent electrical performance are some of its features. The high quality standard of LEGRAND in design and production allows Trimod MCS to pass the strictest quality tests.
The EPS 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 MCS EPS, 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.

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.

1.2 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.

Any adjustments and 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 the technician who must have received adequate preliminary training.

The intended use and configurations envisaged for the equipment and 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 installation and user manual.

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

1. Introduction

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 the things around it.

WARNING

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 the things around it.

CAUTION

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 the 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 supplied manuals are an integral part of the equipment and must therefore be kept for their entire lifetime.
In case of need (for example in case of damage that even partially compromise the 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 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 updated version of the manual 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. In particular 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:
- installation and wiring completed by personnel not possessing the qualifications required by the regulations of the country of installation for working on equipment operating on dangerous voltages;
- installation and wiring completed by personnel not wearing the Personal Protective Equipment required by the regulations of the country of installation;
- failure to observe the installation, maintenance instructions and use of the equipment which differs from the specifications in the user manual;
- 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, operating 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 or protections other than those indicated in the installation and maintenance manual;
- damage caused by failure to install or establish the safety protections indicated in the manuals, or by failure to comply with the safety labels.

Transfer of the equipment to others also requires the handing over of all the manuals. Failure to hand over the manuals shall automatically nullify any right of the buyer, including the terms of the guarantee where applicable.
If the equipment is sold to another party in a country where a different language is spoken, the original owner shall be responsible for providing a faithful translation of the manuals in the language of the country where the equipment will be used.

1.6.1 Guarantee terms

The terms of the guarantee may vary depending on the country where the EPS 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 EPS has not been brought into service by a properly trained skilled technician (see paragraph 2.2.1).

If during the guarantee period the EPS does not conform with the characteristics and performance laid down in this manual, LEGRAND at its discretion will repair or replace the EPS 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 Guarantee extension and maintenance contracts

The standard guarantee can be consolidated in an 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.
For more information contact the LEGRAND Technical Support Service.

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.

2. Regulatory and safety requirements

DANGER
Before carrying out any operation on the equipment, it is necessary to read the entire manual carefully, especially this chapter.
Look after this manual carefully and consult it repeatedly while using the EPS.

2.1 General notes

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

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 qualification and are aware of the method of installing, assembling, repairing, commissioning and safe use of the equipment.
In addition to the requirements listed in the paragraph below for general operators, the Skilled Technician must be qualified in accordance with the safety regulations in force in the country of installation on the measures to implement when working in presence of hazardous voltage. He must also use the Personal Protective Equipment required by the safety regulations in force at the country of installation for all the activities indicated in the installation and maintenance manual (see paragraph 2.3)

WARNING
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 the people working on the equipment have received all 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 current;
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 should 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 requirements 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 operating status and the restore of the functioning after it shuts down;
- the activation of the necessary provisions for maintaining the quality performance of the EPS;
- the cleaning of the equipment;
- cooperation with personnel responsible for ordinary maintenance activities (skilled technicians).

2.3 Personal Protective Equipment

DANGER

The equipment 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

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.

How to proceed in an emergency
Do not use water to quench fires but just the extinguishers specifically designed for putting out fires in electrical equipment.

No smoking
This sign indicates that smoking is not allowed.

2.5 Signs on the equipment

Displayed on the equipment are explanatory plates that can vary depending on the country the equipment is intended for and constructional standards applied.
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 it is no longer legible, even partially, the Manufacturer must be contacted for another one in order to replace it.

2. Regulatory and safety requirements

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 EPS works with dangerous voltages. Only SKILLED TECHNICIANS must perform the installation and ordinary maintenance operations. No part of the EPS 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 the ground connections are removed during installation and maintenance (applicable to remote equipment and battery supplies without a grounded supply circuit).
g) never leave powered 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.
The batteries installed inside the cabinet must be disposed of correctly. For the disposal requirements refer to local laws and relevant standards.

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

CAUTION
Do not open the battery fuse holders while the EPS is powering the loads in battery mode.

WARNING
To reduce the risk of fire or electric shock, the EPS 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

The equipment generates, uses and can radiate radio frequency energy. If it is not installed and used in accordance with the instructions in the manuals, it may cause harmful interference with radio communications.

Trimod MCS 3,5,7 and 10 are category C2 products according to standard EN62040-2.
In the home environment these devices could cause radio interference; in this case appropriate countermeasures must be taken.
All other Trimod MCS models are category C3 products according to standard EN62040-2.
They can therefore be used in commercial and industrial environments; nevertheless restrictions or adequate countermeasures might be necessary to avoid radio interference.

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 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 each and 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 disconnector and must be locked with an appropriate padlock.
- The EPS 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 them.
- Do not disable any safety, signalling or warning devices and do not ignore any alarms, warning messages or notices, 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 equipment, the devices and the operation sequence, be modified, disabled or tampered with in any way, without prior consultation with the Manufacturer.
- When replacing fuses, only use ones of the same type.
- The replacement of the batteries is an operation intended to be carried out by a skilled technician.
- Keep a register in which to enter 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, carry out a careful check in order to make sure 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 EPS door;
- the installation and maintenance manual.

2.7 How to proceed in an emergency

The following information are general.
For the 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 specifically designed for putting out fires in electrical equipment.

3. Technological description

3.1 Trimod MCS technology

LEGRAND® has developed an innovative project that is the only one of its kind by producing Trimod MCS, the EPS with 3, 5, 7, 10, 15, 20, 30, 40, 60 and 80 kVA power.
The concepts underlying the project are modularity, expandability and redundancy in such a way as to offer maximum reliability and to be the guarantee of considerable savings.

Trimod MCS is EPS designed in accordance with EN 50171 for the preservation of power supply in emergency and security systems. Some of its features are:
- permanent overload capability of 120% in relation to the rated power;
- batteries with rated life expectancy of 10 years;
- battery polarity inversion protection
- protection against complete discharge;
- short circuit protection;
- high current battery charger for full charge time of 12 hours;
- IP20 metal enclosure according to EN 60598-1.

If the mains is available, the EPS output is enabled by default. It is possible to change this setting from the control panel. If the mains input is missing, the output is supplied by the EPS in battery mode.

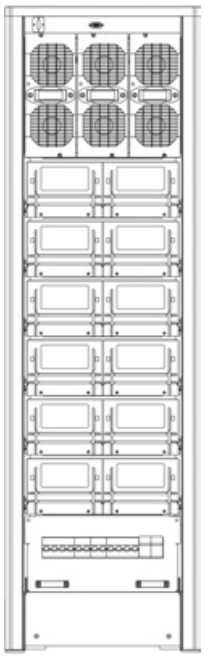
Trimod MCS is a modular EPS whose base module is single phase and can be programmed to obtain the desired input/output configuration. It is thus possible to manage three phase and single phase voltages on input and output to have a choice of the traditional three phase/three phase, three phase/single 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 EPS is controlled by one command board.

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

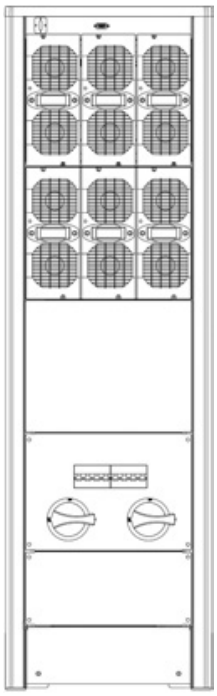
CM 0	PM 0	PM 1	PM 2



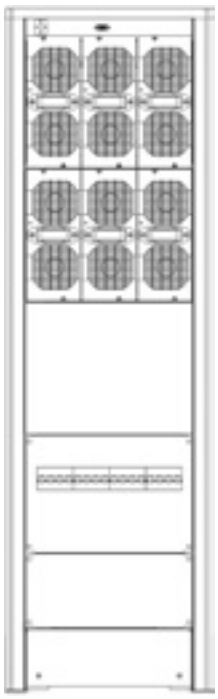
Trimod MCS 3-5-10

Trimod MCS 20

Trimod MCS 7-15

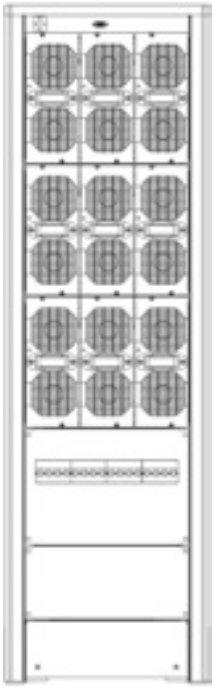


Trimod MCS 30



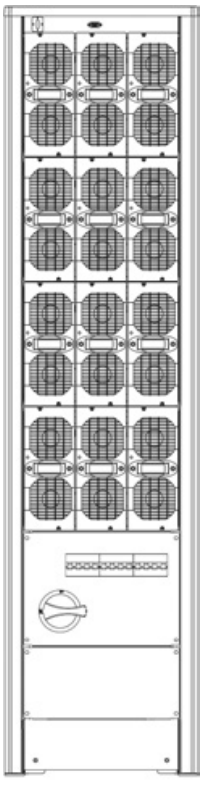
Trimod MCS 40

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



Trimod MCS 60

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



Trimod MCS 80

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

3. Technological description

The command board is connected to a control panel with display from which it is possible to verify the status and setups of the EPS and to a communication interface with RS-232 and SNMP connection, dry contacts and logical contacts. It is possible to access all the EPS 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 operation. 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 EPS represents the current state of the art.
A sophisticated microprocessor-type control optimises the performance both 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 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
Trimod MCS concentrates 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 EPS 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 EPS.

Expandability
Most EPS 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 EPS, 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 EPS, it is necessary to put at least two in parallel thereby doubling the power acquired, the space occupied and the electricity consumed. Trimod MCS modular architecture makes it possible to have redundant configurations within a single cabinet.
The advantages are:
- a redundant modularity EPS can be configured as a power redundant N+X system. 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.

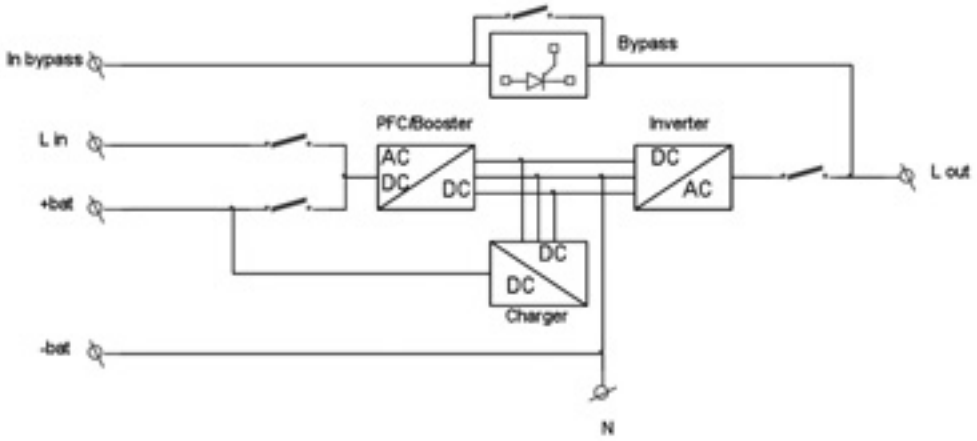
Power module
The high-efficiency single phase module, available in three power sizes of 3400 VA (PM4), 5000 VA (PM6) and 6700 VA (PM7) respectively, and is mainly made up of the following functional blocks:
- command and control logic (managed by a microprocessor);
- PFC rectifier/booster;
- inverter;
- 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 operation 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 EPS.
The 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 operating 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 connection. A drawer consists of five 12V-9Ah 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 MCS 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, 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 battery operation autonomy of the EPS can be increased by adding more battery drawers in multiples of four, using both the seats in the EPS cabinet if available, and the seats in the additional modular battery cabinets.

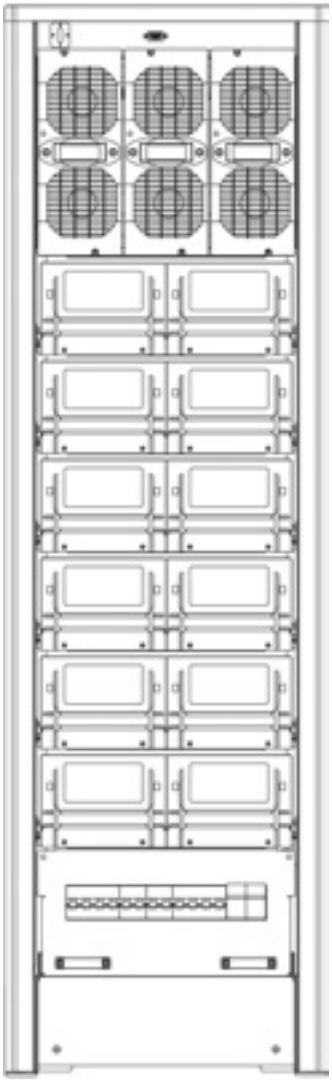
Digital display and alarm display
Trimod MCS is managed by a microprocessor-type command board (according to the version) and it has a backlit LCD alphanumeric display with twenty characters on four lines.
The display is incorporated in the control panel where there is also a high-brightness operating status indicator with traffic light type green-yellow-red.
Five keys situated near the display enable the user to display the operating data, set the operating parameters, analyse the status of the individual power modules, select the language in which the messages are to be displayed 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 additional battery charger module provides up to 15A of charge current that are added to the current of the battery chargers inside the power modules. Every power module can provide up to 2.5A of charge current. 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 operation, the 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 inside the EPS cabinet. All the information regarding the operating status of the BCM is given by the LED on the front of the module and by what is shown on the EPS display.
The module is managed by a microprocessor to optimize performance and reliability. It is recommended to install it together with a battery cabinet with capacity exceeding 60 Ah.

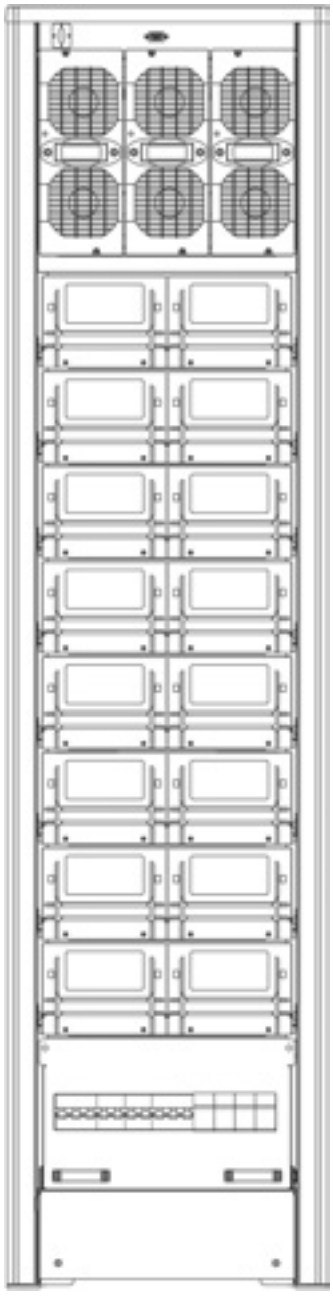
ECO MODE
One functioning mode of Trimod MCS is called "eco mode". With this mode it is possible to save energy while guaranteeing uninterruptability of the power supply to the load connected. During the functioning in eco mode, the load is powered directly from the electrical mains through the automatic 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 EPS actuates its inverter stage and powers the load with the energy stored in the batteries. The autonomy during the battery operation 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 EPS switches automatically back to the eco mode. It is possible to change the operating mode between on-line and eco mode (and viceversa) both with the EPS on and with the UPS off (in this case entering the Service Mode).

3. Technological description

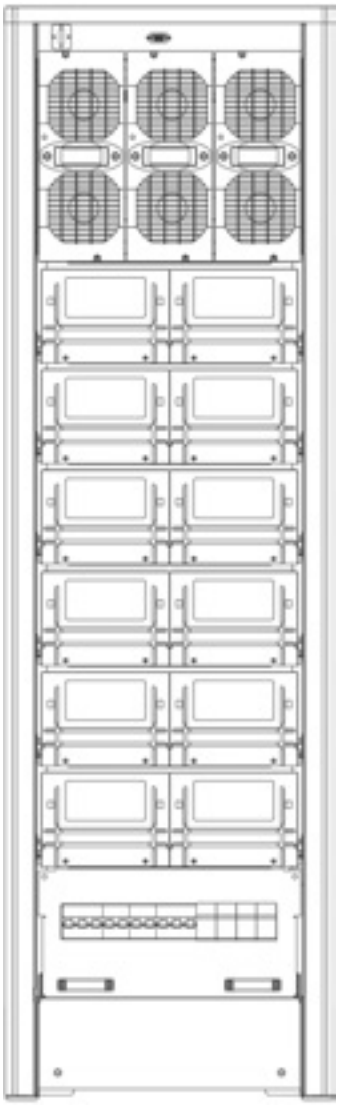
3.3 Models



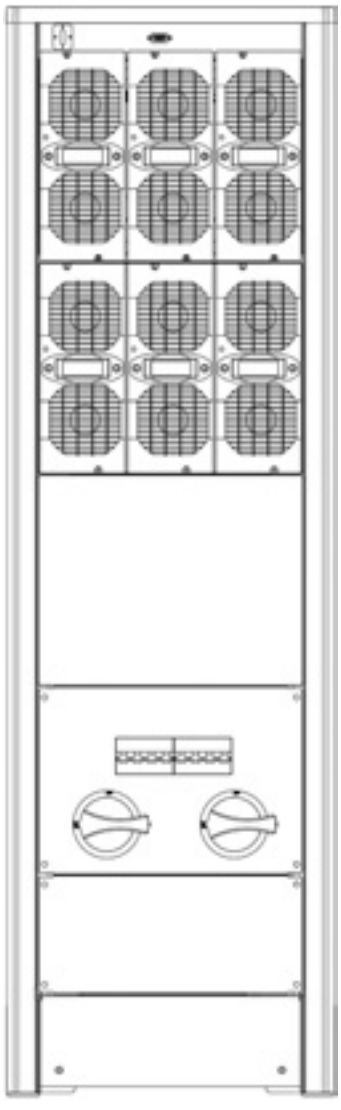
Trimod MCS 3-5-10



Trimod MCS 7-15

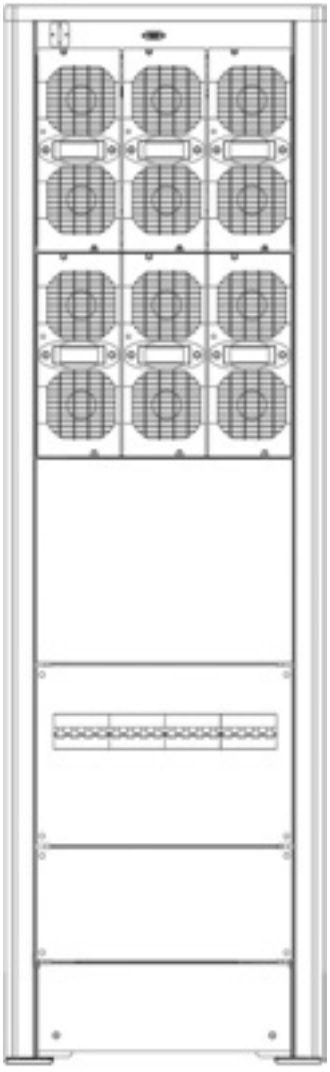


Trimod MCS 20

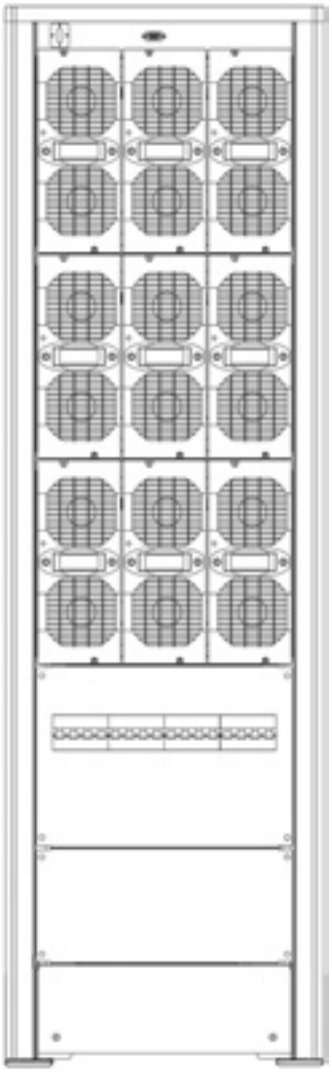


Trimod MCS 30

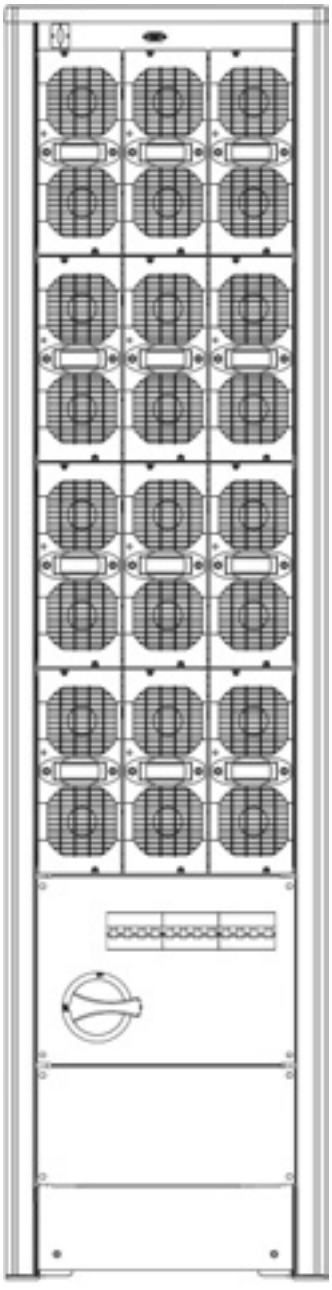
3. Technological description



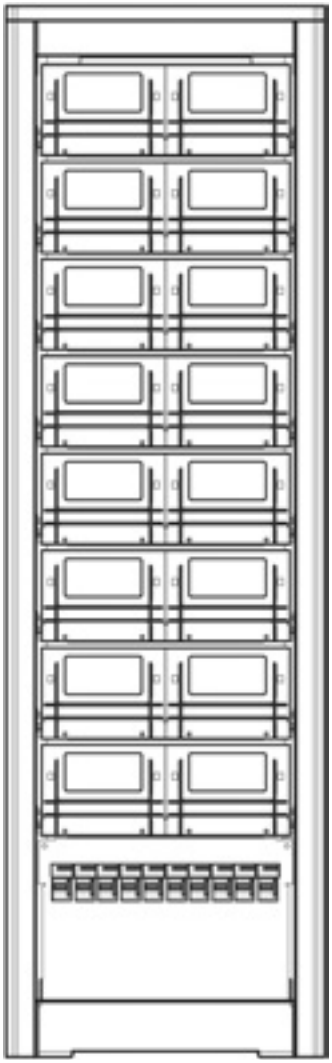
Trimod MCS 40



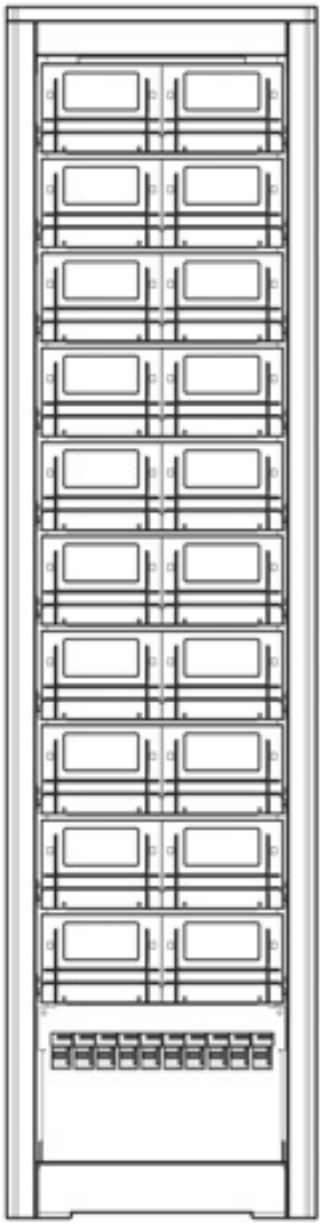
Trimod MCS 60



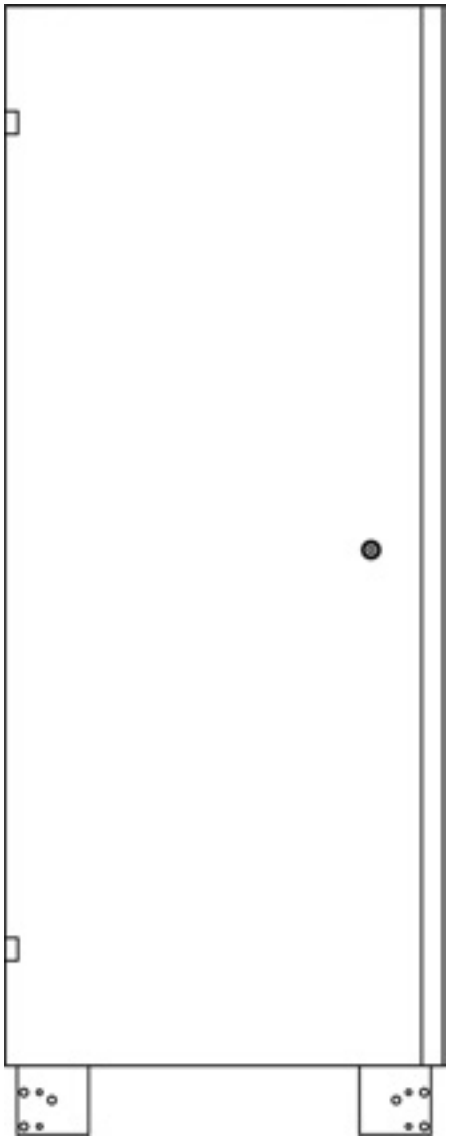
Trimod MCS 80



Trimod MCS MODULAR BATTERY 4KB
(16 battery drawers)



Trimod MCS MODULAR BATTERY 5KB
(20 battery drawers)

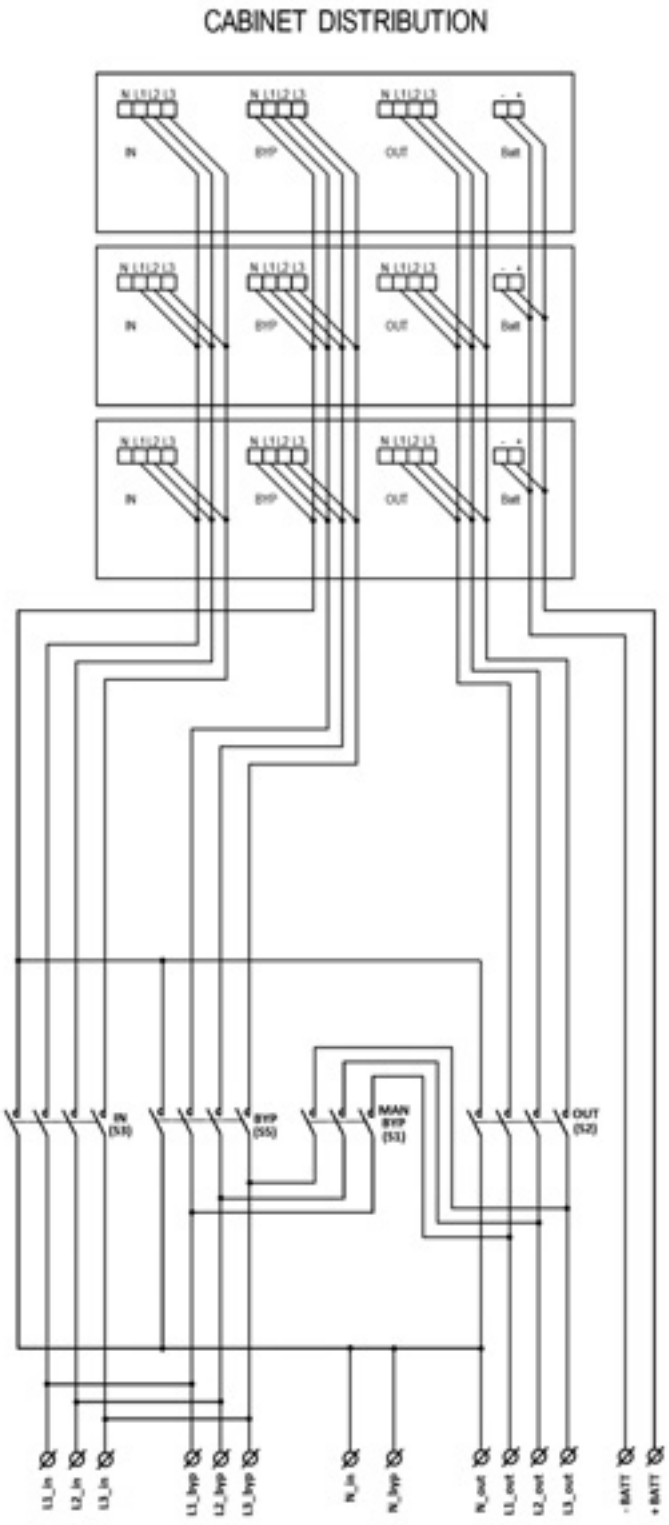


Trimod NON-MODULAR BATTERY 1KB
(94Ah)

3. Technological description

3.4 Block diagram of interconnections and distributions of the EPS

The following figure shows the block diagram of a Trimod MCS 60 distribution. The layout is similar for all the other models.
The bypass input terminals are represented according to the factory configuration (bypass input line in common).



4. Unpacking and positioning

4.1 Visual check

On delivery of the EPS, 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 damaged immediately inform:
- the transporter;
- the LEGRAND Technical Support Service.

Check the equipment corresponds with the material indicated in the delivery documentation.
Follow the instructions in Chapter 9 when storing the equipment.

4.1.1 Equipment and supplied accessories check

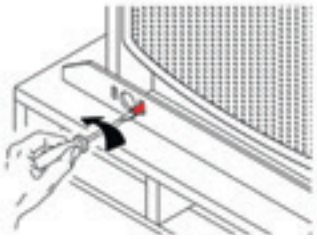
The equipment and the relative supplied accessories must be in a perfect state of repair.
Check that:
- the shipping data (address of the recipient, no. of packages, order no, etc.) correspond to what is contained in the delivery documentation;
- the technical rating plate data on the label applied to the EPS correspond with the material purchased, described in the delivery documentation;
- the documentation accompanying the equipment includes the installation manual and the user manual.

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 EPS by undoing the four fixing screws present;
7. check the equipment for damage. Immediately inform the shipper and the supplier in the case of apparent damage.

Keep the packaging material for any future shipment of the equipment.
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 MCS EPS;
- 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 in 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 MCS 10, 15, 20 and 30);
- 1 front closing panel;
- 2 base strips for side closing;
- user manual;
- acceptance report;
- installation and maintenance manual.

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

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

INDICATION
In case of purchase of empty cabinets, the power modules and any battery drawers to install must be bought separately.

4. Unpacking and positioning

4.4 Movement

WARNING

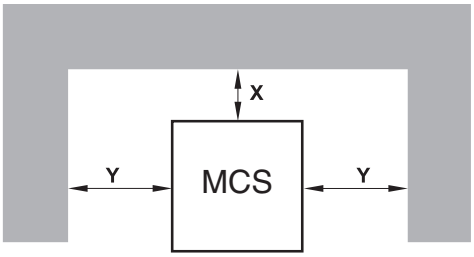
Move the EPS very carefully, lifting it as little as possible and avoiding dangerous swings or falls.
The equipment must always be handled by trained and instructed personnel equipped with the Personal Protective Equipment illustrated in chapter 2.

The EPS has wheels at the back of the cabinet. Before installations, 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.

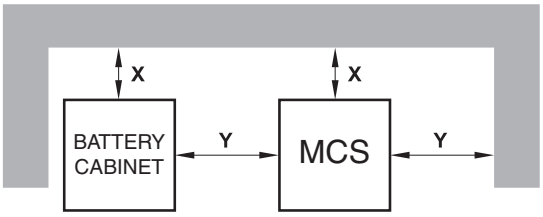
WARNING

Do not move the equipment after installation or following the insertion of power modules and any battery drawers.

4.5 Positioning constraints



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



Minimum recommended distances Trimod MCS UPS + Trimod MCS BATTERY X=100 mm / Y=200 mm

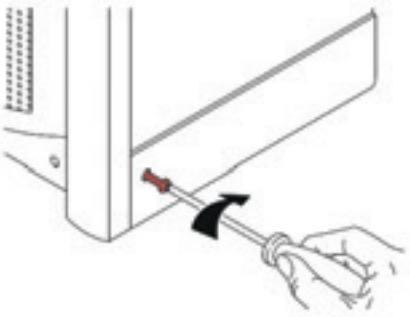
The EPS must be positioned respecting the following conditions:
- temperature and humidity must be within permitted limits;
- fire regulations must be respected;
- the wiring must be simply made;
- front and rear accessibility must be available for assistance or periodic servicing;
- the cooling flow 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 equipment 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 proceding 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.

4.6 Final operations

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



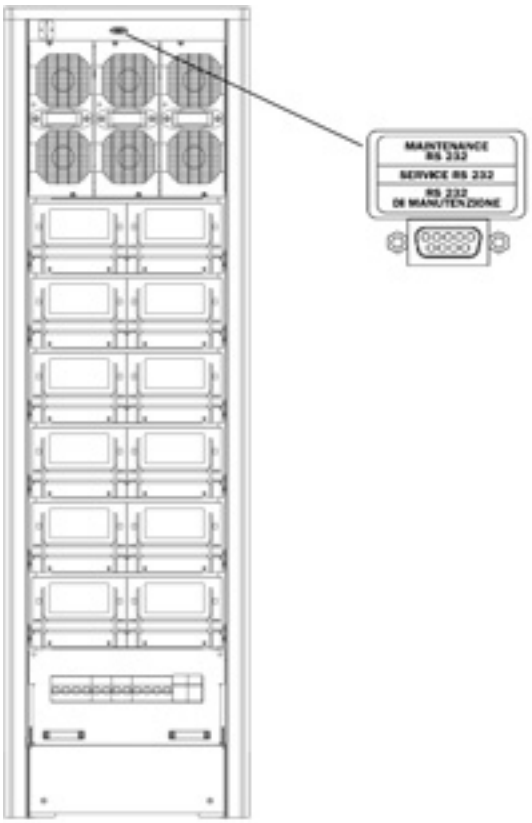
5. Communication devices

Trimod MCS EPS have two RS232 serial ports, one contact interface, one logic level interface on DB15 socket and one SNMP slot.
The communication interfaces are found in the rear of the equipment. The RS232 serial maintenance port is inside the EPS door, above the first row of power modules.

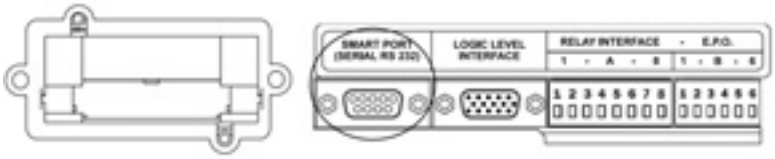
CAUTION
For the operator's safety it is essential the interfaces are connected in such a way that:
- the maximum voltage between any two wires connected to the interface and between any one of these wires and the earth is less than 42Vpk or less than 60Vdc;
- the insulation voltage between any wire connected to the interface and the earth is at least 1500Vac.

5.1 RS232 serial ports

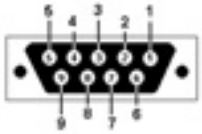
The first of the two RS232 serial ports is called "maintenance RS232" and is found above the first row of power modules, in a part accessible only to a skilled technician with a key to open the door. The RS232 maintenance door is dedicated exclusively to diagnostic functions and to update the equipment firmware.



The second serial port called "user interface" is located at the back of the EPS. Via computer, this port allows to access some data relative to the operation of the device as well as control the unmanned shutting down of the operating system.



5. Communication devices



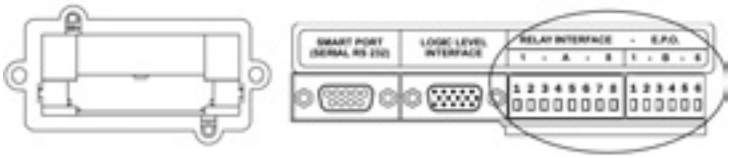
PIN	FUNCTION
2	RX
3	TX
5	GND
1 - 4 - 6	*connected together*
7 - 8	*connected together*

5.2 Contact interface

The notifications available through this interface are:
• battery mode operation
• autonomy reserve
• generic alarm
• overload
• EPS in bypass mode
• EPS in operating mode

The contacts of the relay interface are programmed in default mode as normally open (NO) and with specific signalling functions. These settings can be changed by means of the control panel (see section 6.4.2 - path **UPS Setup → Dry contacts**).
The contacts are available through 8 and 6 pole connectors.

The electric characteristics of the relay interface are the following:
- V_{MAX} = 250 Vac / 30 Vdc.
- I_{MAX} = 5 A.



PIN	CONNECTOR A FUNCTION
1 - 2	Contact 1 default: battery mode operation
3 - 4	Contact 2 default: autonomy reserve
5 - 6	Contact 3 Default: generic alarm
7 - 8	Contact 4 default: overload

PIN	CONNECTOR B FUNCTION
1 - 2	Contact 5 default: EPS in bypass mode
3 - 4	EPO (see paragraph 5.3)
5 - 6	-

5.3 Emergency Power Off (EPO)

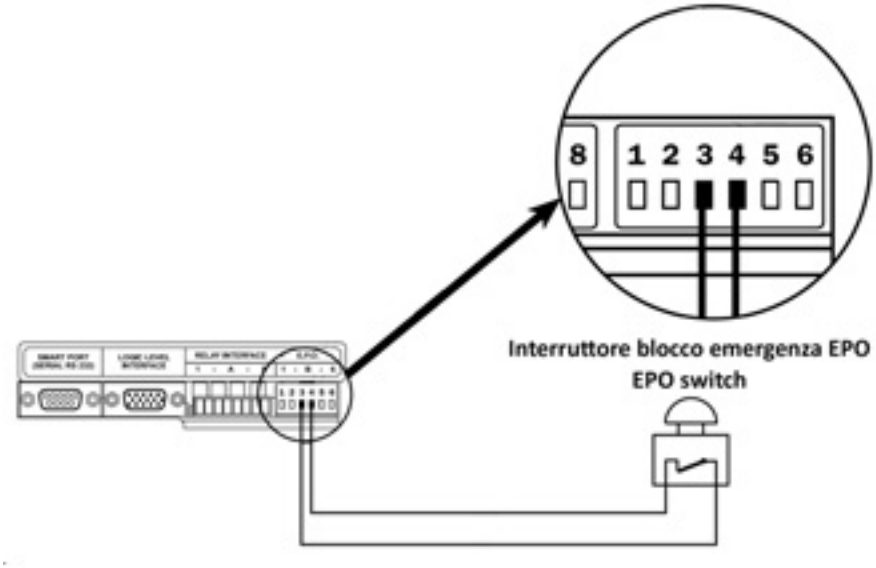
The EPS has an external normally closed contact (NC) that can be opened to activate the immediate stop of the equipment.
The EPO terminal is at the back of the EPS on pins 3 and 4 of the 6-pole connector of the relay interface.

For the correct connection of the EPO, the following requirements must be adhered to:
- use a double-insulation cable of up to 10 meters in length;
- check that the switch used is galvanically isolated.

INDICATION
It is not possible to connect the EPO circuits of different EPS in parallel. If necessary, use contacts on the EPO emergency pushbutton isolated from each other.

The electric characteristics of the EPO interface are:
- voltage between terminals 3 and 4 with open circuit: 12Vdc.
- current between terminals 3 and 4 with closed circuit: 5mA.

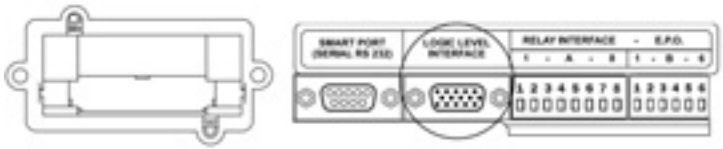
The figure below shows how the EPO connection must be made:



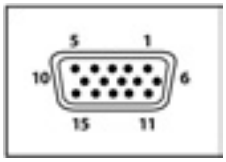
5.4 Logic level interface

The logic level interface is available on connector DB15 at the back of the EPS and makes it possible to connect the equipment in remote control mode with the aim of monitoring its operating status.
The following control signals are available:
• Mains/battery operation
• Autonomy reserve
• EPS fault
• Overload
• EPS in bypass mode
• ON/OFF input

The electric characteristics of the logic level interface are:
- Logical output: V_{MAX} = 12 Vdc, impedance on output: 2.2 kΩ in series
- Power supply: 12 Vdc, I_{MAX} = 700 mA, not regulated.
- Open collector outputs: 30 Vdc, I_{MAX} = 100 mA.

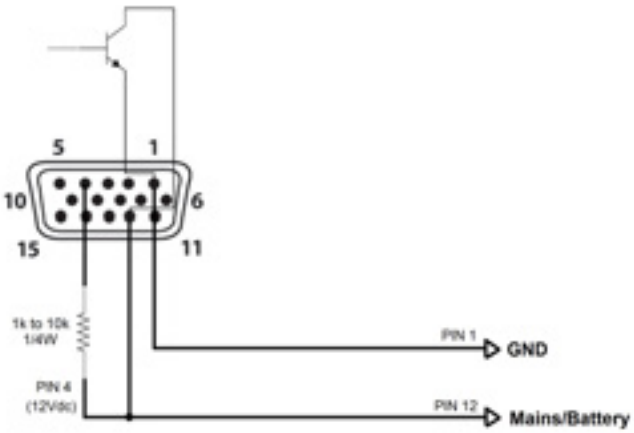


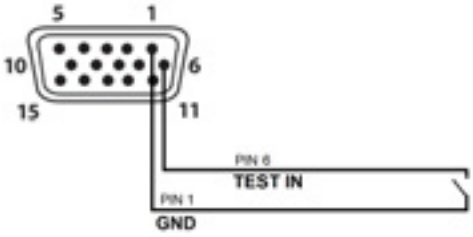
5. Communication devices



PIN	FUNCTION
1	GND
2	Mains / Battery (output, active high)
3	Autonomy reserve (output, active high)
4	Power supply
6	Test IN (if the output is disabled in normal mode, it is possible to enable it in presence of the mains by connecting the pin to the GND)
7	Overload (open collector, active low)
12	EPS in battery mode (open collector, active low)
13	EPS in bypass mode (open collector, active low)
14	Autonomy reserve (open collector, active low)
15	Alarm (open collector, active low)
5 - 8 - 9 - 10 - 11	*do not connect*

Two examples of how the open collector outputs and the TEST IN pin can be used are given below:





5.5 Network card (SNMP) slot

At the back of the EPS there is a slot for the SNMP card (optional).
The current taken from the SNMP slot for the operation of the network card must be in total less than 700mA.

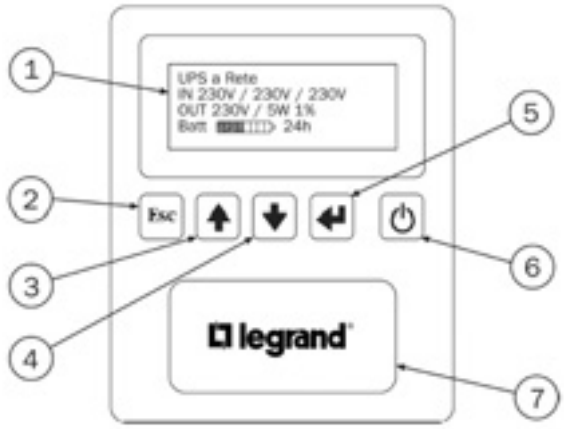
6. Control panel

6.1 Description

WARNING

The control panel allows to access some configuration pages of the EPS 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 equipment 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 characters 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 previous 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 following function;
- decrease 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.

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 EPS on and off;
- to shut down the output phases individually (only with the EPS set with 3 output independent phases).

7 - multicolour backlit status indicator

6. Control panel

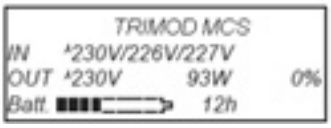
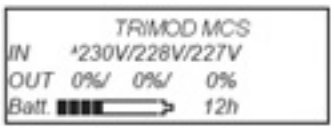
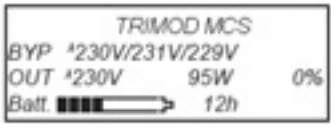
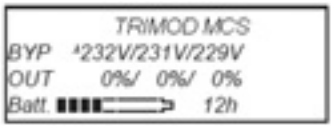
6.2 Service Mode

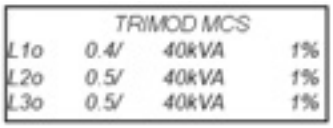
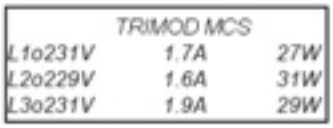
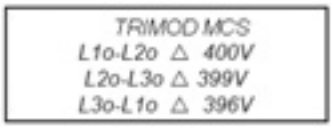
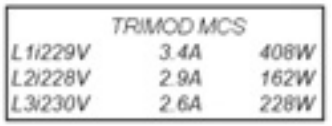
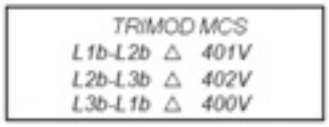
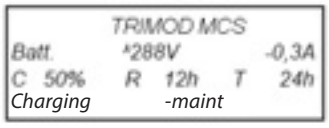
This is the operating mode necessary to make the setup during the installation and to manage the software update of the command board and power modules.
To access this mode, press the ENTER key with the the EPS off until the display shows the text "Service Mode..." At the end of the start-up procedure, 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 EPS turns off automatically after 20 minutes without receiving manual or serial commands.

6.3 Main screen

The main screen is shown on the display during EPS 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 equipment.

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

MAIN PAGE	DATA DISPLAYED
1 input - output - battery 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Input voltages 3rd line: Voltage set on output, active power absorbed by the load and total percentage of the load applied. 4th line: Bar showing the battery residual capacity and the actual operation time in case of a power failure.
2 input - percentage output - battery 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Input voltages 3rd line: Percentage of the load on the output phases 4th line: Bar showing the battery residual capacity and the actual operation time in case of a power failure.
3 bypass - output - battery 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Bypass voltages 3rd line: Voltage set on output, active power absorbed by the load and total percentage of the load applied. 4th line: Bar showing the battery residual capacity and the actual operation time in case of a power failure.
4 bypass - percentage output - battery 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Bypass voltages 3rd line: Percentage of the load on the output phases 4th line: Bar showing the battery residual capacity and the actual operation time in case of a power failure.

MAIN PAGE	DATA DISPLAYED
5 load availability on output 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Phase L1 - power in kVA or in W compared with the rated power or current compared with the rated one and relative percentage 3rd line: Phase L2 - power in kVA or in W compared with the rated power or current compared with the rated one and relative percentage 4th line: Phase L3 - power in kVA or in W compared with the rated power or current compared with the rated one and relative percentage
6 measurements on output 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Output L1 phase: Voltage, current and active power 3rd line: Output L2 phase: Voltage, current and active power 4th line: Output L3 phase: Voltage, current and active power
7 output line voltages 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: line voltage between L1 and L2 on output 3rd line: line voltage between L2 and L3 on output 4th line: line voltage between L3 and L1 on output
8 measurement on input 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Input L1 phase: Voltage, current and active power 3rd line: Input L2 phase: Voltage, current and active power 4th line: Input L3 phase: Voltage, current and active power
9 bypass line voltages 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: Line voltage between L1 and L2 of bypass line 3rd line: Line voltage between L2 and L3 of bypass line 4th line: Line voltage between L3 and L1 of bypass line
10 battery status 	1st line: Operating status of the EPS. If the text alternates "TRIMOD MCS" and "EPS in stand-by", the output is disabled 2nd line: voltage, charging current (negative value when charging in progress, positive value when the batteries are powering the equipment) 3rd line: battery capacity percentage compared with the nominal percentage, time remaining, total autonomy time 4th line: battery status: - Battery Stand-by - Discharging - Reserve autonomy - End autonomy - Charging - ph1 - battery recharging status (current limitation) - Charging - ph2 - battery recharging status (voltage limitation) - Charging - maint: Battery recharging in maintenance mode - Charging - float.: Battery charging in floating mode - Testing batteries: Battery test in progress - Equaliz. batteries: Battery equalizing in progress - BATTERY FAULT: battery voltage less than 100 V - MaxTime on Battery: End of the maximum set time for battery mode operation

6. Control panel

6.4 Main menu and submenu

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

The main menu has the following items:
- UPS Status: it allows to check the EPS status in real time;
- UPS Setup: it allows to configure all the EPS 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 EPS history;
- Tools: it allows to carry out a series of functional tests on the EPS;
- Log Out: it allows to end 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 (par. 6.4.1)	**UPS Setup** (par. 6.4.2)	**Power Modules** (par. 6.4.3)	**Events** (par. 6.4.4)	**Tools** (par. 6.4.5)	**Log Out (o)** (par. 6.4.6)
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 equipment has a menu and relative submenu tree structure, the functions of which are explained in the following paragraphs.
On the right side 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.

6.4.1 UPS Status

UPS Info	Model	Equipment model (TRIMOD MCS)
	SYNC. address	Synchronisation address of the command board
	Number of CM	Number of command boards recognised
	Max VA	Maximum apparent power [kVA]
	Maw 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	EPS serial number

UPS Cfg	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 EPS
	Number BCM	Number of battery charger module 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

Measures	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	Effective line voltage among the output phases [V rms]
		Irms	Output effective current on phase X [A rms]
		Peak Current	Output peak current on 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 EPS on phase X
		Maw W	Maximum active power available on phase X [W]
		Power	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 available by the EPS on phase X [VA]
		Appar. Power	Apparent power on phase X, expressed as a percentage in relation to the maximum apparent power available by the EPS 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.

6. Control panel

Measures	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 [V rms]
		Vrms ph-ph	Effective line voltage among the input phases [V rms]
		Irms	Absorbed effective input current on phase X [A rms]
		Peak Current	Input peak current on 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.

Measures	Batteries	Voltage	Battery voltage [V]
		Current	Current supplied by the batteries (negative if the EPS 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. - Testing batteries - Equaliz. batteries - BATTERY FAULT - MaxTime on Battery
		Total Auton.	Total autonomy the EPS would have with batteries 100% charged
		Resid.Auton.	Residual autonomy of the EPS
		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 EPS 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

Measures	Misc.	Int.Temp	Internal temperature [°C]
		Pos.H.V.Bus	Voltage on positive DC BUS [V]
		Neg.H.V.Bus	Voltage on negative DC BUS [V]

Alarms	Alarm Log. See chapter 7.

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

History Data	UPS RunTime	Total runtime
	OnBatteryTime	Total runtime on battery mode
	This batt.	Total 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

6.4.2 UPS Setup

Options	Startup on Battery	If enabled, it allows the EPS 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.

(*) Only available in the "Service Mode"

6. Control panel

Output	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 EPS detects the frequency of the input voltage and synchronises the output to the same value. If disabled, the EPS uses the "Nominal Value" setting.
	Inverter (*)	This sets the output configuration and the applied load: - Single Phase: a unique single phase output - Three Phases 120°: three phase output suitable for 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 L2 phase L3 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 shutdown

(*) Available in the "Service Mode" only *(**) Available with the inverter set up as three independent phases only*

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

Input	PLL enable	If enabled, the EPS 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 EPS synchronises the output voltage with the input: - NORMAL: syncronization for frequency variations of ±2% of the nominal value - EXTENDED: syncronization for frequency variations of ±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 EPS 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 0.1 Hz step
	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 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 equipment turns off in case of an extended overload.

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

Bypass	Bypass enable	If enabled, the EPS manages the bypass intervention automatically. If disabled, the EPS never switches to bypass mode so in the case of an extended overload or in the case of failure and absence of redundancy, it turns off.
	Forced Mode	If enabled, the EPS activates the bypass permanently
	DIP speed	It allows to vary the switching circuit sensitivity: - SLOW: indicated for loads that are not sensitive to voltage fluctuations and that cause current peaks - STANDARD: normal mode - FAST: for all loads that are highly sensitive to voltage fluctuations
	Off-Line Mode	If enabled, the EPS operates in eco mode. During the operation, the load is powered directly by the automatic bypass circuit. If there is a power failure or the voltage input tolerance is exceeded, the EPS activates the inverter thereby powering the load through the batteries.
	Startup 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.

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

Batteries	Threshold Values	Reserve Time	This sets the start time of the battery autonomy warning [min]
		MaxTime on Battery	This sets the maximum operating time in battery mode. Once this time has elapsed, the EPS turns off. Set at OFF to disable the function
	Charger	Standby Charge	If enabled, it activates the battery charge with the EPS off
	Auto Restart	Restart Enable	This enables or disables the restart of the EPS 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 standby charge function in order to restart automatically the EPS after a total battery discharge.
	Total KB	This sets the total number of KB installed. The parameter is necessary for the EPS 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 EPS [Ah].	

(*) Available in the "Service Mode" only

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

6. Control panel

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

(*) Only available with the chosen password.

Clock Setup	DD/MM/YY – HH:mm:SS	This sets the date/time of the EPS. By pressing the ENTER key, the value to modify is selected. By pressing the ARROW UP/DOWN keys, the selected value is increased or decreased. DD: day MM: month YY: year HH: hour mm: minutes SS: seconds

Dry contacts	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 allows to set the type of contact: - 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	This allows to set for all the contacts: - NORMALLY CLOSED - NORMALLY OPEN	

6.4.3 Power Modules

PM Status	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 supplied by power module X [VA]	
		Maw W	Maximum available active power supplied by 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 the mains by power module X [W]
			Appar.Power	Apparent power absorbed by the mains by power module X [VA]
			Vrms	Effective input voltage to the power module X [V rms]
			Vrms bypass	Effective input voltage to the power module X of the bypass line [V rms]
			Vrms ph-ph	Input line voltage to the power module X [V rms]
			Irms	Effective current absorbed by the mains supplied by power module X [A rms]
			Peak Current	Peak current of the 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	Output 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
			Maw W	Maximum available active power from power module X [W]
			Power	Output 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 [%]

(continue)

6. Control panel

PM Status	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 the 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 DC BUS of power module X [V]
			Neg.H.V.Bus	Voltage on the negative DC BUS of power module X [V]
	PM History Data	Run Time	Total runtime	
		Batt.Time	Total runtime on battery mode	
		Chg.Time	Total battery charger runtime	
		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 that the input line voltage has exceeded the maximum permitted value 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 to the power module	

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

Diagnostics (*)	PM errors recovery	This deletes the error memory detected in the power module. It deletes only the resettable errors.

PM SW update (*)	Update all PM	This allows the sequential and automatic update of the internal software in all the power modules. Press the ENTER key to start the procedure. If the update is not necessary, the message "PM SW Versions updated!" appears on the display. Press the ESC key to exit.
	Single PM SW update	This allows the internal software update of a single power module. Use the ARROW UP/DOWN keys to choose the module that has to be updated ('PM00' indicates the first power module installed in the first tunnel at the top left). Press the ENTER key to display a comparison between the software currently present in the selected module and the new software to be installed. Press the ENTER key to start the update procedure. When the update is complete, the message "PM SW Version updated!" appears on the display. Press the ESC key to exit.

(*) Available in the "Service Mode" only

CAUTION
Only a skilled technician is authorized to carry out an update.

6.4.4 Events

Events	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

6.4.5 Tools

Battery	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. For precise information about the battery charge status, it is necessary to perform the calibration in the following cases: - after installation and first start-up; - in case the batteries are replaced; - every six months after the first year of the EPS life.	
	Battery cycle	This carries out a battery test and their equalization to check the status, the performance and to maximise the battery life.	

Signalling Test (*)	This carries out the test of the status indicator signalling (green, orange and red) and of the acoustic notfication.

LCD Display Test (*)	This performs the test of the alphanumeric display. Press the ENTER key to display all the available characters.

(*) Available in the "Service Mode" only

Assistance	Display Identifier	This displays the code to communicate to the Technical Support Service.
	Use code	Enter the code provided by the Technical Support Service.

CM errors recovery	This deletes the error memory detected by the command board. It restores only the resettable errors.

6.4.6 Log Out

It is possible to set a password to prevent non-authorised personnel to modify the configuration.
By choosing a password, it is necessary to enter a private session to modify the 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.

6. Control panel

6.5 POWER ON/OFF menu

When the EPS is on, it is possible to access a menu called POWER ON/OFF by pressing the ON/OFF pushbutton for less than 0,5 seconds.
The choices that can be made in this menu are the following:

L1 phase (**)	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. Press the ARROW UP/DOWN keys to choose the ON or the OFF value. Press the ENTER key to confirm the value. Press the ESC key to leave the submenu.
L2 phase (**)	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. Press the ARROW UP/DOWN keys to choose the ON or the OFF value. Press the ENTER key to confirm the value. Press the ESC key to leave the submenu.
L3 phase (**)	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. Press the ARROW UP/DOWN keys to choose the ON or the OFF value. Press the ENTER key to confirm the value. Press the ESC key to leave the submenu.
UPS	Press the ENTER key to access the submenu to switch the EPS off. Press the ENTER key again to switch the equipment off. Press the ESC key to leave the submenu.
Hot swap	Press the ENTER key to access a submenu to make the hot-swap substitution of the power modules. **CAUTION** This operation CANNOT BE PERFORMED

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

6.6 Switching off the EPS

CAUTION
The shutdown procedure must be applied exclusively if the load is off or does not need to be supplied by the EPS.

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 two seconds.
2. The display shows the text "Turn off the UPS?". Press the ENTER key.
3. Wait for the shutdown operations to complete.

If a prolonged shutdown is planned, apply what is prescribed in chapter 9.

6.7 Switching on the EPS

The operator can turn the equipment on with the following procedure:
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 EPS turns off.
   If the display shows the message "WARNING: different UPS setup! <ENTER> to confirm UPS turn on", the EPS setup is different from the last power up. A skilled technican must check the 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.

7. Diagnosis

7.1 Luminous and audible notifications

The status indicator of the control panel and the led on the front of every power module change their colour according to the actual operating status of the EPS. This status is shown in the table below.

INDICATION

Some luminous notifications come with an audible notification. Press the ESC key to silence the buzzer. On every subsequent press, the buzzer 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 TIPS
GREEN Steady	**GREEN Steady**	-	Trimod MCS	Normal EPS operation with mains present, load within the limits and output enabled
GREEN Steady ORANGE Steady	**ORANGE Flashing**	-	TRIMOD MCS EPS in stand-by	Normal EPS operation with mains present, load within the limits and output disabled
-	-	-	3V Battery Fail	Contact the LEGRAND Technical Support Service
GREEN Steady ORANGE Flashing	**ORANGE Flashing**	-	Output/phase turned OFF	Phase OFF in configuration of 3 independent phases output. Check the output setup.
GREEN Steady ORANGE Flashing	-	-	Modules turned OFF	Command board in Hot Swap
GREEN Steady	**1 module: Steady ORANGE Remaining modules: Steady GREEN**	-	Equalizing Battery	Battery equalization in progress
GREEN Quick flashing	**GREEN Quick flashing**	-	-	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 input mains.
GREEN Quick flashing	-	-	-	One or more of the following problems are present: bypass absent, input PLL not synchronised, bypass voltage outside the limits, bypass three-phase circuit sequence not correct or reversed, bypass frequency out of tolerance. A skilled technician must check the bypass line.
GREEN Quick flashing	**GREEN Quick flashing**	-	Bypass line KO	The bypass line cannot be used to power the load
ORANGE Quick flashing	**ORANGE Flashing**	-	Forced on Bypass UPS on Bypass	Operation in forced bypass mode
ORANGE Steady	**ORANGE Steady**	ON 500 ms and OFF 12 s	UPS on Battery	Battery mode operation
ORANGE Steady	**ORANGE Steady**	-	Battery Cal..	Battery calibration in progress

continue...

7. Diagnosis

STATUS INDICATOR	POWER MODULE LED	AUDIBLE NOTIFICATION	STATUS MESSAGE	UPS STATUS DESCRIPTION AND OPERATING TIPS
ORANGE Steady	-	-	Battery Test...	Battery test in progress
ORANGE long intermittent	**GREEN Steady**	-	Make Maintenance	Contact the LEGRAND Technical Support Service
ORANGE long intermittent	**GREEN Steady**	-	Check Batteries	A skilled technician must check the battery status
ORANGE Quick flashing	**ORANGE Flashing**	-	Maintenance Bypass	Operation in manual bypass mode
ORANGE Short and double intermittent with pause	**ORANGE Steady**	Short intermittent blinks and double with pause	RUNTIME RESERVE!	Autonomy reserve during the battery mode operation
RED Steady	**RED Steady only on the module with the fault**	Quick flashing	FAULT CHARGER	Battery charger faulty on at least one power module. A skilled technician must replace the faulty module.
RED Steady	**RED Steady only on the module with the fault**	Quick flashing	FAULT MODULE	A skilled technician must replace the faulty power module.
RED Quick flashing	**ORANGE Flashing**	Quick flashing	BATTERIES KO	Batteries failed. A skilled technician must check the batteries.
RED Quick flashing	**RED Quick flashing**	Quick flashing	BATTERY DISCONNECTED	Batteries failed or not connected. A skilled technician must check the batteries.
RED Quick flashing	**RED Short and double intermittent with pause**	Quick flashing	BATTERY RUNAWAY	Excessive battery voltage. If the alarm persists over time a skilled technician must check the batteries.
RED Quick flashing	**RED Short and double intermittent with pause**	Quick flashing	HVBUS RUNAWAY FAIL	Contact the LEGRAND Technical Support Service
RED Quick flashing	**RED Steady**	Quick flashing	OUT DC LEVEL FAIL	Reset the power module error from the control panel in Service Mode (paragraph 6.4.3) and turn on the EPS. If the error persists, one or more power modules are faulty and a skilled technician must replace them.
RED Quick flashing	**RED Short and double intermittent with pause only on the module in alarm**	Quick flashing	OVERHEAT	Overheating of one or more power modules. Check the operation of the module fans and clean the air intake grilles.
RED Quick flashing	**RED Short and double intermittent with pause only on the module in overload**	Quick flashing	OVERLOAD	Overload on one or more power modules. Check the applied load.
RED Quick flashing	-	Quick flashing	CM FAILURE	Contact the LEGRAND Technical Support Service
RED Quick flashing	-	Quick flashing	Reference Error! or Reference Warning	Contact the LEGRAND Technical Support Service
RED Quick flashing	-	Quick flashing	BACKFEED	Contact the LEGRAND Technical Support Service

7.2 Messages

This paragraph shows the messages that appear on the control panel display or in the event list (see paragraph 6.4.4) 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 TIPS
TRIMOD MCS	The EPS is operating properly
Service mode	EPS in Service Mode. The parameters can be modified through the control panel and updates can be made.
UPS initialize...	The EPS is starting-up
CM initialize...	The command board is starting-up all the associated power modules after the exit from the hot-swap mode.
CM turning off...	The command board is turning off all the associated power modules after entering the hot-swap mode
Service Mode...	The EPS 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 EPS has entered the forced Bypass mode through a selection from the control panel.
UPS on Bypass	EPS 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.
Output/phase turned OFF	Phase or Output off. Configuration obtained via display or after a EPS malfunctioning.
UPS on battery	EPS in battery mode. A fault in the equipment power supply system or a loss of mains has occurred.
UPS in off-line	The load is powered directly from the bypass line. In case of a power failure, the equipment switches to battery mode.
Battery Cal...	The EPS is performing the calibration of the batteries through a command from the control panel.
Battery Test...	The EPS is carrying out a test on the batteries in order to check their status and proper operation.
Equalizing Battery	The EPS is performing battery equalization.
Buzzer Muted	The buzzer has been silenced.
RUNTIME RESERVE!	The battery charge is low while the EPS is working in battery mode.
FAULT MODULE	One or more power modules are faulty. A skilled technician must replace them.

continue...

7. Diagnosis

MESSAGE	MEANING AND OPERATING TIPS
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 failed. A skilled technician must check their status and replace them if necessary.
BATTERY DISCONNECTED	The EPS detects a battery voltage lower than 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 load is higher than the rated power of the EPS.
OVERHEAT	The temperature inside the EPS is outside the nominal range. Check the operation of the module fans and clean the air intake grilles.
OUT DC LEVEL FAIL	Reset the power module error from the control panel in Service Mode (paragraph 7.4.3) and turn on the EPS. If the error persists, one or more power modules are faulty and a skilled technician must replace them.
HVBUS RUNAWAY FAIL	Contact the LEGRAND Technical Support Service.
BATTERY RUNAWAY	The battery voltage 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 exhausted. 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 battery status.
Make Maintenance	Contact the LEGRAND Technical Support Service.
Shutdown ongoing...	The EPS is shutting down after being programmed to do so by the user
Charging Battery	The EPS 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 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 EPS 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 EPS.
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.

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 ventilation system.
OVERLOAD	Overload. Check the connected load level.
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	Excessive battery voltage. A skilled technician must check the batteries.
MODULE COMMUNICATION FAIL PM -> CM	Failure 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	Failure in the communication 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.

7. Diagnosis

SCREEN DISPLAYED ON START-UP OR SHUT DOWN

MESSAGE	MEANING AND OPERATING TIPS
First Turn ON: Supply Mains!	The EPS has never been turned on. No mains input. Start-up not permitted. Make sure the mains is present before turning on.
Mains not Present! Startup not Allowed	No mains input. Start-up not permitted. To start the EPS in battery mode select this configuration from the control panel (paragraph 6.4.2).
Emergency Power Off!	The Emergency Power Off (EPO) has been activated. The EPO command has been sent by a pushbutton or a disconnector switch on the input line has been opened during the operation of the EPS. Check the emergency pushbutton.
Incomplete Setup for start-up!	The EPS 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 input 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 EPS continues the start-up procedure.
Invalid PM HW Versions!	One or more power modules are not compatible with the EPS. Contact the LEGRAND Technical Support Service.
START UP Error!	An error has occurred during the start-up procedure of the EPS. Contact the LEGRAND Technical Support Service.
Startup aborted	The EPS start-up has not been confirmed from the control panel within 30 seconds after the confirmation request of the start-up procedure.
UPS turned off by program!	EPS shut down as programmed via software in a remote control system
Incorrect setup turn-off	An error has occurred during the configuration. EPS is shutting down. One or more 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 6.4.2)
Low Battery TurnOff	EPS 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 EPS or the BUS is not properly charged. A skilled technician must check the batteries.
Battery Time Expired	EPS shutdown during battery mode because the maximum battery operating time set from the control panel has been reached (paragraph 6.4.2)
Load turned OFF	The load power has been cut off
Powered from Output	Start-up error. Voltage present on the equipment output. A skilled technician must check the connections.
Turned Off with charged H.V.bus	The EPS has not shutdown properly. Make sure the DC buses are discharged before performing any maintenance operation.
Saving NVData error	Error saving some EPS 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.

MESSAGES DISPLAYED ON START-UP

MESSAGE	MEANING AND OPERATING TIPS
WARNING: alarm records in memory!	It is necessary to confirm the turning on of the EPS in presence of alarms in the even list
WARNING: different UPS setup!	The EPS configuration has changed from the last power up. A skilled technican must check the setup before confirming the power up.
Maintenance Bypass! Open output	Open the output breaker before turning on the EPS to exit the manual maintenance bypass mode.
Turn ON after low battery turn OFF.	The EPS is turned on after a previous end of autonomy
<ENTER> to confirm UPS turn ON	Press the ENTER key to turn on the EPS

CRITICAL EVENTS (paragraph 6.4.4)

MESSAGE	MEANING AND OPERATING TIPS
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 ventilation system.
Overload	Overload. Check the connected load level.
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 output
Battery voltage too high	Excessive battery voltage. 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 output load power has been cut off
Irregular TurnOff	EPS shutdown in an anomalous way. The skilled technician must make sure that there is no voltage inside the equipment before performing any maintenance operation.
Overload TurnOff	EPS shutdown due to an extended overload
Emergency Power Off turn-OFF	EPS 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.
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.

continue...

7. Diagnosis

MESSAGE	MEANING AND OPERATING TIPS
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 6.4.4)

MESSAGE	MEANING AND OPERATING TIPS
Low Battery TurnOff	EPS shutdown due to autonomy end during the battery mode operation.
Invalid sequence turn-OFF	EPS 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 EPS because the maximum battery operating time set from the control panel has been reached (paragraph 6.4.2)
StartUP error	Start-up error.
Start-up granted with alarms	EPS start-up authorised in presence of alarms
Start-up granted with new cfg	EPS start-up authorised with new configuration. The number of power modules installed on the UPS has changed.
Incorrect setup turn-off	EPS shutdown because the configuration is wrong. The number of power modules detected by the EPS 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 EPS output. A skilled technician must check the connections.
Turned Off with charged H.V.bus	The EPS has not shutdown properly. The EPS 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
Charge finished	Faulty operation 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 6.4.4)

MESSAGE	MEANING
User Turn ON	User start-up of the EPS
User Turn OFF	User shutdown of the EPS
Auto turn ON	Automatic EPS start-up
Timed turn OFF	The EPS has been shut down via the delayed shutdown programming (paragraph 6.4.2)
Stand-by battery charge start	The battery charger has started in EPS stand-by mode
UPS on battery	The EPS has transferred to battery operation mode
UPS on mains	The EPS has transferred to mains operation mode
Line Out turned OFF	The EPS output has been shut down
Battery test executed	Battery testing successfully completed
Battery learning executed	Battery calibration successfully completed
Forced Bypass ON	The forced bypass operation mode has been enabled
Forced Bypass OFF	The forced bypass operation mode has been disabled
Maintenance Bypass ON	The load is powered directly from the manual bypass disconnector switch
Maintenance Bypass OFF	The load is no longer powered directly from the manual bypass disconnector switch
Enter in Hot Swap	The equipment has started-up the hot-swap mode
Exit from Hot Swap	The equipment 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

8. Installation and maintenance

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

8.1 Introduction

This chapter contains all the information necessary for an operator to correctly install and maintain the EPS.

DANGER
The operator is not authorised to perform the operations contained in the installation and maintenance manual.
LEGRAND declines all liability for any injury or damage caused by activities carried out differently from the instructions in this manual or by a skilled technician who does not observe the requirements laid down in the installation and maintenance manual.

8.2. Installation

The operator is not authorized to install and electrically connect the EPS. 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.

8.3 Preventive maintenance

The EPS does not contain parts for preventative maintenance by the operator.
The operator must periodically perform:
- a normal general external cleaning;
- a check to verify the absence of alarms on the display;
- a check to verify the correct operation of the fans on each power module.

After the first year of EPS life, 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 EPS detects the discharge curve of the batteries in order to provide precise information on the charging status.
To activate the function enter the main menu 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.

8.4 Periodical checks

The correct EPS operation must be guaranteed by periodical maintenance inspections. These are essential to safeguard the EPS reliability.

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

8.5 Ordinary maintenance

Contact a skilled technician if it is necessary to replace or add power modules, battery drawers for modular Trimod MCS BATTERY or batteries for non-modular Trimod BATTERY.

8.6 Extraordinary maintenance

Contact the LEGRAND Technical Support Service if faults have occurred which require access to internal parts of the EPS.

9. Warehousing

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

DANGER
The SKILLED TECHNICIAN must check that there is no voltage present before disconnecting the cables. All the battery breakers on the EPS and on the external battery cabinets must be open. The modular Trimod MCS BATTERY battery drawers (if present) and the EPS battery drawers (according to the model) must be removed.

9.1 EPS

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

9.2 Batteries

It is possible to store batteries without recharging them in the following conditions:
- 6 months at +20°C (+68°F);
- 3 months at +30°C (+86°F);
- 2 months at +35°C (+95°F).

For the recharging of the battery contact a qualified technician.

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

10. 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.

10.1 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 country for the proper procedure.

Pb

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

10.2 EPS dismantling

The dismantling of the EPS 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 machine 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.

10.3 Electronic component dismantling

For the disposal of electronic waste like the control panel 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.

11. Technical data

Main features

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Nominal power	3.4 kVA	5 kVA	6.7 kVA	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA	60 kVA	80 kVA
Active Power	3.4 kW	5 kW	6.7 kW	10 kW	15 kW	20 kW	30 kW	40 kW	60 kW	80 kW
Active power according to EN50171	2.83 kW	4.16 kW	5.58 kW	8 kW	12.5 kW	16.7 kW	25 kW	33.3 kW	50 kW	66.7 kW
Technology	Classification according to EN62040-3: VFI-SS-111									
IN/OUT Configuration	Single-phase / Single-phase			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 the models									
Command boards	1									
EPS 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

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Maximum three-phase/ three-phase current	-	-	-	19.2 A	28.8 A	38.4 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/single phase current	-	-	-	57.6 A	86.4 A	115.2 A	172.8 A	-	-	-
Maximum single-phase/single-phase current	19.5 A	28.7 A	38.5 A	57.6 A	86.4 A	115.2 A	172.8 A	-	-	-
Rated input voltage	230 V + 15% - 20% (Single-phase)			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%									

11. Technical data

Electrical output characteristics (normal mode)

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Maximum three-phase/ three-phase current	-	-	-	14.5 A	21.7 A	29 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/single phase current	-	-	-	14.5 A	21.7 A	29 A	43.5 A	-	-	-
Maximum single-phase/single-phase current	14.8 A	21.7 A	29.2 A	43.5 A	65.2 A	87 A	130.5 A	-	-	-
Rated output voltage	230 V ± 1% (Single-phase)			230 V ± 1% (Single-phase) 400 V ± 1% (Three-phase)				400 V ± 1% (Three-phase)		
Rated output frequency	50 / 60 Hz									
Tolerance on the output frequency	If synchronised with the input frequency: adjustable range from ±1% to ±14% If not synchronised: ± 1%									
Crest factor admitted on the output current	3:1									
Efficiency (AC/AC on-line)	up to 96%									
Efficiency ECO mode	99% max									
Overload admitted	120% continuously without automatic bypass intervention 135% for 10 minutes without automatic bypass intervention 150% for 60 seconds without automatic bypass intervention									

Electrical output characteristics (battery mode)

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Rated output voltage	230 V ± 1% (Single-phase)			230 V ± 1% (Single-phase) 400 V ± 1% (Three-phase)				400 V ± 1% (Three-phase)		
Rated output frequency	50 / 60 Hz ± 1%									
Total harmonic distortion of output voltage on non-linear nominal load	< 1%									
Overload admitted	120% until end of autonomy 135% for 2 minutes 155% for 30 seconds									

Batteries and Battery Charger Characteristics

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Battery type	Long-life maintenance-free sealed lead-acid (VRLA); life expectancy 10 years									
Unitary capacity	Battery drawers: 5 batteries 12Vdc - 9Ah Non-modular external battery cabinets: 20 batteries 12Vdc - 94Ah									
Rated battery voltage	240 Vdc (20 batteries 12V in series)									
Type of battery charger	High performance PWM, one for each power module									
Recharge curve	Smart Charge, advanced three-stage cycle									
Battery charger nominal recharge current	2.5 A max for every power module installed									
Charging time (EN50171)	12 h max									

	3 109 90 Trimod MCS 3	3 109 91 Trimod MCS 5	3 109 92 Trimod MCS 7	3 109 93 Trimod MCS 10	3 109 94 Trimod MCS 15	3 109 95 Trimod MCS 20	3 109 96 Trimod MCS 30	3 109 97 Trimod MCS 40	3 109 98 Trimod MCS 60	3 109 99 Trimod MCS 80
Minimum number of batteries to guarantee an autonomy of 1 h (EN50171) *	8 battery drawers	12 battery drawers	16 battery drawers	24 battery drawers (12 in the EPS + 12 in the external modular battery cabinet 4KB)	36 battery drawers (16 in the EPS + 20 in the external modular battery cabinet 5KB)	1 external non-modular battery cabinet	2 external non-modular battery cabinet	2 external non-modular battery cabinet	3 external non-modular battery cabinet	4 external non-modular battery cabinet

**1h autonomy only guaranteed for the item codes listed in the table*

Features

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Signals and alarms	Large four line alphanumeric screen, multicolour status indicator, acoustic notification									
Communication ports	2 x RS 232 ports, 1 relay interface, 1 contact port, 1 SMNP module slot									
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 EPO contact Auxiliary contact for Backfeed protection									

11. Technical data

Mechanical characteristics

	3 110 00 Trimod MCS 3	3 110 00 Trimod MCS 5	3 110 00 Trimod MCS 10	3 110 01 Trimod MCS 20	3 110 03 Trimod MCS 30	3 110 04 Trimod MCS 40	3 110 05 Trimod MCS 60
Net weight (without batteries and power modules)	87 kg			90 kg	86 kg	83 kg	92 kg
Dimensions in mm (w x h x d)	414 x 1370 x 628						
3400 VA power modules installed	1	-	3	-	-	-	-
5000 VA power modules installed	-	1	-	-	6	-	-
6700 VA power modules installed	-	-	-	3	-	6	9
Power module net weight	8.5 kg						
Battery drawer net weight	13.3 kg			-	-	-	-

	3 110 02 Trimod MCS 7	3 110 02 Trimod MCS 15	3 110 06 Trimod MCS 80
Net weight (without batteries and power modules)	105 kg		122 kg
Dimensions in mm (w x h x d)	414 x 1650 x 628		
3400 VA power modules installed	-	-	-
5000 VA power modules installed	-	3	-
6700 VA power modules installed	1	-	12
Power module net weight	8.5 kg		
Battery drawer net weight	13.3 kg		-

	3 110 07 Trimod MCS Battery Cabinet 4KB	3 106 16 Trimod MCS Battery Cabinet 5KB	3 108 08 3 108 09 3 108 10 3 108 11 Trimod Battery Cabinet 94Ah
Net weight (without batteries)	82 kg	96 kg	100 kg
Dimensions in mm (w x h x d)	414 x 1370 x 628	414 x 1650 x 628	600 x 1635 x 800
Battery drawer weight	13.3 kg		-
Weight of each 94Ah battery	-		32.6 kg

Environmental conditions

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
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 dB									
Protection index	IP 20									
Operating height	up to 1000 metres above sea level without derating									

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

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

Reference directives and standards

CPSS	EN 50171
Safety	2014/35/EU directive EN 62040-1
EMC	2014/30/EU directive EN 62040-2
Performance and test requirements	EN 62040-3

LEGRAND
Pro and Consumer Service
BP 30076 - 87002
LIMOGES CEDEX FRANCE
www.legrand.com

Installer stamp

Legrand reserves at any time the right to modify the contents of this booklet and to communicate,
in any form and modality, the changes brought to the same.

Trimod MCS

Installation and maintenance manual

Item LE10961AA-01/19-01 CT

Trimod MCS

Contents

Contents

1. Introduction

CAUTION
The instructions in this manual are intended for a SKILLED TECHNICIAN (paragraph 2.2.1).
Once the EPS has been installed, the skilled technician must not leave this manual at the operator's disposal.

1.1 Purpose of the manual

The purpose of this manual is to provide the skilled technician (see paragraph 2.2.1) with instructions for safely installing the TRIMOD MCS EPS, also called "equipment" in the rest of the manual, and carry out ordinary maintenance procedures.

Any adjustments and extraordinary maintenance operations are not dealt with in this manual because they are the sole preserve of LEGRAND's Technical Support Service.

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

The intended use and configurations envisaged for the equipment and 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 installation and user manual.

This manual also makes reference to laws, directives and standards that the skilled technician 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.

1.2 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 the things around it.

WARNING
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 the things around it.

CAUTION
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 the things around it.

INDICATION
This symbol indicates important information which should be read carefully.

1.3 Where and how to keep the manual

This manual must be kept in a safe, dry place and must always be available for consultation exclusively by the skilled technician.
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 supplied manuals are an integral part of the equipment and must therefore be kept for their entire lifetime.
In case of need (for example in case of damage that even partially compromise the consultation) the skilled technician is required to get a new copy from the Manufacturer, quoting the publication code on the cover.

1.4 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 standards 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 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 updated version of the manual is available on the Internet at http://www.ups.legrand.com

1.5 Manufacturer's liability and guarantee

The skilled technician and the operator shall scrupulously comply with the precautions indicated in the manuals. In particular 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:
- installation and wiring completed by personnel not possessing the qualifications required by the regulations of the country of installation for working on equipment operating on dangerous voltages;
- installation and wiring completed by personnel not wearing the Personal Protective Equipment required by the regulations of the country of installation;
- failure to observe the installation, maintenance instructions and use of the equipment which differs from the specifications in the user manual;
- 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 or protections other than those indicated in the installation and maintenance manual;
- damage caused by failure to install or establish the safety protections indicated in the manuals, or by failure to comply with the safety labels.

Transfer of the equipment to others also requires the handing over of all the manuals. Failure to hand over the manuals shall automatically nullify any right of the buyer, including the terms of the guarantee where applicable.
If the equipment is sold to another party in a country where a different language is spoken, the original owner shall be responsible for providing a faithful translation of the manuals in the language of the country where the equipment will be used.

1.5.1 Guarantee terms

The terms of the guarantee may vary depending on the country where the EPS 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.

1. Introduction

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

The guarantee becomes void if the EPS 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 EPS 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 Copyright

The information contained in this manual cannot be divulged to third parties. Any partial or total duplication of the manual which is not authorised in writing by the Manufacturer, by photocopying or other systems, including by electronic scanning, 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.

2. Regulatory and safety requirements

DANGER
Before carrying out any operation on the equipment, it is necessary to read the entire manual carefully, especially this chapter.
Look after this manual carefully and consult it repeatedly during installation and maintenance by a skilled technician.

2.1 General notes

The equipment has been made for the applications given in the manuals. It may not be used for purposes other than those for which it has been designed, or differently from those specified.
The various operations must be carried out according to the criteria and the chronology described 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 qualification and are aware of the method of installing, assembling, repairing, commissioning and safe use of the equipment.
In addition to the requirements listed in the paragraph below for general operators, the Skilled Technician must be qualified in accordance with the safety regulations in force in the country of installation on the measures to implement when working in presence of hazardous voltage. He must also use the Personal Protective Equipment required by the safety regulations in force at the country of installation for all the activities indicated in the installation and maintenance manual (see paragraph 2.3)

WARNING
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 the people working on the equipment have received all 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 current;
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 should 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 requirements 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 EPS;
- the cleaning of the equipment;
- cooperation with personnel responsible for ordinary maintenance activities (skilled technicians).

2. Regulatory and safety requirements

2.3 Personal Protective Equipment

DANGER
The equipment 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 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

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.


How to proceed in an emergency
Do not use water to quench fires but just the extinguishers specifically designed for putting out fires in electrical equipment.


No smoking
This sign indicates that smoking is not allowed.

2.5 Signs on the equipment

Displayed on the equipment are explanatory plates that can vary depending on the country the equipment is intended for and constructional standards applied.
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 it 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 EPS works with dangerous voltages. Only SKILLED TECHNICIANS must perform the 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.

DANGER
Before beginning any installation and/or maintenance operation, make sure that all the DC and AC power sources are disconnected.
The EPS must be installed with an earth connection to avoid high leakage currents. First connect the earthing cable.
Check during each installation and/or maintenance operation the continuity of the earthing system.

DANGER
The EPS is powered by its own DC energy source (batteries). The output terminals may have a dangerous voltage even if the EPS is not connected to the AC power network.
The DC power source could comprise multiple battery drawers in parallel and/or external battery units. Disconnect all battery drawers and external battery units before performing any installation and/or maintenance operation.

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 the ground connections are removed during installation and maintenance (applicable to remote equipment and battery supplies without a grounded supply circuit).
g) never leave powered 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.
The batteries installed inside the cabinet must be disposed of correctly. For the disposal requirements refer to local laws and relevant standards.

CAUTION
The EPS works 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 the output 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 while the EPS is powering the loads in battery mode.

2. Regulatory and safety requirements

WARNING

To reduce the risk of fire or electric shock, the equipment 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

The equipment generates, uses and can radiate radio frequency energy. If it is not installed and used in accordance with the instructions in the manuals, it may cause harmful interference with radio communications.

Trimod MCS 3, 5, 7 and 10 are category C2 products according to standard EN62040-2.
In the home environment these devices could cause radio interference; in this case appropriate countermeasures must be taken.
All other Trimod MCS models are category C3 products according to standard EN62040-2.
They can therefore be used in commercial and industrial environments; nevertheless restrictions or adequate countermeasures might be necessary to avoid radio interference.

The skilled technician must also:
- pass with a double turn, the cables connected to the backfeed terminals to a Fair-Rite toroid code 0431176451 made with T31 material, installed as close as possible to the clamps;
- pass the input cables through three EPCOS TDK toroids code B64290L699X35 made with T35 material;
- pass the output cables through two EPCOS TDK toroids code B64290L699X35 made with T35 material;

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 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 each and any access area.
- The connection of the equipment (and of any accessory devices) must always be perfectly grounded to discharge short-circuit currents and electrostatic voltages. The input voltage must correspond with the value shown on the rating plate. Current adapters must not be used under any circumstances. Pay attention to polarity when connecting.
- Any intervention on the equipment must be done only after it has been disconnected from the power supply network by means of a switch disconnector and must be locked with an appropriate padlock.
- The EPS must not be turned on if liquid is leaking from the batteries.
- The equipment used for any maintenance operations (pliers,screwdrivers etc.) must be electrically insulated.
- Depositing flammable material near the equipment is strictly forbidden. The equipment should always be locked, and only specifically trained personnel are allowed access to them.
- Do not disable any safety, signalling or warning devices and do not ignore any alarms, warning messages or notices, 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 equipment, the devices and the operation sequence, be modified, disabled or tampered with in any way, without prior consultation with the Manufacturer.
- When replacing fuses, only use ones of the same type.
- The replacement of the batteries is an operation intended to be carried out by a skilled technician.
- Keep a register in which to enter 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, carry out a careful check in order to make sure 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 EPS door;
- the installation and maintenance manual.

2.7 How to proceed in an emergency

The following information are general.
For the specific interventions consult the regulations in force in the country where the equipment is installed.

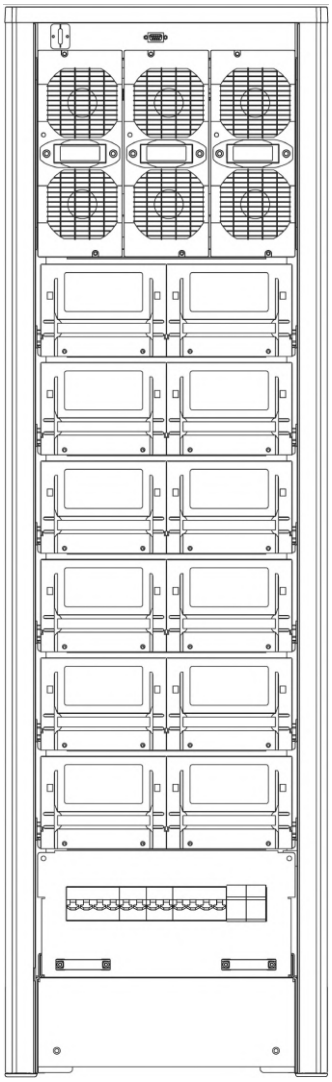
2.7.1 First-aid procedures

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

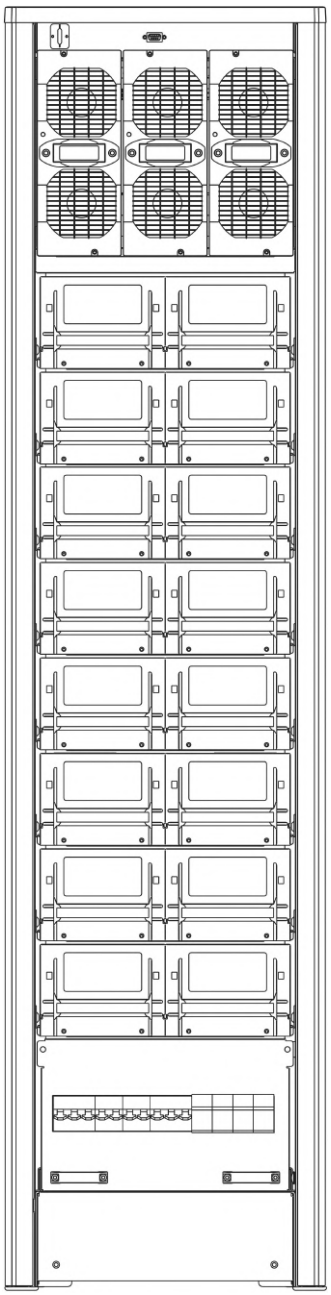
2.7.2 Fire procedures

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

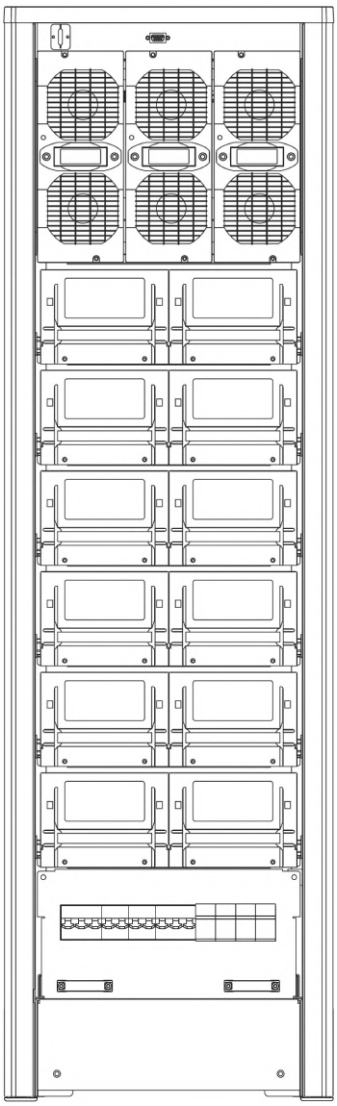
3. Models



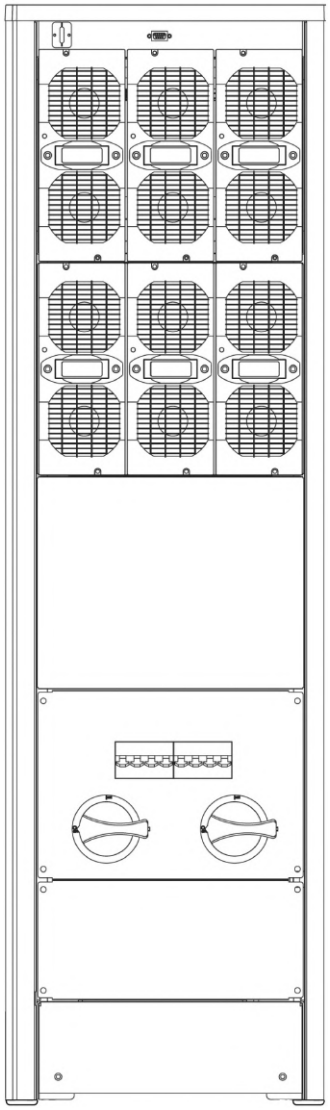
Trimod MCS 3-5-10



Trimod MCS 7-15

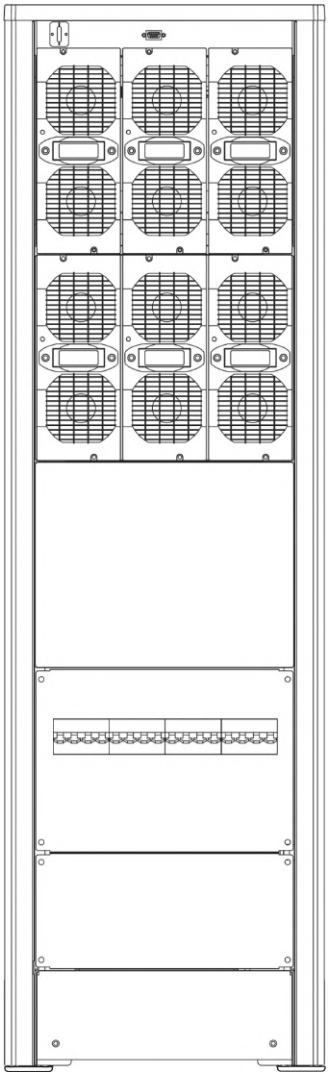


Trimod MCS 20

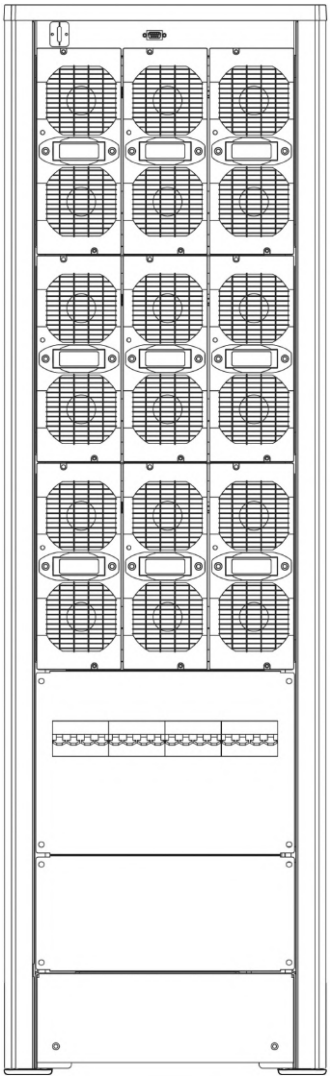


Trimod MCS 30

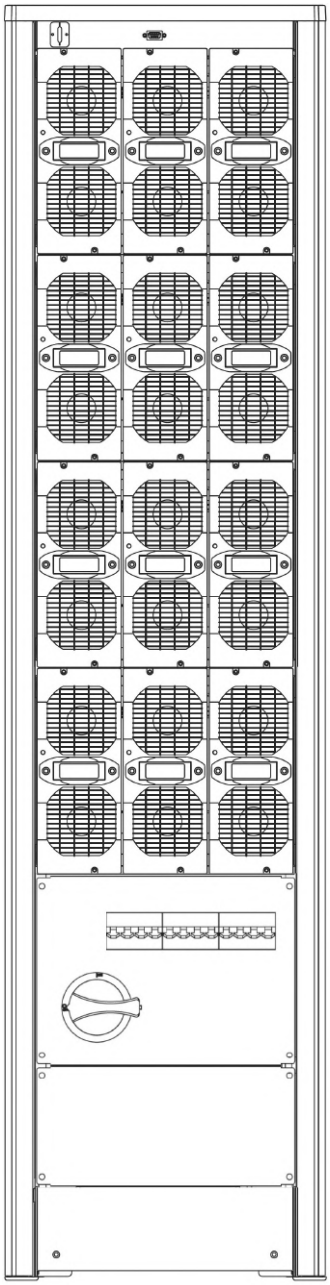
3. Models



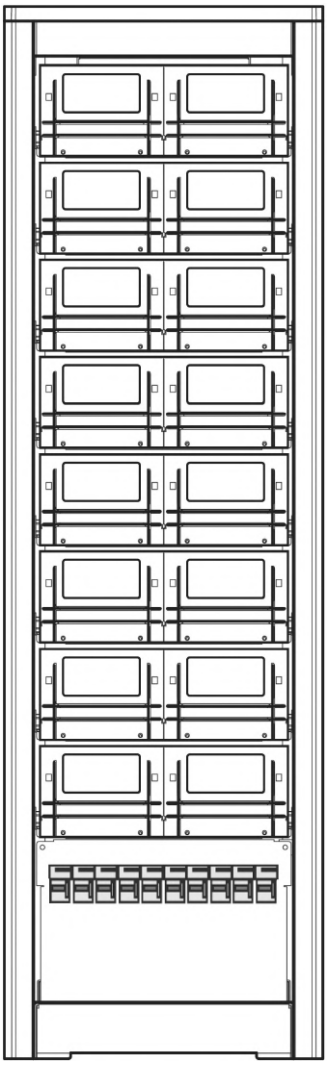
Trimod MCS 40



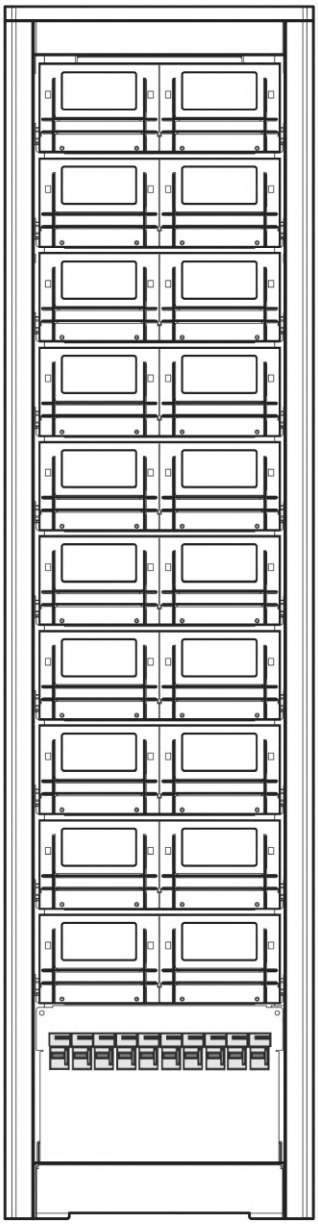
Trimod MCS 60



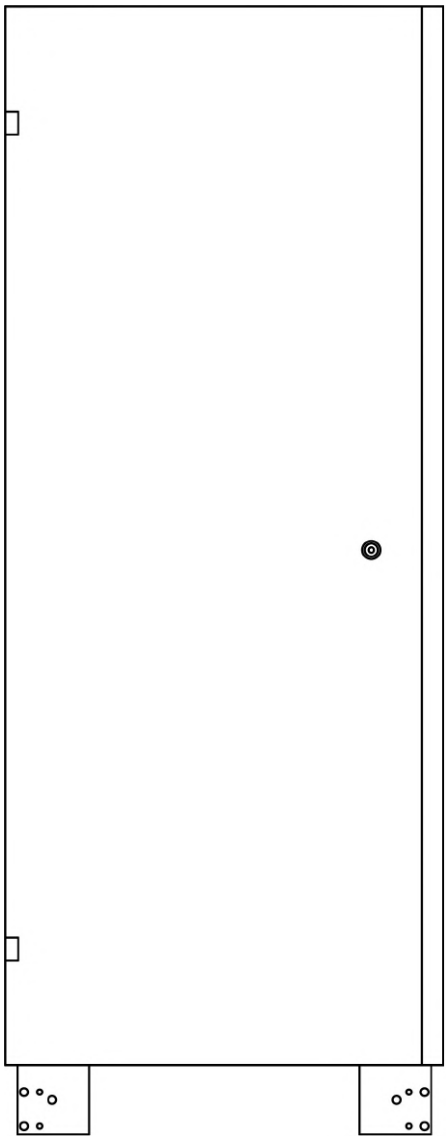
Trimod MCS 80



Trimod MCS MODULAR BATTERY 4KB
(16 battery drawers)



Trimod MCS MODULAR BATTERY 5KB
(20 battery drawers)

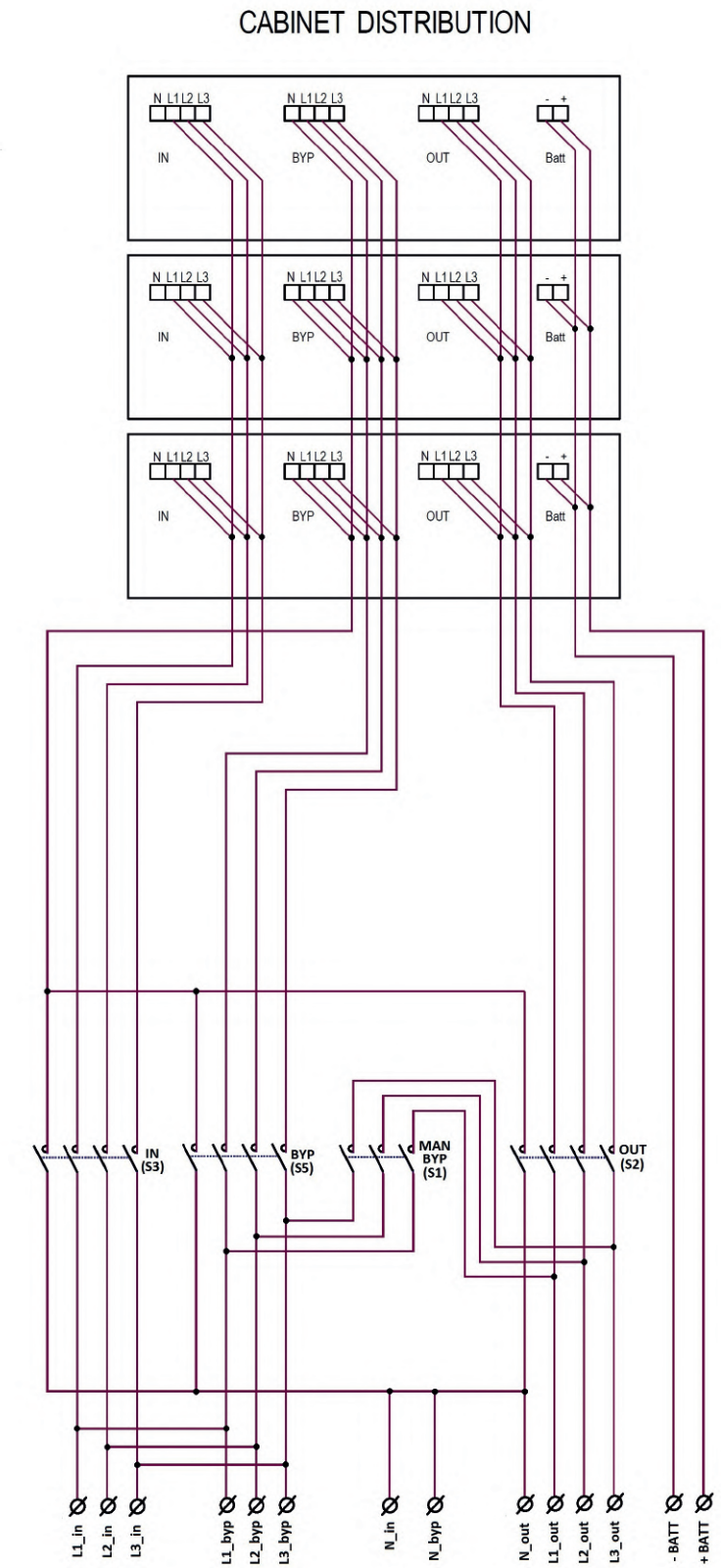


Trimod NON MODULAR BATTERY 1KB
(94Ah)

3. Models

3.1 Block diagram of interconnections and distributions of the EPS

The following figure shows the block diagram of a Trimod MCS 60 distribution. The layout is similar for all the other models. The bypass input terminals are represented according to the factory configuration (bypass input line in common).



4. Unpacking and positioning

4.1 Visual check

On delivery of the EPS, 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 damaged immediately inform:
- the transporter;
- the LEGRAND Technical Support Service.

Check the equipment corresponds with the material indicated in the delivery documentation.
Follow the instructions in Chapter 8 when storing the equipment.

4.1.1 Equipment and supplied accessories check

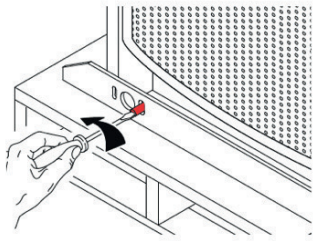
The equipment and the relative supplied accessories must be a perfect state of repair.
Check that:
- the shipping data (address of the recipient, no. of packages, order no, etc.) correspond to what is contained in the delivery documentation;
- the technical rating plate data on the label applied to the EPS correspond with the material purchased, described in the delivery documentation;
- the documentation accompanying the equipment includes the installation manual and the user manual.

Should any of these be different from what they should be, 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 EPS by undoing the four fixing screws present;
7. check the equipment for damage. Immediately inform the shipper and the supplier in the case of apparent damage.

Keep the packaging material for any future shipment of the equipment.
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 MCS EPS;
- 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 in 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 MCS 10, 15, 20 and 30);
- 1 front closing panel;
- 2 base strips for side closing;
- user manual and installation and maintenance manual;
- acceptance report.

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

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

INDICATION
In case of purchase of empty cabinets, the power modules and any battery drawers to install must be bought separately.

4. Unpacking and positioning

4.4 Movement

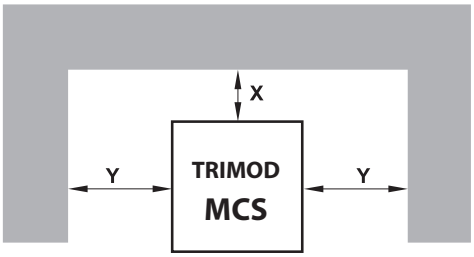
WARNING
Move the EPS very carefully, lifting it as little as possible and avoiding dangerous swings or falls.
The equipment must always be handled by trained and instructed personnel equipped with the Personal Protective Equipment illustrated in chapter 2.

The EPS has wheels at the back of the cabinet. Before installations, 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.

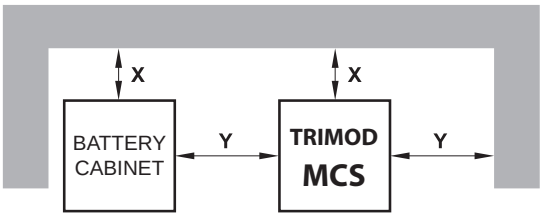
WARNING
Do not move the equipment after installation or following the insertion of power modules and any battery drawers.

4.5 Positioning constraints

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



Minimum recommended distances Trimod MCS + Trimod MCS BATTERY X=100 mm / Y=200 mm



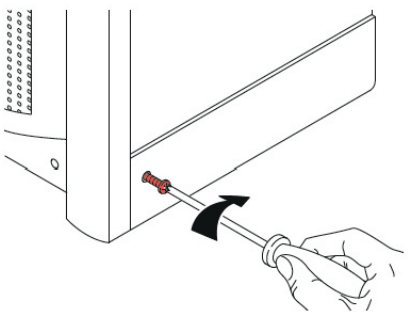
The EPS must be positioned respecting the following conditions:
- temperature and humidity must be within permitted limits;
- fire regulations must be respected;
- the wiring must be simply made;
- front and rear accessibility must be available for assistance or periodic servicing;
- the cooling flow 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 equipment 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 proceding 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.

4.6 Final operations

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



5. Installation

DANGER
All the installation operations must be carried out exclusively by a SKILLED TECHNICIAN.

5.1 Safety regulations

CAUTION
Before carrying out any installation operation you must read and apply the following:

1. The EPS has a high leakage current. It is essential to make the earth connection before connecting the power supply. It is necessary to make sure that the switchgear has a safe connection with the earth circuit and adequate protection as required by the installation standards.
2. The equipment must only be installed in a fixed way with a thermal-magnetic circuit breaker placed upstream of it. Connection to the mains via traditional type plug is not allowed.
3. A circuit to protect from voltage backfeed made as in the diagrams shown in paragraph 5.2.6 must be provided outside the EPS.
4. The switchgear or the disconnector must be installed near the equipment and must be easily accessible.
5. A warning label must be placed on all the mains disconnector switches installed away from the area of the equipment for the purpose of reminding the assistance personnel of the fact that the circuit is connected to a EPS. The label must bear the following text (or the equivalent):

Before working on this circuit
- Isolate the Emergency Power System (EPS)
- Then check for the presence of Hazardous Voltage between all terminals including the protective earth.

Risk of Voltage Backfeed

5.2 Electrical connections

The electric hook-up of the equipment to the switchgear is part of the installation that is not normally performed by the manufacturer; for this reason, the indications that follow are to be considered approximate and it is recommended that the electric connections are made on the basis of local installation standards.
After removing the EPS from the packaging and positioning it in its definitive place, the skilled technician can begin to make the electric connections.

CAUTION
The choice of cable type and their cross sections depending on the current they carry and their installations must be made as indicated by the installation standards in force and it is a responsibility of the skilled technician. The input current and the output power of the EPS are indicated in chapter 10 and the battery current in table 8 of chapter 11.

INDICATION
Chapter 11 shows the instructions for sizing cables, fuses and automatic/residual current breakers.

5.2.1 Safety warnings

DANGER
Before proceeding with the operations it is necessary to read and apply what is reported below. Proceeding with the operations if one or more of the following conditions have not been met is prohibited.
- Do not carry out the installation if there is water or humidity around.
- Do not open or remove the EPS panels.
- Check there is no mains voltage on the equipment.
- Check that the loads are off and disconnected from the EPS.
- Check the EPS is off and no voltage is present.
- Check that the battery breakers on the EPS (if present) and on all external battery cabinets, if there are any installed, are open.

5. Installation

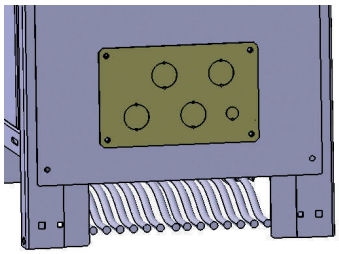
All the electrical connection operations are carried out on the connection terminal strips inside the equipment. For the Trimod MCS 3, 5, 7, 10, 15, 20 models, it is necessary to unscrew the distribution drawer locking screws and pull it outward to get at the distribution terminal strip. For the Trimod MCS 30, 40, 60 and 80 models, it is necessary to remove both the lower panels to get at the terminal distribution strip.
Outside the drawer there are the fuse breakers (depending on the model), the output switch, the mains input switch, the bypass input switch and the manual maintenance bypass switch.

5.2.2 Preliminary operations

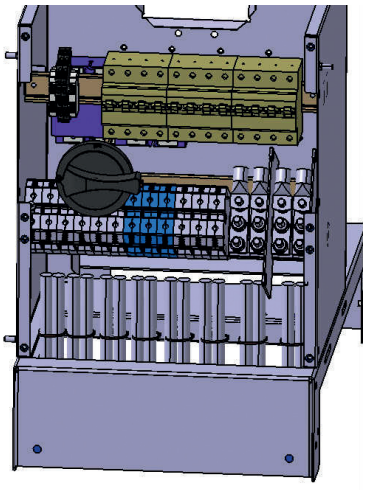
Before connecting the EPS, check that:
- the mains input voltage and frequency correspond with the values indicated in the technical data on the rating plate;
- the earthing has been carried out in compliance with IEC (International Electrotechnical Commission) standards or local regulations;
- the electrical system has been fitted with the necessary differential and thermal-magnetic protections upstream of the equipment input.

5.2.3 Wiring

For all the models, it is possible to pass the cables from underneath, through the opening at the base. For the models of Trimod MCS from 3 kVA to 60 kVA, it is also possible to pass the cables from the metal plate fixed to the rear panel by means of four screws. In this case it is necessary to lock the cables in place with appropriate cable glands, not supplied, to be inserted in the holes of the plates. The plates have four holes 33 mm in diameter and one hole 16 mm in diameter.

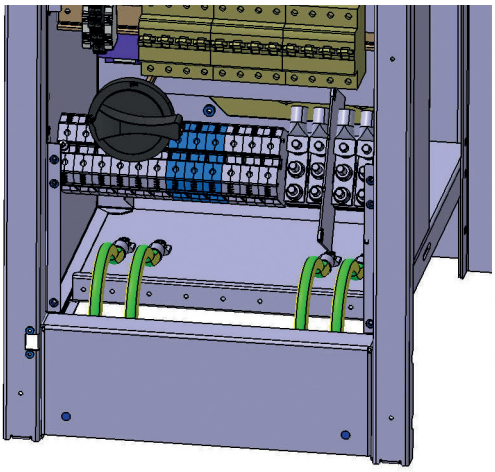


In the case of the Trimod MCS 80, the cables must be passed into the opening at the base. The fastening is done on the appropriate bar by means of clamps and clips present in one of the accessory packs.



5.2.4 Earthing

Before carrying out any other installation operation, connect the earthing wiring coming from the low voltage switchgear to the earthing terminal on the EPS terminal strip.
In the case of the Trimod MCS 80, the earthing cables must be connected via cable lugs in the 8mm threaded holes on the base, as shown in the following image:

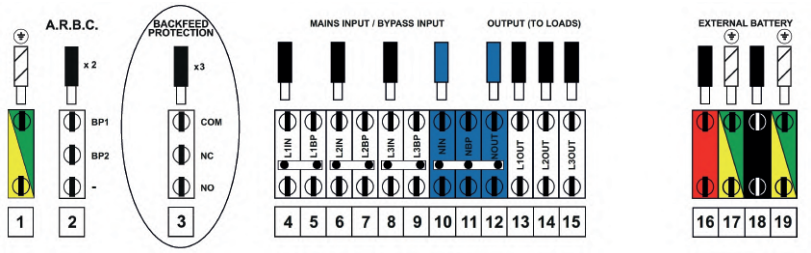


5.2.5 Protective devices

Adequate protection must be used at electrical system level to ensure the correct operation of the EPS and protect it against overloads or output short circuits.
Install automatic differential and thermal-magnetic circuit breakers upstream of the equipment on both the mains input line and the bypass input line (if separate). The circuit breakers must be sized according to the indications of the tables in Chapter 11.

5.2.6 Backfeed protection

The Trimod MCS is fitted with an auxiliary contact for the actuation of the external backfeed protection (protection against power transfer towards the input). This auxiliary contact has been created with a C/NC/NO relay and is available on the the relative tripolar "BACKFEED PROTECTION" terminal on the terminal strip.



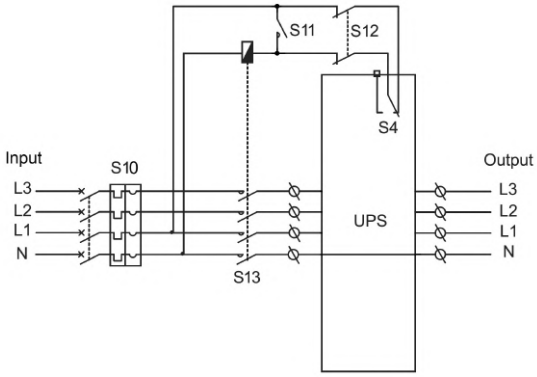
If the EPS detects a voltage backfeed, the relay is energised and changes status, enabling the disconnection of the input lines that must be done externally as indicated in the diagrams shown below.
The relay contacts characteristics are:
• Maximum applicable voltage: 250Vac.
• Maximum applicable current: 5A, cosφ = 1

INDICATION

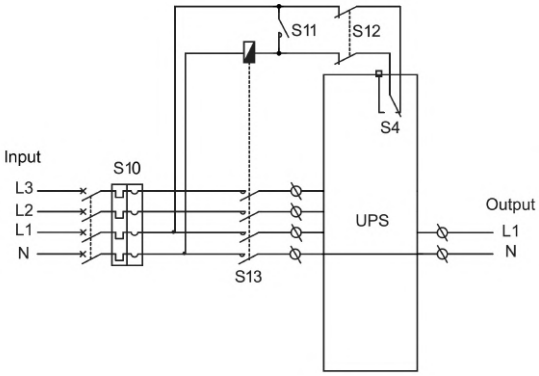
If, during operation, the equipment signals that the backfeed protection has been actuated, contact the LEGRAND Technical Support Service.

5. Installation

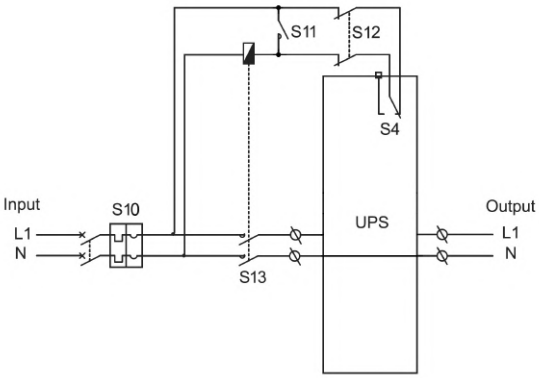
TT or TN-S distribution system and backfeed protection circuit connection diagrams with bypass line in common with the mains input



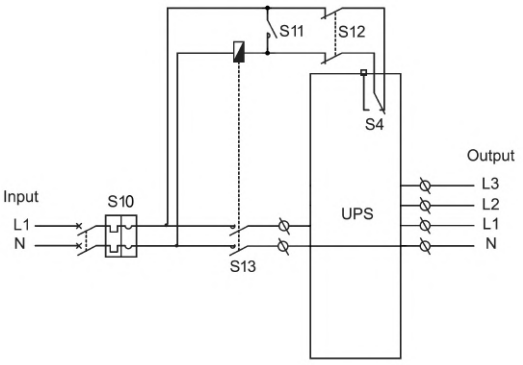
Three phase/Three phase configuration



Three phase/Single phase configuration



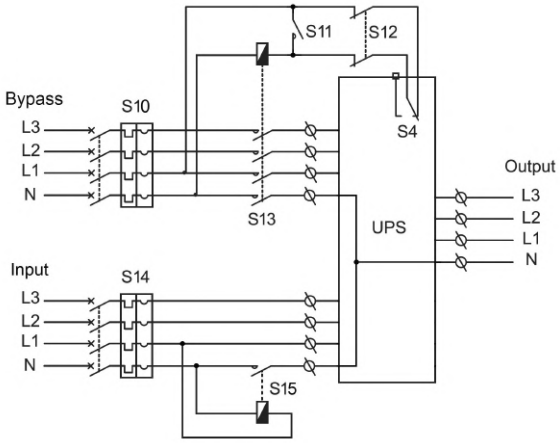
Single phase/Single phase configuration



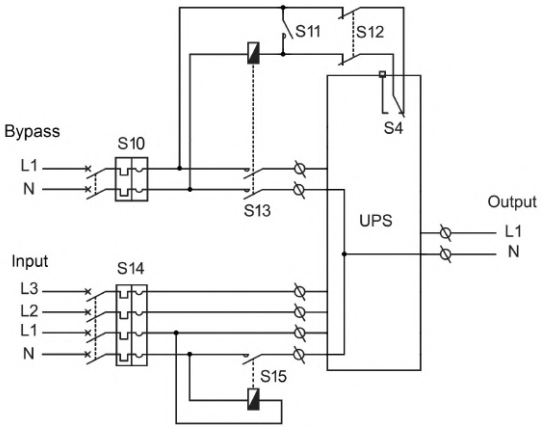
Single phase/Three phase configuration

S10: thermal-magnetic/differential breakers specified for the input line
S13: mains input line opening contactor
S11: disconnector in parallel to the S13 contactor coil
S12: two-pole disconnector in series to the line to the EC9 connector of the contact interface card
S4: backfeed auxiliary contact

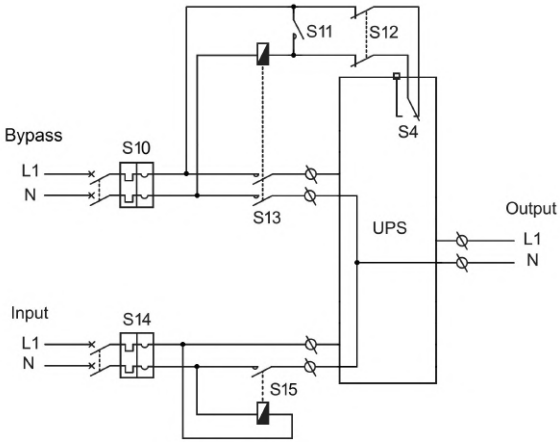
TT or TN-S distribution system and backfeed protection circuit connection diagrams with a separate bypass line to the mains input



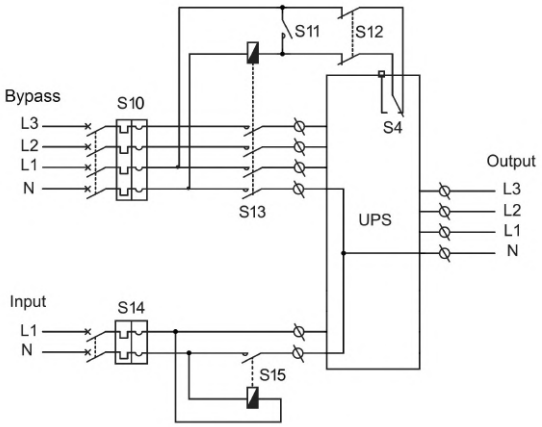
Three phase/Three phase configuration



Three phase/Single phase configuration



Single phase/Single phase configuration

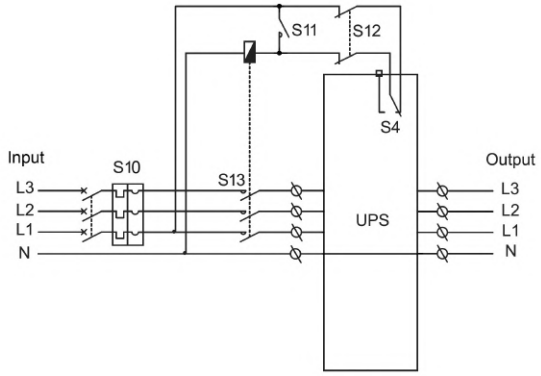


Single phase/Three phase configuration
(available only for SINGLE PHASE input
and THREE INDEPENDENT PHASES output)

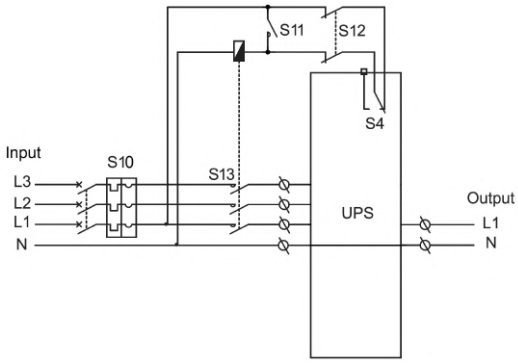
S10-S14: thermal-magnetic/differential isolation switches specified for the input line and the bypass line
S13: bypass line opening contactor
S15: mains input line neutral opening contactor
S11: disconnector in parallel to the S13 contactor coil
S12: two-pole disconnector in series to the line to the EC9 connector of the contact interface card
S4: backfeed auxiliary contact

5. Installation

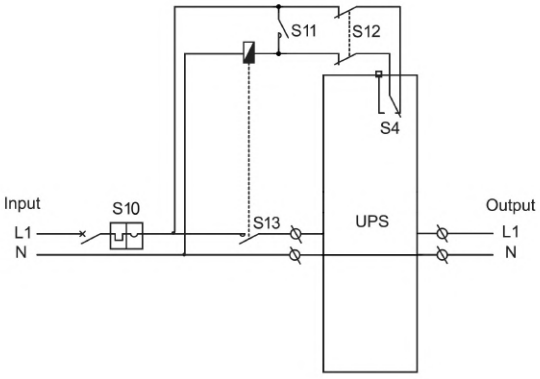
TN-C distribution system and backfeed protection circuit connection diagrams with bypass line in common with the mains input



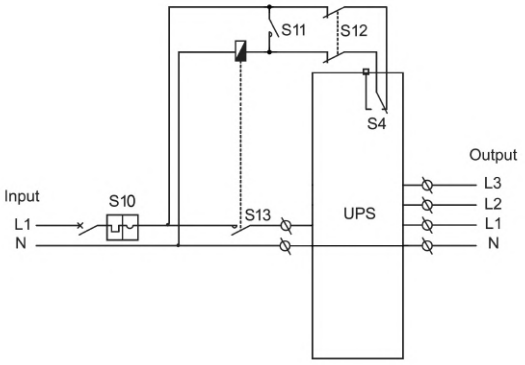
Three phase/Three phase configuration



Three phase/Single phase configuration



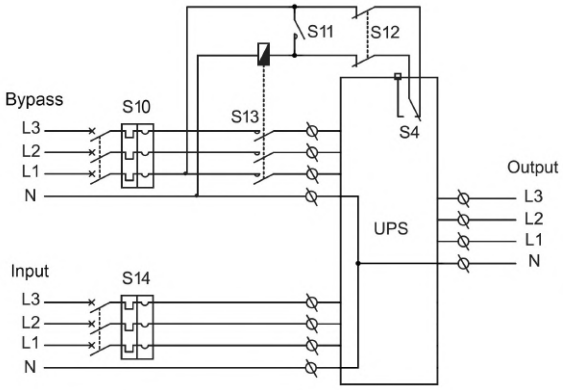
Single phase/Single phase configuration



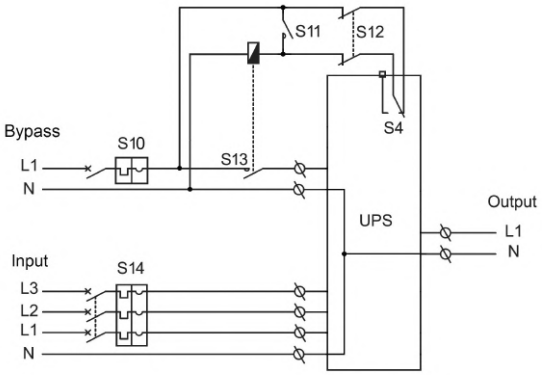
Single phase/Three phase configuration

S10: thermal-magnetic/differential breakers specified for the input line
S13: mains input line opening contactor
S11: disconnector in parallel to the S13 contactor coil
S12: two-pole disconnector in series to the line to the EC9 connector of the contact interface card
S4: backfeed auxiliary contact

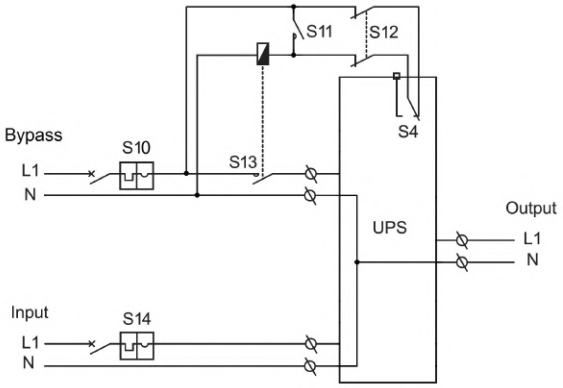
TN-C distribution system and backfeed protection circuit connection diagrams with a separate bypass line to the mains input



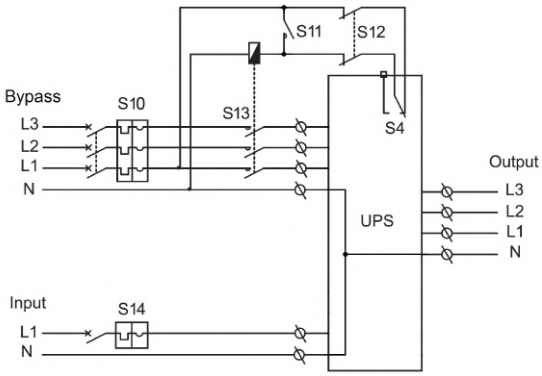
Three phase/Three phase configuration



Three phase/Single phase configuration



Single phase/Single phase configuration



Single phase/Three phase configuration
(available only for SINGLE PHASE input
and THREE INDEPENDENT PHASES output)

S10-S14: thermal-magnetic/differential isolation switches specified for the input line and the bypass line
S13: bypass line opening contactor
S11: disconnector in parallel to the S13 contactor coil
S12: two-pole disconnector in series to the line to the EC9 connector of the contact interface card
S4: backfeed auxiliary contact

INDICATION
By protecting external backfeed protection as indicated in the diagrams, it is possible to disconnect the line from the outside and secure it. First switch on the S11 isolation switch in parallel to the contact coil and then switch off the S12 two-pole isolation switch in series to the line to the EC9 connector.

5.2.7 External battery cabinet installation (Trimod MCS BATTERY)

By installing external battery cabinets it is also possible to increase the autonomy of the EPS.

Three Trimod MCS BATTERY models are available:
- a modular model, consisting of a cabinet with an internal structure using battery drawers for a maximum of eighty 12V 9Ah batteries (16 drawers)
- a modular model, consisting of a cabinet with an internal structure using battery drawers for a maximum of one hundred 12V 9Ah batteries (20 drawers)
- a compact, non-modular model that on the other hand uses a shelf architecture that can house twenty 12V-94 Ah batteries inside.

5. Installation

CAUTION

1 KB (Battery Kit) represents a string of 20 batteries in series.
In case of models with internal battery drawers and for external modular battery cabinets, 1 KB comprises 4 battery drawers.
It is necessary to install 1 KB every 10 kVA of nominal EPS power in case of modular units with battery drawers.
For example , for the Trimod MCS 40 it is necessary to have at least one external modular battery cabinet with 4 KB (16 battery drawers).
In case of non-modular 94Ah external battery cabinets, each unit represents 1 KB and 1 KB is sufficient for all the Trimod MCS models.

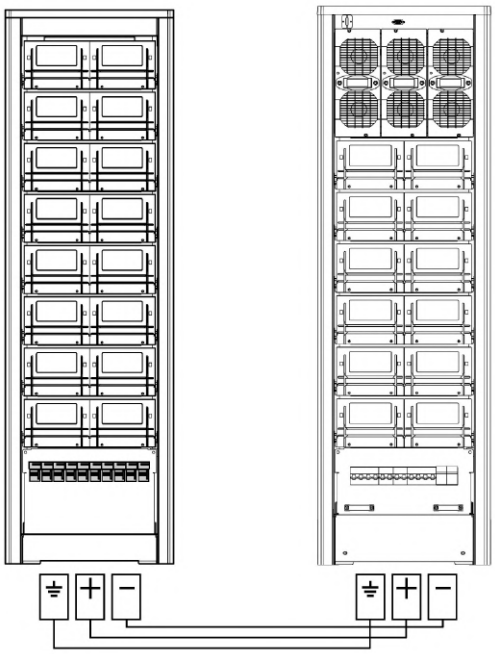
Connection of one external modular battery cabinet to the Trimod MCS 3-5-7-10-15-30

The Trimod MCS MODULAR BATTERY 4KB-5KB must be connected to the Trimod MCS 3-5-7-10-15-30 with one of the multipolar cables provided with each battery cabinet.

CAUTION

Table 8 of chapter 11 includes instructions for sizing the cables to connect the EPS to the first external battery cabinet in case the multipolar cable provided is not used.
The maximum length of the connection cable between the equipment and the first external battery cabinet must not exceed 3 meters.
In case of configurations where there are more than one external battery cabinet, it is recommended to implement a battery switchboard as indicated in this paragraph under the subtitle “Connection of one or more external battery cabinets to the Trimod MCS”.

The connection must be made according to the diagram and the passages indicated below:

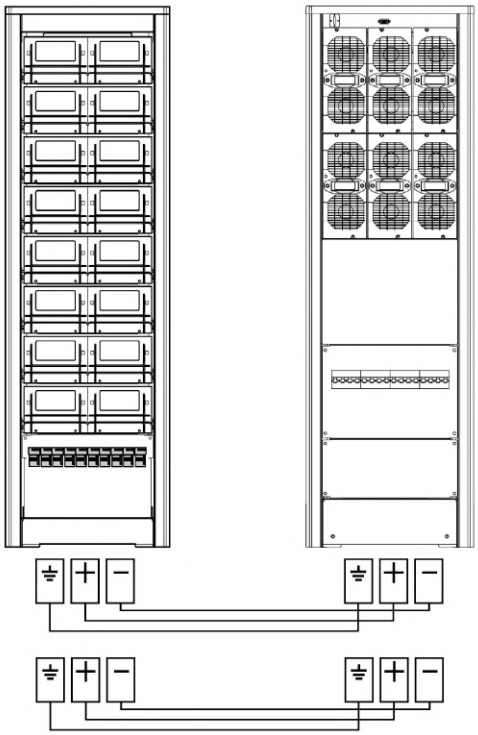


1. Check that all the battery fuse disconnectors are open.
2. Loose the screws that keep close the panel that gives access to the terminal strips of the external battery cabinet.
3. By using one of the multipolar cables provided with the external battery cabinet, connect the EPS to the external battery cabinet installed using the earthing wires (yellow-green).
4. By means of the multipolar cables used in the preceding point , connect the positive and negative terminals of the equipment with those of the external battery cabinet installed.
5. Refit the panel and tighten the screws.

Connection of one external modular battery cabinet to the Trimod MCS 40
The Trimod MCS MODULAR BATTERY 4KB-5KB must be connected to the Trimod MCS 40 with both the multipolar cables provided with the battery cabinet.

CAUTION
Table 8 of chapter 11 includes instructions for sizing the cables to connect the EPS to the first external battery cabinet in case the multipolar cable provided is not used.
The maximum length of the connection cable between the equipment and the first external battery cabinet must not exceed 3 meters.
In case of configurations where there are more than one external battery cabinet, it is recommended to implement a battery switchboard as indicated in this paragraph under the subtitle "Connection of one or more external battery cabinets to the Trimod MCS".

The connection must be made according to the diagram and the passages indicated below:



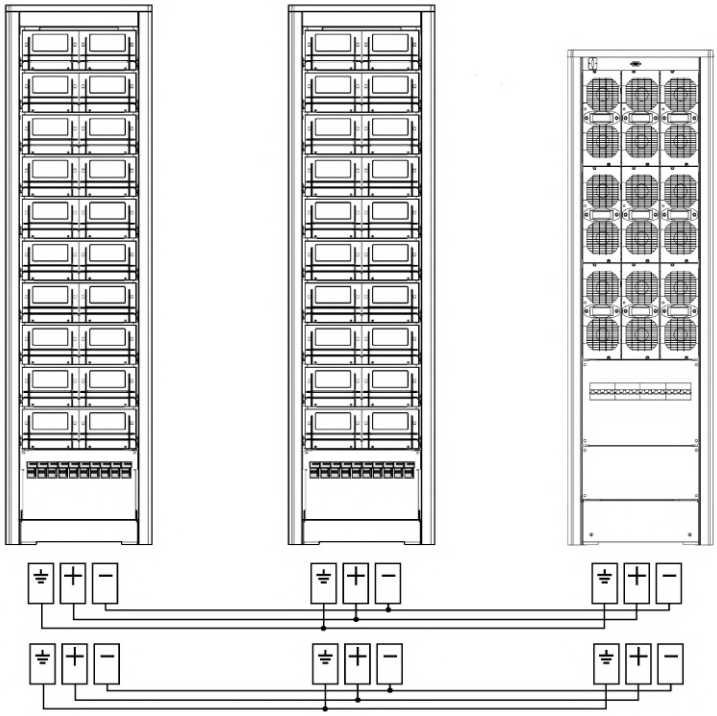
1. Check that all the battery fuse disconnectors are open.
2. Loose the screws that keep close the panel that gives access to the terminal strips of the external battery cabinet.
3. By using both the multipolar cables provided with the external battery cabinet, connect the EPS to the external battery cabinet installed using the earthing wires (yellow-green).
4. By means of the multipolar cables used in the preceding point , connect the positive and negative terminals of the equipment with those of the external battery cabinet installed.
5. Close the panel and tighten the screws.

5. Installation

Connection of two external modular battery cabinets to the Trimod MCS 60
A Trimod MCS 60 can only be connected to two TRIMOD MCS MODULAR BATTERY 5 KB (20 battery drawers) using exclusively external cables as per the instructions provided in table 8 of chapter 11.
The multipolar cables provided with each battery cabinet must only be used for the cascade connection of the first external battery cabinet to the second.

CAUTION
The maximum length of the connection cables between the EPS and the first external battery cabinet must not exceed 3 meters.
It is not possible to connect only one TRIMOD MCS BATTERY 5KB to the Trimod MCS 60.
The external battery cabinets must be homogeneous in the number of battery drawers. The difference between one cabinet and the other must be a maximum of 1 KB (4 battery drawers).
For the connection of two or more external battery cabinets, it is recommended to implement a battery switchboard as indicated in this paragraph under the subtitle "Connection of one or more external battery cabinets to the Trimod MCS".

The cascade connection of the two external battery cabinets must be made according to the diagram and the passages indicated below:

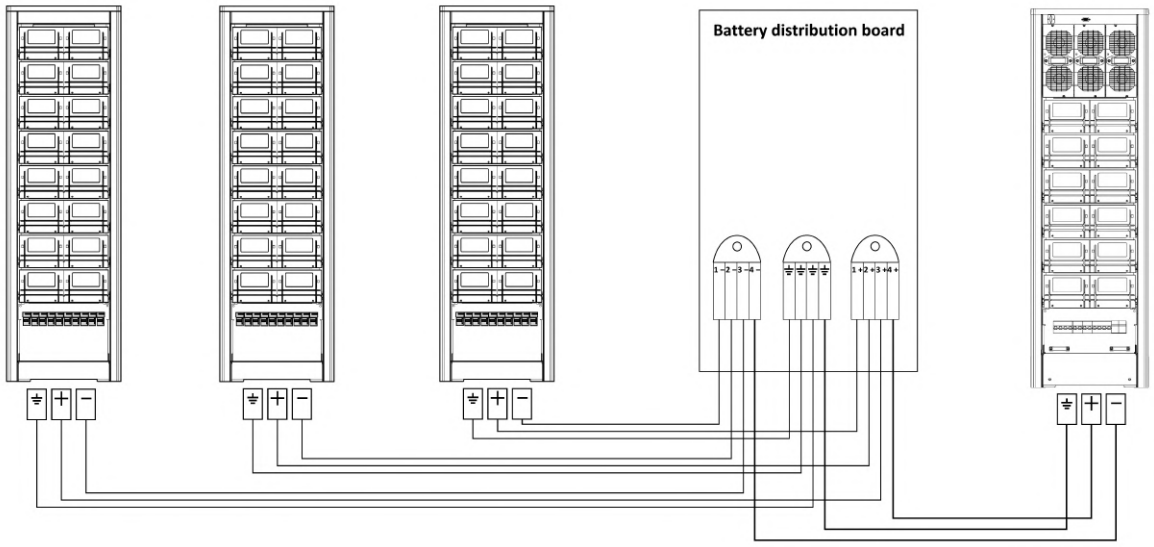


1. Check that all the battery fuse disconnectors are open.
2. Loose the screws that keep close the panel that gives access to the terminal strips of the external battery cabinets.
3. Connect the EPS and the first external battery cabinet installed using an earthing (green/yellow) cable.
4. By means of two cables with minimum cross-section indicated in table 8 of chapter 11, connect the positive and negative terminals of the EPS with those of the first external battery cabinet installed.
5. Connect the first external battery cabinet with the second using both the multipolar cables provided by connecting the earthing cable first and then the positive and negative terminals.
6. Close the panel and tighten the screws.

Connection of the external modular battery cabinets to the Trimod MCS 80
It is not possible to connect the external modular battery cabinets to the Trimod MCS 80 EPS.
It is only possible to connect the non modular model with 12V-94Ah batteries. For the connection, it is necessary to use the external cables according to the instructions given in table 8 of chapter 11.

Connection of one or more external non-modular battery cabinets to the Trimod MCS
It is possible to connect to the non-modular model with 12V-94Ah batteries to the Trimod MCS 20, 30, 40, 60 and 80. For the connection, it is necessary to use the external cables according to the instructions given in table 8 of chapter 11.
It is recommended to implement a battery switchboard as indicated in this paragraph under the subtitle "Connection of one or more external battery cabinets to the Trimod MCS".

Connection of one or more external battery cabinets to the Trimod MCS
If the EPS must be connected to one or more external battery cabinets, it is recommended to implement a battery switchboard as indicated below:



The external modular battery cabinets must be connected to the switchgear with the multi-polar cables provided.
The external non-modular battery cabinets must be connected to the external cables according to the instructions given in table 8 of chapter 11.

CAUTION
Different connection solutions are the sole responsibility of the installer.
The implementation of the battery switchboard must be carried out according to the local installation regulations and it is a responsibility of the installer.
The length of the connection cable between the EPS and the switchboard must not exceed 3 meters.
The external modular battery cabinets must be homogeneous in the number of battery drawers. The difference between one cabinet and the other must be a maximum of 1 KB (4 battery drawers).

INDICATION
Table 8 of chapter 11 shows the sizing of the cables for connecting the EPS to the battery switchboard.
The input current and the output power of the EPS are indicated in chapter 10 and the battery current in table 8 of chapter 11.
Tables 3 and 4 of chapter 11 provide information to size the fuses to be installed in the external modular battery units.
Table 5 of chapter 11 provides information to size the fuses to be installed in the battery switchboard for the connection to the EPS.

5.2.8 Mains connection

Before connecting the input power supply cables, check that all the EPS switches are open (OFF position) and arrange the connection jumpers on the terminal strip according to the requested input-output configuration.

INDICATION
Chapter 11 shows the instructions for sizing cables, fuses, automatic and differential breakers.

The default configuration is SINGLE-PHASE INPUT and SINGLE-PHASE OUTPUT for Trimod MCS 3-5-7 and THREE PHASE INPUT and THREE PHASE 120° OUTPUT for Trimod MCS 10-15-20-30-40-60-80.

5. Installation

If this type of distribution is used, the connection jumpers are correctly sized and positioned. For different configurations, it is necessary to consult paragraph 5.3 that includes the connection diagrams and chapter 6.

The connection must be made according to the passages indicated below:
- Before beginning to connect the mains, check that the available mains power is more than or the same as the nominal EPS input power.
- Check that the cables to connect to the equipment are isolated upstream and no voltage is present.
- Check that the earth cable from the low voltage switchgear panel is connected to the appropriate terminal, or secured to the base of the EPS (in case of Trimod MCS 80).
- Connect the mains input neutral cable to the Nin mains input terminal.
- Connect cables L1, L2 and L3 of the mains input line to the L1in, L2in and L3in terminals, being careful to observe the phase sequence (L1, L2, L3).

WARNING
The neutral input cable must ALWAYS be connected otherwise the EPS may be damaged irreparably once powered from the mains.

5.2.9 Bypass input line connection

The default configuration has the bypass line in common to the mains input.
A separate bypass line can only be connected if the bypass and mains input neutral cables are in common (same potential) and the two supply lines must always have a single differential circuit breaker, if provided. The EPS has the mains, bypass and output passing neutral and they are connected internally to each other.

INDICATION
Chapter 11 shows the instructions for sizing cables, fuses, automatic and differential breakers.

For the configuration of a separate bypass input line, refer to paragraph 5.3, which includes the connection diagrams, and chapter 6 for configuration with separate bypass input line.

The connection must be made according to the passages indicated below:
- Before beginning to connect the bypass line, check that the available mains power is more than or the same as the nominal EPS input power.
- Check that the cables to connect to the equipment are isolated upstream and no voltage is present.
- Connect the earth cable of the bypass line to the appropriate terminal, or secure it to the base of the EPS (in case of Trimod MCS 80).
- Connect the bypass line neutral cable to the appropriate Nbyp bypass input terminal.
- Remove the three jumpers linking terminals L1in, L2in, L3in and L1byp, L2byp, L3byp.
- Connect cables L1, L2 and L3 of the bypass input line to the L1byp, L2byp and L3byp bypass input terminals, being careful to observe the phase sequence (L1, L2, L3).

WARNING
The neutral cable of the separate bypass mains must ALWAYS be connected otherwise the EPS may be damaged irreparably once powered from the mains.

5.2.10 Output line connection

Before beginning to connect the loads, check that the nominal power of the EPS indicated on the rating plate technical data is more than or the same as the total sum of the load powers. The choice of the type and section of the connecting cables depending on their design current and installation must be done as indicated in the current standards.

INDICATION
Chapter 11 shows the instructions for sizing the output cables.

Provide a separate switchgear for the load. It is advisable to use switches or automatic breakers in line with IEC standards to protect the lines that originate from the switchgear.
Indicate the values reported below on the system switchgear by means of stickers or similar:
- maximum nominal power of the total load;
- maximum nominal power of the load at the load outlets;
- if a common switchgear is used (mains and EPS power outlets), make sure that there is an indication of the relative power source on every power outlet (“Mains” or “EPS”).

The default configuration is SINGLE-PHASE INPUT and SINGLE-PHASE OUTPUT for Trimod MCS 3-5-7 and THREE PHASE INPUT and THREE PHASE 120° OUTPUT for Trimod MCS 10-15-20-30-40-60-80.
If this type of distribution is used, the connection jumpers are correctly sized and positioned. For different configurations, it is necessary to consult paragraph 5.3 that includes the connection diagrams and chapter 6.

The connection must be made according to the passages indicated below:
- Before beginning to connect the output, check that the EPS is off and that the output terminals are not live.
- Connect the output line earth cable to the appropriate terminal, or secure it to the base of the equipment (in case of Trimod MCS 80).
- Connect the line output neutral cable to the Nout output terminal.
- Connect cables L1, L2 and L3 of the output line to the L1out, L2out and L3out output terminals, being careful to observe the phase sequence (L1, L2, L3).

5.3 Wiring diagrams

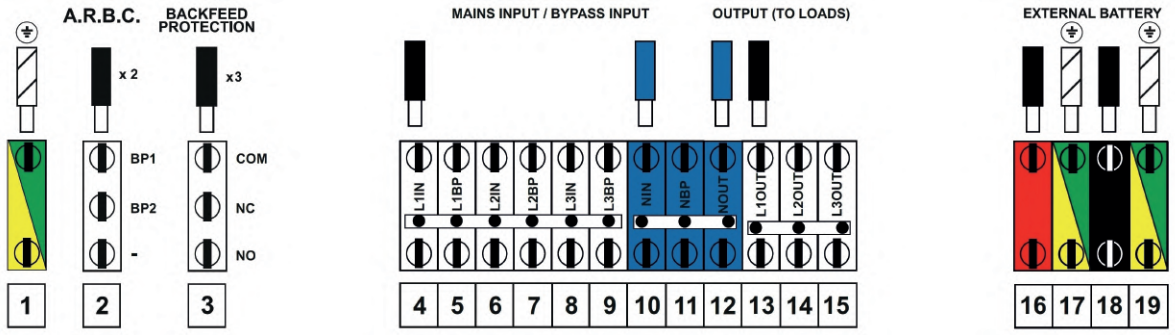
The electric configuration is completed both on the control panel and the distribution terminal box. For the explanation of the meaning of the A.R.B.C terminal see paragraph 5.3.9.

WARNING

Always check that the screws of the connection jumpers are tight. If the factory configuration is changed, make sure to configure the new mode of operation using the control panel as indicated in chapter 6.

5.3.1 Factory configuration Trimod MCS 3-5-7: SINGLE PHASE input - SINGLE PHASE output

The EPS default configuration is set in the factory according to the following diagrams depending on the model.
It is however recommended that a check is made of the correct configuration of the connection jumper.

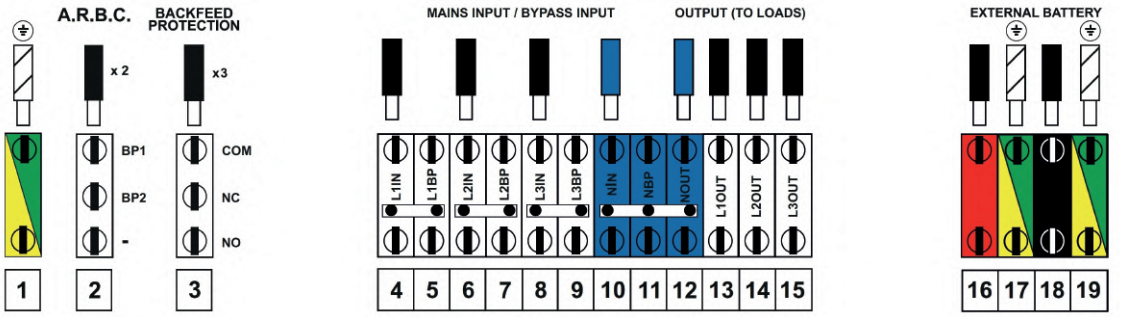


Trimod MCS 3 - 5 - 7

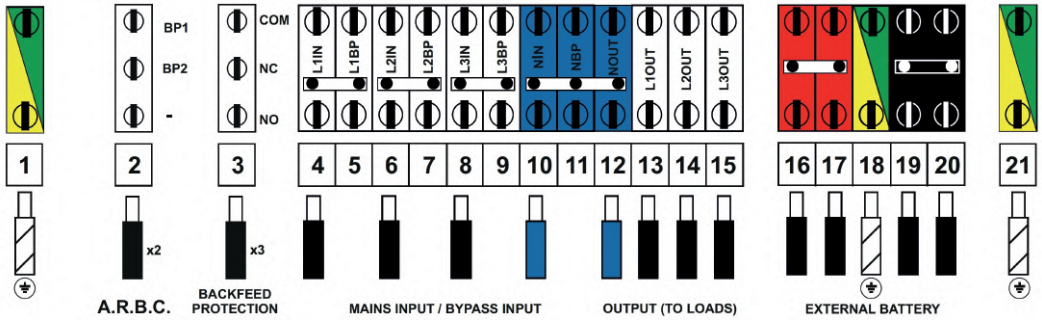
5. Installation

5.3.2 Factory configuration Trimod MCS 10-15-20-30-40-60-80: THREE PHASE input – THREE PHASE output with common bypass input line

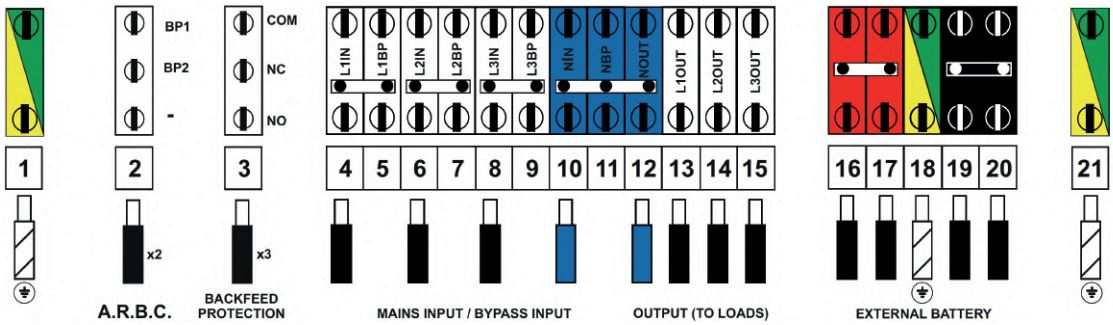
The EPS default configuration is set in the factory according to the following diagrams depending on the model.
To use this configuration, no further action is necessary; it is however recommended that a check is made of the correct configuration of the connection jumper.



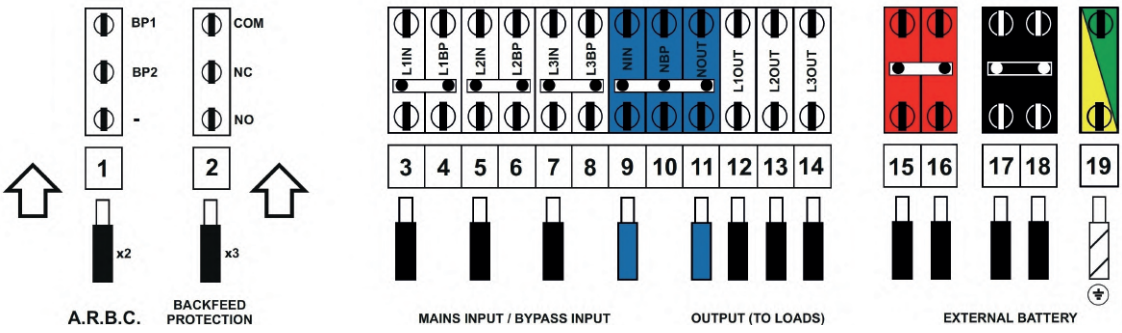
Trimod MCS 10 - 15 - 20



Trimod MCS 30

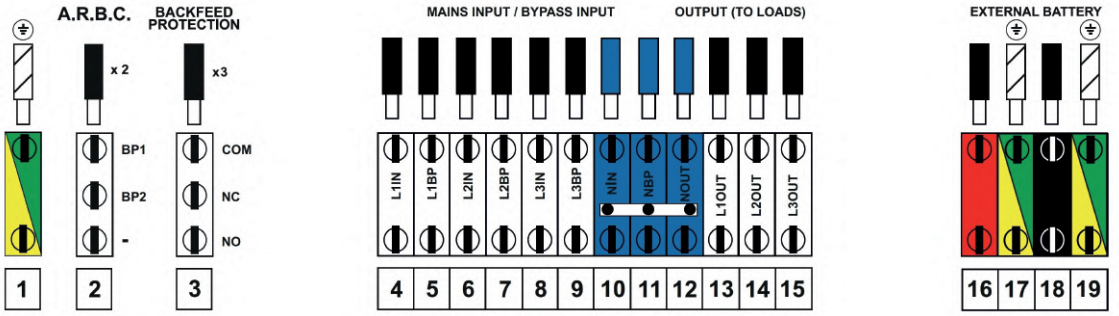


Trimod MCS 40 – 60

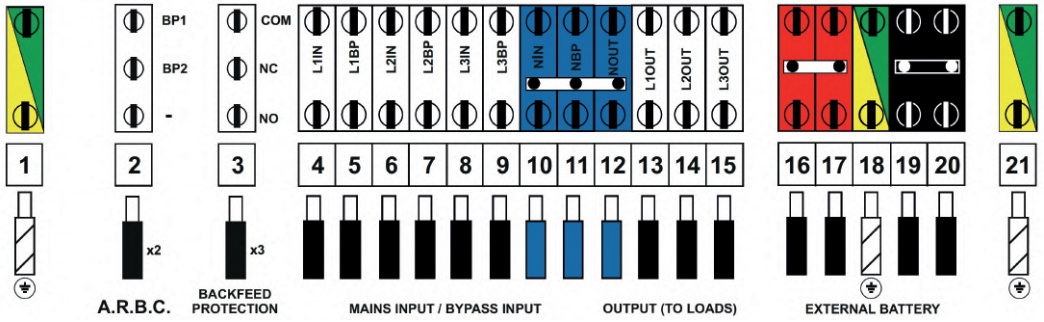


Trimod MCS 80

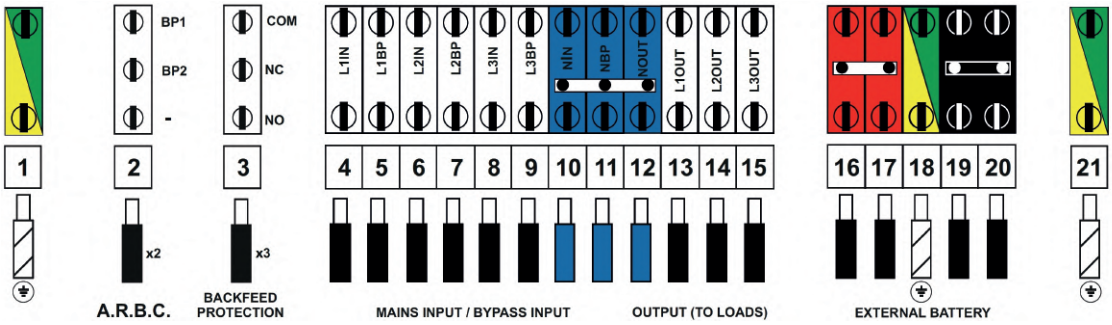
5.3.3 THREE PHASE input - THREE PHASE output connection with separate bypass input line



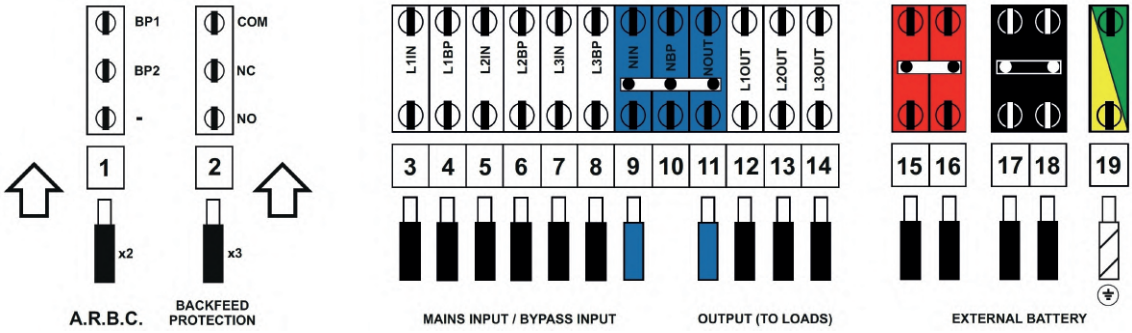
Trimod MCS 10 - 15 - 20



Trimod MCS 30



Trimod MCS 40 – 60

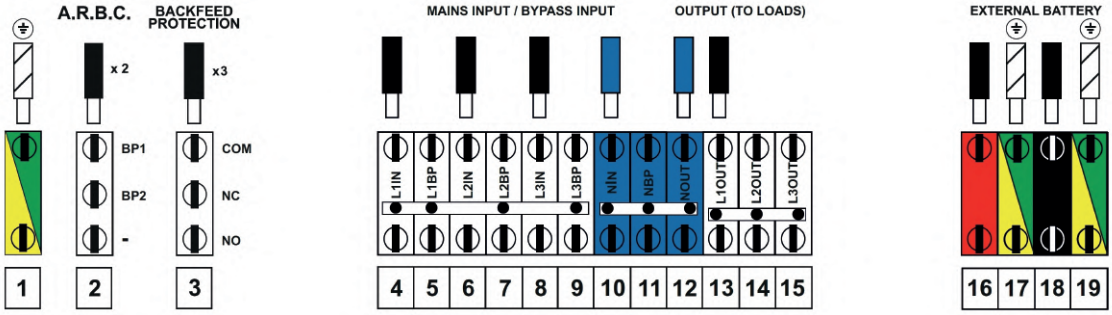


Trimod MCS 80

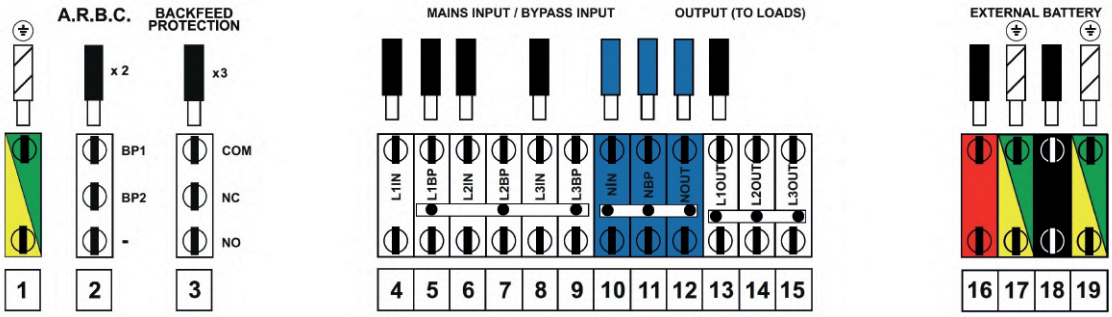
5. Installation

5.3.4 THREE PHASE input – SINGLE PHASE output connection

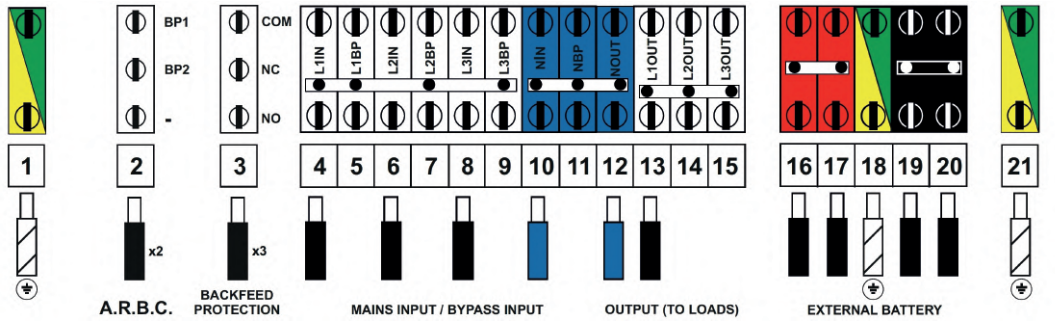
This connection is available only for Trimod MCS 10, 15, 20 and 30. In addition to the wiring shown in the following images, it is necessary to configure the functioning mode as illustrated in chapter 6.



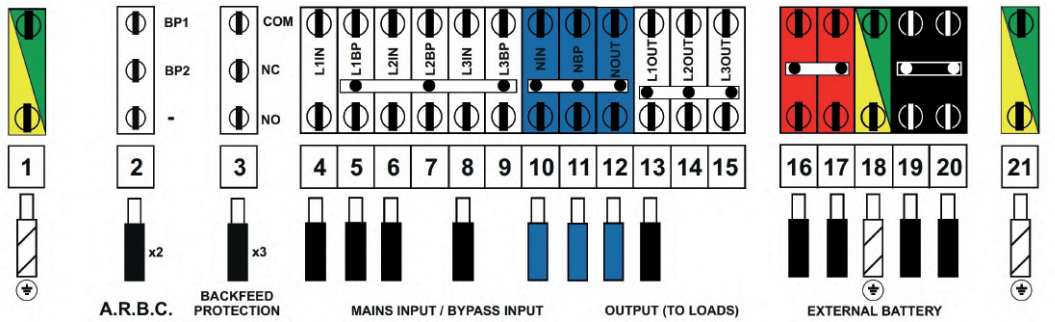
Trimod MCS 10 - 15 - 20
with common bypass input line



Trimod MCS 10 - 15 - 20
with separate bypass input line



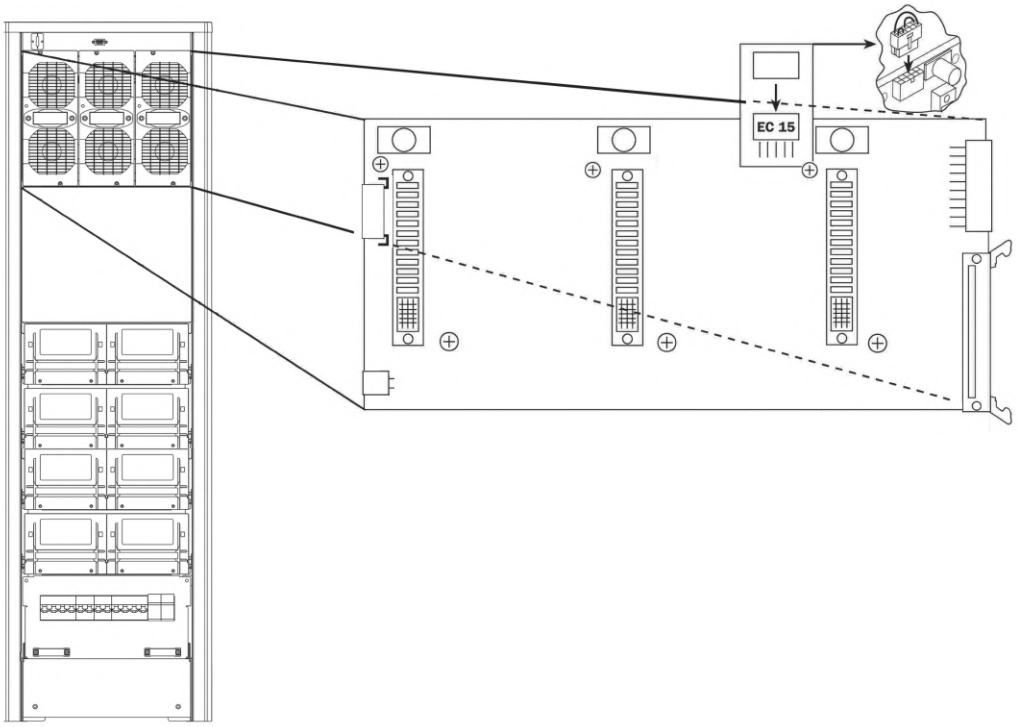
Trimod MCS 30
with common bypass input line



Trimod MCS 30
with separate bypass input line

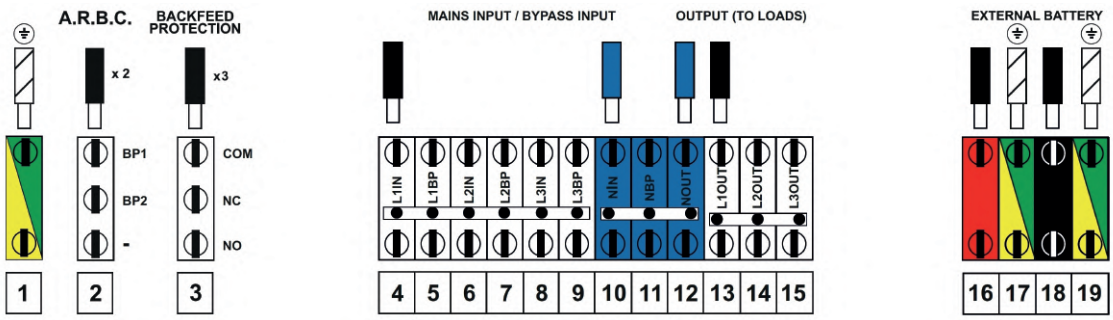
CAUTION

For the configuration with single phase output, it is necessary to insert in all the back panel boards a special connector provided in the accessory kit.
The back panel boards are located in the equipment behind the power modules. In the Trimod MCS 10, 15 and 20 models there is just one back panel board. In the Trimod MCS 30 model there are two back panel boards.
The connector must be inserted in the position indicated by EC 15 serigraphed onto the board as shown in the following figure:



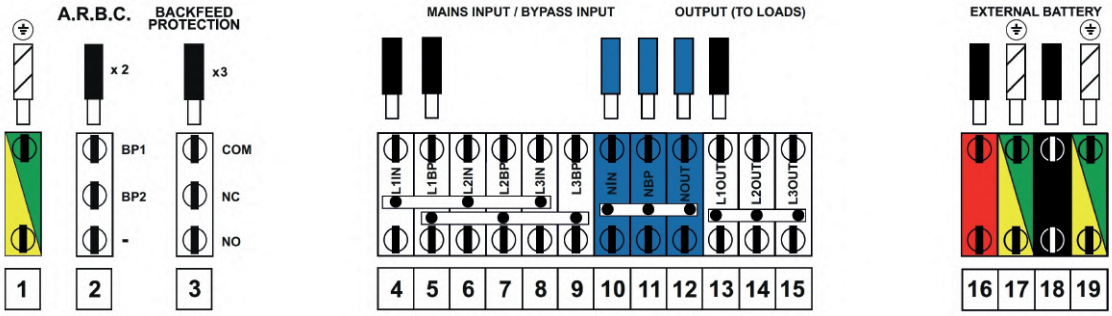
5.3.5 SINGLE PHASE input - SINGLE PHASE output connection

This connection is available only for Trimod MCS 10, 15, 20 and 30.
In addition to the wiring shown in the following images, it is necessary to configure the functioning mode as indicated in chapter 6.

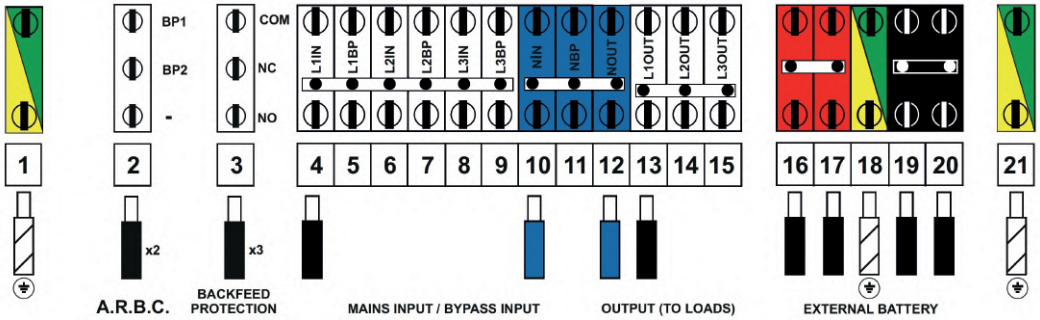


Trimod MCS 10 - 15 - 20
with common bypass input line

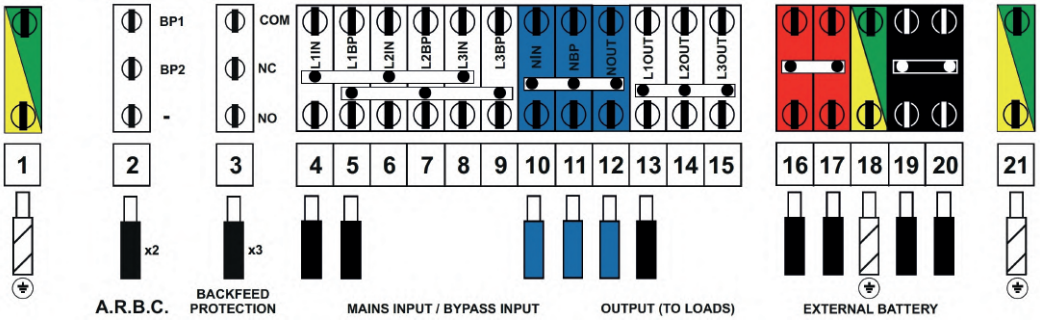
5. Installation



Trimod MCS 10 - 15 - 20
with separate bypass input line



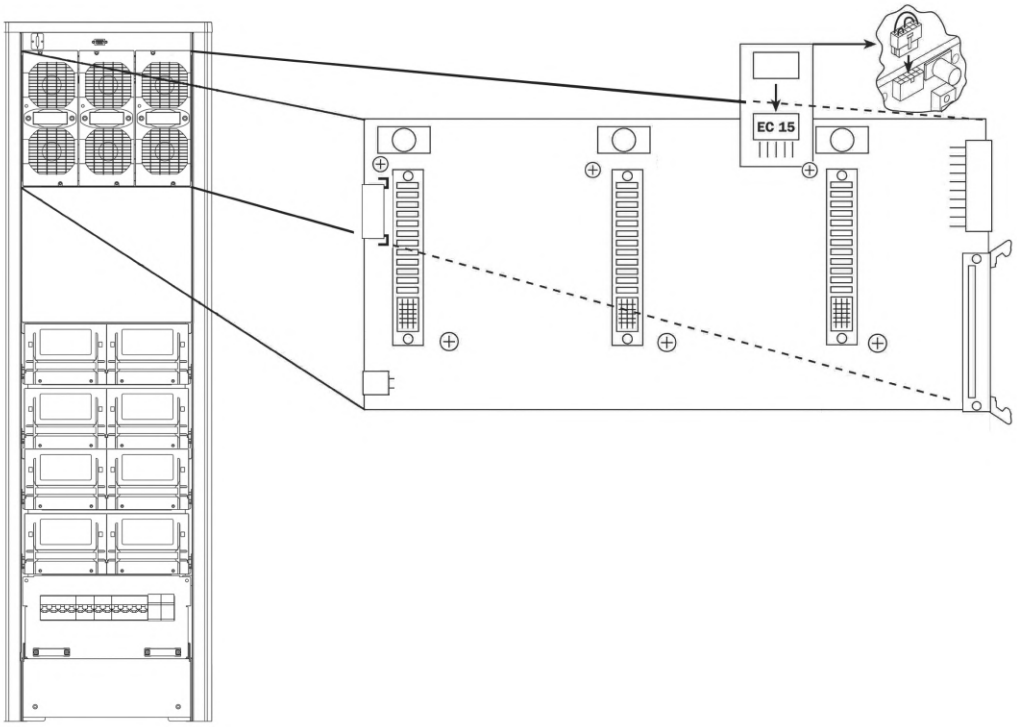
Trimod MCS 30
with common bypass input line



Trimod MCS 30
with separate bypass input line

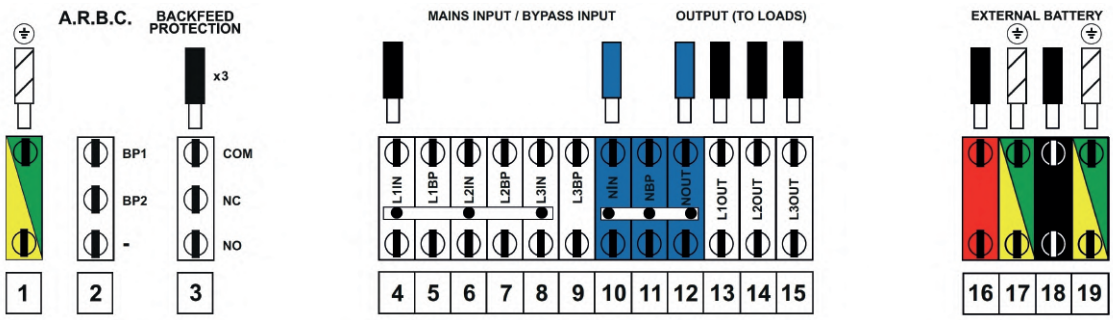
CAUTION

For the configuration with single phase output, it is necessary to insert in all the back panel boards a special connector provided in the accessory kit.
The back panel boards are located in the equipment behind the power modules. In the Trimod MCS 10, 15 and 20 models there is just one back panel board. In the Trimod MCS 30 model there are two back panel boards.
The connector must be inserted in the position indicated by EC 15 serigraphed onto the board as shown in the following figure:



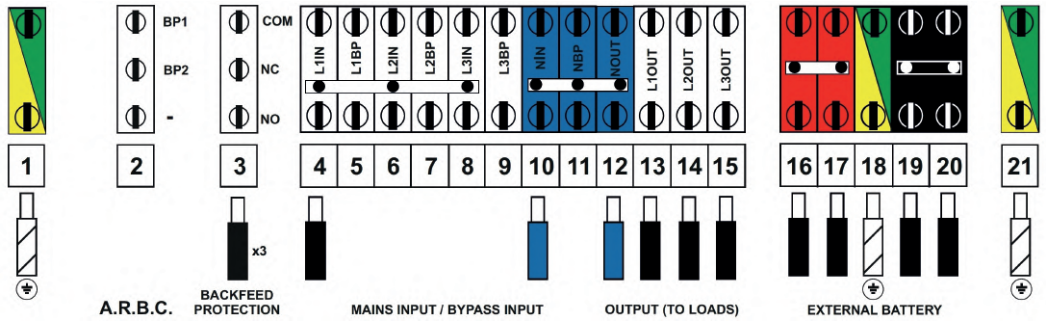
5.3.6 SINGLE PHASE input - THREE PHASE 120° output connection

This connection is available only for Trimod MCS 10, 15, 20 and 30.
In addition to the wiring shown in the following images, it is necessary to configure the functioning mode as indicated in chapter 6.



Trimod MCS 10 - 15 - 20
(disabled bypass input line)

5. Installation



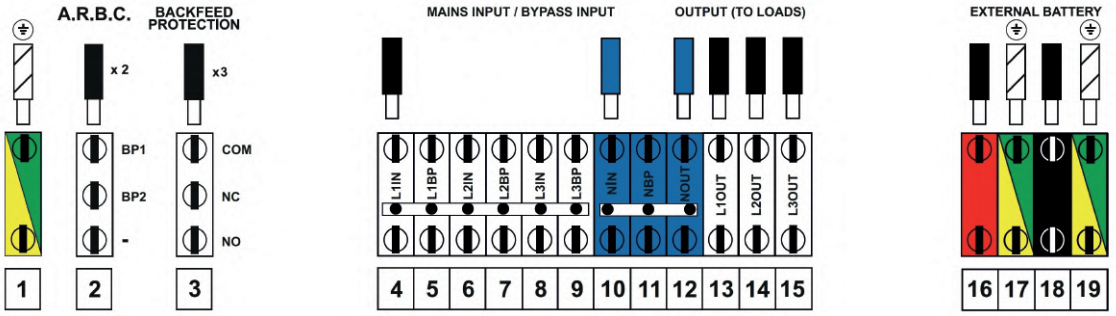
Trimod MCS 30
(disabled bypass input line)

CAUTION

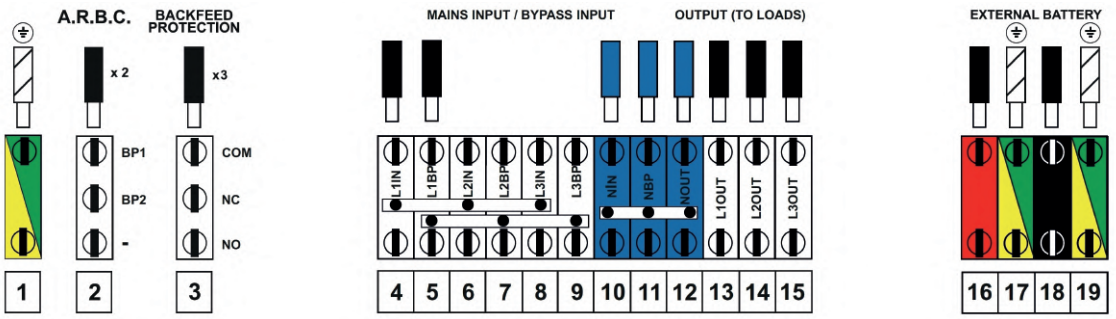
The bypass function is not available for the configuration with single phase input and three phase 120° output.
The manual maintenance bypass switch S1 and bypass input line switch S5 must NEVER be activated. For greater safety, it is possible to completely eliminate the manual maintenance bypass by cutting the brown, black and grey cables that connect the relative S1 switch to the output S2 switch and being careful to isolate the wires adequately.

5.3.7 SINGLE PHASE input - THREE INDEPENDENT PHASE output connection

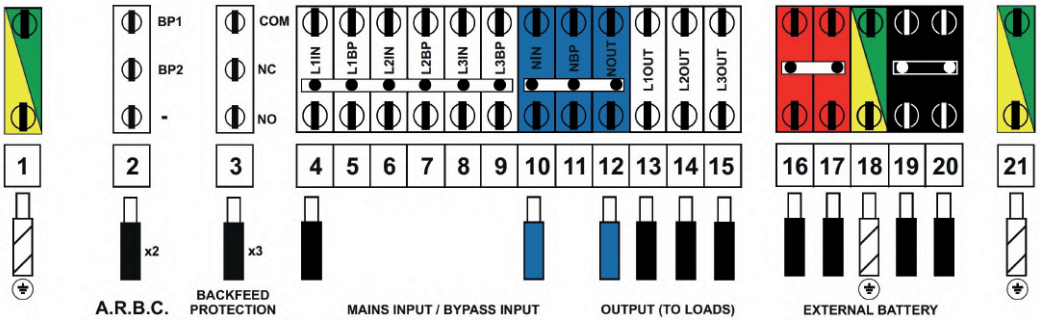
This connection is available only for Trimod MCS 10, 15, 20 and 30.
In addition to the wiring shown in the following images, it is necessary to configure the functioning mode as indicated in chapter 6.



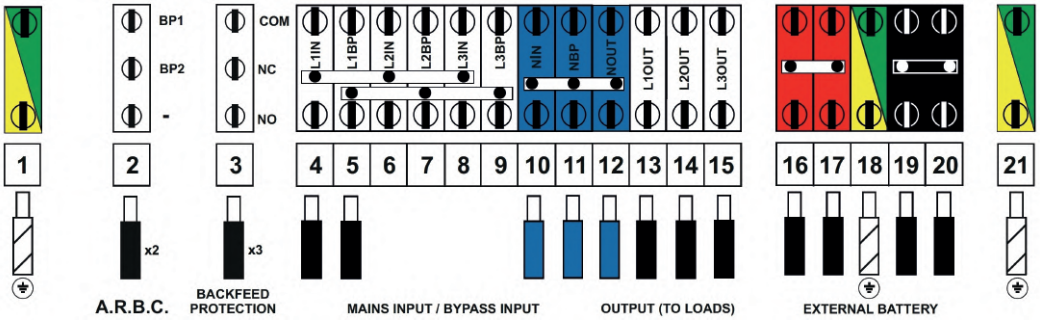
Trimod MCS 10 - 15 - 20
with common bypass input line



Trimod MCS 10 - 15 - 20
with separate bypass input line



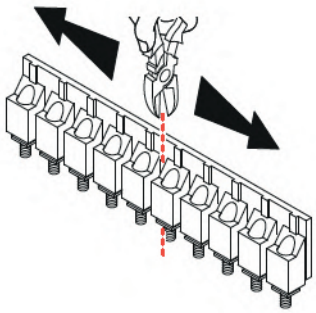
Trimod MCS 30
with common bypass input line



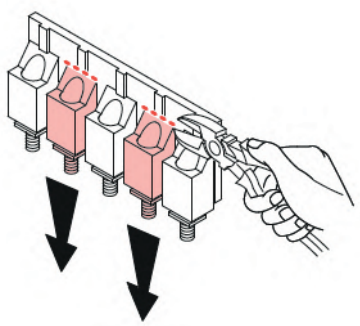
Trimod MCS 30
with separate bypass input line

5.3.8 Installation of the connection jumpers

1. Take one of the connection jumpers out of the accessory envelope and cut it so as to make it the requisite length. Check that after the cut there are no burrs that could cause contact with adjacent jumpers.

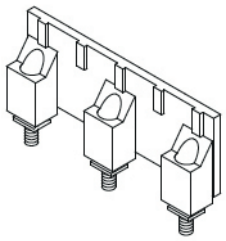


2. Eliminate the vertical connections that are not represented in the connection diagrams.

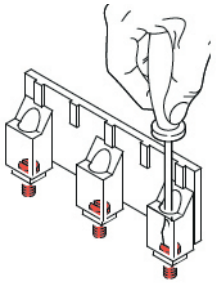


5. Installation

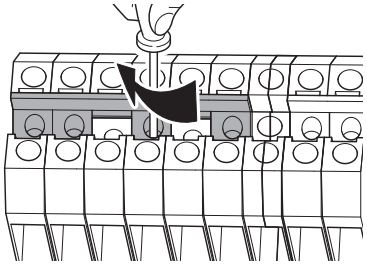
3. Insert the jumper into the terminal strip as shown in the connection diagrams.



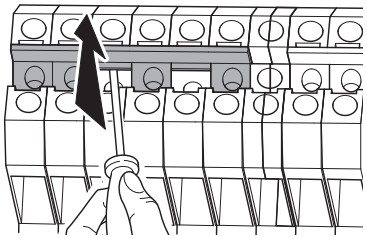
4. Carefully tighten all the screws to the terminal strip.



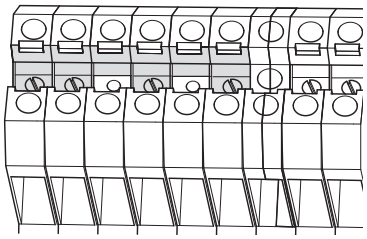
5. Tighten up the terminals.



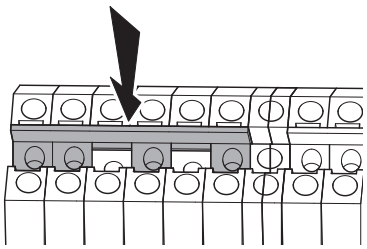
6. Use the screwdriver to extract the yellow plastic part.



7. Check that the screw head abuts properly on the terminals.



8. Reinsert the yellow plastic part.



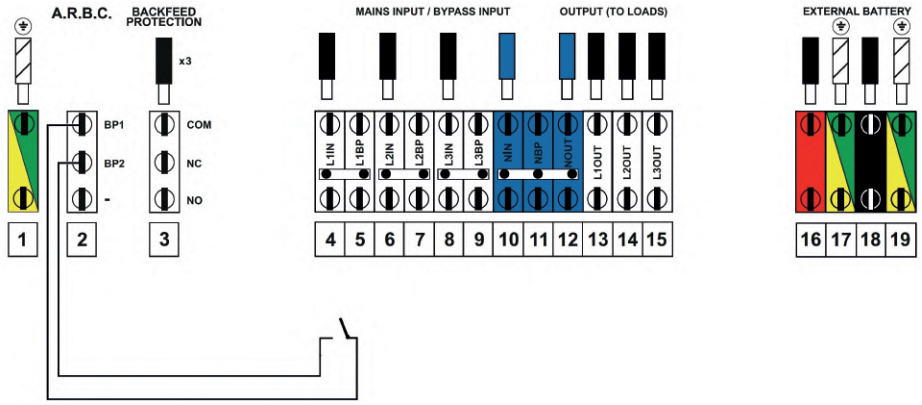
5.3.9 ARBC (Auxiliary Remote Bypass Contact)

Trimod MCS makes it possible to enable EPS forced bypass functioning without any operation from the control panel but simply through a normally open external contact.
The external bypass contact terminal is found on the terminal strip and is marked by the wording "A.R.B.C.".

For the correct connection of the external contact, the following requirements must be adhered to:
- use a double-insulation cable of up to 10 meters in length;
- make sure that the switch used is galvanically isolated.

The electric characteristics of the auxiliary remote bypass contact are the following:
- voltage with open contacts: less than 100 V
- current with closed contacts: less than100 mA

The figure below shows how the external bypass contact must be connected:



CAUTION
After the forced bypass enable contact is closed, the output is powered. When this contact is opened, the output is no longer powered.

INDICATION
It is not possible to use the auxiliary contact if the EPS is configured as a single phase input-three phase 120° output.

5.4 Insertion of power modules and battery drawers

Once all the electrical connections have been made, close the distribution drawer for the Trimod MCS 3, 5, 7,10, 15, 20 models or screw up the lower panels for the Trimod MCS 30, 40, 60 and 80.
It is then possible to move onto the insertion of the power modules and battery drawers into the EPS (depending on the model) and in the external modular battery units (if there are any).

WARNING
The Trimod MCS EPS have electrical distribution sized for the nominal power of the equipment and must be used exclusively with the power modules provided as shown in the "Mechanical characteristics" table in chapter 11 of this manual.
Do not use power modules that differ from those indicated and do not exchange the modules with each other and/or replace them to vary the power of the EPS.
The model, the nominal power and the type of power module to be installed in the Trimod MCS EPS are indicated in the manuals and on the rating plate inside the door of the EPS.
The type and the nominal power of the power module are indicated on a rating plate at the back of the module.

Insert the power modules one at a time checking that they abut. Fix them to the frame with the two screws provided with each module. Use SHC M4x20 screws (hex socket head). The two fixing screws also act as the module's earth connection and must both be fixed for safety purposes.
If one or more power modules are not installed, the free slots must be protected by using the plastic cover of the kit 3 108 66 in each of them. The cover must be fixed with two TCEI M4x20 screws.

6. Configuration and Starting-up

DANGER
All the configurations and start-up operations must be done only by a SKILLED TECHNICIAN (paragraph 2.2.1)

6.1 Introduction

This chapter contains all the information necessary for a correct configuration of the Trimod MCS EPS and for its subsequent startup.
The factory configuration provides SINGLE-PHASE INPUT and SINGLE-PHASE OUTPUT for Trimod MCS 3-5-7 and THREE PHASE INPUT and THREE PHASE 120° OUTPUT for other models.

6.2 Input configuration

Trimod MCS automatically recognises the input voltage, frequency and number of phases if the electrical connection on the terminal strip is modified.

CAUTION
Make sure the neutral cable is always connected.

6.3 Output configuration

Trimod MCS does not automatically recognise the electrical configuration on the output terminal strip. For this reason it is ALWAYS necessary to select the type of output voltage from the control panel according to the applied load.

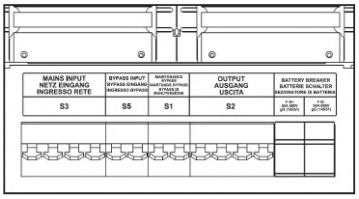
The default configuration for the Trimod MCS 3-5-7 EPS is single-phase; for the other models is three phase 120°, 400Vac. The equipment can also be configured to obtain a unique single phase output 230 Vac in the Trimod MCS 10,20 and 30 models.

If the EPS is configured with three phase output, it is possible to select the management of the three phase as follows :
- THREE PHASES 120°: this is the default setup and is usually used if three phase loads are applied on the output (e.g. three phase electrical motors) or if there are both three phase and single phase loads. The EPS manages the three output phases protecting the three phase load. For example, if an excessive load is applied to one of the three output lines, the automatic bypass switches all three lines on output.
- THREE SINGLE PHASE OUTPUTS: this setup is necessary if three single phase lines have been created with the common neutral on the output. The EPS manages the three outputs completely independently of each other. For example, if an excessive load is applied to one of the three output lines, the bypass only cuts in on the overloaded line , while the power supply continues to be guaranteed on the other two by the equipment. If the input is single phase, the three lines are not in phase but rather with a phase shift of 120° and therefore cannot be connected in parallel. If the input is three phase, the outputs are in phase and the possibility of using the bypass is guaranteed.

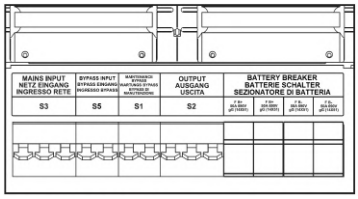
For the correct selection of the output configuration, follow the instructions given in section 6.5.

6.4 Pre-start-up checks

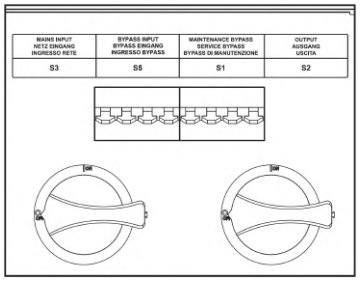
Before powering the equipment, carry out the following checks:
1. Check that the mains input switch S3 of the EPS is open (OFF position).
2. Check that the bypass input switch S5 of the EPS is open (OFF position).
3. Check that the battery fuse breakers of the EPS FB+ and FB- (if the model includes them) and those inside the Trimod MCS BATTERY (if present) are open (OFF position).
4. Check that the maintenance bypass switch S1 and the output switch S2 of the EPS are open (OFF position)
5. Check that the wiring on input and output has been done and that all the connections have been tightened up properly.
6. Check the correct phase sequence of the mains input and bypass line (if separate).
7. Check that the parameters (voltage and frequency) of the input line are compatible with those shown on the rating plate.
8. Check that all the power modules are inserted properly and that the fixing screws of the power modules are present and screwed up to abut the relative slots (use SHC M4x20 screws with hex socket head).
9. Check that all the battery drawers, if present, are inserted properly and that all the fixing screws are present and screwed up to abut the relative slots (use SHC M4x20 screws with hex socket head).



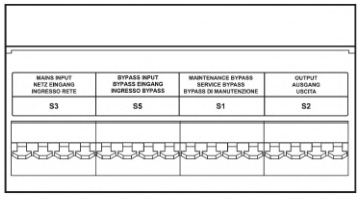
Trimod MCS 3-5-10



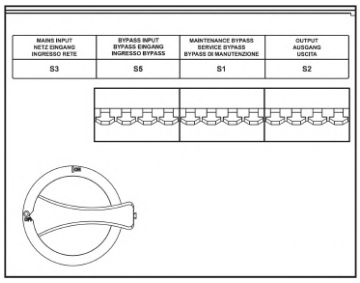
Trimod MCS 7-15-20



Trimod MCS 30



Trimod MCS 40-60



Trimod MCS 80

6.5 Start-up procedure

1. Insert the battery fuses into the appropriate fuse breakers of the Trimod MCS, if the model includes them and inside the external Trimod MCS BATTERY (if present).
2. Close the battery fuse breakers of the EPS and Trimod MCS BATTERY FB+ and FB- (if present).

CAUTION

Before turning on the EPS it is necessary to select the correct output configuration (Single phase/ Three Phases 120° / Three independent phases). In order to do so, the rest of the procedure must be applied.

3. With the EPS off, press the ENTER key on the control panel and keep it held down until the text "Language" appears. Using the ARROW UP and ARROW DOWN keys, select the language you require and confirm your choice with ENTER key.
4. Then press the ESC key to leave the Language page. The text "Service Mode" appears on the display.
   For further information about the function Service Mode and how the control panel works, consult the user manual.

CAUTION

Trimod MCS is able to recognise the presence of non aligned firmware among the power modules and therefore prevent the start-up.
In Service Mode the status indicator flashes orange rapidly and the texts "Service Mode" and "PM FW not updated!"
Follow the path **Power Modules → PM SW update** to update the power module firmware. It is possible to choose **Update all PM** to check and if necessary update all the power modules, while with the option **Single PM SW update** you can select the specific power module to update.

5. Press the ENTER key to enter the menu. Using the ARROW UP and ARROW DOWN keys, it is possible to move the selection on the display; the ENTER key is used to confirm the choice and the ESC key is used to cancel the choice.
   Follow the path **UPS Setup → Output → Inverter**
   Select "Three Phases 120°" / "Three Phases indep." / "Single Phase" in accordance with the type of load and distribution downstream of the EPS.

6. Configuration and Starting-up

CAUTION

The inverter output configuration must correspond with the configuration set on the output terminal strip during the installation.

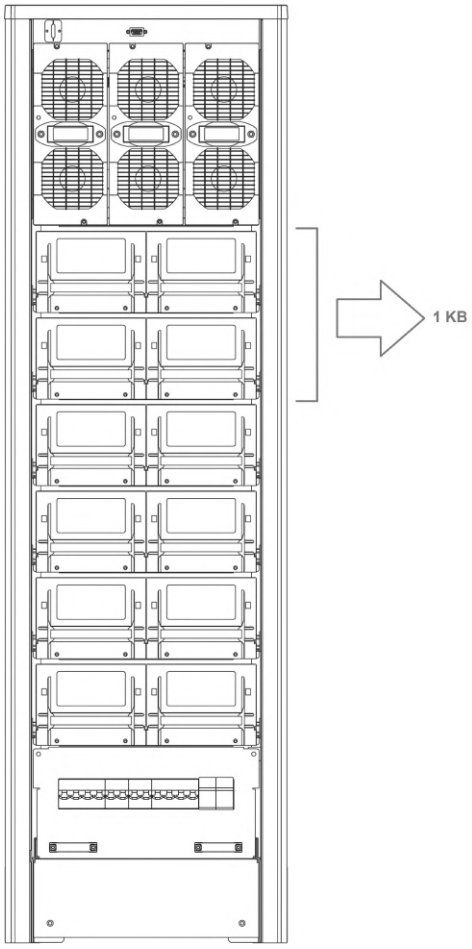
Wrong connections or incorrect output configurations may cause injury and/or damage.

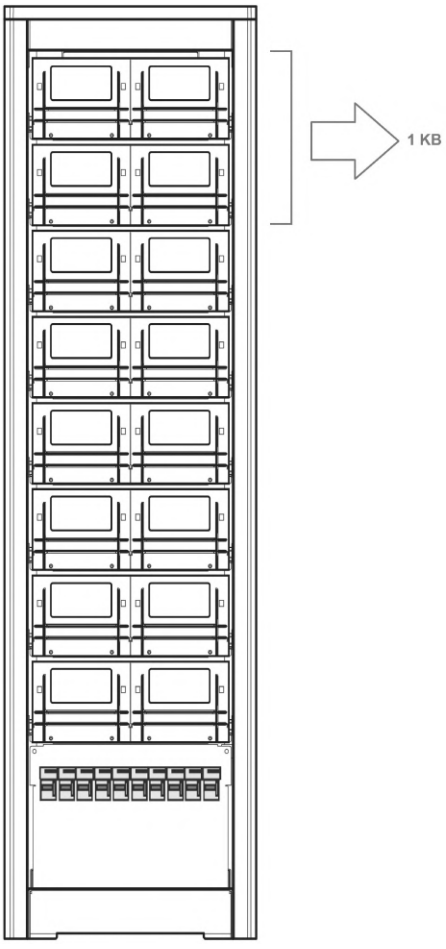
6. Follow the path **UPS Setup → Output → Voltage and UPS Setup → Output → Frequency** to check that the voltage and the frequency of the set outputs are the ones required.
7. Follow the path **UPS Setup → Options → Output options** to select whether the output is enabled or disabled in normal mode. The default value set is "ENABLED".
8. Follow the path **UPS Setup → Batteries → Total KB** to select the correct number of KB (Battery Kits) installed.

INDICATION

1 KB (Battery Kit) represents a string of 20 batteries in series.

In case of models with internal battery drawers and for external modular battery units, 1 KB comprises 4 battery drawers.





It is necessary to install 1 KB every 10 kVA of nominal EPS power in case of modular cabinets with battery drawers.

For example , for the Trimod MCS 40 it is necessary to have at least one external modular battery cabinet with 4 KB (16 battery drawers).

In case of non-modular 94Ah external battery cabinets, each unit represents 1 KB and 1 KB is sufficient for all the Trimod MCS models.

9. Follow the path **UPS Setup** → **Batteries** → **Capacity** to select the correct value of the capacity in Ah of the individual KB.

INDICATION
The EPS calculates the total battery capacity as produced by the total KB * Capacity.

10. Leave the Service Mode pressing the ON/OFF key.
11. Provide the power supply to the equipment and close the S3 mains input switch and S5 bypass input switch (ON position) of the EPS.

INDICATION
If the "Standby Charge" is enabled, when the EPS is powered a battery charge cycle is started automatically. Press the ESC key to interrupt the standby charge and proceed with the power up of the Trimod MCS as described below.

12. Press the ON/OFF key to turn on the EPS. When the display shows the text "<ENTER> to confirm UPS turn ON", press the ENTER key.

CAUTION
If the firmware of the power modules is out of alignment, the status indicator flashes red rapidly and the display shows the text "Invalid PM SW Versions: ↵ to execute update".
Press the ENTER key to update the modules and complete the start up phase. Press the ESC key to interrupt the update and start-up procedures.
If no operation is carried out within 30 seconds, the EPS turns off.

13. Wait for the backlit status indicator on the control panel to show a steady green light.
14. Check that the output voltage and frequency values set correspond with the requirements of the applied load. If this is not the case, insert the values necessary (see the user manual).
15. Close the S2 output disconnector switch (position ON) of the EPS. The load is not powered. When there is a power cut, the load is powered by the EPS.
16. Close the EPS door and remove the key.

INDICATION
If during the installation phase it is necessary to check the proper functioning of the EPS in battery mode, remove the mains by means of the breaker placed upstream of the EPS.

CAUTION
Do not remove the power modules during the functioning of the EPS without first having activate the proper replacement procedure (described in section 7.4). The removal of one or more power modules without the proper use of the procedure could damage the equipment.

INDICATION
The keys for opening the EPS door must not be left at the operator's disposal.

INDICATION
The installation and maintenance manual must not be left at the disposal of the operator.

7. Maintenance

DANGER
ORDINARY MAINTENANCE operations may be done only by SKILLED TECHNICIANS (section 2.2.1).
EXTRAORDINARY MAINTENANCE operations may be done only by the LEGRAND TECHNICAL SUPPORT SERVICE.

7.1 Introduction

This chapter contains all the information necessary to a skilled technician for a correct maintenance of the Trimod MCS EPS.

DANGER
The operator is not authorised to perform the operations contained in this chapter.
LEGRAND declines all liability for any injury or damage caused by activities carried out differently from the instructions in this manual or by a skilled technician who does not observe the requirements laid down in the installation and maintenance manual.

7.2 Preventive maintenance

The EPS does not contain parts for preventative maintenance by the operator.
The operator must regularly 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.

During a preventive maintenance inspection the skilled technician must carry out the following checks:
- no alarm presence;
- list of the memorised events;
- correct function of the static and maintenance bypass;
- integrity of the electrical installation;
- flow of cold air;
- battery status;
- characteristics of the applied load;
- conditions of the installation location.

After the first year of EPS life, 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 EPS detects the discharge curve of the batteries.
To activate the function, enter the main menu 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 EPS must be guaranteed by periodical maintenance inspections. These are essential to safeguard the its reliability.

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

7.4 Ordinary maintenance

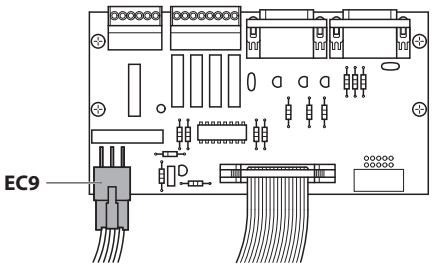
7.4.1 Maintenance procedure with EPS off

This mode is necessary to perform maintenance or replace parts such as power modules, command boards, backplanes, update the EPS firmware, etc.

1. Keep the ON/OFF key pressed for at least two seconds.
2. When the display shows the text "Turn off the UPS?", press the ENTER key.
3. Wait for the shutdown operations to complete.
4. Open the (S2) output disconnector by bringing it to the OFF position.
5. Open the (S3) mains disconnector and (S5) bypass input disconnector by bringing them to the OFF position.
6. Open the battery fuse breakers of the EPS and Trimod MCS BATTERY (if present).
7. Press the ON/OFF key to discharge any internal capacity.
8. Open the circuit breaker upstream of the EPS which supplies power from the mains. If these operations are performed correctly, there will be no voltage to the equipment. It is now possible to proceed with the maintenance operations.

WARNING

Inside the upper part of the EPS where the command boards and the contact interface card are located there could be dangerous voltage due to the connection of the external backfeed control line.
Be careful of connector EC9 of the relay interface card to which the backfeed line is connected.



Note: by protecting external backfeed protection as indicated in the diagrams in paragraph 5.2.6, it is possible to disconnect the line from the outside and secure it.

7.4.2 Maintenance procedure for the EPS in maintenance bypass mode

This mode is necessary to perform maintenance or replace parts such as power modules, command boards, backplanes, update the EPS firmware, etc.

CAUTION

During forced and maintenance bypass operations, the load is supplied by the bypass input line and is not protected by the EPS

CAUTION

The power modules must not be replaced without adhering scrupulously to the instructions below.

Accessing the manual maintenance bypass mode

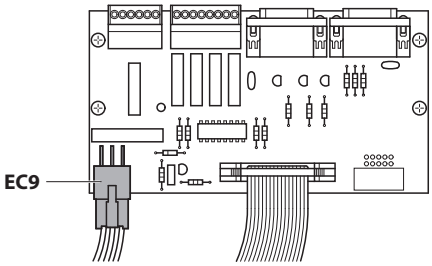
1. Open the Trimod MCS door.
2. Enable the EPS in forced bypass mode. Enter the main menu and follow the path **UPS Setup → Bypass → Forced Mode.** Set the value of the parameter to "Enable" with the ARROW UP/DOWN keys. Press the ENTER key to confirm. In this condition the power modules are excluded and the load is powered directly from the mains. The display shows the text "Forced on Bypass". When the equipment is in forced bypass mode, the status indicator flashes quickly. The LEDs on the power modules flash quickly as well.
3. Close the maintenance manual bypass disconnector (S1) by bringing it to the ON position. The load is powered directly from the mains. The display shows the text "Maintenance Bypass".
4. Open the (S2) output disconnector by bringing it to the OFF position.

7. Maintenance

5. Shutdown the EPS by holding the ON/OFF key down for a few seconds. When the display shows the text "Turn off the UPS?", press the ENTER key.
6. Open the (S3) mains input disconnector and (S5) bypass input disconnector by bringing them to the OFF position.
7. Open the battery fuse breakers of the EPS and all the Trimod MCS BATTERY (if present).
8. Press the ON/OFF key to discharge any internal capacity. It is now possible to proceed with the maintenance operations.

WARNING
In the case of models with internal batteries, some parts remain with dangerous voltage even after all the battery fuse breakers are opened. Remove at least one battery drawer for every shelf present in order to interrupt the battery string set.

WARNING
Inside the upper part of the EPS where the command boards and the contact interface card are located there could be dangerous voltage due to the connection of the external backfeed control line.
Be careful of connector EC9 of the relay interface card to which the backfeed line is connected.



Note: by protecting external backfeed protection as indicated in the diagrams in paragraph 5.2.6, it is possible to disconnect the line from the outside and secure it.

Power module replacement or inclusion of new modules

1. Check that the procedure for placing in maintenance bypass mode described above has been applied.
2. Extract the power module after undoing the two fixing screws.

CAUTION
On the cover of the power module there are two holes from which it is possible to see two LEDs that signal the presence of dangerous voltage on the rear connection. Before performing any operation on the power module, make sure that these LEDs are off. If they are on, wait for them to turn off.

3. Check that the two LEDs visible through the two holes in the side cover of the new power module are off. If they are on, wait for them to turn off.
4. Insert the new power module in the same slot where the previous one was located.
5. Fix the new power module to the frame with the two screws provided along with the power module, making sure they abut. Use SHC M4x20 screws (hex socket head). The two fixing screws allow the module's earthing and must both be fixed for safety purposes.

The procedure described does not need further manual settings from the control panel. The EPS automatically recognises the new power module and it is configured automatically.

INDICATION
The procedure to add power modules is similar to the previous one. At point 2 remove the plastic covers of kit 3 108 66 which protect the empty slots where new power modules are to be added.

Exit from maintenance manual bypass

To transfer the EPS from the maintenance bypass mode to the normal mode, do the following:
1. Check that the output disconnector (S2) is open (OFF position).
2. Close all the battery fuse breakers of the EPS and all the Trimod MCS BATTERY (if present).
3. Close the mains input disconnector (S3) and bypass input disconnector (S5) by bringing them to the ON position.

4. Press the ON/OFF key to turn on the EPS. When the display shows the text "<ENTER> to confirm UPS turn ON", press the ENTER key.

CAUTION

Trimod MCS is able to recognise the presence of non aligned firmware among the power modules and therefore prevent the start-up.
If the firmware of the power modules is out of alignment, the status indicator flashes red rapidly and the display shows the text "Invalid PM SW Versions: ↵ to execute update".
Press the ENTER key to update the power modules and complete the start up phase of the EPS. Press the ESC key to interrupt the update and start-up procedures.
If no operation is carried out within 30 seconds, the EPS turns off.

5. Wait for the power-on procedure to be completed. The main screen is shown on the display. In this condition the load is supplied directly by the bypass line. The display shows the text "Manual Bypass" and "Forced on Bypass". The backlit status indicator becomes orange.
6. Open the output disconnector (S2) by bringing it to the ON position.
7. Open the maintenance manual bypass disconnector (S1) by bringing it to the OFF position.
8. Enable the EPS in normal mode. Enter the main menu and follow the path **UPS Setup → Bypass → Forced Mode.** Set the value of the parameter to "Disabled" with the ARROW UP/DOWN keys. Press the ENTER key to confirm.
9. At the end of the procedure, the EPS returns to normal operation, with the output not powered. Under these conditions the backlit indicator alternates green and orange colours.
10. Close the Trimod MCS door (the keys must not be left at the operator's disposal).

7.5 Battery drawers requirements

The battery drawers of the EPS and modular Trimod MCS BATTERY can be installed/replaced in two different ways in addition to the one with the EPS off described in paragraph 7.4.1.

INDICATION

The battery drawers must always be added/removed in multiples of 4 (1 KB consists of four battery drawers for models with internal battery or external modular battery cabinets). If a KB is added, start from the free slots at the bottom and covered with the plastic covers of the kit 3 108 65. If a KB i s completely removed, cover the free slots with the empty battery slot covers of the kit 3 108 65.
If the installation/removal procedure changes the total number of KB installed, it is necessary to update this setting from the control panel.
After concluding the installation/replacement operations, calibrate the batteries from the control panel to get precise indications regarding the total autonomy of the EPS. To activate the function, enter the main menu and follow the path **Tools → Batteries → Batt. Calibration.**
Press the ENTER key to confirm the choice.

INDICATION

Always replace only 1 KB at a time

7. Maintenance

7.5.1 Installation/replacement of battery drawers with EPS in normal mode

If the EPS has in total more than 1 KB every 10kVA of power supplied on the output, it is possible to replace 4 battery drawers (1 KB) a time with the EPS in normal mode.
This operation can be carried out on models with internal batteries and on modular Trimod MCS BATTERY.

The replacement procedure is as follows:
1. Check that the equipment has installed more than 1KB every 10kVA of power supplied.
2. Check that the EPS is not functioning in battery mode and that the battery charger is in the "maintenance" or "standby" state. To check the status of the battery charger, go into the menu **UPS Status → Measures → Batteries** and check the fourth item shown on the screen.
3. Extract the four battery drawers relative to just one KB. To add another KB, do not remove any battery drawer.
4. Insert the four new battery drawers and fix them with the screws provided with them.
5. Repeat steps 2, 3 and 4 for every KB to install/replace.

INDICATION
If the EPS switches to battery mode during the operation, do not extract nor insert battery drawers. It is possible to resume the operation when the equipment returns to the normal mode.
If during the operation the input mains power fails, the autonomy is reduced: it is therefore necessary to carefully assess this circumstance in relation to the application before beginning the procedure.

7.5.2 Installation/replacement of battery drawers with EPS in maintenance manual bypass

This procedure is valid for both models with internal batteries and for modular Trimod MCS BATTERY.

1. Check that the procedure for placing in maintenance bypass mode, described in paragraph 7.4.2, has been applied.
2. Extract the four battery drawers relative to just one KB. To add another KB, do not remove any battery drawer.
3. Insert the four new battery drawers and fix them with the screws provided with them.
4. Repeat steps 2 and 3 for every KB to install/replace.
5. To leave the maintenance manual bypass status actuate the procedure described in paragraph 7.4.2.

CAUTION
During maintenance manual bypass operations, the load is supplied by the bypass input line and is not protected by the EPS

7.6 Extraordinary maintenance

Contact the LEGRAND Technical Support Service if faults have occurred which require access to internal parts of the EPS.

8. Warehousing

DANGER
The warehousing operations must only be done by SKILLED TECHNICIANS (paragraph 2.2.1).

DANGER
The SKILLED TECHNICIAN must check that there is no voltage present before disconnecting the cables. All the battery breakers on the EPS and on the external battery cabinets must be open. The modular Trimod MCS BATTERY battery drawers (if present) and the EPS battery drawers (according to the model) must be removed.

8.1 EPS

The EPS may be stored in an environment with a 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:
- 6 months at +20°C (+68°F);
- 3 months at +30°C (+86°F);
- 2 months at +35°C (+95°F).

For the recharging of the battery contact a qualified technician.

CAUTION
The battery drawers or the external Trimod MCS BATTERY 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 EPS 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 country for the proper procedure.

Pb

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

9.2 EPS dismantling

The dismantling of the EPS 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 this 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 machine 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 panel or the command boards it is necessary to refer to the relevant standards.

This symbol indicates that at the end of its life the product is collected separately from other waste and taken to authorised collection centres, in the cases and ways laid down by the national laws of EU countries, to avoid negative effects for the environment and human health. Unauthorised disposal at the end of life is subject to legal penalties. It is recommended to check that this equipment subject to WEEE legislations in the country where it is used.

10. Technical data

Main features

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Rated power at 120% of the load (EN50171)	3.4 kVA	5 kVA	6.7 kVA	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA	60 kVA	80 kVA
Active power at 120% of the load (EN50171)	3.4 kW	5 kW	6.7 kW	10 kW	15 kW	20 kW	30 kW	40 kW	60 kW	80 kW
Active power at 100% of the load	2.83 kW	4.16 kW	5.58 kW	8 kW	12.5 kW	16.7 kW	25 kW	33.3 kW	50 kW	66.7 kW
Technology	Classification according to EN62040-3: VFI-SS-111									
IN/OUT Configuration	Single-phase / Single-phase			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 the models									
Command boards	1									
EPS 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

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Maximum three-phase/ three-phase current	-	-	-	19.2 A	28.8 A	38.4 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/single phase current	-	-	-	57.6 A	86.4 A	115.2 A	172.8 A	-	-	-
Maximum single-phase/single-phase current	19.5 A	28.7 A	38.5 A	57.6 A	86.4 A	115.2 A	172.8 A	-	-	-
Rated input voltage	230 V + 15% - 20% (Single-phase)			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)

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Maximum three-phase/ three-phase current	-	-	-	14.5 A	21.7 A	29 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/single phase current	-	-	-	14.5 A	21.7 A	29 A	43.5 A	-	-	-
Maximum single-phase/single-phase current	14.8 A	21.7 A	29.2 A	43.5 A	65.2 A	87 A	130.5 A	-	-	-
Rated output voltage	230 V ± 1% (Single-phase)			230 V ± 1% (Single-phase) 400 V ± 1% (Three-phase)				400 V ± 1% (Three-phase)		
Rated output frequency	50 / 60 Hz									
Tolerance on the output frequency	If synchronised with the input frequency: adjustable range from ±1% to ±14% If not synchronised: ± 1%									
Crest factor admitted on the output current	3:1									
Efficiency (AC/AC on-line)	up to 96%									
Efficiency ECO mode	99% max									
Overload admitted	120% continuously without automatic bypass intervention 135% for 10 minutes without automatic bypass intervention 150% for 60 seconds without automatic bypass intervention									

Electrical output characteristics (battery mode)

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Rated output voltage	230 V ± 1% (Single-phase)			230 V ± 1% (Single-phase) 400 V ± 1% (Three-phase)				400 V ± 1% (Three-phase)		
Rated output frequency	50 / 60 Hz ± 1%									
Total harmonic distortion of output voltage on non-linear nominal load	< 1%									
Overload admitted	120% until end of autonomy 135% for 2 minutes 155% for 30 seconds									

Batteries and Battery Charger Characteristics

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Battery type	Long-life maintenance-free sealed lead-acid (VRLA); life expectancy 10 years									
Unitary capacity	Battery drawers: 5 batteries 12Vdc - 9Ah Non-modular external battery cabinets: 20 batteries 12Vdc - 94Ah									
Rated battery voltage	240 Vdc (20 batteries 12V in series)									
Type of battery charger	High performance PWM, one for each power module									
Recharge curve	Smart Charge, advanced three-stage cycle									
Battery charger nominal recharge current	2.5 A max for every power module installed									
Charging time (EN50171)	12 h max									

	3 109 90 Trimod MCS 3	3 109 91 Trimod MCS 5	3 109 92 Trimod MCS 7	3 109 93 Trimod MCS 10	3 109 94 Trimod MCS 15	3 109 95 Trimod MCS 20	3 109 96 Trimod MCS 30	3 109 97 Trimod MCS 40	3 109 98 Trimod MCS 60	3 109 99 Trimod MCS 80
Minimum number of batteries to guarantee an autonomy of 1 h (EN50171) *	8 battery drawers	12 battery drawers	16 battery drawers	24 battery drawers (12 in the EPS + 12 in the external modular battery cabinet 4KB)	36 battery drawers (16 in the EPS + 20 in the external modular battery cabinet 5KB)	1 external non-modular battery cabinet	2 external non-modular battery cabinet	2 external non-modular battery cabinet	3 external non-modular battery cabinet	4 external non-modular battery cabinet

**1h autonomy only guaranteed for the item codes listed in the table*

Features

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
Signals and alarms	Large four line alphanumeric screen, multicolour status indicator, acoustic notification									
Communication ports	2 x RS 232 ports, 1 relay interface, 1 contact port, 1 SMNP module slot									
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 EPO contact Auxiliary contact for Backfeed protection									

10. Technical data

Mechanical characteristics

	3 110 00 Trimod MCS 3	3 110 00 Trimod MCS 5	3 110 00 Trimod MCS 10	3 110 01 Trimod MCS 20	3 110 03 Trimod MCS 30	3 110 04 Trimod MCS 40	3 110 05 Trimod MCS 60
Net weight (without batteries and power modules)	87 kg			90 kg	86 kg	83 kg	92 kg
Dimensions in mm (w x h x d)	414 x 1370 x 628						
3400 VA power modules installed	1	-	3	-	-	-	-
5000 VA power modules installed	-	1	-	-	6	-	-
6700 VA power modules installed	-	-	-	3	-	6	9
Power module net weight	8.5 kg						
Battery drawer net weight	13.3 kg			-	-	-	-

	3 110 02 Trimod MCS 7	3 110 02 Trimod MCS 15	3 110 06 Trimod MCS 80
Net weight (without batteries and power modules)	105 kg		122 kg
Dimensions in mm (w x h x d)	414 x 1650 x 628		
3400 VA power modules installed	-	-	-
5000 VA power modules installed	-	3	-
6700 VA power modules installed	1	-	12
Power module net weight	8.5 kg		
Battery drawer net weight	13.3 kg		-

	3 110 07 Trimod MCS Battery Cabinet 4KB	3 106 16 Trimod MCS Battery Cabinet 5KB	3 108 08 3 108 09 3 108 10 3 108 11 Trimod Battery Cabinet 94Ah
Net weight (without batteries)	82 kg	96 kg	100 kg
Dimensions in mm (w x h x d)	414 x 1370 x 628	414 x 1650 x 628	600 x 1635 x 800
Battery drawers weight	13.3 kg		-
Weight of each 94Ah battery	-		32.6 kg

Environmental conditions

	Trimod MCS 3	Trimod MCS 5	Trimod MCS 7	Trimod MCS 10	Trimod MCS 15	Trimod MCS 20	Trimod MCS 30	Trimod MCS 40	Trimod MCS 60	Trimod MCS 80
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 dB									
Protection index	IP 20									
Operating height	up to 1000 metres above sea level without derating									

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

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

Reference directives and standards

CPSS	EN 50171
Safety	2014/35/EU directive EN 62040-1
EMC	2014/30/EU directive EN 62040-2
Performance and test requirements	EN 62040-3

11. Tables

CAUTION

The choice of the type and section of the connecting wires depending on their voltage, rated current and installation must be done as indicated in the standards in force in the country where the EPS is installed and it is a responsibility of the installation engineer.
The input current and the output power of the EPS are indicated in chapter 10 and the battery current in table 8 of this chapter.
The following tables give an indication of the wire cross sections to use if the wires are unipolar with simple PVC installation and installation in tube in the air.

TABLE 1
Minimum cable cross sections recommended for Trimod MCS

POWER	INPUT PHASES	OUTPUT PHASES	INPUT CABLE	BYPASS CABLE (in case of separate bypass line)	OUTPUT CABLE
3 kVA	1	1	3 x 2.5 mm^2	3 x 2.5 mm^2	3 x 2.5 mm^2
5 kVA	1	1	3 x 4 mm^2	3 x 4 mm^2	3 x 4 mm^2
7 kVA	1	1	3 x 6 mm^2	3 x 6 mm^2	3 x 6 mm^2
10 kVA	3	3	5 x 4 mm^2	5 x 4 mm^2	5 x 4 mm^2
	1	1	3 x 10 mm^2	3 x 10 mm^2	3 x 10 mm^2
	1	3	3 x 10 mm^2	3 x 10 mm^2	5 x 4 mm^2
	3	1	5 x 10 mm^2	5 x 10 mm^2	3 x 10 mm^2
15/20 kVA	3	3	5 x 10 mm^2	5 x 10 mm^2	5 x 10 mm^2
	1	1	3 x 25 mm^2	3 x 25 mm^2	3 x 25 mm^2
	1	3	3 x 25 mm^2	3 x 25 mm^2	5 x 10 mm^2
	3	1	5 x 25 mm^2	5 x 25 mm^2	3 x 25 mm^2
30 kVA	3	3	5 x 16 mm^2	5 x 16 mm^2	5 x 16 mm^2
	1	1	3 x 50 mm^2	3 x 50 mm^2	3 x 50 mm^2
	1	3	3 x 50 mm^2	3 x 50 mm^2	5 x 16 mm^2
	3	1	5 x 50 mm^2	5 x 50 mm^2	3 x 50 mm^2
40 kVA	3	3	5 x 25 mm^2	5 x 25 mm^2	5 x 25 mm^2
60 kVA	3	3	5 x 35 mm^2	5 x 35 mm^2	5 x 35 mm^2
80 kVA	3	3	5 x 50 mm^2	5 x 50 mm^2	5 x 50 mm^2

INDICATION
The maximum cable cross section that can be installed in the terminals is 50 mm^2 for all the models.

TABLE 2
Battery fuse values recommended for Trimod MCS with internal batteries

POWER	BATTERY FUSES	
	Trimod MCS	
	F B+	F B-
3/5/7/10/15 kVA	50A 400V gG (14 x 51 mm)	50A 400V gG (14 x 51 mm)

TABLE 3
Battery fuse values recommended for MODULAR Trimod MCS BATTERY 4KB

POWER	BATTERY FUSES	
	MODULAR Trimod MCS BATTERY 4KB (16 drawers)	
	F B+	F B-
3/5/7/10 kVA	n°4 – 50A 500V gG (14 x 51 mm)	n°4 – 50A 500V gG (14 x 51 mm)

TABLE 4
Battery fuse values recommended for MODULAR Trimod MCS BATTERY 5KB

POWER	BATTERY FUSES	
	MODULAR Trimod MCS BATTERY 5KB (20 drawers)	
	F B+	F B-
3/5/7/10/15 kVA	No. 5 – 50A 500V gG (14 x 51 mm)	No. 5 – 50A 500V gG (14 x 51 mm)

TABLE 5
Battery fuse values recommended for NON MODULAR Trimod BATTERY 1KB (94Ah)

POWER	BATTERY FUSES	
	NON MODULAR Trimod BATTERY 1KB (94Ah)	
	F B+	F B-
20 kVA	No. 1 – 100A 500V gG (22 x 58 mm)	No. 1 – 100A 500V gG (22 x 58 mm)
30 kVA	No. 2 – 80A 500V gG (22 x 58 mm)	No. 2 – 80A 500V gG (22 x 58 mm)
40 kVA	No. 2 – 125A 500V gG (22 x 58 mm)	No. 2 – 125A 500V gG (22 x 58 mm)
60 kVA	No. 3 – 100A 500V gG (22 x 58 mm)	No. 3 – 100A 500V gG (22 x 58 mm)
80 kVA	n°4 – 100A 500V gG (22 x 58 mm)	n°4 – 100A 500V gG (22 x 58 mm)

11. Tables

TABLE 6
Automatic breaker recommended for mains input and bypass line

POWER	INPUT PHASES	OUTPUT PHASES	RECOMMENDED AUTOMATIC CIRCUIT BREAKER	RECOMMENDED INPUT FUSE
3 kVA	1	1	C curve 20A (2P)	20A gG
5 kVA	1	1	C curve 32A (2P)	32A gG
7 kVA	1	1	C curve 40A (2P)	40A gG
10 kVA	3	3	C curve 20A (3P+N)	20A gG
	3	1	C curve 63A (3P+N)	63A gG
	1	1-3	C curve 63A (1P+N)	63A gG
15kVA	3	3	C curve 32A (3P+N)	32A gG
	3	1	C curve 100A (3P+N)	100A gG
	1	1-3	C curve 100A (1P+N)	100A gG
20 kVA	3	3	C curve 40A (3P+N)	32A gG
	3	1	C curve 100A (3P+N)	100A gG
	1	1-3	C curve 100A (1P+N)	100A gG
30 kVA	3	3	C curve 63A (3P+N)	63A gG
	3	1	C curve 160A (3P+N)	160A gG
	1	1-3	C curve 160A (1P+N)	160A gG
40 kVA	3	3	C curve 80A (3P+N)	63A gG
60 kVA	3	3	C curve 100A (3P+N)	100A gG
80 kVA	3	3	C curve 150A (3P+N)	125A gG

TABLE 7
Residual current breaker recommended for mains input and bypass line

POWER	RESIDUAL CURRENT BREAKER RESIDUAL CURRENT (IΔn)
3 kVA	≥30 mA B type
5 kVA	≥30 mA B type
7 kVA	≥30 mA B type
10 kVA	≥ 300 mA B type
15 kVA	
20 kVA	
30 kVA	
40 kVA	
60 kVA	
80 kVA	

TABLE 8
Maximum current absorbed by the batteries at 100% of the load and minimum wire cross sections recommended for connection of the EPS to the external Trimod MCS BATTERY battery cabinets.

POWER	MAXIMUM BATTERY CURRENT	RECOMMENDED MINIMUM WIRE CROSS SECTION
3 kVA	16 A	1 x 10 mm^2 for each pole
5 kVA	27 A	1 x 10 mm^2 for each pole
7 kVA	38 A	1 x 10 mm^2 for each pole
10 kVA	50 A	1 x 10 mm^2 for each pole
15 kVA	76 A	1 x 16 mm^2 for each pole
20 kVA	100 A	1 x 25 mm^2 for each pole
30 kVA	152 A	2 x 25 mm^2 for each pole
40 kVA	202 A	2 x 35 mm^2 for each pole
60 kVA	304 A	2 x 50 mm^2 for each pole
80 kVA	405 A	2 x 70 mm^2 for each pole

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Installer stamp

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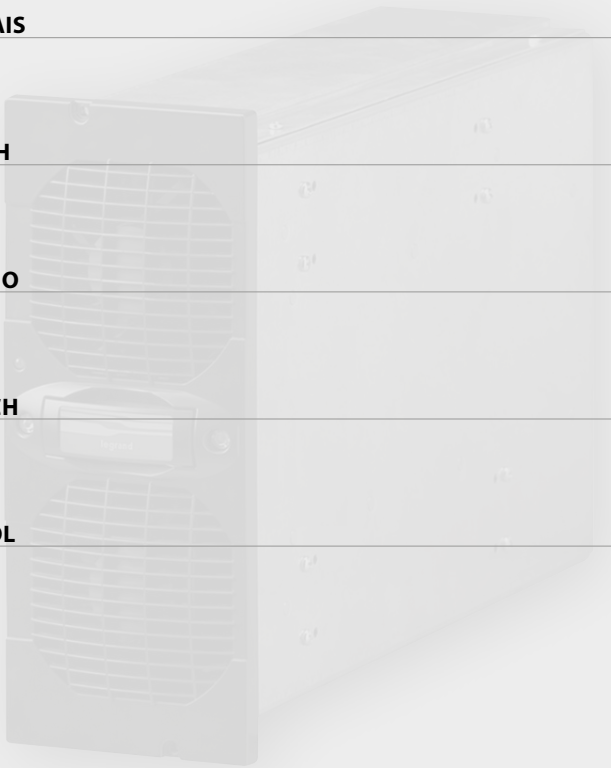
in any form and modality, the changes brought to the same.

Power Module
Battery Charger Module

Installation Manual

Part. LE05774AB-04/19-02 GF

Power Module
Battery Charger Module



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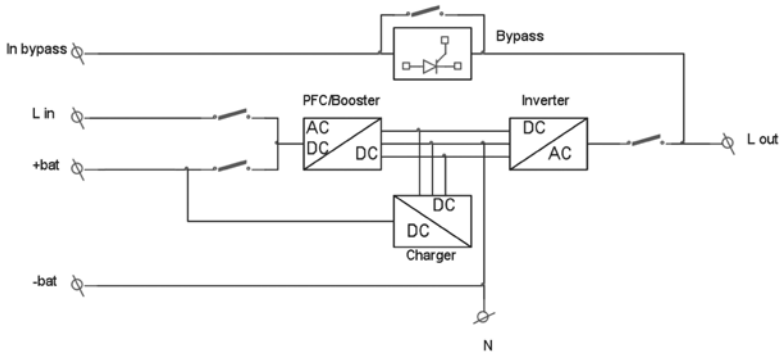
1.1 Module de puissance

Le module monophasé à haute efficacité, disponible dans trois puissances, 3400 VA (PM4), 5000 VA (PM6) et 6700 VA (PM7), est pour l'essentiel constitué des blocs fonctionnels suivants:
- logique de commande et de contrôle (gérée par microprocesseur) ;
- redresseur PFC/booster ;
- variateur ;
- chargeur ;
- circuit de bypass automatique.

Sur chaque module de puissance, est présent un micro-contrôle en mesure de superviser les principales fonctions de l'unité, d'assurer le monitorage du fonctionnement et de signaler les éventuels dysfonctionnements.
Le module de puissance est de type Plug & Play pour faciliter l'expansion de puissance et les éventuelles interventions d'entretien.
Chaque module est mis en parallèle avec d'autres modules identiques jusqu'à ce que soit atteinte la puissance de l'onduleur.
Les modules sont indépendants les uns des autres et peuvent également fonctionner en cas de panne de l'un d'eux. Sur la partie frontale du module, un voyant multicolore vert-jaune-rouge est présent qui permet de connaître rapidement l'état de fonctionnement de l'unité électronique.

Le schéma par blocs du module de puissance est le suivant :



1.2 Module chargeur (BCM - Battery Charger Module)

Le module chargeur supplémentaire fonctionne en parallèle et de manière synchronisée avec les chargeurs internes des modules de puissance ; il est géré par le même algorithme qui régule le cycle de charge. Chaque module chargeur supplémentaire fournit jusqu'à 15A de courant de charge qui se somment aux courants des chargeurs internes des modules de puissance. Chaque module de puissance peut distribuer jusqu'à 2,5A de charge. Cela permet de réduire les temps de charge sur les installations onduleurs qui nécessitent de longues autonomies et augmentent la disponibilité du système onduleur après une coupure de secteur. Pendant le fonctionnement, le module chargeur prélève le courant sur la phase d'entrée sur laquelle il est installé. Il est possible d'installer n'importe quel nombre de modules BCM à condition qui soit présent au moins un module de puissance par phase et que le nombre de logements vides à l'intérieur de l'armoire de l'onduleur soit suffisant. Toutes les informations sur l'état de fonctionnement du BCM sont fournies par le voyant présent sur le devant du module et par les indications affichées sur l'écran de l'onduleur. Le module chargeur est géré par un microprocesseur pour optimiser le rendement et la fiabilité. Son installation est recommandée avec des armoires de batteries d'une capacité supérieure à 60 Ah

2 Installation et entretien

DANGER
Les opérations d'installation et d'entretien doivent être exclusivement confiées à un TECHNICIEN QUALIFIÉ en mesure d'intervenir également en présence de tension électrique dangereuse.
La mise en place et/ou le changement d'un module de charge de batterie supplémentaire doivent être effectués uniquement après avoir consulté le manuel d'installation et d'entretien de l'onduleur LEGRAND sur lequel le module doit être installé.

LEGRAND décline toute responsabilité directe et indirecte dans les cas suivants :
- non-respect des instructions d'installation et d'entretien de l'onduleur ;
- utilisation du module d'une manière autre que celle prévue dans le manuel d'utilisation de l'onduleur ;
- utilisation par un personnel qui n'aurait pas lu et bien compris le contenu du manuel d'installation de l'onduleur ;
- utilisation non-conforme aux normes spécifiques en vigueur dans le pays où l'interface est installée ;
- modifications effectuées sur l'appareillage, le logiciel, la logique de fonctionnement, sans autorisation préalable accordée par écrit par le Constructeur ;
- réparations non autorisées par le Centre d'assistance technique LEGRAND ;
- dommages causés volontairement, dommages causés par la négligence, par des phénomènes naturels, des événements exceptionnels, par le feu ou par des infiltrations de liquides.

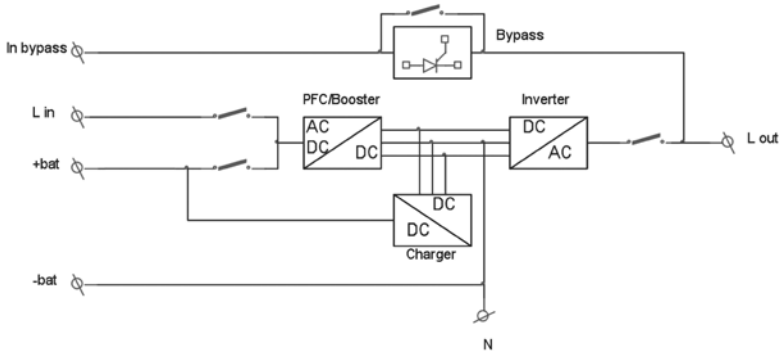
Table of Contents

1.1 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 block diagram of the power module is the following:



1.2 BCM - Battery Charger Module

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 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. Every power module can provide up to 2.5A of charge current. This guarantees a reduction of the charge time in installations of UPSs 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 number 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.

2 Installation and maintenance

DANGER
Installation and maintenance operations must be carried out exclusively by a SKILLED TECHNICIAN capable of working with dangerous live voltages.
The installation and/or replacement of a power module or the additional battery charging module must only be carried out after reading the installation and maintenance manual of the LEGRAND UPS on which the module is to be installed.

LEGRAND declines all indirect or direct responsibility arising from:
- failure to observe the installation and maintenance instructions of the UPS;
- use of the module which differs from the specifications in the UPS user manual;
- use by personnel who have not read and thoroughly understood the content of the UPS installation 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.

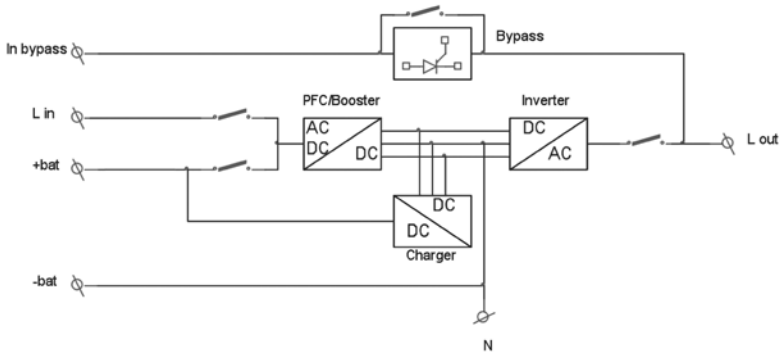
Indice

1.1 Modulo di potenza

Il modulo monofase ad alta efficienza, è disponibile in tre tagli di potenza rispettivamente da 3.400VA (PM4), 5.000 VA (PM6) e 6.700VA (PM7), ed è composto dai seguenti blocchi funzionali:
- logica di comando e controllo (gestita da microprocessore);
- raddrizzatore PFC/booster;
- inverter;
- caricabatterie;
- bypass automatico.

In ogni modulo di potenza e presente un microcontrollore in grado di sovraintendere alle principali funzioni della singola unita, di monitorarne il corretto funzionamento e di segnalare eventuali malfunzionamenti.
Il modulo di potenza è Plug & Play per facilitare l'espansione di potenza ed eventuali interventi di manutenzione. Ogni modulo viene messo in parallelo con altri identici fino a raggiungere la potenza dell'UPS.
I moduli sono indipendenti l'uno dall'altro e possono funzionare anche in caso di avaria di uno di essi. Nella parte frontale del modulo è presente un led multicolore con codifica semaforica verde-giallo-rosso che permette una rapida individuazione dello stato di funzionamento dell'unità elettronica.

Il diagramma a blocchi del modulo di potenza è il seguente:



1.2 Modulo caricabatterie (BCM - Battery Charger Module)

Il modulo caricabatterie aggiuntivo lavora in parallelo ed in sincrono con i caricabatterie interni ai moduli di potenza, gestito dallo stesso algoritmo che regola il ciclo di ricarica. Ogni modulo caricabatterie aggiuntivo fornisce fino a 15A di corrente di ricarica, che si sommano alle correnti dei caricabatterie interni ai moduli di potenza. Ogni modulo di potenza può erogare fino a 2,5A di ricarica. Questo garantisce di ridurre i tempi di ricarica nelle installazioni UPS che richiedono lunghe autonomie ed aumenta la disponibilità del sistema UPS dopo una mancanza rete. Durante il funzionamento, il modulo preleva corrente dalla fase di ingresso in cui è installato. È possibile installare un qualunque numero di moduli BCM a condizione che sia presente almeno un modulo di potenza per fase e che ci sia un sufficiente numero di slot vuoti all'interno del cabinet dell'UPS. Tutte le informazioni sullo stato di funzionamento del BCM sono segnalate dal LED presente sul frontale del modulo e dalle indicazioni riportate sul display dell'UPS. Il modulo è gestito da microprocessore per ottimizzare rendimento e affidabilità. Si consiglia di installarlo in abbinamento a cabinet batterie di capacità superiore ai 60Ah.

2 Installazione e manutenzione

PERICOLO
Le operazioni d'installazione e manutenzione devono essere effettuate soltanto da un TECNICO SPECIALIZZATO in grado di operare in presenza di tensione elettrica pericolosa.
L'inserimento e/o la sostituzione di un modulo di potenza o del modulo caricabatterie aggiuntivo devono essere effettuati solo dopo aver consultato il manuale di installazione e manutenzione dell'UPS LEGRAND in cui si deve installare il modulo.

LEGRAND declina ogni responsabilità diretta e indiretta derivante da:
- inosservanza delle istruzioni d'installazione e manutenzione dell'UPS;
- utilizzo del modulo diverso da quello previsto nel manuale d'uso dell'UPS;
- uso da parte di personale che non abbia letto e compreso a fondo il contenuto del manuale d'installazione dell'UPS;
- uso non conforme a normative specifiche vigenti nel Paese di installazione;
- modifiche effettuate sull'apparecchiatura, sul software, sulla logica di funzionamento, se non autorizzate dal Costruttore per iscritto;
- riparazioni non autorizzate dal Centro Assistenza Tecnica di LEGRAND;
- danni provocati da palese dolo, incuria, fenomeni naturali, eventi eccezionali, fuoco o infiltrazioni da liquidi.

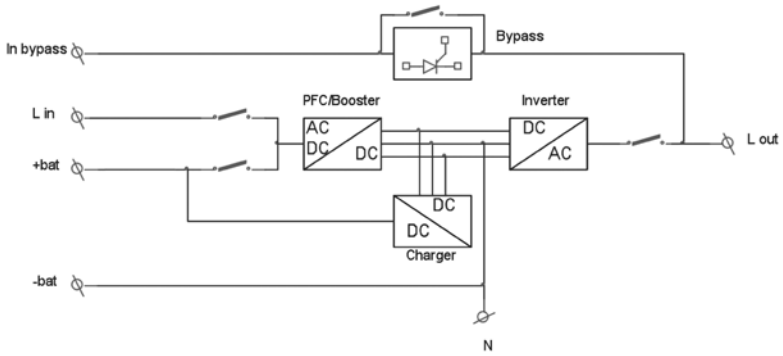
Inhaltsverzeichnis

1.1 Leistungsmodul

Das Hochleistungs-Einsphasenmodul ist mit drei unterschiedlichen Leistungen - 3400VA (PM4), 5000VA (PM6) und
6700VA (PM7) - erhältlich und besteht aus folgenden Funktionsblöcken:
- Steuer- und Kontrolllogik (über den Mikroprozessor gesteuert);
- Gleichrichter PFC/Booster;
- Frequenzumrichter;
- Frequenzumrichter;
- automatischer Bypass-Kreislauf.

Jedes Leistungsmodul enthält einen Mikrokontroller, der die wichtigsten Funktionen der einzelnen Einheit steuert, den sachgerechten Betrieb überwacht und eventuelle Störungen meldet.
Das Leistungsmodul ist des Typs Plug & Play, um die Leistungserweiterung und eventuelle Wartungseingriffe zu erleichtern. Jedes Modul wird parallel mit anderen genau gleichen Modulen geschaltet, um die Leistung der USV-Einheit zu erreichen.
Die Leistungsmodule sind voneinander unabhängig und können auch dann weiter funktionieren, wenn ein Modul defekt ist. An der Frontseite des Moduls ist eine mehrfarbige Led mit einer grünen, einer gelben und einer roten Leuchte, die eine schnelle Identifizierung des Betriebszustands der Elektronikeinheit gestattet.

Das Blockschema des Leistungsmoduls ist folgendes:



1.2 Akku-Ladegerätmodul (BCM - Battery Charger Module)

Das zusätzliche Akku-Ladegerätmodul ist mit den internen Ladegeräten der Leistungsmodule parallel geschaltet und synchron und wird durch dasselbe Algorithmus gesteuert, das den Aufladezyklus regelt. Jedes zusätzliche Ladegerätmodul liefert bis au 15A Aufladestrom, der dem Strom der internen Ladegeräte der Leistungsmodule hinzugefügt wird.
Jedes Leistungsmodul kann bis zu 2,5A Aufladestrom liefern. Dadurch werden die Aufladezeiten bei USV-Installationen gekürzt, die eine lange Autonomie benötigen und die Verfügbarkeit des USV-Systems nach einem Stromausfall verbessert. Während des Betrieb entnimmt das Akku-Ladegerätmodul den Strom von der Phase am Eingang des Platzes, an dem es installiert ist. Die BCM können in beliebiger Anzahl installiert werden, vorausgesetzt es ist mindestens ein Leistungsmodul pro Phase vorhanden und es sind genügend leere Slots im Inneren der USV-Box vorhanden. Alle Informationen über den Betriebsstatus des BCM werden durch die Led an der Frontseite des Moduls und durch die Meldungen am Display der USV-Einheit identifiziert. Das Ladegerätmodul wird über einen Mikroprozessor gesteuert, um die Leistung und Zuverlässigkeit zu optimieren. In Verbindung mit der Box, empfehlen wir Ladegerätmodul mit einer Leistung von über 60Ah zu installieren.

2 Installation und wartung

GEFAHR
Installations- und Wartungsarbeiten dürfen nur von einem speziell dafür QUALIFIZIERTEN TECHNIKERN durchgeführt werden, der in der Lage ist, unter gefährlicher elektrischer Spannung zu arbeiten.
Das Einsetzen und/oder Auswechseln eines Leistungsmoduls oder des zusätzlichen Batterielademoduls darf nur nach Beachtung der Installations- und Wartungsanleitung der LEGRAND USV, in die das Modul eingebaut werden soll, durchgeführt werden.

LEGRAND haftet weder direkt noch indirekt nicht in folgenden Fällen:
- Nichtbeachtung der Installations- und Wartungsanweisungen der USV;
- Verwendung eine Moduls, das nicht in der Bedienungsanleitung der USV vorgesehen ist;
- Gebrauch durch das Personal, das die Installationsanweisungen der USV nicht gelesen und nicht verstanden hat;
- ungeeigneter Gebrauch, der nicht den im Installationsland geltenden Vorschriften entspricht;
- Änderungen am Gerät, an der Software oder an der Betriebslogik, die nicht vom Hersteller schriftlich zugelassen wurden;
- Reparaturen, die nicht von der technischen Kundendienststelle von LEGRAND genehmigt wurden;
- Schäden, die durch offensichtlichen Betrug, Fahrlässigkeit, Naturphänomene, außergewöhnliche Ereignisse, Feuer oder Infiltration von Flüssigkeiten verursacht werden.

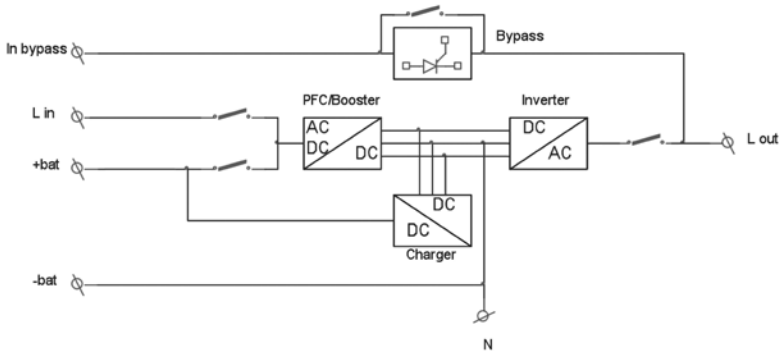
Índice

1.1 Módulo de potencia

El módulo monofásico de alta eficiencia, disponible en tres cortes de potencia respectivamente de 3400VA (PM4), 5000VA (PM6) y 6700VA (PM7), está compuesto por los siguientes bloques funcionales:
- lógica de mando y control (gestionada mediante microprocesador);
- rectificador PFC/booster;
- inverter;
- cargador de baterías;
- circuito de bypass automático.

En cada módulo de potencia hay un microcontrolador, que realiza las funciones principales de la unidad individual, monitoriza el funcionamiento correcto y señala los posibles funcionamientos incorrectos.
El módulo de potencia es Plug & Play para facilitar la expansión de potencia y posibles intervenciones de mantenimiento.
Cada módulo se pone en paralelo con otros idénticos para alcanzar la potencia del UPS.
Los módulos de potencia son independientes entre sí y pueden funcionar también en caso de fallo de uno de ellos. En la parte frontal del módulo hay un led multicolor con codificación de semáforo verde-ámbar-rojo, que permite una identificación rápida del estado de funcionamiento de la unidad electrónica.

El esquema de bloques del módulo de potencia es el siguiente:



1.2 Módulo cargador de baterías (BCM - Battery Charger Module)

El módulo cargador de baterías adicional funciona en paralelo y en síncrono con los cargadores de baterías internos en los módulos de potencia, gestionado por el mismo algoritmo que regula el ciclo de carga. Cada módulo cargador de baterías adicional proporciona hasta 15A de corriente de carga, que se suman a las corrientes de los cargadores de batería internos en los módulos de potencia. Cada módulo de potencia puede proporcionar hasta 2,5A de carga. Esto asegura la reducción de los tiempos de carga en las instalaciones UPS, que demandan autonomías largas y aumenta la disponibilidad del sistema UPS tras un corte en la red. Durante el funcionamiento, el módulo cargador de baterías retira corriente de la fase de entrada donde se encuentra instalado. Se puede instalar un número cualquiera de módulos BCM siempre y cuando haya al menos un módulo de potencia por fase y un número suficiente de slots vacíos internamente en el armario UPS. Toda la información acerca del estado de funcionamiento del BCM es indicada por el LED presente en el frontal del módulo y por las indicaciones contenidas en la pantalla del UPS. El módulo cargador de baterías se gestiona mediante un microprocesador para optimizar rendimiento y fiabilidad. Se aconseja la instalación en combinación con armarios baterías con una capacidad superior a los 60Ah.

PELIGRO
Las operaciones de instalación y mantenimiento han de ser efectuadas solamente por un TÉCNICO ESPECIALIZADO, capacitado para operar con la presencia de tensión eléctrica peligrosa.
La inserción y/o la sustitución de un módulo de potencia o del módulo cargador de baterías adicional han de efectuarse únicamente después de haber consultado el manual de instalación y mantenimiento del SAI LEGRAND donde se debe instalar dicho módulo.

LEGRAND queda eximido de toda responsabilidad, directa e indirecta, derivada de:
- incumplimiento de las instrucciones de instalación y mantenimiento del SAI;
- uso del módulo no contemplado en el manual de uso del SAI;
- uso por parte de personal que no ha leído y entendido completamente el contenido del manual de instalación del SAI;
- uso no conforme a normativas específicas vigentes en el país de instalación;
- modificaciones efectuadas en el aparato, en el software, en la lógica de funcionamiento sin estar autorizadas por el Fabricante por escrito;
- reparaciones no autorizadas por el Centro de Asistencia Técnica de LEGRAND;
- daños provocados por evidente dolo, descuido, fenómenos naturales, eventos excepcionales, incendio o infiltraciones de líquidos.

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BP 30076 - 87002
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TRIMOD MCS

MODULAR CPS

For centralised power
and safety systems

THE **GLOBAL SPECIALIST**
IN BUILDING ELECTRIC AND DIGITAL INFRASTRUCTURES

legrand®

TRIMOD MCS

CENTRALISED EMERGENCY STATION

The MCS series is designed according to EN 50171 standards and represents the ideal solution for installation in buildings subject to fire safety standards and, specifically, to power emergency lighting systems.

CPS TRIMOD MCS can also be used to power emergency systems such as automatic fire extinguishing systems, emergency detection and alarm systems, smoke exhaust and carbon dioxide detection devices and specific safety systems in sensitive areas.

EN 50171 Standard Compliance

TRIMOD MCS is the ideal solution for centralised safety power systems and meets reference standard CEI EN 50171.

Protection against battery inversion

This guarantees maximum operator safety both during installation and maintenance avoiding incorrect battery connections.

120% continuous overload

TRIMOD MCS is designed and dimensioned to support continuous overloads (without time limits) up to 120% of rated reference machine power CEI EN 50171.

Dual Input Function

TRIMOD MCS, provides cabinets with power up to 80 kW and DUAL INPUT function. All configurations can be powered by two AC sources independently: distribution can be reset upon installation and easily obtained using the input distribution.

High versatility

TRIMOD MCS can be set with SA output (Always Powered) and with SE output (Emergency Only) on the display without having to add elements to the system.

TRIMOD MCS

EXPANDABLE
SCALABLE
MODULAR
VERSATILE

The concept of modularity, made up of independent single phase modules that distinguish the entire TRIMOD MCS range, optimises power availability, increases system flexibility and reduces overall overhead costs (TCO).

The highly standardised structure, made up of modules with reduced dimensions and weights, makes transport and installation easy.

All components are self-settable and are included in a Plug&Play connection system to facilitate all diagnostic, maintenance and future expansion phases.

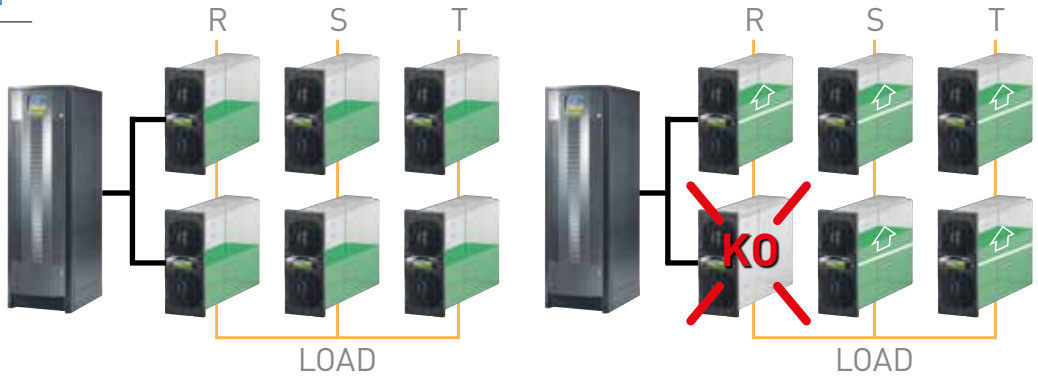
Due to its versatility and system programming ease, TRIMOD MCS also can:
- power three independent single phase lines, assigning a different priority in terms of autonomy to each;
- provide four different input/output configurations in a single cabinet: 3/3, 1/1, 3/1, 1/3;
- increase average battery working life thanks to the Smart Charging System.

Compact and lightweight single phase power module (only 8.5 kg)

Manageable and easy to install battery module (only 13 kg)

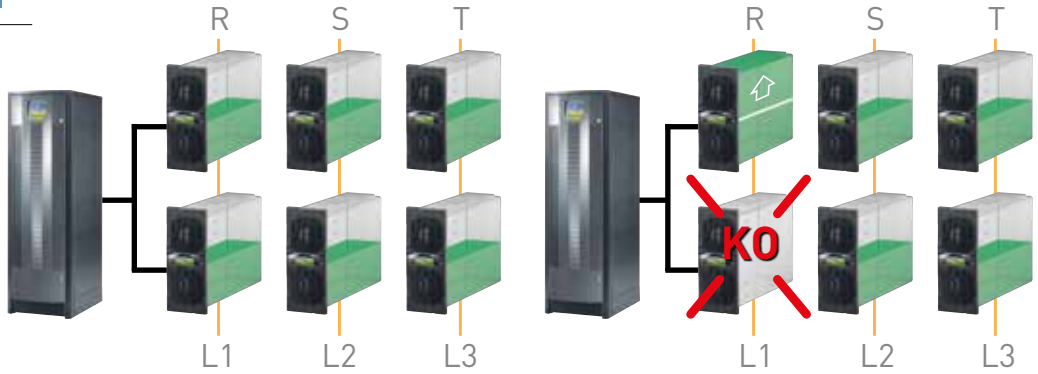
Redundancy on single phase load

In a system with three phase power and single phase load there is no power loss in the event of a single module fault since power is distributed by the other operating modules.



Redundancy on phases

Redundancy can be set on the single phases in a system with three independent outputs. In the event one power module fails, the same phase modules make up for the failed module.



High redundancy levels

Thanks to the CPS TRIMOD MCS construction technology the various redundancy levels can be set to always guarantee maximum service continuity.

TRIMOD MCS

CPS Modular three-phase double conversion VFI

3 109 90

3 110 02

3 108 71

3 108 75

Articles	TRIMOD MCS				
	Model	Autonomy according to EN50171	No. and Type Cabinet	IN-OUT factory settings	
3 109 90	3	1h	1A	1-1	
3 109 91	5	1h	1B	1-1	
3 109 92	7	1h	1A	1-1	
3 109 93 + 3 106 18	10	1h	1B	3-3	
3 109 94 + 3 106 19	15	1h	1B	3-3	
3 109 95 + 3 104 78	20	1h	1A	3-3	
3 109 96 + 2 x 3 104 70	30	1h	1A	3-3	
3 109 97 + 2 x 3 104 78	40	1h	1A	3-3	
3 109 98 + 3 x 3 104 78	60	1h	1A	3-3	
3 109 99 + 4 x 3 104 78	80	1h	1B	3-3	

Articles	Accessories
	Description
3 108 69	3.4 kW power module
3 108 71	5 kW power module
3 108 73	6.7 kW power module

Articles	Battery accessories
	Description
3 108 75	Single module with 5 9Ah long life batteries (installed in multiples of 4)

Articles	Additional empty battery cabinet
	Description
3 110 07	16-module modular battery cabinet
3 106 16	20-module modular battery cabinet

Articles	Additional battery cabinet with batteries Long Life
	Description
3 106 18	Modular battery cabinet with 3KB for CPS 10kW
3 106 19	Modular battery cabinet with 5 KB for CPS 15kW
3 104 70	Battery cabinet for CPS type A
3 104 78	Battery cabinet for CPS type B

Articles	TRIMOD MCS (Empty CPS Cabinet)				
	N° of installed power modules	N° of installable battery drawers	No. phases	Type Cabinet	Weight (kg)
3 110 00	up to 3 3.4kW	12	1-1 / 3-3 / 3-1 / 1-3	A	86
3 110 01	up to 3 6.7kW	12	1-1 / 3-3 / 3-1 / 1-3	A	89
3 110 02	up to 3 6.7kW	16	1-1 / 3-3 / 3-1 / 1-3	B	103
3 110 03	up to 6 5kW	-	1-1 / 3-3 / 3-1 / 1-3	A	85
3 110 04	up to 6 6.7kW	-	3-3	A	82
3 110 05	up to 9 6.7kW	-	3-3	A	91
3 110 06	up to 12 6.7kW	-	3-3	B	120

Codes in red new products.
Cabinet A h=1370, Cabinet B h=1650

NOTE: the stated back-up times in minutes are estimated and may vary according to the load characteristics, operating conditions and environment.

TRIMOD MCS

CPS Modular three-phase double conversion VFI

Characteristics

General specifications	3 109 90	3 109 91	3 109 92	3 109 93+ 3 106 18	3 109 94+ 3 106 19	3 109 95+ 3 104 78	3 109 96+ 2x 3 104 70	3 109 97+ 2x 3 104 78	3 109 98+ 3x 3 104 78	3 109 99+ 4x 3 104 78
Nominal power (kVA)	3	5	6.7	10	15	20	30	40	60	80
Active power (kW)	3	5	6.7	10	15	20	30	40	60	80
Active power according to EN50171 (kW)	2.88	4.16	5.58	8	12.5	16.7	25	33.3	50	66.7
Classification	On-Line Double Conversion VFI-SS-111									
System	Modular, expandable and redundant UPS system									
Input specifications										
Input voltage	220,230,240 1F+N+PE			380, 400, 415 3F+N+PE (o 220, 230, 240 1F)			380, 400, 415 3F+N+PE			
Input frequency	45-65 Hz (43.0 ÷ 68.4 Hz)									
Input voltage range	230V +15%/-20%			400V +15%/-20% - 230V +15%/-20%			400V +15%/-20%			
THD Input Current	< 3% (at full load)									
Compatibility with Power Supply Units	Yes									
Input Power Factor	> 0.99									
Output Specifications										
Output voltage	220,230,240 1F+N+PE			380, 400, 415 3F+N+PE (o 220, 230, 240 1F)			380, 400, 415 3F+N+PE			
Efficiency	Up to 96%									
Efficiency in Eco Mode	99%									
Nominal Output frequency	50/60 Hz selectable by the user ±2 % (standard), ±14 % (extended)									
Crest Factor	3:1									
Waveform	Sinusoidal									
Output Voltage Tolerance	±1%									
THD Output Voltage	< 1%									
Overload Capacity	120% continuous, 10 minutes at 135%, 60 seconds at 150%									
Bypass	Automatic bypass (static and electromechanical) and manual maintenance bypass									
Batteries										
Battery Module	Plug & play									
Battery Series Type/Voltage	Long Life									
Autonomy	1h (settable as needed)									
Battery Charger	80% autonomy in 12h - Smart Charge technology. 3-stage advanced cycle									
Communication and management										
Display and Signals	4 20-character rows, 4 menu navigation buttons, multi-colour LED status indicator, alarms and acoustic signals									
Communication Ports	2 RS232 serial ports, 1 logic level port, 5 clean contact ports, 1 interface slot									
Back feed protection	NC/NO auxiliary contact									
Emergency Power Off (EPO)	Yes									
Remote management	Available									
Mechanical characteristics										
Dimensions H x L x D	1370x 414x 628	1650x 414x 628	1370x 414x 628	1650x 414x 628	1650x 414x 628	1370x 414x 628	1370x 414x 628	1370x 414x 628	1370x 414x 628	1650x 414x 628
Net weight kg	202.5	265.5	327.5	273.5	344.5	115	136	134	158.5	222
Battery cabinet dimensions (H x L x D)	-	-	-	1370x 414x 628	1650x 414x 628	600x 800x 1635	600x 800x 1635	600x 800x 1635	600x 800x 1635	600x 800x 1635
Battery cabinet net weight kg	-	-	-	257	375	790	710	790	790	790
Installable Battery Drawers	8	12	16	-	-	-	-	-	-	-
Ambient Conditions										
Operating temperature/humidity	0 - 40°C / 0 - 95% non condensing									
Protection rating	IP21									
Maximum Audible Noise at 1 m from the Unit (dBA)	58-62									
Conformity										
Certifications	EN 62040-1, EN 62040-2, EN 62040-3, EN 50171									
Services										
Installation	User executable, modular architecture with “plug & play” power modules and batteries									
Maintenance	Availability of optional services provided by the manufacturer									
Ease of Management	Advanced diagnostic functions via the touch screen display									

* Standard configurations with 3-3 distribution (multi IN/OUT settings available upon request)

CUSTOMER SERVICES

Reliable

Directly present in more than 70 countries and servicing its products in more than 150 countries worldwide, a team of qualified engineers is available to support your UPS system to ensure power quality and availability to the most critical loads.

Excellent

Legrand's competitive edge lies in its ability to provide high value-added UPS systems and services for both end users and business partners.

For Legrand, creating value means coming up with solutions for lower energy consumption, but also integrating product design into the overall development process. With around 200 000 catalogue items,

the Group also provides all products required for electrical and digital building installations, particularly as integrated systems, finding solutions to fit everyone's needs.

Tailor-made

Legrand offers a complete range of specific solutions and services to meet customer requirements:

- Technical pre-sales support at the project design stage
- Factory acceptance test
- Supervision of installation, testing and commissioning, site acceptance test
- Operator training
- Site audit
- Warranty extension
- Annual maintenance contract
- Fast intervention on emergency call

SUPPORT

SITE INSPECTION, INSTALLATION SUPERVISION.
We perform a comprehensive check of the UPS environment to ensure safety and fault-free operation.
Our technical experts give manufacturer's recommendations to the site engineer or electrical contractors, and supervise the UPS installation before load power-up.

SITE TEST, COMMISSIONING.
Our Service Engineers conduct rigorous site tests and full setting-up of the UPS system before going live. They also perform site acceptance tests according to your requirements.
Commissioning operations for all UPS are carried out by qualified engineers to guarantee seamless start-up.
After the final handing over of the UPS system, a Test and Commissioning report is delivered to you.

TRAINING

We offer on-site training to ensure your equipment's safe and efficient operation.
Troubleshooting courses are also available in our plants for intensive hands-on practice on UPS training equipment.

MAINTENANCE

PREVENTIVE MAINTENANCE
Electronic equipment and power systems, such as UPS, contain life-limited components and parts that must be replaced according to the manufacturer's specifications.
To ensure optimal performance and to protect your critical application from potential downtime, it is crucial to perform preventive maintenance operations on a regular basis and replace parts when needed. Our Service Contracts include cleaning, IR thermography, measurements, functional tests, event log and power quality analysis, battery health check, hardware and software upgrades, and technical reports.
A Preventive Maintenance Plan is one of the most cost-effective actions that can preserve your initial investment and ensure your business continuity.

CORRECTIVE MAINTENANCE, EMERGENCY CALL
In the event of an Emergency Call, our worldwide service network, with engineers and spare-parts stocks strategically located as close as possible to your site, guarantees a fast intervention time with 24/7/365 assistance.
After connecting his laptop to your UPS, very powerful diagnostic software helps our engineer to identify the fault, thus ensuring short MTTR (Mean Time To Repair).
Corrective actions are performed such as part replacement, adjustments and upgrades to return the UPS system back to normal operation.

NOTES

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