UPS OPERATING MANUAL

UPSAVER

ELECTROMAGNETIC COMPATIBILITY
RISK OF DISTURBANCE

This is a product for commercial and industrial application in the second environment - installation restrictions or additional measures may be needed to prevent disturbances.
UPS category: C3 according to IEC 62040-2

UPSAVER

CENTRALISED BATTERY

Rev.	Descrizione Description	Data Date	Emesso Issued	Approvato Approved	Lingua Language	Pagina Page	di Pag. of Pag.
A	First Issue	10.02.23	E. Biancucci	P. Conti	E	1	1
					Code / Code		
					OMBG7360		

WARNINGS AND GENERAL INFORMATION

Index

Thank you for choosing an Legrand product. This section of the manual contains indications regarding the symbols used in the UPS documentation as well as basic information about the product, including the factory warranty terms.

1. CONVENTIONS USED

The following symbols have been used to indicate potential dangers and to highlight useful information, so as to minimize the risks to persons and property.

HAZARD

"HAZARD" statements contain characteristics and basic instructions for the safety of persons. Non-compliance with such indications may cause serious injury or death.

WARNING

"WARNING" statements contain characteristics and basic instructions for the safety of persons. Non-compliance with such indications may cause injury.

CAUTION

"CAUTION" statements contain characteristics and important instructions for the safety of things. Non-compliance with such indications may cause damage to materials.

NOTE

"NOTE" statements contain characteristics and important instructions for the use of the device and for its optimal operation.

2. DOCUMENTATION NOTES

Storing documentation

This manual and any other supporting technical documentation relating to the product must be stored and made accessible to personnel in the immediate vicinity of the UPS.

Further information

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

3. FACTORY WARRANTY

The factory warranty provided by Legrand is subject to the terms indicated below.

Validity

a) The present warranty terms only apply to the UPS systems manufactured by Legrand and to their storage batteries, when supplied by Legrand.

Duration

a) The factory warranty provided by Legrand has a validity of 12 (twelve) months from the startup date of the UPS. The warranty expires at the latest 18 (eighteen) months from the purchasing date (invoicing).

General conditions

b) The execution of one or more repairs within the warranty time will not alter the original expiry of the warranty.

c) If a unit is faulty and/or damaged within the time frame covered by the warranty, it will be repaired or replaced with an equivalent or similar product.

Costs

a) The warranty covers all the costs resulting from repairs and/or spares to restore the correct operation of the product covered by our factory warranty.

b) All other costs, particularly shipping costs, travel and accommodation costs for the service personnel of Legrand for on-site repairs, as well as costs for the customer’s own employees, will not be covered by the factory warranty and will be charged to the end customer.

c) In case of service performed following a call made by mistake, or in case our technicians incur extra time and/or costs due to the site inaccessibility or due to work interruptions required by the customer, such costs will be invoiced in accordance with ANIE rates CLASS III COLUMN B.

Modes required

a) In the event of a fault covered by the warranty, the customer shall notify Legrand in writing of the occurred fault, providing a short description of the fault.

b) The customer shall also provide documents showing the validity of the warranty (receipt/purchasing invoice with serial number of the product – report indicating the start-up date).

Service at the installation site

a) During preventive maintenance visits or emergency service, access shall be ensured to the installation site, and the device shall be made available in order to ensure maintenance or repair with no waiting time.

b) During the intervention, the customer's representative must attend service operations at the installation site, so that he/she may operate the control devices outside the equipment.

c) In case entry permits are necessary in order to enter the installation site, Legrand must be notified of the time necessary to obtain the documentation required, if any.

d) In case of customer's non-compliance, Legrand reserves the right to refuse warranty service. Legrand will not accept any product returned for repair or replacement without prior agreement.

Exclusions

a) Our warranty does not cover the products which are faulty or damaged due to:

- Transport,
- Installation or start-up defects caused by the customer's non-compliance with the installation and use instructions provided by Legrand.
- Tampering, alterations or repair attempts made without the specific written approval by Legrand.
- Damage caused by work done by personnel not authorized by Legrand.
- Damage to the device caused by improper use, negligence, voluntary damage or use of the device beyond the allowed limits;
- Damage caused by external factors such as dirt, fire, flooding, failed operation of the air conditioning system, etc.;
- Non-compliance with applicable safety standards;
- Force majeure (e.g. lightning, surges, natural disasters, fire, acts of war, riots, etc.);
- Fall or displacement due to incorrect installation;
- Ordinary wear caused by proper and continuous use of the device.

b) Protective devices inside the units (fuses and dischargers) are also excluded from the warranty, unless the failure is due to component faults.

Responsibility

a) In no event shall Legrand be liable for direct or indirect damage, or any damage whatsoever connected with the execution of warranty services (e.g. possible voltage interruptions during the repair period or assembly and dismantling costs), except for the cases provided for by mandatory laws.

b) The present warranty terms do not affect the purchaser's mandatory rights as by law.

4. LIMITATION OF LIABILITY

All the information contained in the present documentation is the exclusive property of Legrand. Written consent by Legrand. is required in order to wholly or partially publish or disclose this information.

- The present manual constitutes an integral part of the product technical support documentation. Read the warnings with attention, as they give important instructions concerning safe usage.
- The equipment must be destined exclusively for the use for which it was expressly designed. Any other use is considered improper and therefore hazardous. The manufacturer cannot be held responsible for possible damage arising from improper, erroneous or unreasonable usage.
- Legrand assumes responsibility for the equipment in its original configuration.
- Any intervention that alters the structure or the operating cycle of the equipment must be carried out and authorized directly by Legrand.
- Legrand will not be held responsible for the consequences arising from the use of non-original spare parts.
- Legrand reserves the right to make technical modifications to the present manual and to the equipment without prior warning. Whenever typographical or other errors are found, the corrections will be included in new versions of the manual.
- Legrand assumes responsibility for the information given in the original version of the manual in Italian language.

OPERATING GENERAL INSTRUCTIONS

Index

Index of the pictures

1. SCOPE

The instructions contained in the operating manual are applicable to the UPS systems of the *UPSaver* series, in all their possible power configurations.

Storing documentation

This manual and any other supporting technical documentation relating to the product must be stored and made accessible to personnel in the immediate vicinity of the UPS.

Further information

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

2. SAFETY RULES AND WARNINGS

2.1 USE OF THE UPS

Congratulations on choosing a product from Legrand for the safety of your equipment. To obtain the best performance from your UPSaver system (Uninterruptible Power Supply), we suggest that you take your time to read the following manual.
The purpose of this manual is to give a short description of the parts composing the UPS and to guide the installer or the user through the installation of the unit in its using environment.
The installer or the user must read and correctly perform the instructions included in the present manual, with particular reference to the requirements regarding safety, in compliance with the current regulations.

Read the technical documentation

Before installing and using the device, make sure you have read and understood all the instructions contained in the present manual and in the technical supporting documentation.

2.2 UPS RATING PLATE

The UPSaver is provided with an identification plate containing the operation ratings. The plate is fixed in the inside of the UPS door.

legrand	**UPSaver**
UPS	**xxxkVA - 3Φ+N**
MAINS 1 - RESEAU 1 - NETZ 1 -RETE 1 - GİRİŞ 1	
Uin (Vac)	400 -20/+15%
Iin (A)	xxx
Frequency - Fréquence - Frequenz Frequenza - Frekans	50÷60Hz ±10%
MAINS 2 - RESEAU 2 - NETZ 2 -RETE 2 - GİRİŞ 2	
Uin (Vac)	380/400/415 ±10%
Iin (A)	xxx
Imax (A)	xxx
Frequency - Fréquence - Frequenz Frequenza - Frekans	50÷60Hz ±10%
OUTPUT - SORTIE- AUSGANG - USCITA - ÇIKIŞ	
Uout (Vac)	380/400/415
Iout (A)	xxx *
Frequency - Fréquence - Frequenz Frequenza - Frekans	50÷60Hz
Power rating - Puissance - Leistung Potenza - Güç	xxxkVA xxxkW (* @ 400V)
Articolo - Code - Code	**xxx**
Serial number Numéro de série Seriennummer N° Serie Seri numarası:	**xxx**
Riferimento macchina - Referenzmaschine	**xxx**
	1/1
	xxx kg
CE UKCA	**Made in ITALY**
LEGRAND - BP 30076 87002 LIMOGES CEDEX FRANCE	
www.ups.legrand.com	

Picture 1 – Rating plate of UPSaver

Check the technical characteristics

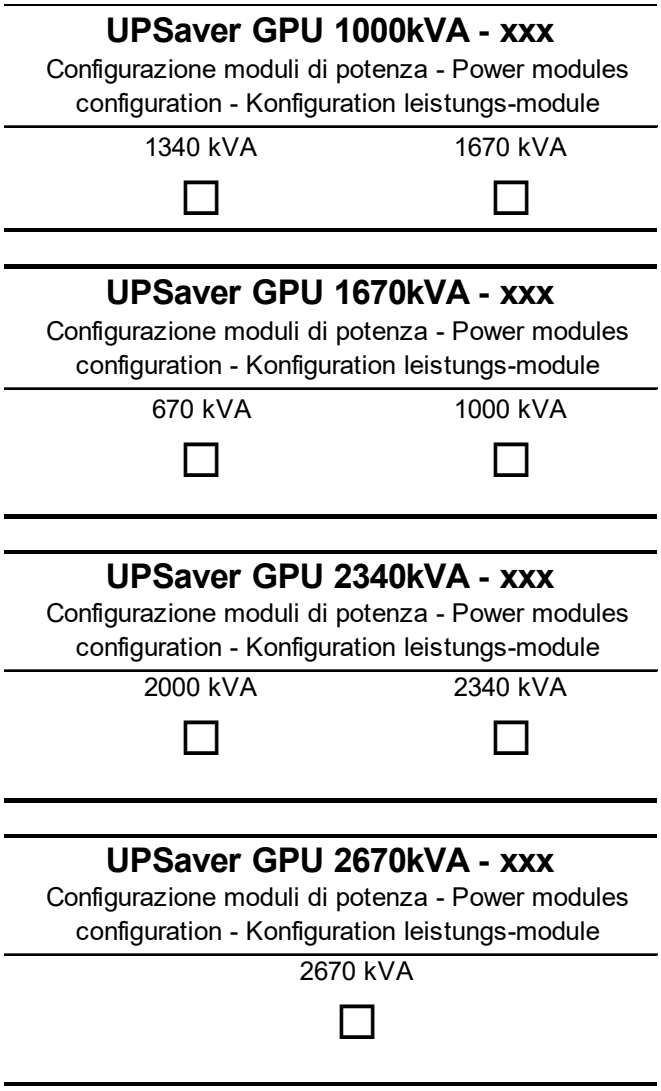
Before carrying out any installation or start-up operation on the UPS, make sure its technical characteristics are compatible with the AC supply line and with the output loads.

System ratings related to the I/O module

The data indicated in the rating plate are related to the maximum power configuration of the I/O module. Refer to the following paragraph for further information.

2.2.1 Actual power configuration

The *UPSaver* system is, by definition, a modular UPS, that can be initially configured for a certain power, which can be increased at a later stage by adding power modules. The maximum power cannot exceed the I/O module rating.
For such reason the rating plate is integrated with an additional section, which indicates the possible system configurations, on the basis of the number of installed power modules (see following picture).
The system test configuration is marked with a tick; the plate can be replaced in case of increase (or decrease) of the UPS rated power, that is in case power modules are added or removed.



Picture 2 – Actual power configuration plates

2.3 SPECIAL SAFETY WARNINGS

2.3.1 General warnings

The *UPS* is provided with various stickers with indications regarding specific dangers. These stickers must be always well visible and replaced in case they are damaged.
The present documentation must be always available in proximity to the device. In case of loss we recommend to request a copy to the manufacturer, whose details are available in the “Contacts” section.

2.3.2 Personnel

Any operation on the *UPS* must be carried out by qualified personnel.
By qualified and trained person we mean someone skilled in assembling, installing, starting up and checking the correct operation of the product, who is qualified to perform his/her job and has entirely read and understood this manual, especially the part regarding safety. Such training and qualification shall be considered as such, only when certified by the manufacturer.

2.3.3 Transport and handling

Avoid bending or deforming the components and altering the insulation distances while transporting and handling the product.

Undistributed weight

The weight of the UPS is not uniformly distributed. Pay attention when lifting.

Please inspect the device before installing it. In case any damage is noticed from the conditions of the package and/or from the outside appearance of the equipment, contact the shipping company or your dealer immediately. The damage statement must be made within 6 days from receipt of the product and must be notified to the shipping carrier directly. Should the product need to be returned to the manufacturer, please use the original package.

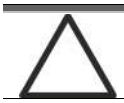
Injury hazard due to mechanical damage

Mechanical damage to the electrical components constitutes a serious danger to persons and property. In case of doubt regarding the non-integrity of the package or of the product contained therein, contact the manufacturer before carrying out the installation and/or the start-up.

2.3.4 Installation

The product must be installed in strict compliance with the instructions contained in the technical back-up documentation, including the present safety instructions. In particular, the following points must be taken into account:

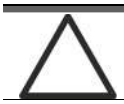
- The product must be placed on a base suitable to carry its weight and to ensure its vertical position;
- The UPS must be installed in a room with restricted access, according to standard CEI EN62040-1;
- Never install the equipment near liquids or in an excessively damp environment;
- Never let a liquid or foreign body penetrate inside the device;
- Never block the ventilation grates;
- Never expose the device to direct sunlight or place it near a source of heat.



Special environmental conditions

The UPS is designed for normal climatic and environmental operating conditions as defined in the technical specification: altitude, ambient operating temperature, relative humidity and environmental transport and storage conditions. It is necessary to implement specific protective measures in case of unusual conditions:

- harmful smoke, dust, abrasive dust;
- humidity, vapour, salt air, bad weather or dripping;
- explosive dust and gas mixture;
- extreme temperature variations;
- bad ventilation;
- conductive or radiant heat from other sources;
- strong electromagnetic fields;
- radioactive levels higher than those of the natural environment;
- fungus, insects, vermin.



Use authorized personnel only

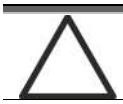
All transport, installation and start-up operations must be carried out by qualified and trained personnel.
The installation of the *UPS* must be carried out by authorized personnel, in compliance with national and local regulations.

Do not modify the device

Do not modify the device in any way: this may result in damage to the equipment itself as well as to objects and persons. Maintenance and repair must be carried out by authorized personnel only. Contact the manufacturer for details of the nearest service centre.

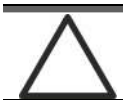
2.3.5 Electrical connection

The UPS connection to the AC power must be carried out in compliance with the current regulations.
Make sure the indications specified on the identification plate correspond to the AC power system and to the actual electrical consumption of all of the equipment connected.



Check the conformity to the Standards

The UPS must be installed in compliance with the standards in force in the country of installation.



IT system

The UPS is also designed to be connected to an IT power distribution system.

All the electrical connections must be carried out by authorized personnel. Before connecting the device make sure that:

- the connection cable to the AC line is properly protected;
- the nominal voltages, the frequency and the phase rotation of the AC supply are respected;
- the polarities of the DC cables coming from the battery have been checked;
- no leakage current to earth is present.

The device is connected to the following voltage supplies:

- DC battery voltage;
- AC mains voltage;
- AC bypass voltage.

Injury hazard due to electric shock!

The device is subject to high voltages, thus all safety instructions must be scrupulously adhered to before performing any operation on the *UPS*:

- Isolate the battery via DC circuit breakers before connecting it to the UPS;
- Connect the ground cable to the relevant bar before carrying out any other connection inside the device.

Injury hazard due to electric shock!

If primary power isolators are installed in an area other than the UPS one, you must stick the following warning label on the UPS. “ISOLATE THE UNINTERRUPTIBLE POWER SUPPLY (UPS) BEFORE WORKING ON THIS CIRCUIT”

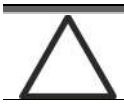
2.3.6 Operation

The installations to which the UPS systems belong must comply with all the current safety standards (technical equipment and accident-prevention regulations). The device can be started, operated and disconnected only by authorized personnel.
The settings can only be changed using the original interface software.

Injury hazard due to electric shock!

During operation, the *UPS* converts power characterized by high voltages and currents.

- All the doors and the covers must remain closed.



Injury hazard due to contact with toxic substances

The battery supplied with the UPS contains small amounts of toxic materials. To avoid accidents, the directives listed below must be observed:

- Never operate the UPS if the ambient temperature and relative humidity are higher than the levels specified in the technical documentation.
- Never burn the battery (risk of explosion).
- Do not attempt to open the battery (the electrolyte is dangerous for the eyes and skin).

Comply with all applicable regulations for the disposal of the battery.

2.3.7 Maintenance

Service and repairs must be carried out by skilled and authorized personnel. Before carrying out any maintenance operation, the *UPS* must be disconnected from AC and DC supply sources.
The device is provided with internal isolators which allow to isolate the internal power circuits. However the voltages of the supply sources are present on the terminals. To isolate the device completely, provide external circuit breakers on the lines.
The device contains dangerous voltages even after shutdown and disconnection from the supply sources, due to the internal capacitors which discharge slowly. Thus we recommend to wait at least 5 minutes before opening the device doors.

Injury hazard due to electric shock!

Any operation must be carried out only when voltage is absent and in compliance with safety directives.

- Make sure the battery circuit breaker that may be placed near the battery has been opened.
- Isolate the device completely by operating the external circuit breakers.
- Wait at least 5 minutes in order to allow the capacitors to discharge.

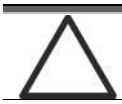
After switching off and disconnecting the device there still might be very hot components (magnetic parts, heat sinks); therefore we recommend to use protective gloves.

High temperature of components

It is strongly recommended to use protective gloves due to the high temperatures that may be reached during the operation.

2.3.8 Storage

If the product is stored prior to installation, it should remain stored in its original package in a dry place with a temperature ranging from -10°C to +45°C.



Special environmental conditions

It is necessary to implement specific protective measures in case of unusual environmental conditions:

- harmful smoke, dust, abrasive dust;
- humidity, vapour, salt air, bad weather or dripping;
- explosive dust and gas mixture;
- extreme temperature variations;
- bad ventilation;
- conductive or radiant heat from other sources;
- fungus, insects, vermin.

2.4 ENVIRONMENTAL PROTECTION

2.4.1 ISO 14001 certification

Legrand is particularly sensitive to the environmental impact of its products. That is why the *UPS* has been manufactured with cutting-edge eco-design criteria (ISO 14001 certification).
Special care was taken in using fully recyclable materials and in reducing the amounts of raw materials used.

2.4.2 Recycling of packing materials

Packing materials must be recycled or disposed of in compliance with applicable local and national laws and regulations.

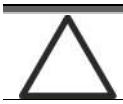
2.4.3 Device disposal

At the end of their product life, the materials composing the device must be recycled or disposed of in compliance with the current local and national laws and regulations.

3. RECEIPT & HANDLING OF THE DEVICES

3.1 RECEIPT OF THE UPS AND POWER MODULE (PU)

Please inspect the device before installing it. In case any damage is noticed from the conditions of the package and/or from the outside appearance of the equipment, contact the shipping company or your dealer immediately. The damage statement must be made within 6 days from receipt of the product and must be notified to the shipping carrier directly. Should the product need to be returned to the manufacturer, please use the original package.

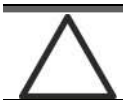


Danger to persons due to transport damages

Mechanical damage to the electrical components constitutes a serious danger to persons and property. In case of doubt regarding the non-integrity of the package or of the product contained therein, contact the manufacturer before carrying out the installation and/or the start-up.

3.1.1 Storage

The package normally ensures protection from humidity and possible damages during transport. Do not store the UPS outdoor.



Risk of damage due to inappropriate storage

- For the environmental storage conditions, refer to the indications given for the installation of the device.
- The device must only be stored in rooms protected from dust and humidity.
- The device cannot be stored outdoor.

3.2 HANDLING OF THE UPS AND POWER MODULE (PU)

The various parts composing the system are packed on wooden pallet; they are handled from the transport vehicle to the installation (or storage) place by a fork lift.

The device has a heavy weight

- Avoid turnover during the transport of the UPS.
- Cabinets must always be handled in upright position.
- During loading and unloading operations, always respect the indications regarding the device barycentre marked on the package.

Before positioning the UPS and the power module (PU), in order to avoid risks of turnover, it's recommended to move the system on the wood pallet on which the device is fixed.
For the positioning in the final location, the mechanical and electrical installation of the system, please refer to "Installation manual".
The system must be installed indoor, in a clean and dry room, preferably without dust or humidity infiltrations. For the environmental conditions in the place of installation, in compliance with the current legislation, please refer to the "Overall dimensions, minimum distances from the walls and ventilation" section.

Special environmental conditions

It is necessary to implement specific protective measures in case of unusual environmental conditions:

- harmful smoke, dust, abrasive dust;
- humidity, vapour, salt air, bad weather or dripping;
- explosive dust and gas mixture;
- extreme temperature variations;
- bad ventilation;
- conductive or radiant heat from other sources;
- fungus, insects, vermin.

3.2.1 UPSaver basic configuration

As outlined in the previous paragraphs, the *UPSaver* system is essentially composed by two modular elements:

- power module (PU);
- input/output base module (IOBM).

The input/output base module (**IOBM**) is composed of a central section containing the connection terminal boards, the sectioning devices. It is furthermore provided of side distribution columns which contain the power modules' input/output switches.
Combining the power modules with the proper I/O module allows to obtain the follow system typologies for what concern the configuration of the battery.

CB → Centralised Battery

The connection from Battery to *UPSaver* is provided on IOBM Battery connection, the battery bank is carried out from the IOBM module to the various PU, and each power module is provided with its own battery static switch.

DB → Distributed Battery

Each power module which compose the *UPSaver* UPS is provided with its own battery. The connection of the various battery banks is carried out in the IOBM module, but each power module is provided with its own battery static switch.

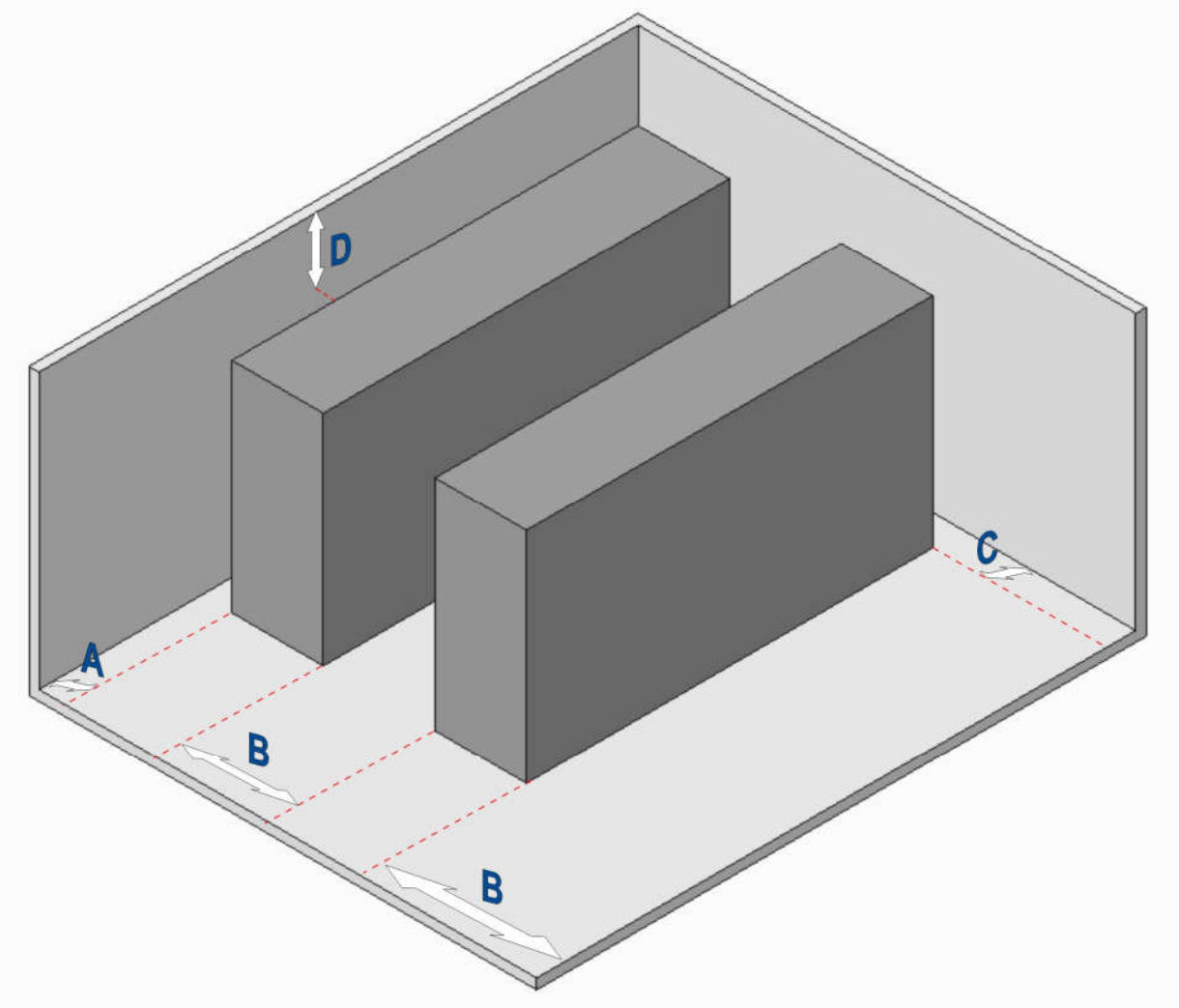
CSB → Centralised Static Bypass switch

The Static Bypass switch is directly connected on IOBM inside a dedicated column.

3.2.2 Basic plan, static load and weights

For the base plan refer to General Arrangement of each system.
The support base of the UPS and power module (PU) must be designed to support the weight of the devices and guarantee its firm and safe support. The bearing capacity must comply with the static load.
Please contact the manufacturer about the weights and the static loads of the sections.

3.2.3 Minimum distances from the walls and ventilation



Picture 3 – Clearances

The UPS must be so installed as to ensure its serviceability and to allow a correct air flow as much as possible.
With regard to the minimum distances from the walls, for all of the UPS sizes the same installation conditions apply as indicated in the table below.

	A (mm)	B (mm)	C (mm)	D (mm)
Recommended clearances	**50**	**1200**	**50**	**600**
Minimum clearances	0	1200	0	400

The table below shows the air volume required for an optimal ventilation and cooling of the equipment. The values are referred to the on-line double-conversion operation with rated load applied.

Power (kVA)	**670**	**1000**	**1340**	**1670**	**2000**	**2340**	**2670**
Air volume (m^3/h)	5000	7500	10000	12500	15000	17500	20000

3.2.4 Environmental installation conditions

The air is classified by the EN 60721-3-3 standard (Classification of environmental parameters and their severities – Stationary use at weather-protected locations) based on climatic and biological conditions as well as on mechanically and chemically active substances.
Therefore the place of installation must meet specific requirements to ensure compliance with the conditions for which the UPS was designed.

➢ **Climatic conditions according to the technical specification**

Environmental parameter	
Minimum operating temperature (°C)	– 10
Maximum operating temperature (°C)	+ 40
Minimum relative humidity (%)	5
Maximum relative humidity (%)	95
Condensation	NO
Rainfall with wind (rain, snow, hail, etc.)	NO
Water with an origin other than rain	NO
Ice formation	NO

➢ **Classification of biological conditions (EN 60721-3-3)**

Environmental parameter	Class		
	3B1	3B2	3B3
a) Flora	NO	Presence of mildew, fungus, etc.	Presence of mildew, fungus, etc.
b) Fauna	NO	Presence of rodents and other animals that are harmful to products, excluding termites	Presence of rodents and other animals that are harmful to products, including termites

➢ **Classification of mechanically active substances (EN 60721-3-3)**

Environmental parameter	Class			
	3S1	3S2	3S3	3S4
a) Sand [mg/m^3]	No	30	300	3000
b) Dust (suspension) [mg/m^3]	0,01	0,2	0,4	4,0
c) Dust (sedimentation) [mg/(m^2·h)	0,4	1,5	15	40
Places where precautions have been taken to minimize the presence of dust. Places away from dust sources	X			
Places without any special precaution to minimize the presence of sand or dust, however not in proximity to sand or dust sources		X		
Places in proximity to sand or dust sources			X	
Places in proximity to working processes that generate sand or dust, or in geographic areas having a high proportion of sand brought by the wind or of dust suspended in the air				X

➢ Classification of chemically active substances (EN 60721-3-3)

Environmental parameter	Class					
	3C1R	3C1L	3C1	3C2	3C3	3C4
a) Sea salt	No	No	No	Salt fog	Salt fog	Salt fog
b) Sulphur dioxide [mg/m^3]	0,01	0,1	0,1	1,0	10	40
c) Hydrogen sulphide [mg/m^3]	0,0015	0,01	0,01	0,5	10	70
d) Chlorine [mg/m^3]	0,001	0,01	0,1	0,3	1,0	3,0
e) Hydrochloric acid [mg/m^3]	0,001	0,01	0,1	0,5	5,0	5,0
f) Hydrofluoric acid [mg/m^3]	0,001	0,003	0,003	0,03	2,0	2,0
g) Ammonia [mg/m^3]	0,03	0,3	0,3	3,0	35	175
h) Ozone [mg/m^3]	0,004	0,01	0,01	0,1	0,3	2,0
i) Nitric oxide (expressed in equivalent values of nitrogen dioxide) [mg/m^3]	0,01	0,1	0,1	1,0	9,0	20
Places where atmosphere is strictly monitored and regulated (“clean spaces” category)	X					
Places where atmosphere is permanently monitored		X				
Places located in rural and urban regions where industrial activities are few and where traffic is moderate			X			
Places located in urban regions with industrial activities and/or considerable traffic				X		
Places in proximity to industrial sources with chemical emissions					X	
Places located in industrial installations. Emissions of highly concentrated chemical pollutants						X

The UPSaver is designed to be installed in an environment that meets the following classifications.

K	Climatic conditions	**In accordance with the technical specification**
B	Biological conditions	**3B1 (EN 60721-3-3)**
C	Chemically active substances	**3C2 (EN 60721-3-3)**
S	Mechanically active substances	**3S2 (EN 60721-3-3)**

In the event that the environmental conditions of the installation room do not comply with the specified requirements, additional precautions must be taken to reduce excessive values to the specified limits.

3.3 POSITIONING AND CONNECTION OF THE BATTERIES

Risk of electric shock

A battery can present a risk for 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 connecting or disconnecting battery terminals;

f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

Follow the installation instructions

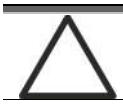
For battery installation please respect EN62040-1 strictly and follow the installation manual of the UPS.

To obtain the battery life indicated by the battery manufacturer, the operating temperature must remain between 0 and 25 °C. However, although the battery can operate up to 40°C, there will be a significant reduction of the battery life.

To avoid the formation of any kind of potentially explosive hydrogen and oxygen mixture, suitable ventilation must be provided where the battery is installed (see EN62040-1 annex M).

For the materials installed in France, the rule stated by NFC 15-100 article 554.2 must be applied: the volume of the renewed air has to be at least 0,05 NI m^3 per hour, where N is the number of the elements inside the battery and I is maximum current of the rectifier.

The batteries can either be internal or external; it is recommended to install them when the UPS is capable of charging them. Please remember that, if the battery is not charged for periods over 2-3 months it can be subject to irreparable damage.

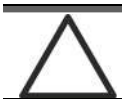


Auxiliary contact of the external battery switch

For a correct operation of the UPS it is advisable to connect the auxiliary contact of the external battery switch to the terminals X111-11/12.

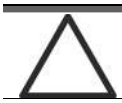
4. ELECTRICAL CONNECTION

The electrical connection is part of the work which is normally provided by the company that carries out the product installation. For this reason, the UPS manufacturer shall not be held responsible for any damages due to wrong connections.



Use qualified personnel only

All the operations related to the electric connection must be carried out by qualified and trained personnel.



Work in compliance with the local standards

The installation of the UPSaver must be carried out in compliance with national and local regulations.

Connection of ground cable

The grounding of the UPS via the relevant terminal is mandatory. It is strongly recommended to connect the ground terminal as first terminal.

The electrical connection is part of the work which is normally provided by the company that carries out the electrical installation and not by the UPS manufacturer. For this reason, the following recommendations are only an indication, as the UPS manufacturer is not responsible for the electrical installation. In any case we recommend to carry out the installation and the electrical input and output connections in compliance with the local standards.

Cables must be selected bearing in mind technical, financial and safety aspects. The selection and the sizing of cables from a technical viewpoint depend on the voltage, on the current absorbed by the UPS, on the bypass line and on the batteries, on the ambient temperature and on the voltage drop. Finally, the kind of cable laying must be taken into particular consideration.

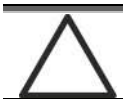
For more explanations regarding the selection and the sizing of cables, please refer to the relevant IEC standards, in particular to IEC 64-8 standard.

“Short-circuit currents” (very high currents with a short duration) and “overload currents” (relatively high currents with a long duration) are among the main causes of cable damage. The protection systems normally used to protect the cables are: thermal magnetic circuit breakers or fuses. Protection circuit breakers must be selected according to the maximum short-circuit current (max Isc) that is needed to determine the breaking power of automatic circuit breakers, and to the minimum current (min Isc) that is needed to determine the maximum length of the line protected. The protection against short-circuit must operate on the line before any thermal and electrothermal effects of the overcurrents may damage the cable and relevant connections.

During the electrical installation take particular care to respect the phase rotation.

The terminal boards for cables connection are positioned inside the IOBM module, further details are available at the paragraph "Terminal boards".

To access the terminals remove the front panel, removing the fixing bolts.

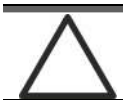


Mains connection

The connection to the mains must be carried out with protection fuses between the mains and the UPS.

The use of differential protection devices in the line supplying the UPS is unadvisable. The leakage current to ground due to the RFI filters is rather high and it can cause spurious tripping of the protection device.

According to CEI EN62040-1 standard, in order to take into account the UPS' leakage current, residual current devices having adjustable threshold can be used.



Mains connection

Include an appropriate and readily accessible disconnecting device in the electrical line connecting the UPS to the mains.

4.1 CONNECTION OF THE POWER CABLES

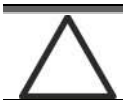
For the electric connection of the *UPSaver* UPS, connect the following cables:

- DC supply from the battery (*+B*, *-B*, *N*);
- AC supply from the rectifier supply mains (*1-L1*, *1-L2*, *1-L3)*;
- Neutral conductors of the input lines (*1-N*, *2-N)*
- AC supply from the bypass supply mains (*2-L1*, *2-L2*, *2-L3)* (cables don't present if required "Single Input");
- AC output to the loads (*3-L1*, *3-L2*, *3-L3*, *3-N)*.

Injury hazard due to electric shock!

Very high voltages are present at the ends of the cables coming from the battery:

- Isolate the battery via DC circuit breakers before connecting it to the UPS;
- Connect the ground cable to the relevant bar before carrying out any other connection inside the device.



Risk of damages to the device due to insufficient insulation

- The cables must be protected from short-circuits and leakage currents to earth;
- The connection points must be hermetically sealed to prevent the air from being sucked through the cable passage.

Risk of damages to the device due to incorrect wiring

To connect the device, follow the electrical drawing scrupulously and respect the polarity of cables.

4.2 BACKFEED PROTECTION DEVICE

The back-feed protection device is installed inside the UPSaver IOBM module and it consist in a trip coil mounted on SBCBS load-switch, that allow to avoid voltage feed-back on the input terminals during a mains failure.

The use of a device installed inside the UPS allows a higher flexibility of use, as only the bypass line is cut leaving the rectifier battery charger in operation.

The use of an external device forces the user to separate the UPS supply lines (rectifier and bypass) if the flexibility and availability of the UPS are supposed to be kept unaltered.

The installer shall apply the following warning label on all primary power isolator that supplies the UPS installed remote to the UPS.

Before working on this circuit
- Isolate uninterruptible power system (UPS)
- Then check for hazardous voltage between all terminals including the protective earth

Risk of Voltage Backfedd

4.3 TERMINAL BOARDS

The *UPSaver* UPS is provided with terminal boards, located inside the IOBM module, for the connection of power cables and of the auxiliary connections.
The cables entry can be provided either from the bottom or the top, on the basis of the plant requirements; the *UPSaver* basic configuration provides for bottom cables entry. For details refer to General Arrangement.

4.4 BATTERY

CAUTION

A battery can present a risk for 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 connecting or disconnecting battery terminals;
f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

Batteries installation

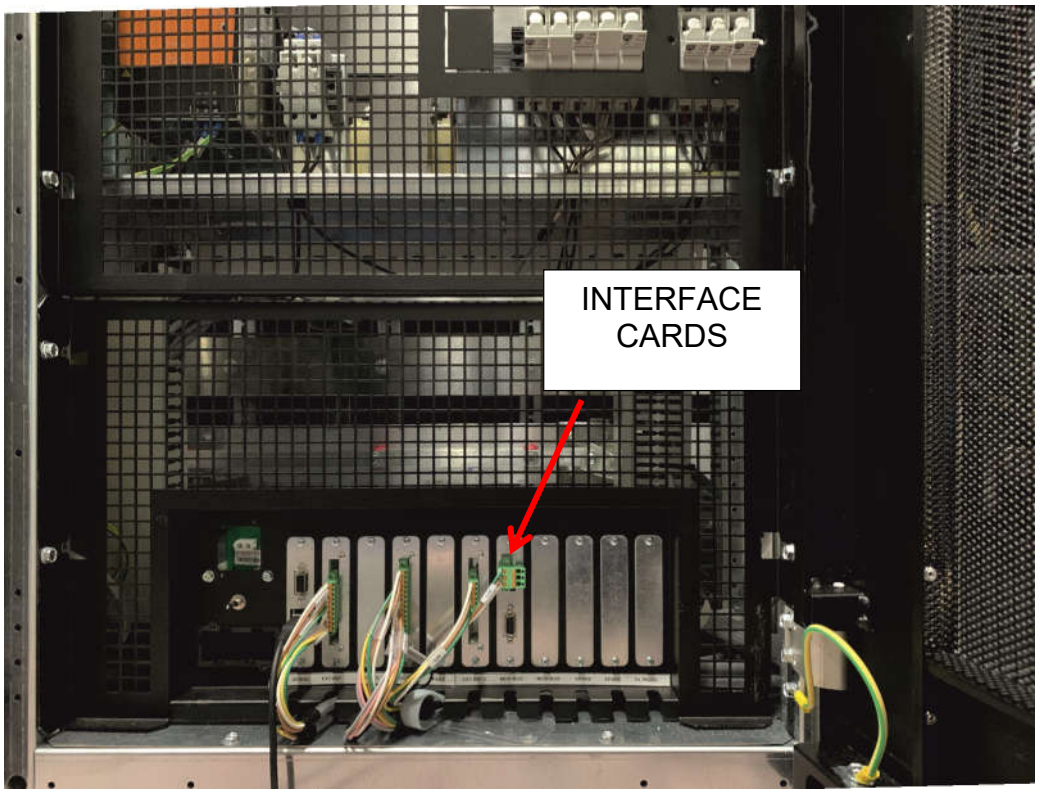
For battery installation please respect the prescriptions of the EN62040-1 standard, paragraph 7.6.
To obtain the battery life indicated by the battery manufacturer, the operating temperature must remain between 0 and 25 °C. However, although the battery can operate up to 40 °C , there will be a significant reduction of the battery life.
To avoid the formation of any kind of potentially explosive hydrogen and oxygen mixture, suitable ventilation must be provided where the battery are installed (see EN62040-1 annex M).

The batteries can only be external, however, it is recommended to install them when the UPS is capable of charging them. Please remember that, if the battery is not charged for periods over 2-3 months they can be subject to irreparable damage.

4.5 INTERFACE CARDS

The UPS is provided with interface cards for the external communication of the operating status and parameters. Access to the card is possible opening the I/O module front door.

- RS232/USB: used for connection to the proprietary programming and control software.
- MODBUS: used for the transmission of data to the outside via MODBUS protocol (RS485).
- PARALLEL (OPTIONAL): used for the communication among *UPSaver* systems in parallel configuration.
- SNMP (OPTIONAL): is used for the external transmission of data via LAN.
- EXT-INP: used for connecting the external contacts.
- EXT-INP-3: used for connecting the external contacts.
- SRC-2: relay card for the remote signalisation of the UPS status and alarms.
- THERMAL PROBE (OPTION): used for connecting an external thermal probe in order to acquire the temperature of the battery room.



Picture 4 – Location of the UPSaver interface cards

4.6 CONNECTION OF THE AUXILIARY CABLES

The *UPSaver* UPS can be connected to external controls and components specifically provided for enhancing the safety and reliability of the equipment.
For such a purpose dedicated interface cards are installed, so that the interconnection wires coming from external components can be connected. For what concern the position of the cards refer to the following paragraph.

On the ***EXT-INP*** card the following signals can be connected:

- *Diesel Mode* enabling contact (from Diesel Generator);
- external bypass switch;
- Remote shut-down contact (EPO);
- Auxiliary contact of the centralised battery isolator.

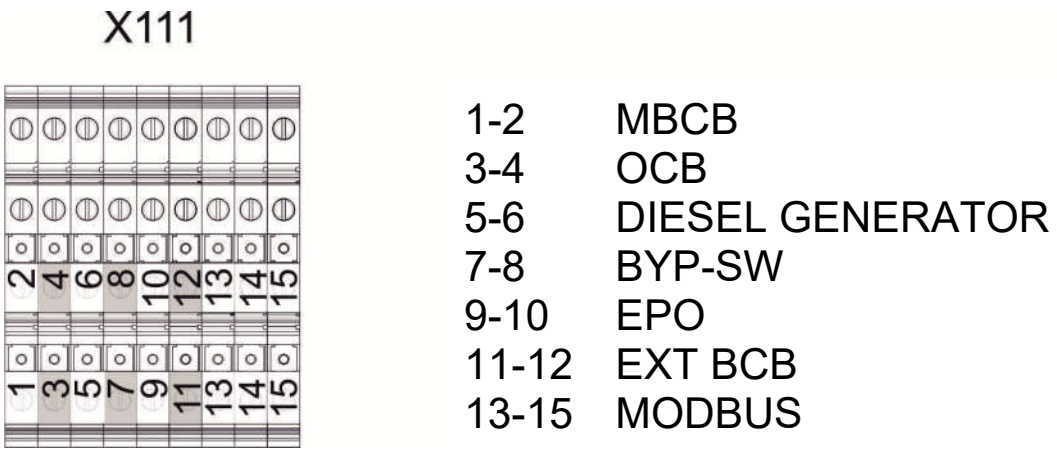
On the ***EXT-INP-3*** card the following signals can be connected:

- Auxiliary contact of the external manual bypass switch;
- Auxiliary contact of the external UPS output switch;

The connection of the auxiliary wires is made using a dedicated terminal board on the interface cards, to which cables with a maximum cross section of 1,5 mm^2 can be connected.

Auxiliary contacts of OCB - MBCB - BCB

The auxiliary contacts of the external switches MBCB, BCB and OCB (if provided) must be mandatorily connected to the UPS.



Picture 5 – Picture 5 - Auxiliary terminals of UPSaver

4.6.1 DIESEL MODE activation X111.5-6

Auxiliary contact from the Diesel Generator; terminals 3-4 card *EXT-INP*.
A normally open contact is required; when the contact is closed (if the Diesel Mode operation is enabled) the microprocessor will acquire its status and vary the battery recharge voltage to the pre-set value.

4.6.2 External Bypass_SW contact X111.7-8

Contact of an external Normal/Bypass selector; terminals 5-6 card *EXT-INP*.
A normally closed contact is required; when the contact is opened the load is switched from inverter to bypass (or vice-versa in case of ECO MODE, where the bypass is the priority line).

4.6.3 Remote shut-down (EPO) X111.9-10

Auxiliary EPO contact; terminals 7-8 card *EXT-INP*.
The voltage supply to the loads can be interrupted from a remote location by using this contact (i.e. for safety requirements). A normally closed contact is required; when this contact is open the static inverter and by-pass switches are opened so that the output supply is interrupted.

4.6.4 Battery switch auxiliary contact X111.11-12

Battery isolator auxiliary contact; terminals 9-10 card *EXT-INP*.
This auxiliary contact is necessary to indicate the position of the isolator (open-closed) and the fuse status (if the fuse indicator is wired in series with the battery isolator auxiliary contact).

4.6.5 External manual bypass X111.1.2

Auxiliary contact of the External Manual Bypass Switch (MBCB), if provided for; terminals 1-2 card *EXT-INP-3*.
A normally open contact is required; when the contact is closed (see Manual Bypass procedure), the microprocessor will acquire the status of the contact and shut down the inverter.

4.6.6 External UPS output switch X111.3.4

Auxiliary contact of the external UPS output switch (OCB), if provided for; terminals 5-6 card *EXT-INP-3*.
This auxiliary contact must concordant with the position of the switch order to activate the alarm when the switch is opened.

4.7 RELAY CARD CONNECTION

The *UPSaver* is provided with a relay card for the remote repetition of operating statuses and alarms, named *SRC-2*. The connection of the user cables is made directly on the card terminals; the card is located in the area reserved to the IOBM module interface cards.
For the statuses and alarms set on the *SRC-2* card please refer to SLD and EWD drawings.

Relay output characteristics of relay card SRC-2:

250 Vac voltage	1 A current	
30 Vdc voltage	1 A current	resistive load

POSITIONING AND INSTALLATION INSTRUCTIONS

Index

Index of the pictures

INTRODUCTION

The UPS is composed by various sections.
See the “General Arrangement” of your UPS to find the sections that compose your system.

NOTE

The processing of the positioning and installation can change, it depends of the system configuration.

1. SYSTEM POSITIONING AND INSTALLATION

Before positioning the IOBM sections and the power module (PU), in order to avoid risks of turnover, it’s recommended to move the system on the wood pallet on which the device is fixed.

WARNING

FOR A PROPER AND EASY INSTALLATION OF THE SYSTEM, WE SUGGEST THE SEQUENCE REPORTED BELOW.

THE HANDLING MANEUVRES MUST BE PERFORMED BY AT LEAST TWO PEOPLE

1. Positioning of the input/output base module IOBM (see paragraph 2)
2. Positioning of the power module PU (see paragraph 3)
3. Installation interconnection power cables (see paragraph 3)
4. Installation interconnection signal cables (see paragraph 4)

1.1 ELECTRICAL CONNECTION SYSTEM OPERATING INSTRUCTIONS

Before to proceed to the electrical connections, please refer to the instructions contained in the “General operating manual” OMBG7362 paragraph “4”.

The manufacturer provides the screws to connect the power bars, please refer to the table below for the installation.

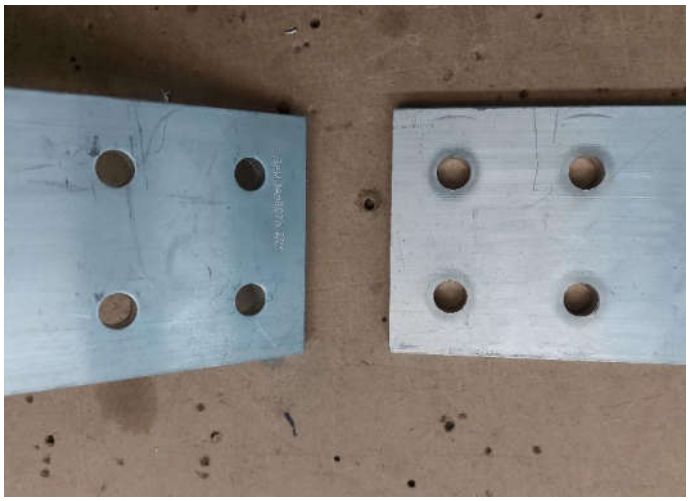
SCREW Ø	HEXAGON	TIGHTENING TORQUE
M10	17	40-50 nM
M12	19	69-85 nM

MANDATORY

To improve the electrical conductivity and the integrity of the connections, before proceeding with each connection of the bars, clean the contact surface of the bars with the supplied specific abrasive cloth supplied by manufacturer.

1.1.1 Polish and junction of conductive bars

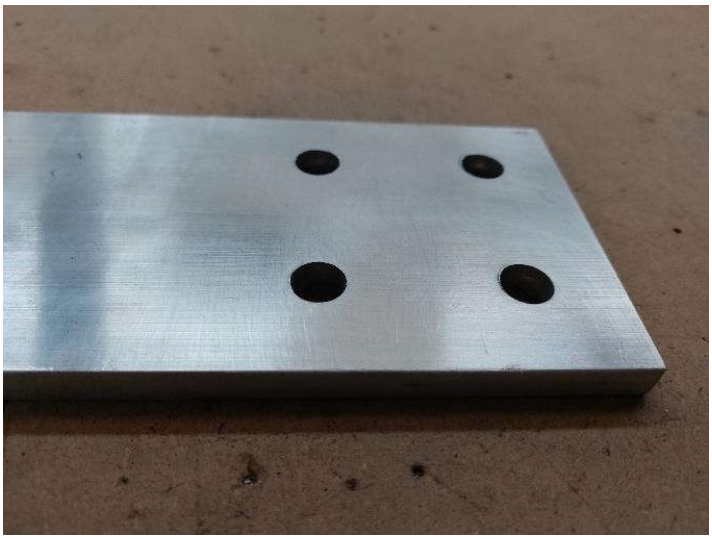
Before to proceed to the electrical connections of the bars, it’s necessary to polish the bars throughout the joint area using a specific abrasive cloth supplied by manufacturer (picture 2). In this way it’s possible to remove the thin layer of oxide created on the metal surface of the bars (picture 1) and allow better electrical conduction.



Picture 1 – Presence of the aluminium oxide on the bars before polish

Picture 2 – Use of abrasive cloth

The polishing must be done with delicate and circular movements avoiding scratching the surface. At the end of the procedure, no scratch or scrape should be visible (picture 3).



Picture 3 – Polished bar

Once the bar is polished, wipe it with a clean paper or cloth to remove any residue. Proceed to join and tighten the bars as soon as possible, avoiding the contact surfaces from getting dirty.

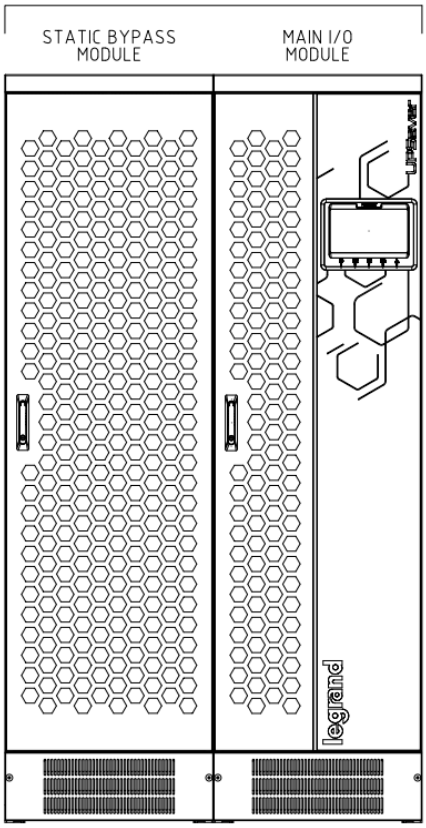
CAUTION

Avoid contact with hands of the polished bars. It's recommended to work in a clean and tidy environment.

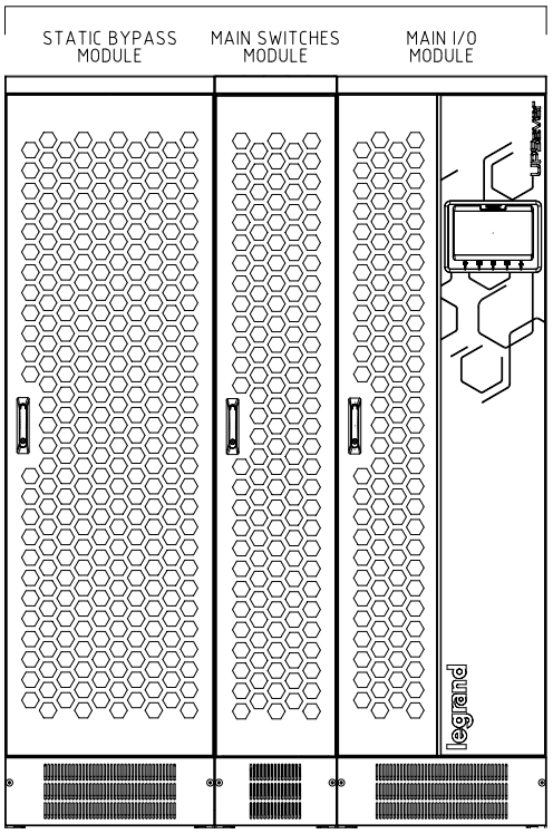
2. IOBM MODULE POSITIONING AND INSTALLATION

2.1 IOBM SHIPPING SECTIONS

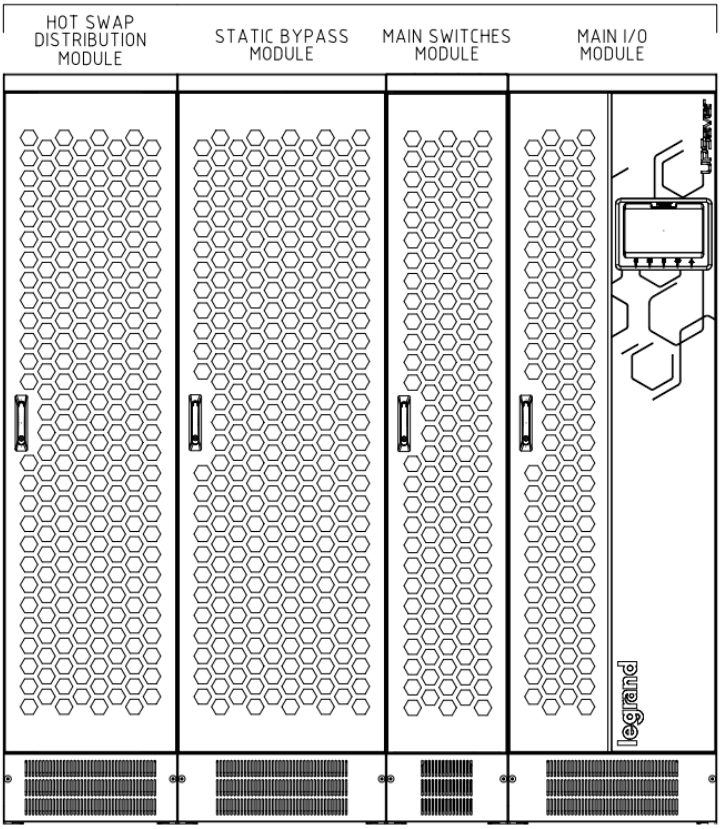
2.1.1 Size 1 – UPSAVER 670kW-1000kW



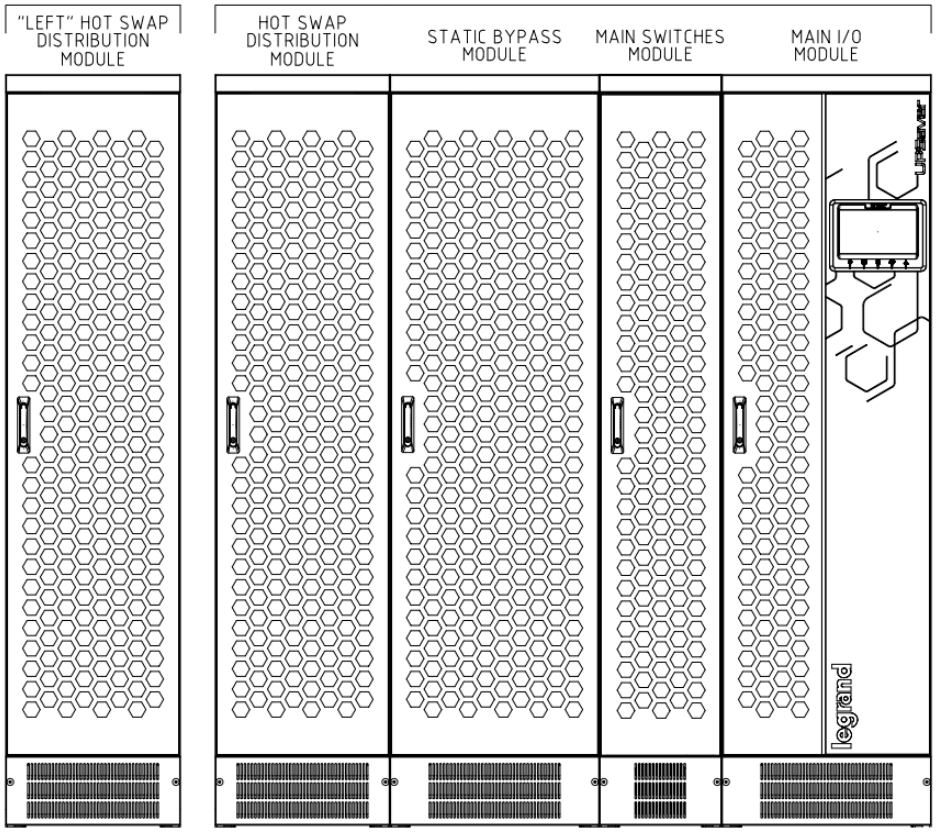
Picture 4 – IOBM basic configuration



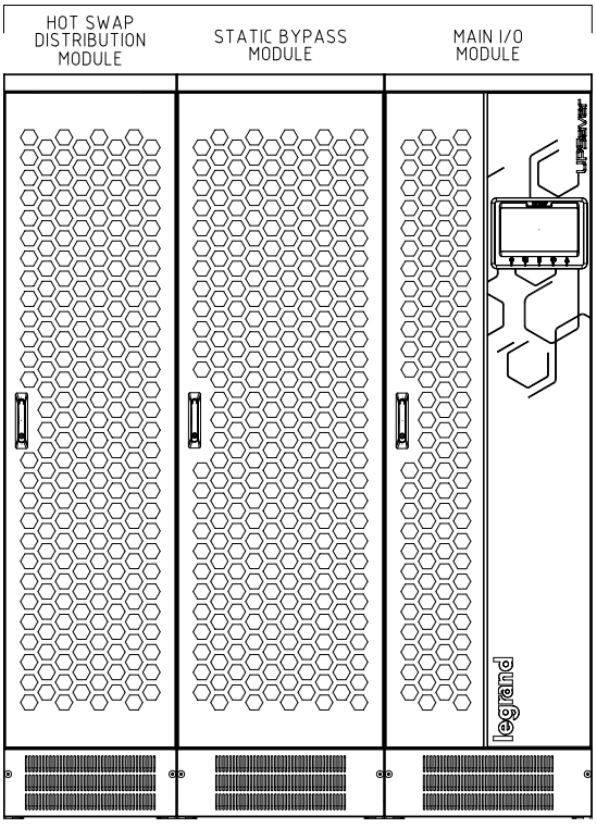
Picture 5 – IOBM configuration with mains switches



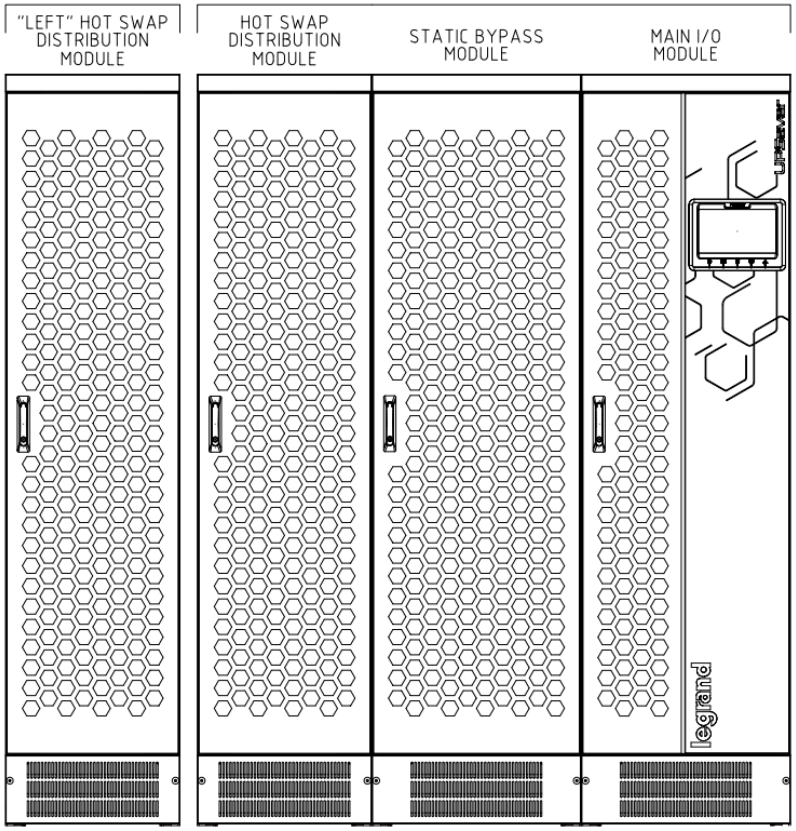
Picture 6 – IOBM configuration with mains switches & one Hot Swap distribution



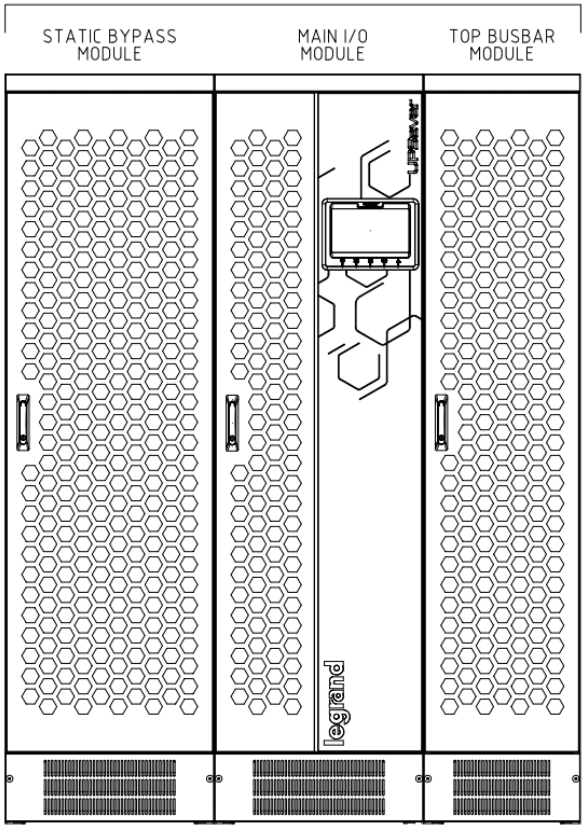
Picture 7 – IOBM configuration with mains switches & two Hot Swap distributions



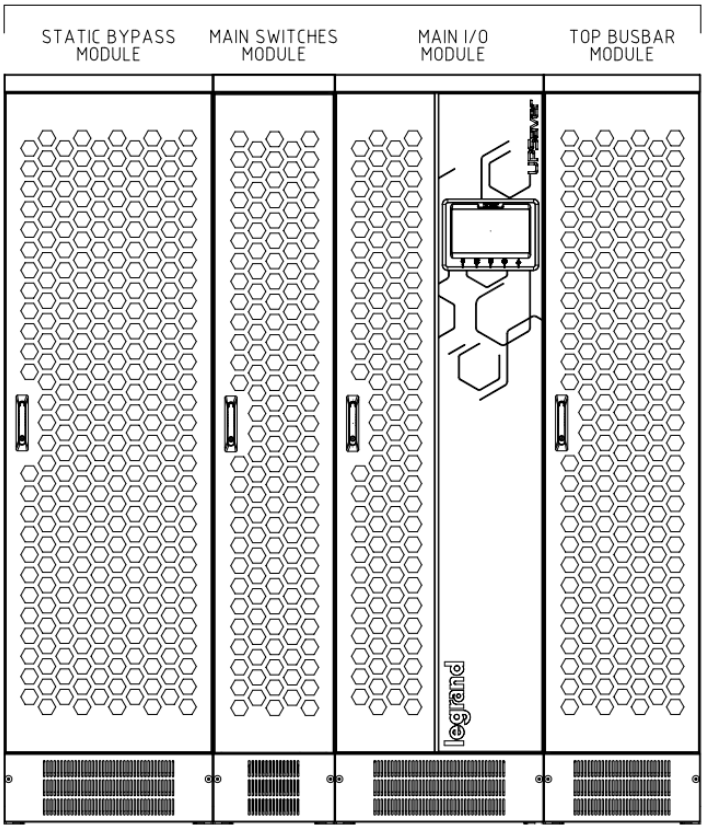
Picture 8 – IOBM configuration with one Hot Swap distribution



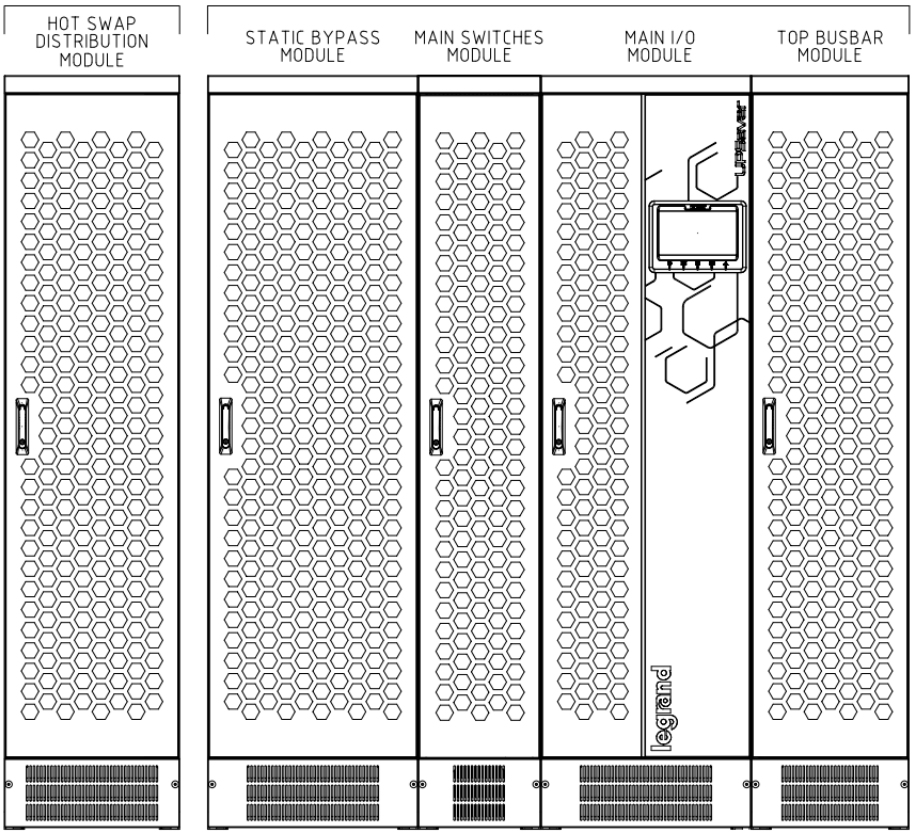
Picture 9 – IOBM configuration with two Hot Swap distributions



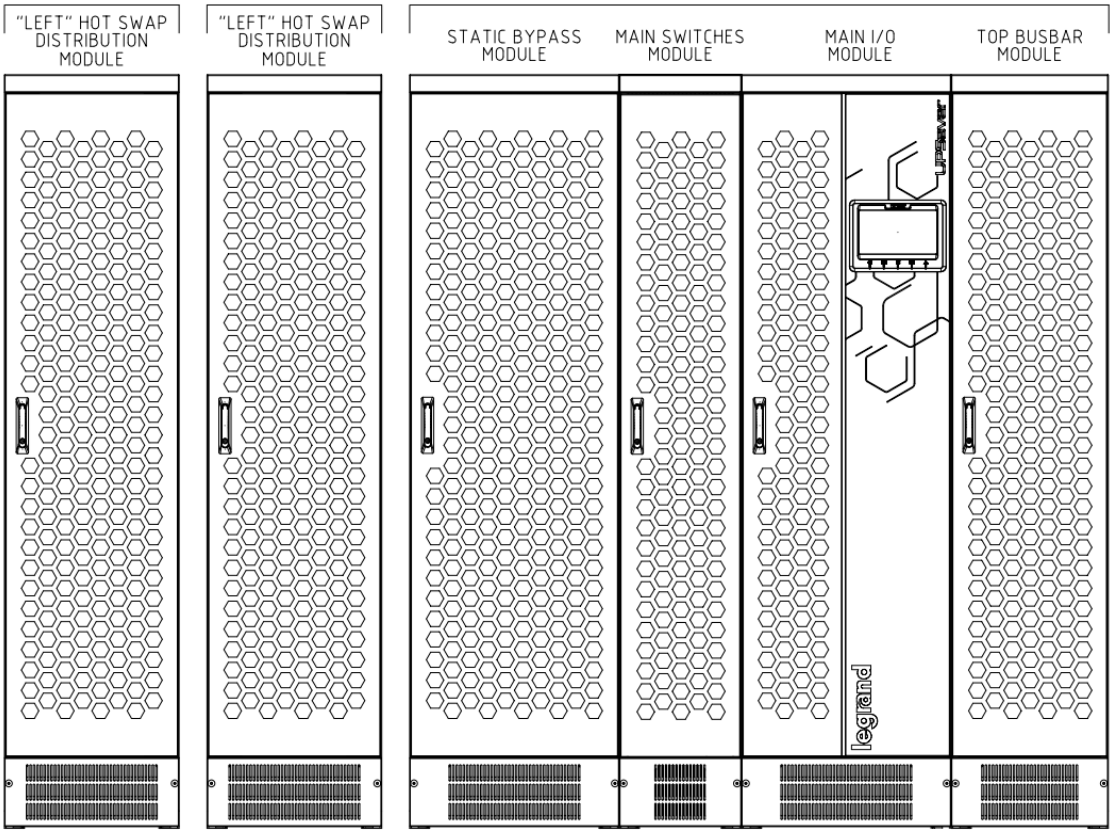
Picture 10 – IOBM blindo top busbar configuration



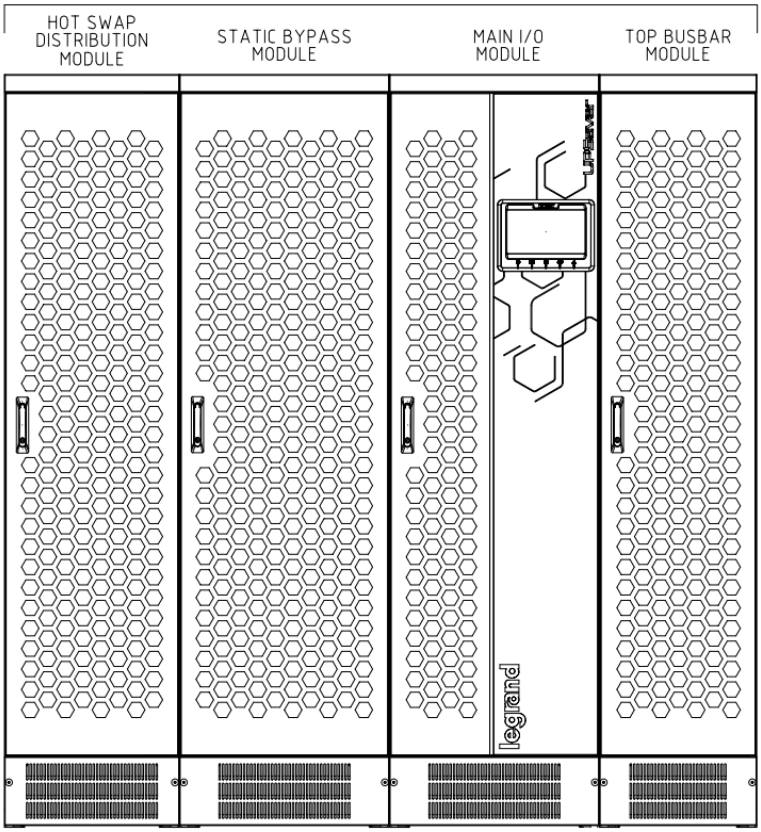
Picture 11 – IOBM blindo top busbar configuration with mains switches



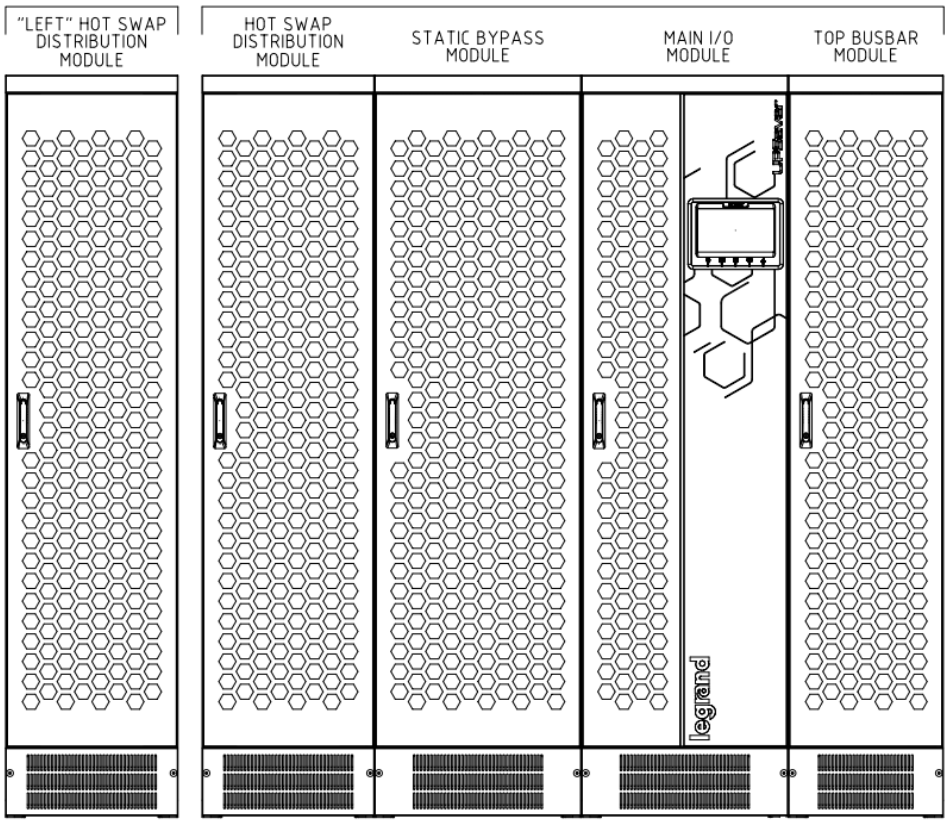
Picture 12 – IOBM blindo top busbar configuration with mains switches & one Hot Swap distribution



Picture 13 – IOBM blindo top busbar configuration with mains switches & two Hot Swap distributions

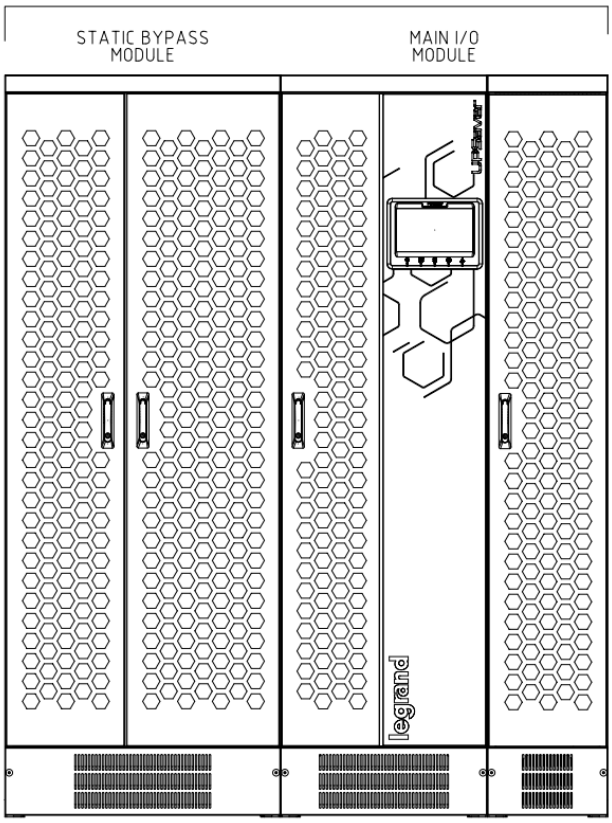


Picture 14 – IOBM blindo top busbar configuration with one Hot Swap distribution

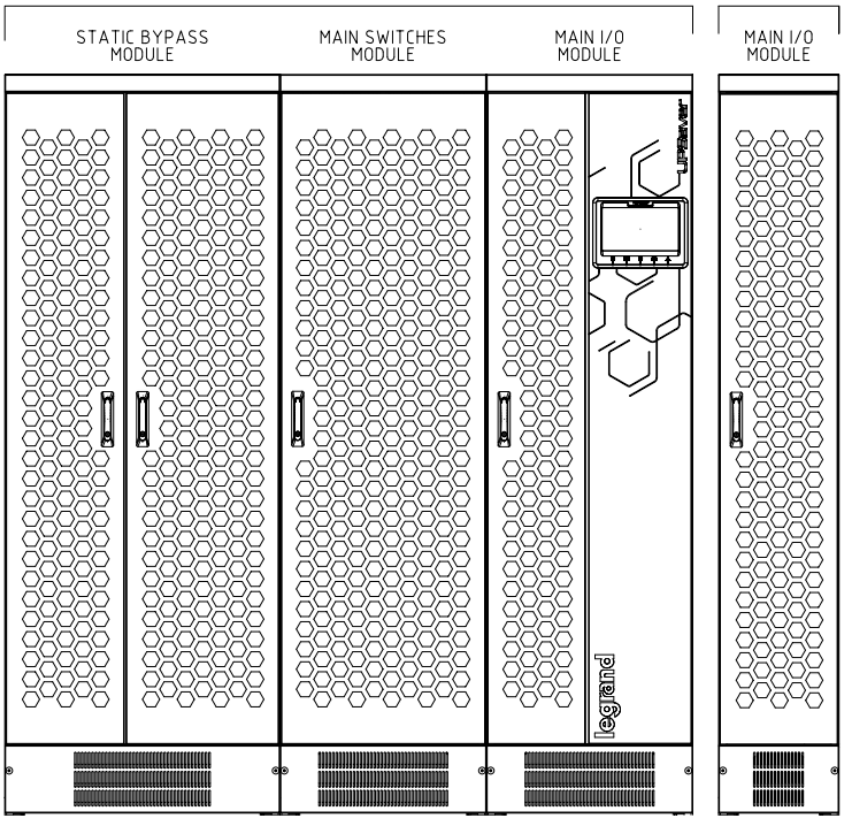


Picture 15 – IOBM blindo top busbar configuration with two Hot Swap distributions

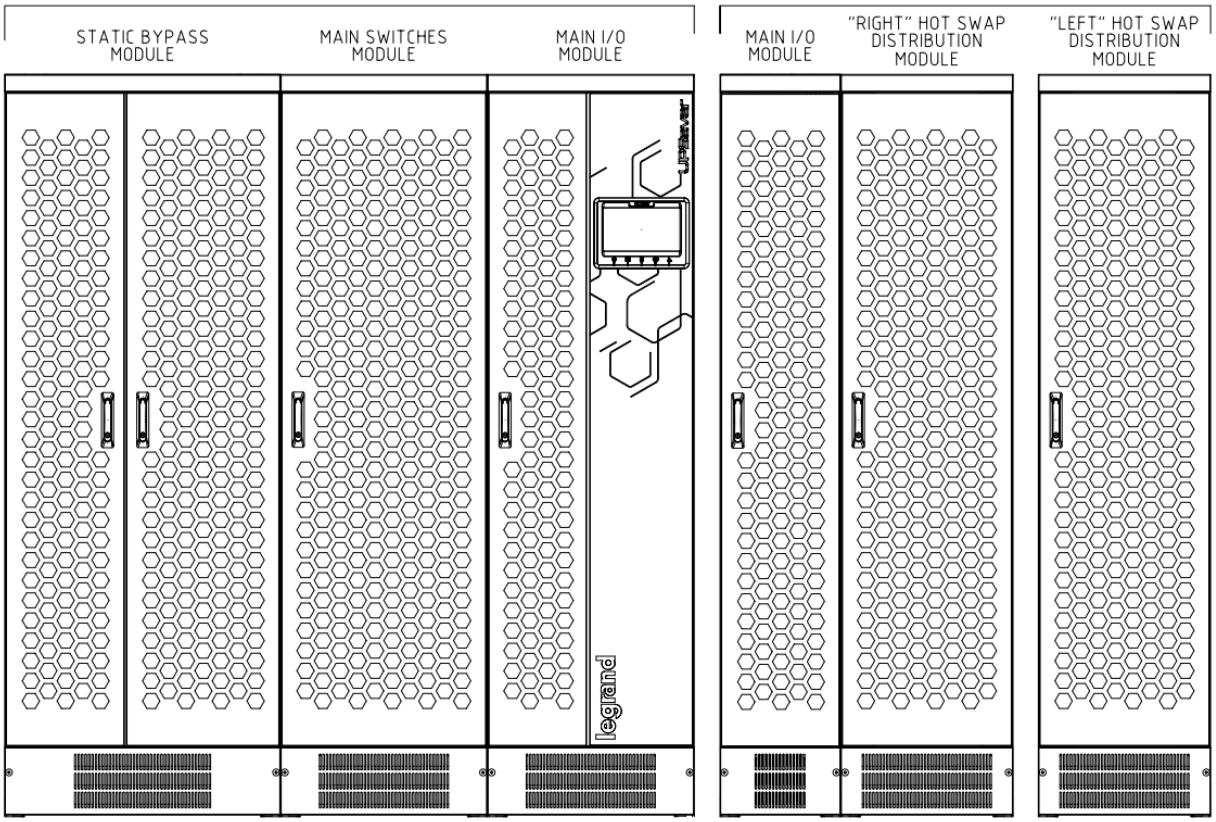
2.1.2 Size 2 – UPSAVER 1340kW-1670kW



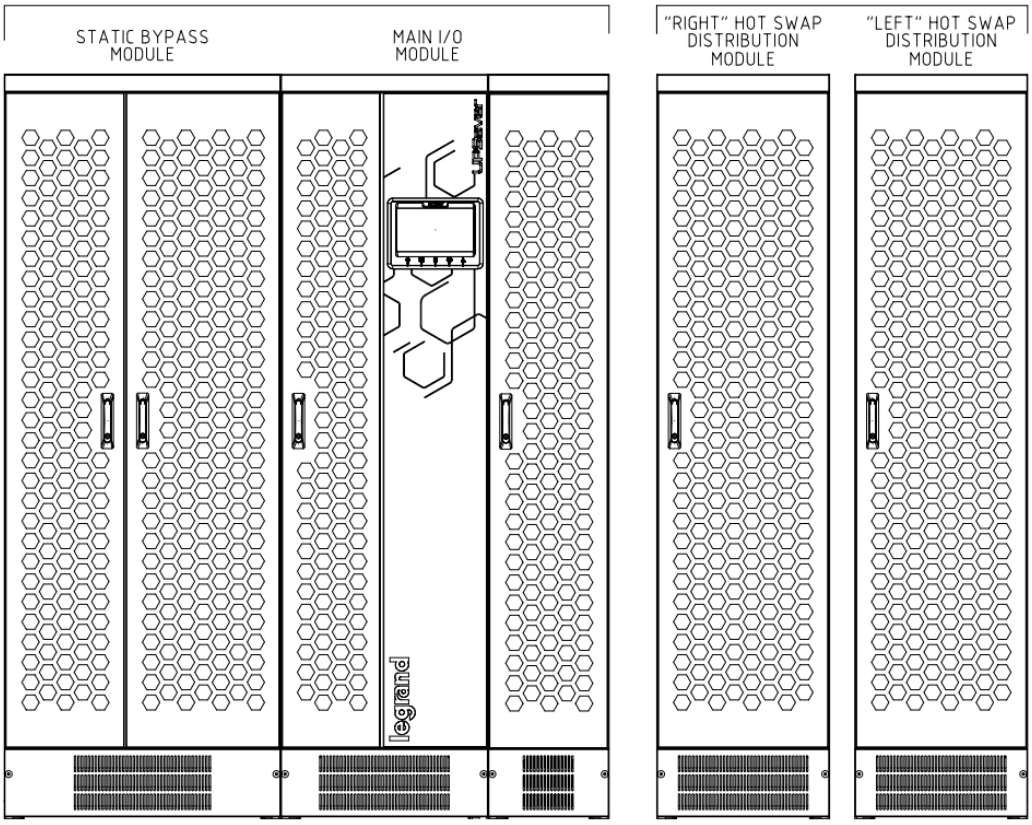
Picture 16 – IOBM basic configuration



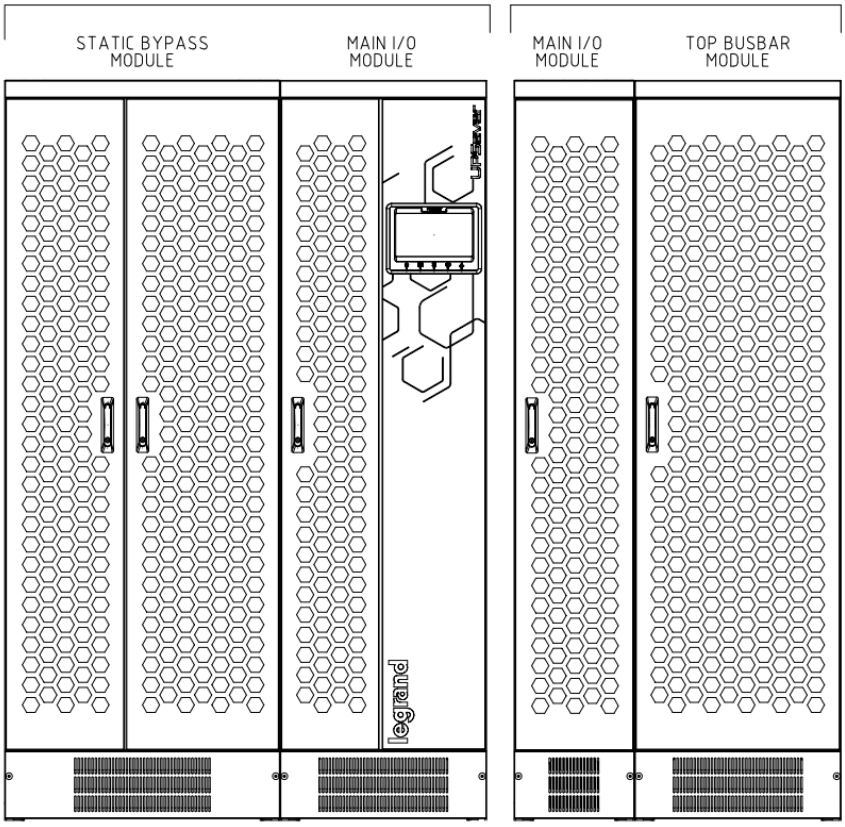
Picture 17 – IOBM configuration with mains switches



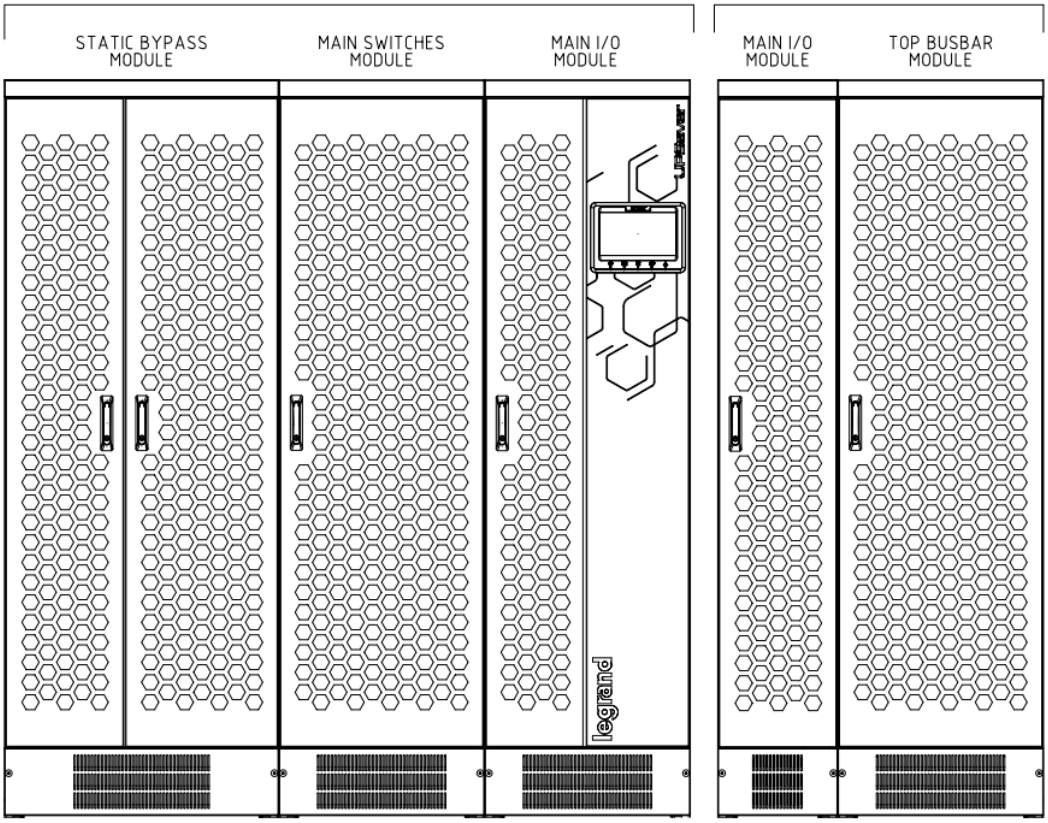
Picture 18 – IOBM configuration with mains switches & Hot Swap distributions



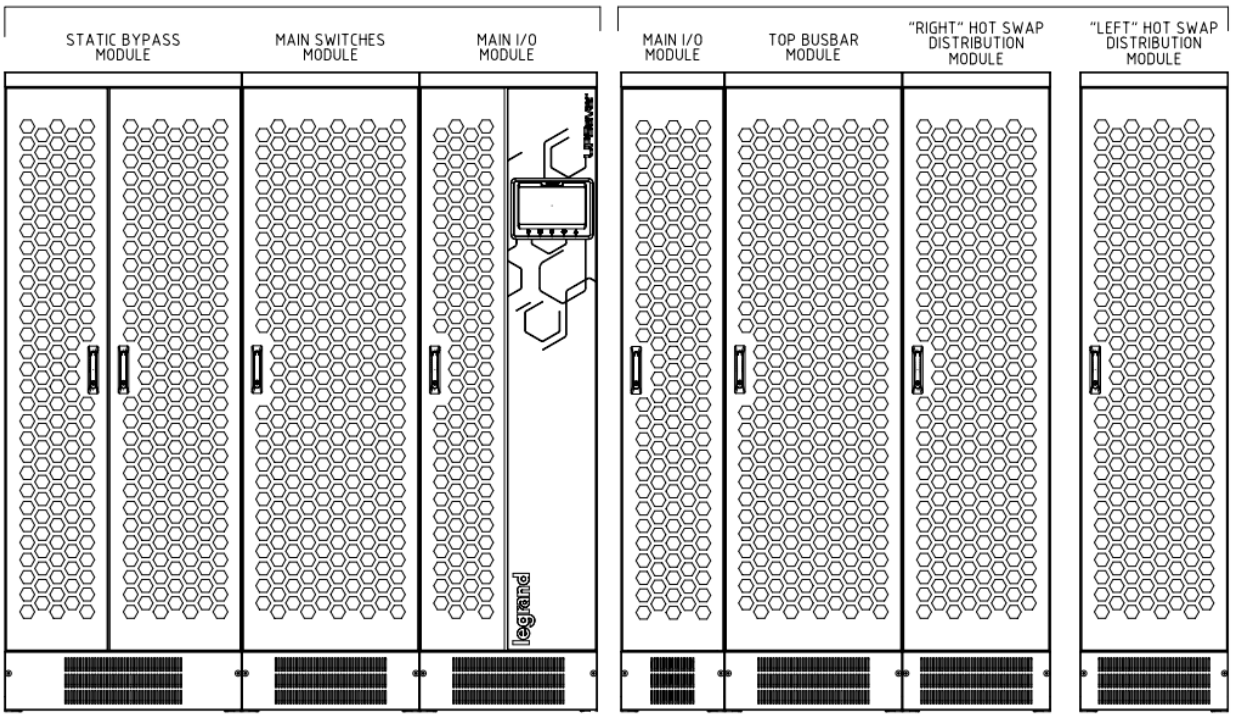
Picture 19 – IOBM configuration with Hot Swap distributions



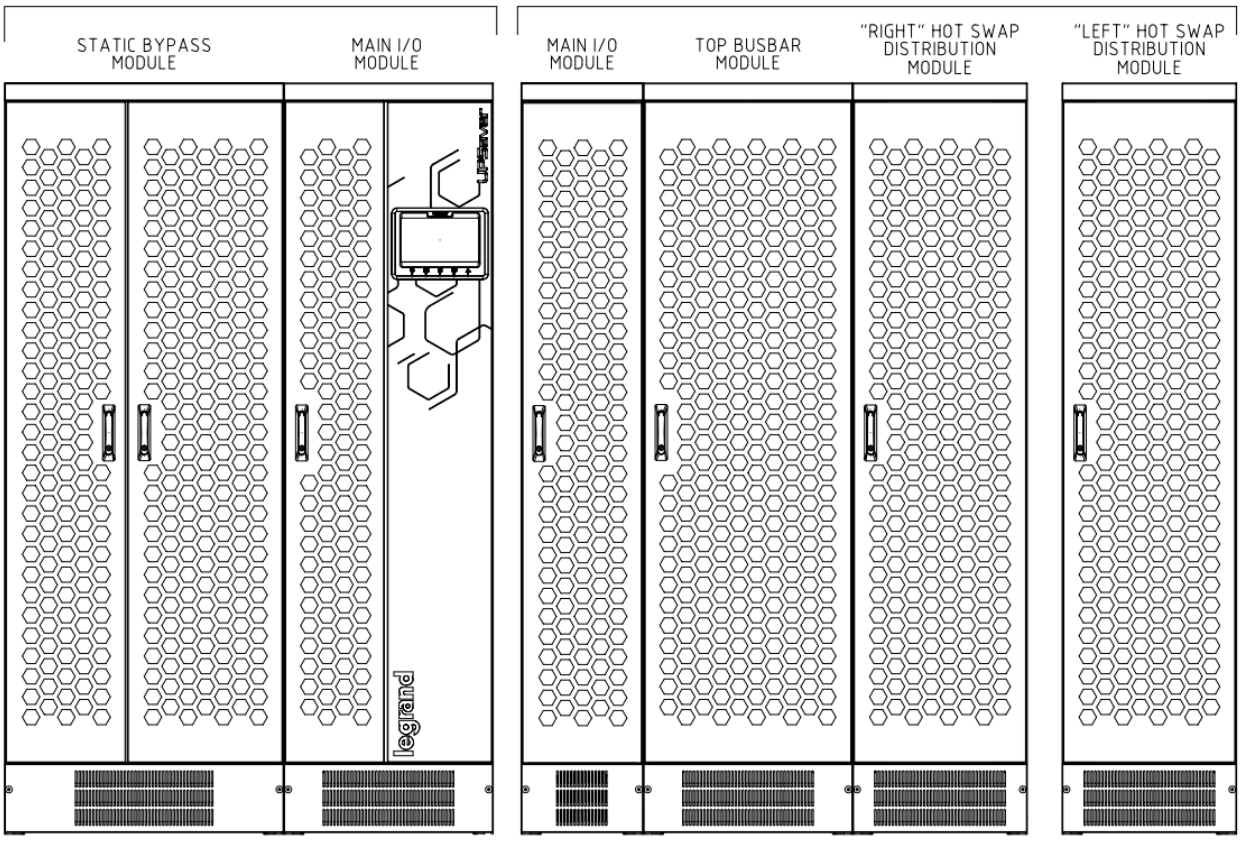
Picture 20 – IOBM blindo top busbar configuration



Picture 21 – IOBM blindo top busbar configuration with mains switches



Picture 22 – IOBM blindo top busbar configuration with mains switches & Hot Swap distributions

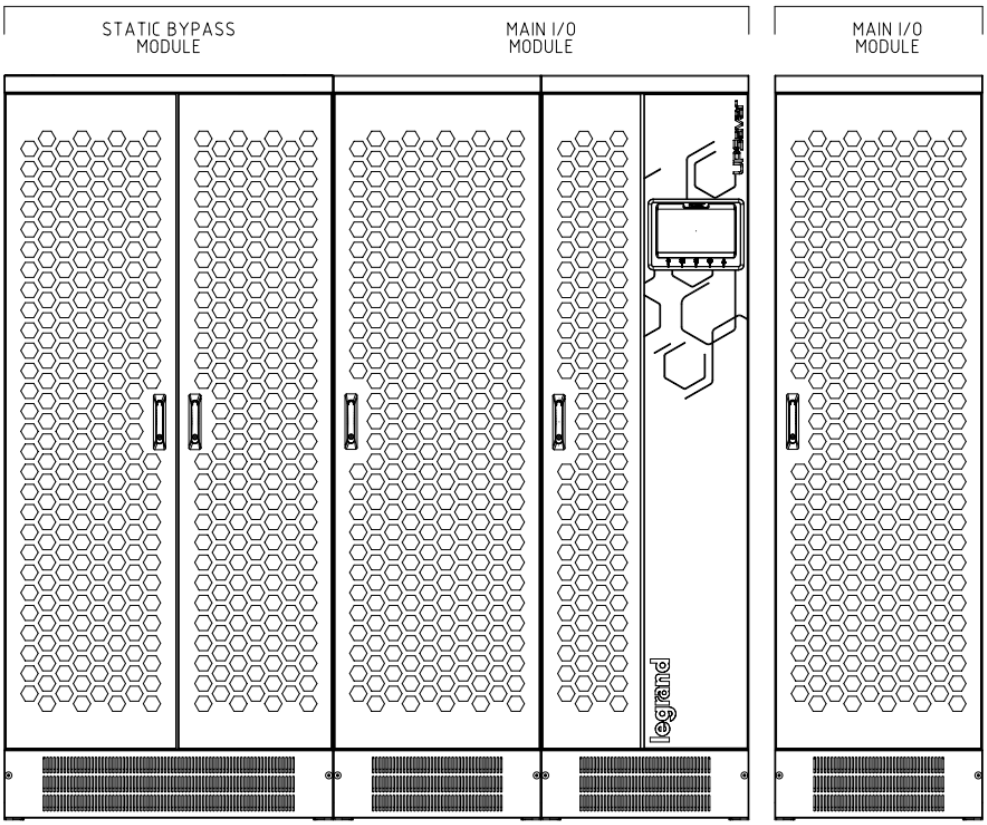


Picture 23 – IOBM blindo top busbar configuration with mains switches & two Hot Swap distributions

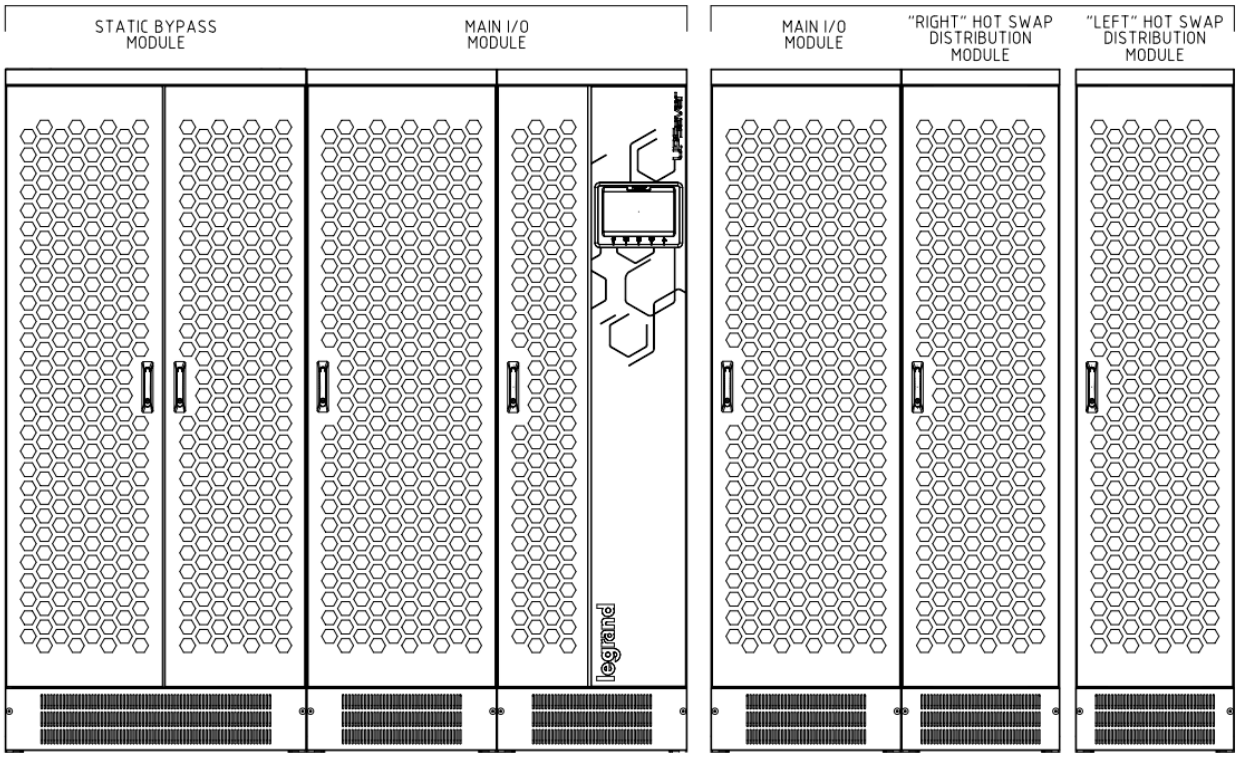
2.1.3 Size 3 – UPSAVER 2000kW-2340kW

NOTE

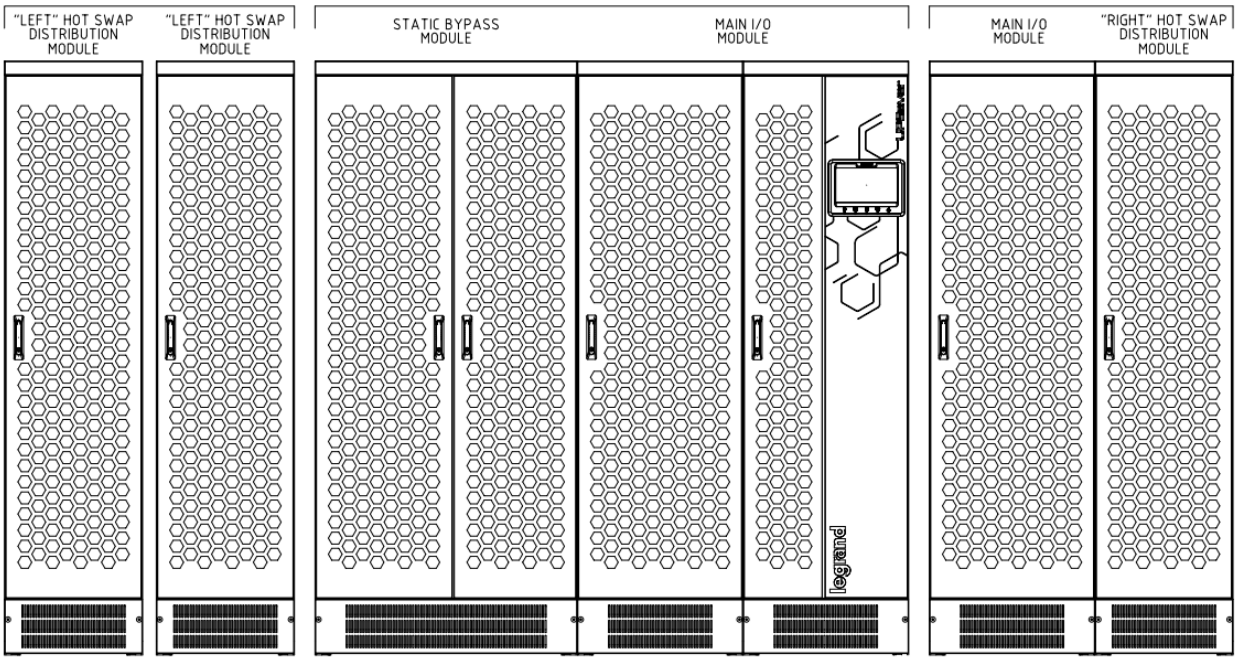
The "Size 3" basic configuration provides always the blindo bus-bar and the main switches place.



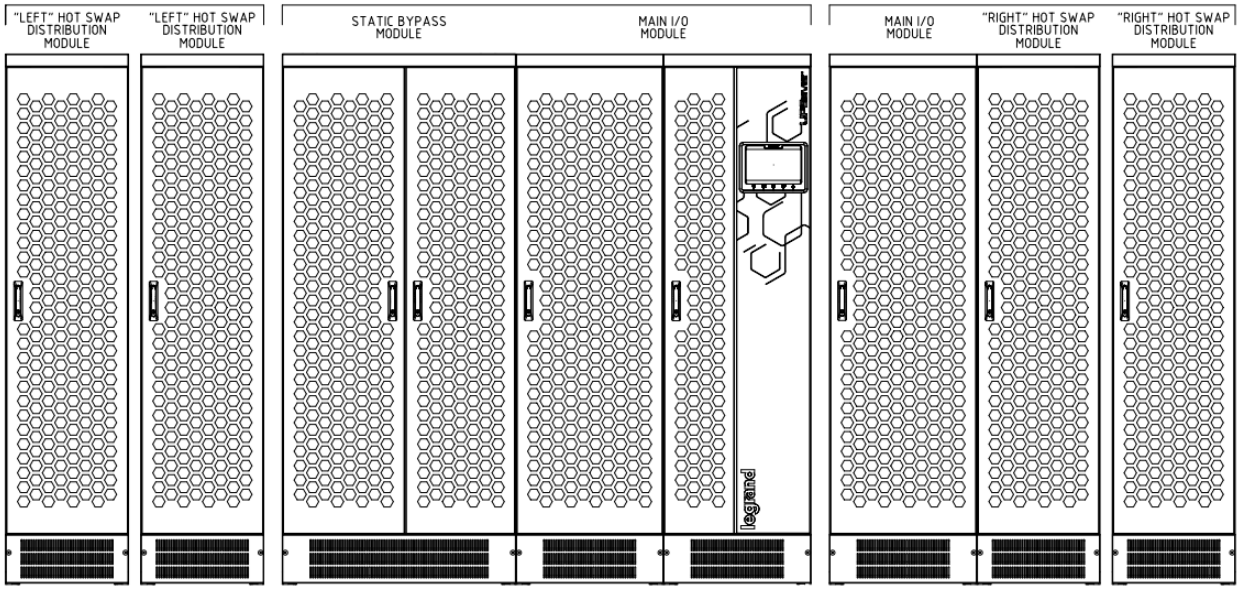
Picture 24 – IOBM basic configuration



Picture 25 – IOBM configuration with two Hot Swap distributions

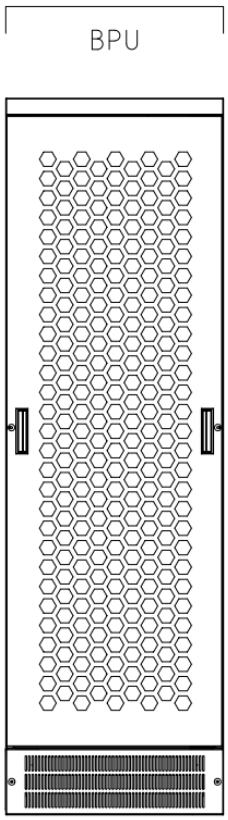


Picture 26 – IOBM configuration with three Hot Swap distributions



Picture 27 – IOBM configuration with four Hot Swap distributions

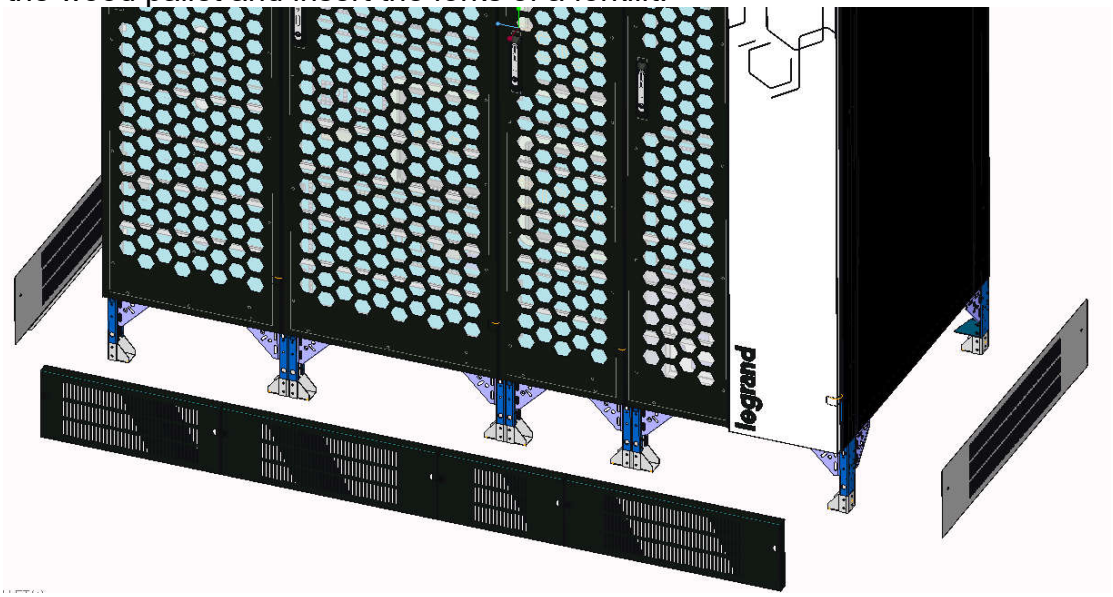
2.2 POWER MODULE (PU) SHIPPING SECTION



Picture 28 – Power module (PU) shipping section

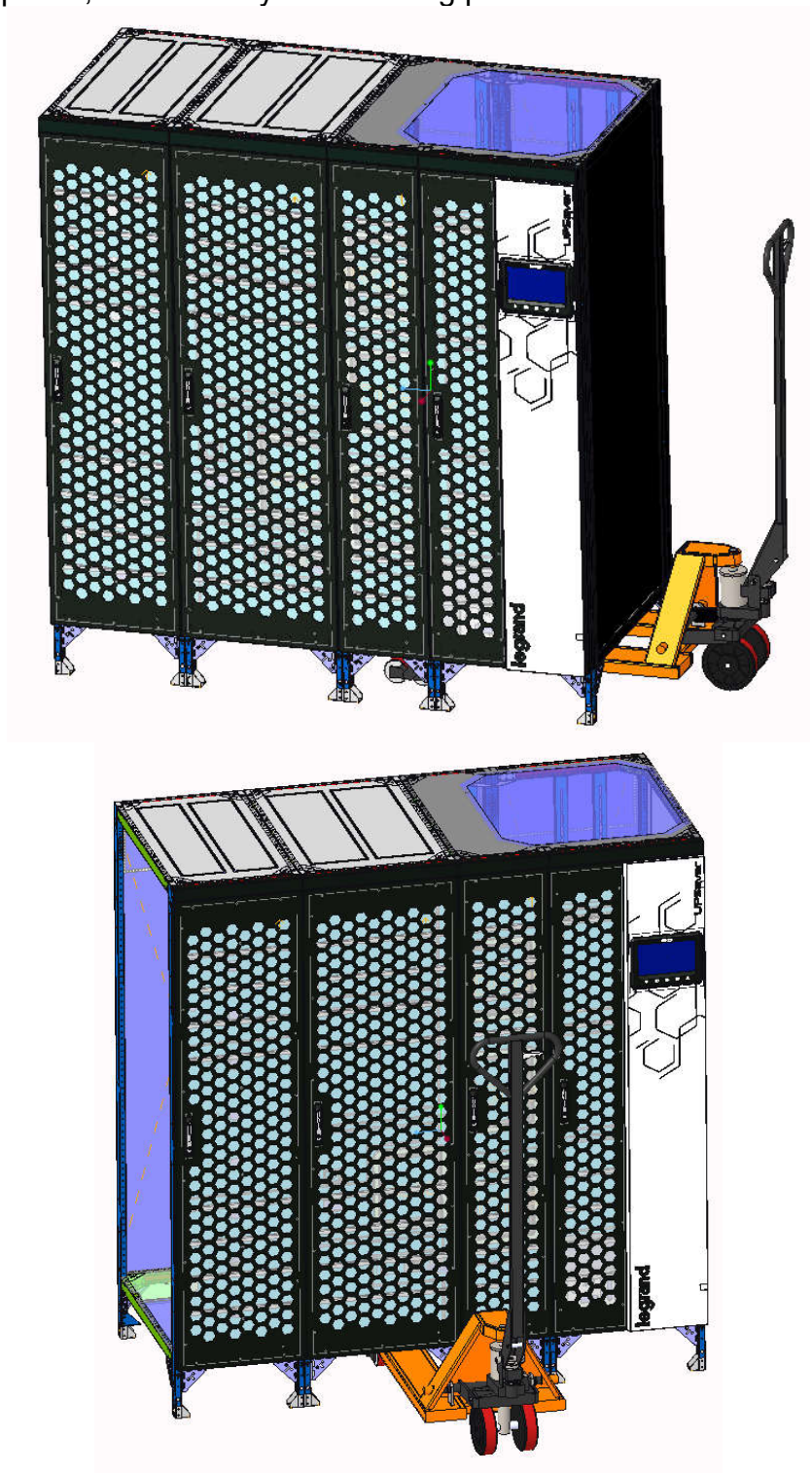
2.3 HANDLING OF THE IOBM

To handle the devices, remove the lower rear and front, than remove the fixing screws from the wood pallet and insert the forks of a forklift.



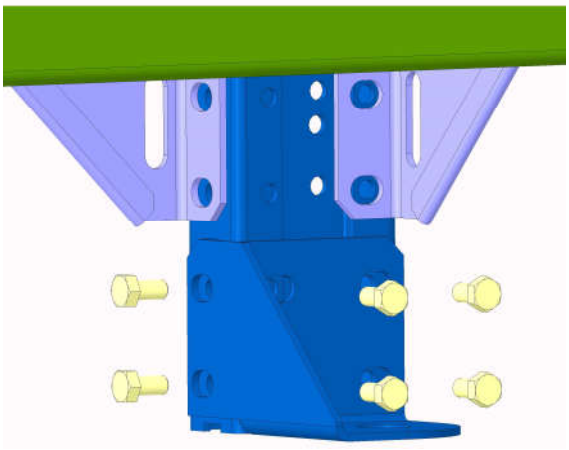
Picture 29 – Handling of the IOBM of UPSaver

The IOBM module can be handled both from the front and from the side according to the available spaces, as shown by the following pictures.

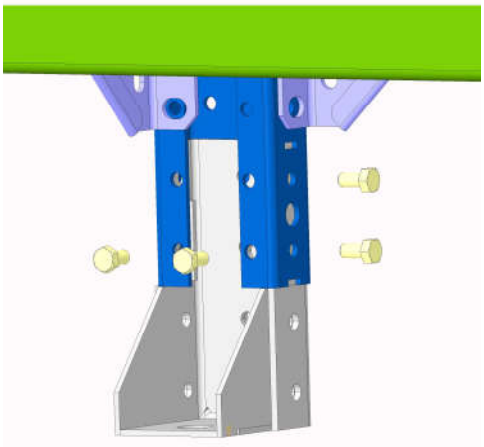


Picture 30 – Handling of the IOBM of UPSaver

Insert the forks of a forklift as show in the pictures 30a and 30b and lift the cabinet to replace the fixing brackets, used to secure the cabinet on the pallet (picture 31), with the support used to fix the cabinet to the floor (picture 32).



Picture 31 – Removal of fixing brackets to the pallet

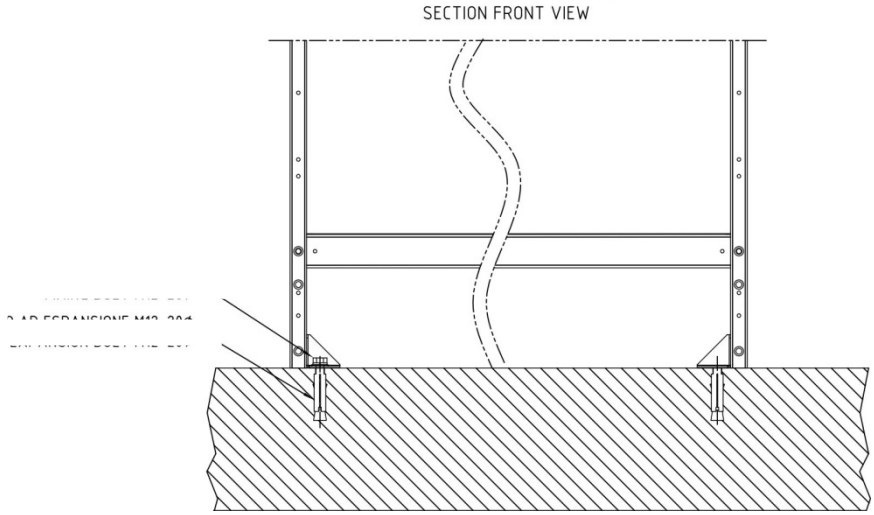


Picture 32 – Mechanical support for fixing to the floor

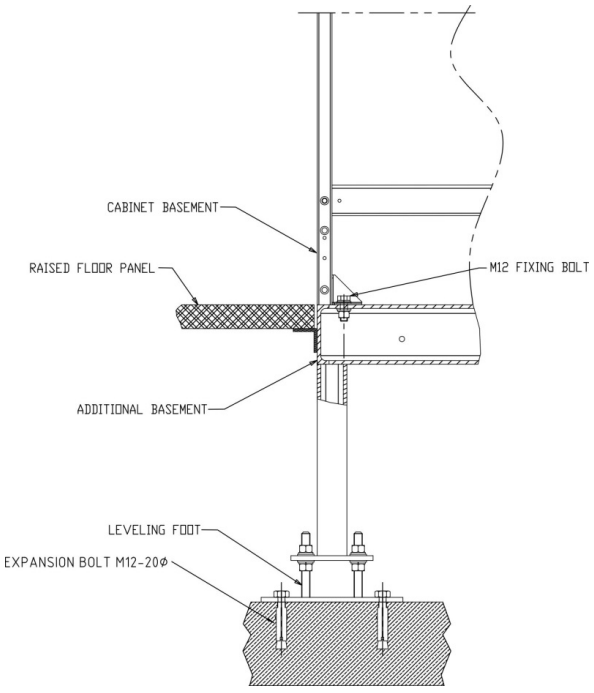
2.4 FLOOR FIXING

The UPSaver system can be positioned on an iron base specifically prepared and placed on the base of a floating floor.

The floor fixing method for the various modules which compose the UPSaver system varies depending on the UPS bearing surface, being it a concrete floor or an iron base.



Picture 33 – Floor fixing



Picture 34 – Iron base fixing

2.5 IOBM MODULE INSTALLATION

The following table indicate the sequence of installation steps.

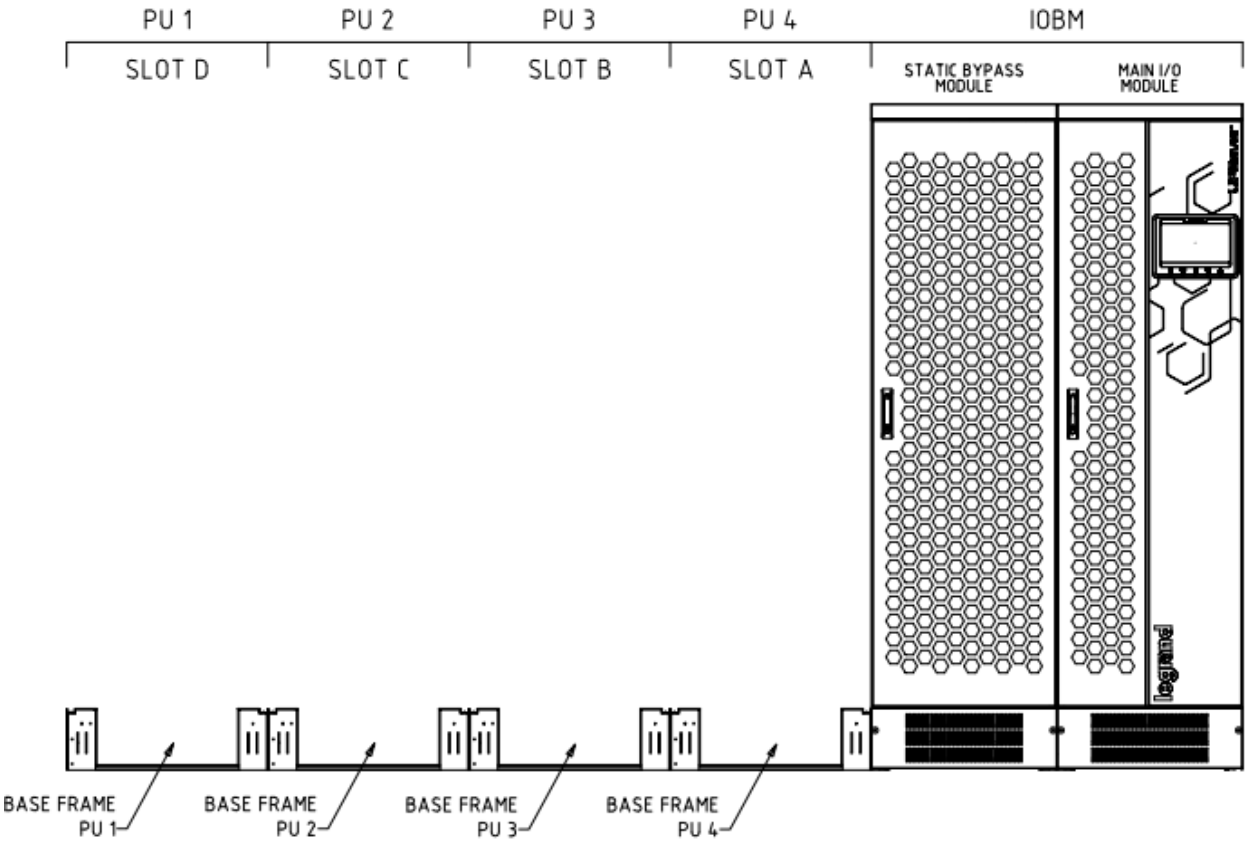
CAUTION

The manufacturer declines any responsibility of damage to people or things, deriving from the non-fulfilment of the following instructions.

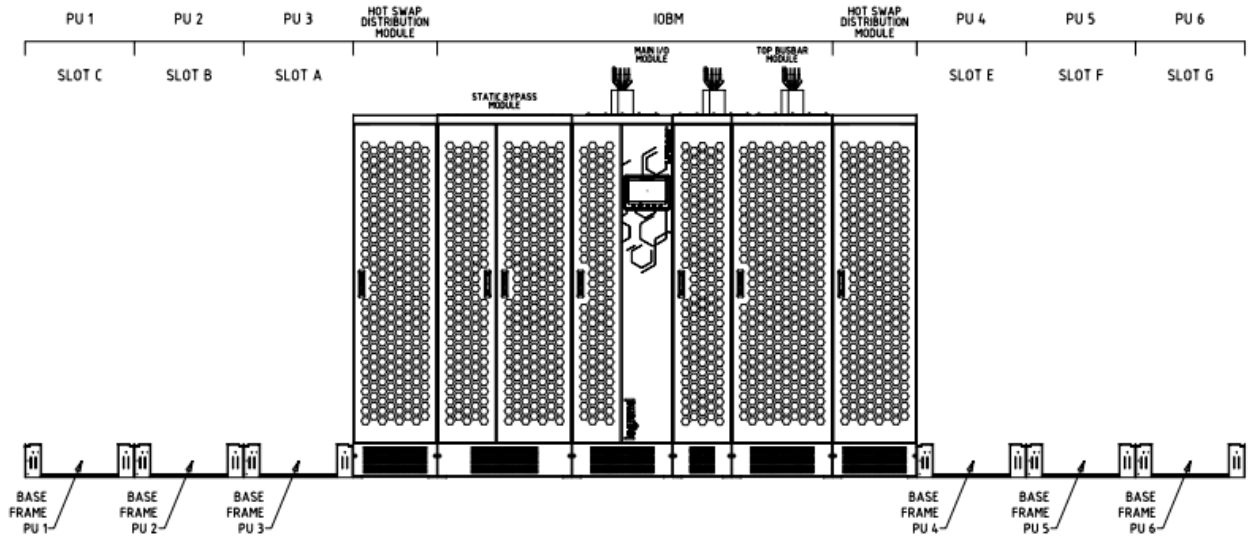
STEP	IOBM CONFIGURATION	ACTIONS
1	**BLINDO-BUS BAR POWER CONNECTION**	Install the blindo BUS-BAR power connection as per paragraph 2.6
2		Place the IOBM section and fix it to the floor or on an iron base (paragraph 2.4).
3a	**WITHOUT HOT SWAP DISTRIBUTION MODULE (Example picture 35)**	Proceed with the power module PU installation (paragraph 3).
3b	**ONE HOT SWAP DISTRIBUTION MODULE (Example picture 36)**	Place the “Hot swap distribution” module and couple it to the IOBM. Fix the module to the floor or on an iron base (paragraph 2.4). Connect the “Hot swap distribution” module to the IOBM. Proceed with the power module PU installation (paragraph 3).
3b	**TWO HOT SWAP DISTRIBUTION MODULES ON SAME IOBM SIDE (Example pictures 37-38)**	Place the “Hot swap distribution” module with the least number of switches and couple it to the IOBM. Fix the modules to the floor or on an iron base (paragraph 2.4). Connect the “Hot swap distribution” module to the IOBM. Route the interconnection cables of the PU and connect them to the “Hot swap distribution” module. Place the second “Hot swap distribution” module and couple it to the external side of the “Hot swap distribution” module already installed, taking care not to damage the interconnecting cables previously connected. Fix the module to the floor or on an iron base (paragraph 2.4). Connect the two “Hot swap distribution” modules with each other. Proceed with the power module PU installation (paragraph 3).

NOTE

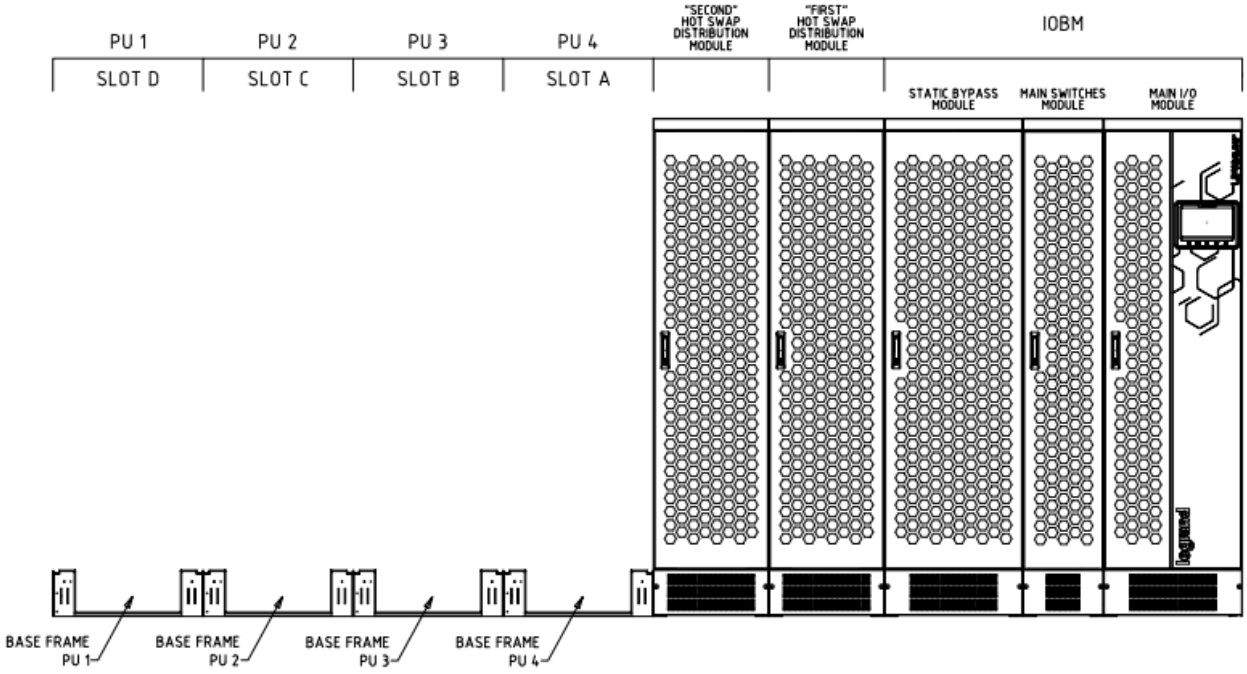
The following pictures are relative only to the IOBM configurations.
See the “General Arrangement” of your UPS to find the real dimension and layout of the IOBM.



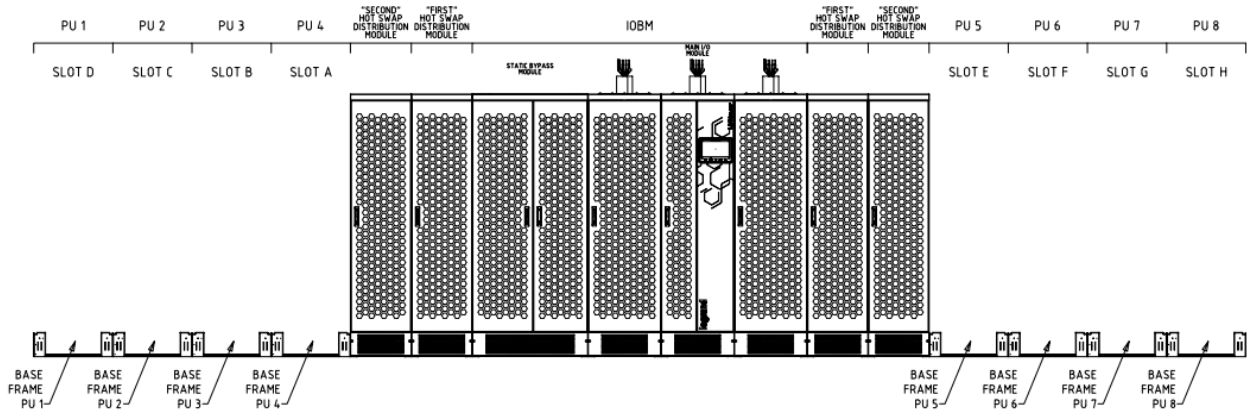
Picture 35 – Size 1 “1000kVA” IOBM basic “N+1 redundancy” configuration without “Hot swap distribution” module



Picture 36 – Size 2 “1670kVA” IOBM “N+1 redundancy” configuration with one “Hot swap distribution” module for IOBM side



Picture 37 – Base frame positioning example – Size 1 "1000kVA" IOBM "N+1 redundancy" configuration with two "Hot swap distribution" modules for IOBM side



Picture 38 – Base frame positioning example – Size 3 "2340kVA" IOBM "N+1 redundancy" configuration with two "Hot swap distribution" modules for IOBM side

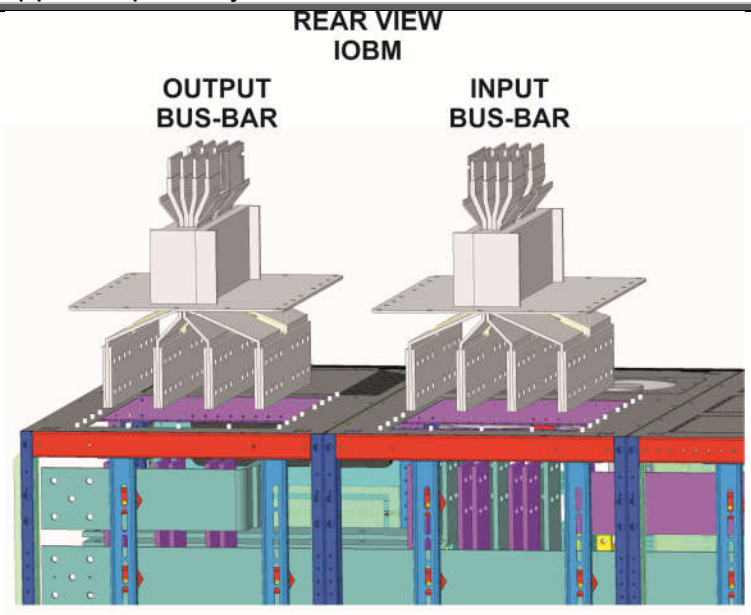
2.6 IOBM DETAIL CONNECTION TERMINALS

2.6.1 Blindo BUS-BAR

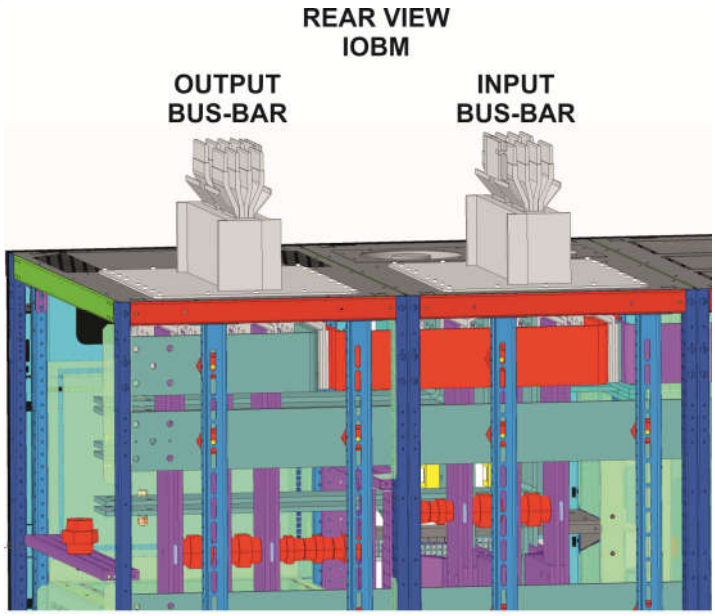
If your UPS is equipped with blindo BUS-BAR power connection, proceed with the installation as indicated below.

NOTE

The blindo BUS-BAR, on the IOBM blindo top busbar configuration system, will be shipped separately and have to be install on site.



Picture 39 – Example blindo BUS-BAR positioning on single input configuration (UPSaver 2000-2340KW)



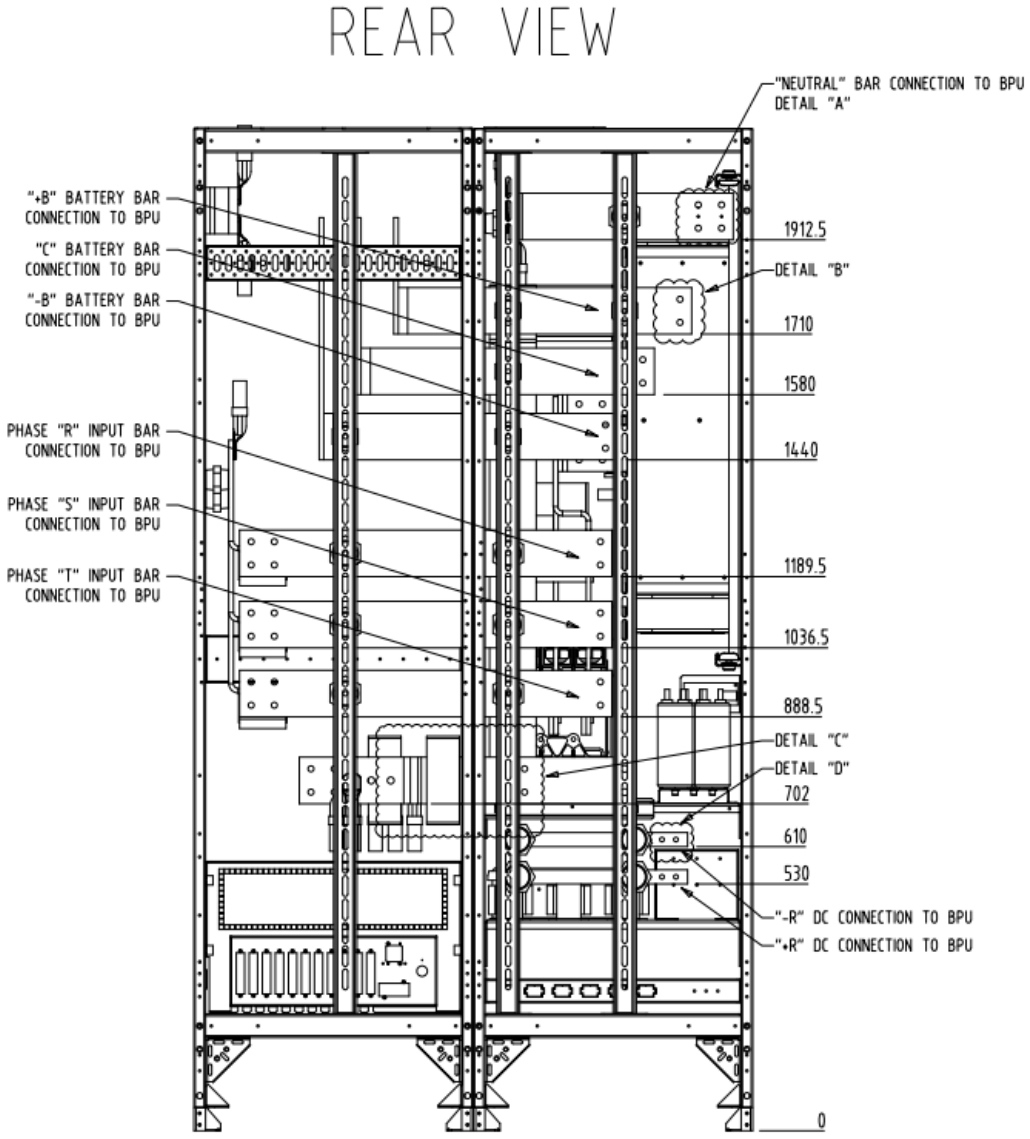
Picture 40 – Example blindo BUS-BAR positioning on single input configuration (UPSaver 2000-2340KW)

2.6.2 IOBM “size 1” detail connection terminals

NOTE

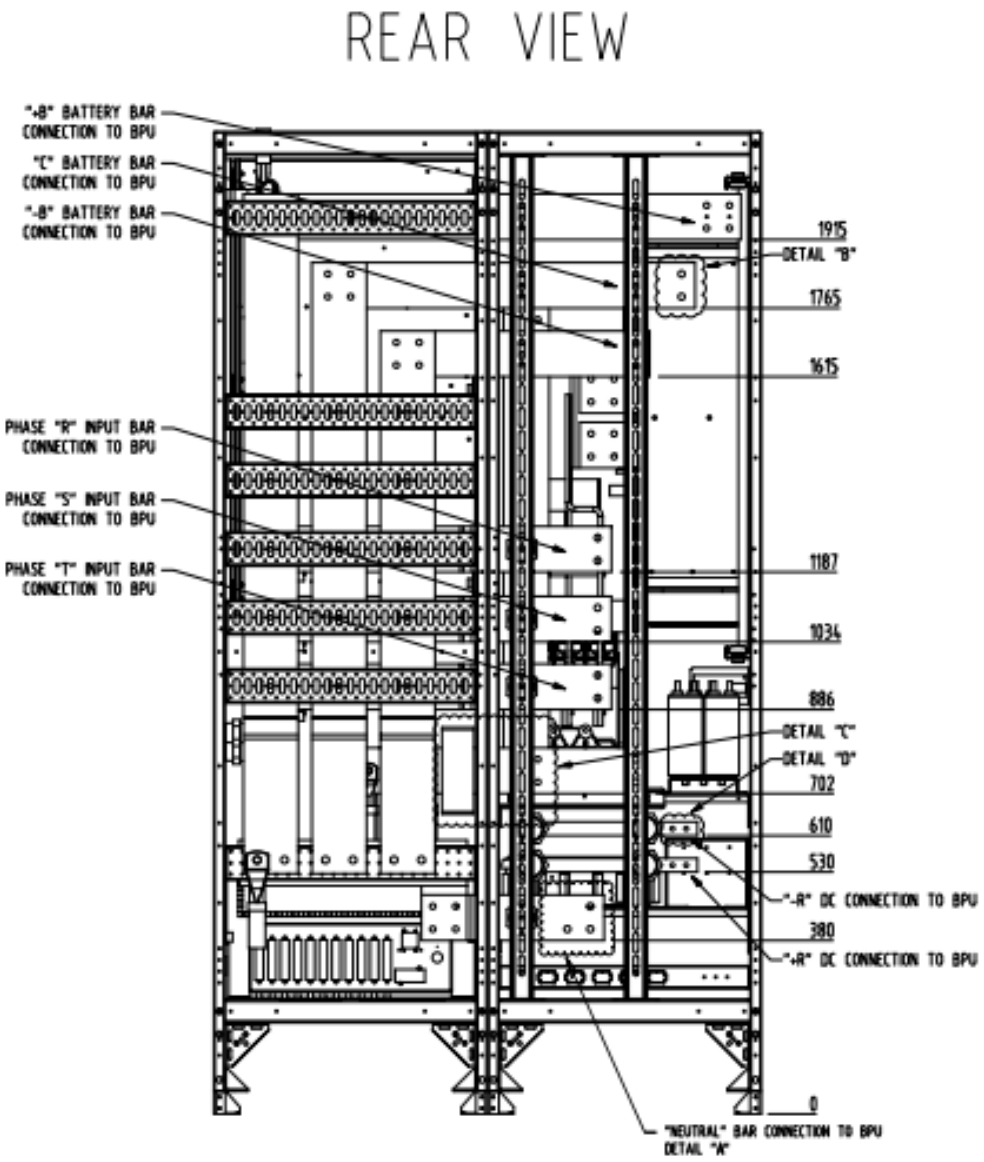
For “Distributed Battery” IOBM configuration, the battery bars are not installed inside the IOBM.

The details of connection between IOBM and PU are indicated below.



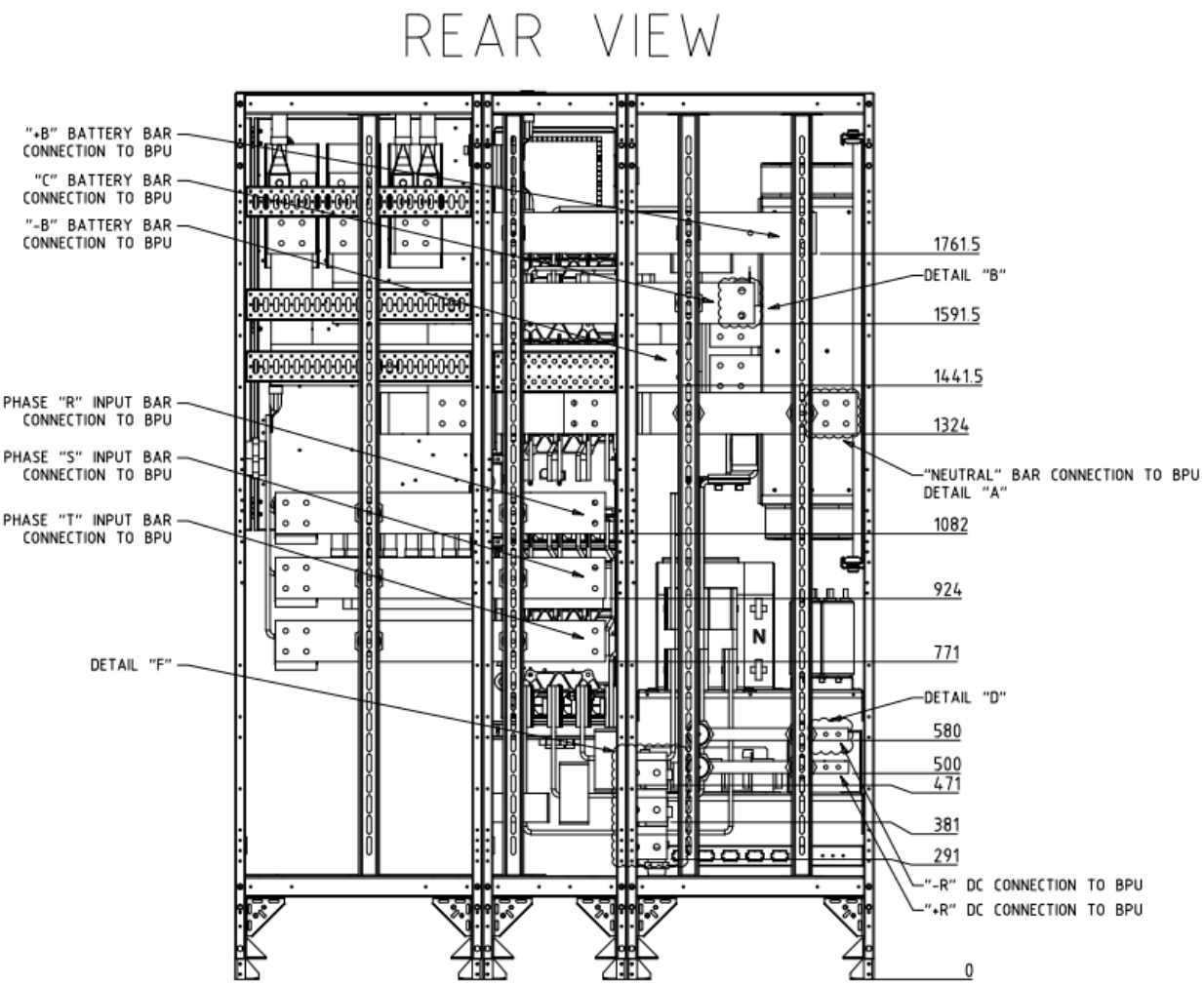
(*) For details “A”, “B”, “C” and “D” see pages 43-44

Picture 41 – IOBM basic configuration “Top cable entry TNS-TNC system”



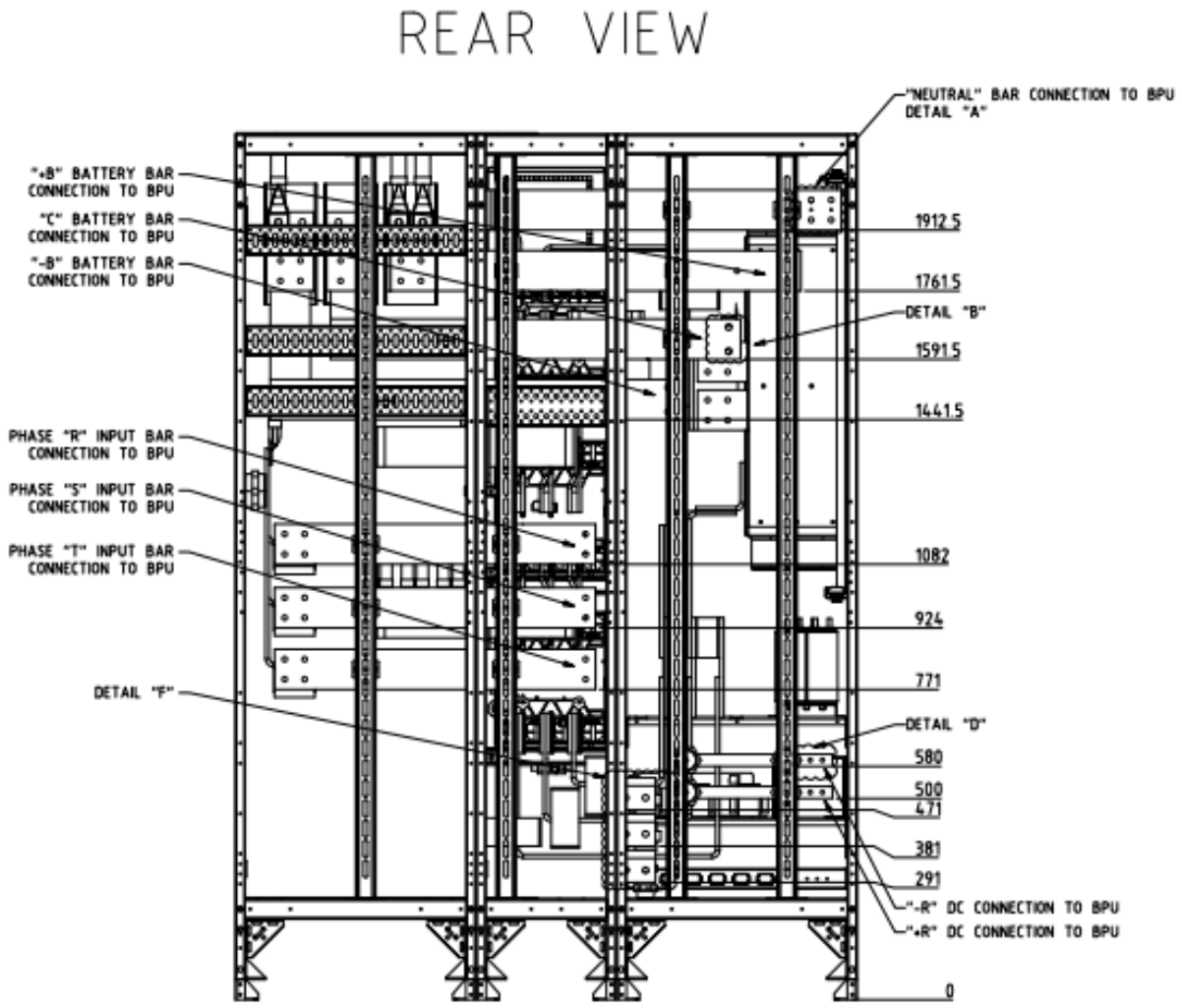
(*) For details “A”, “B”, “C” and “D” see pages 43-44

Picture 42 – IOBM basic configuration “Bottom cable entry TNS-TNC system“



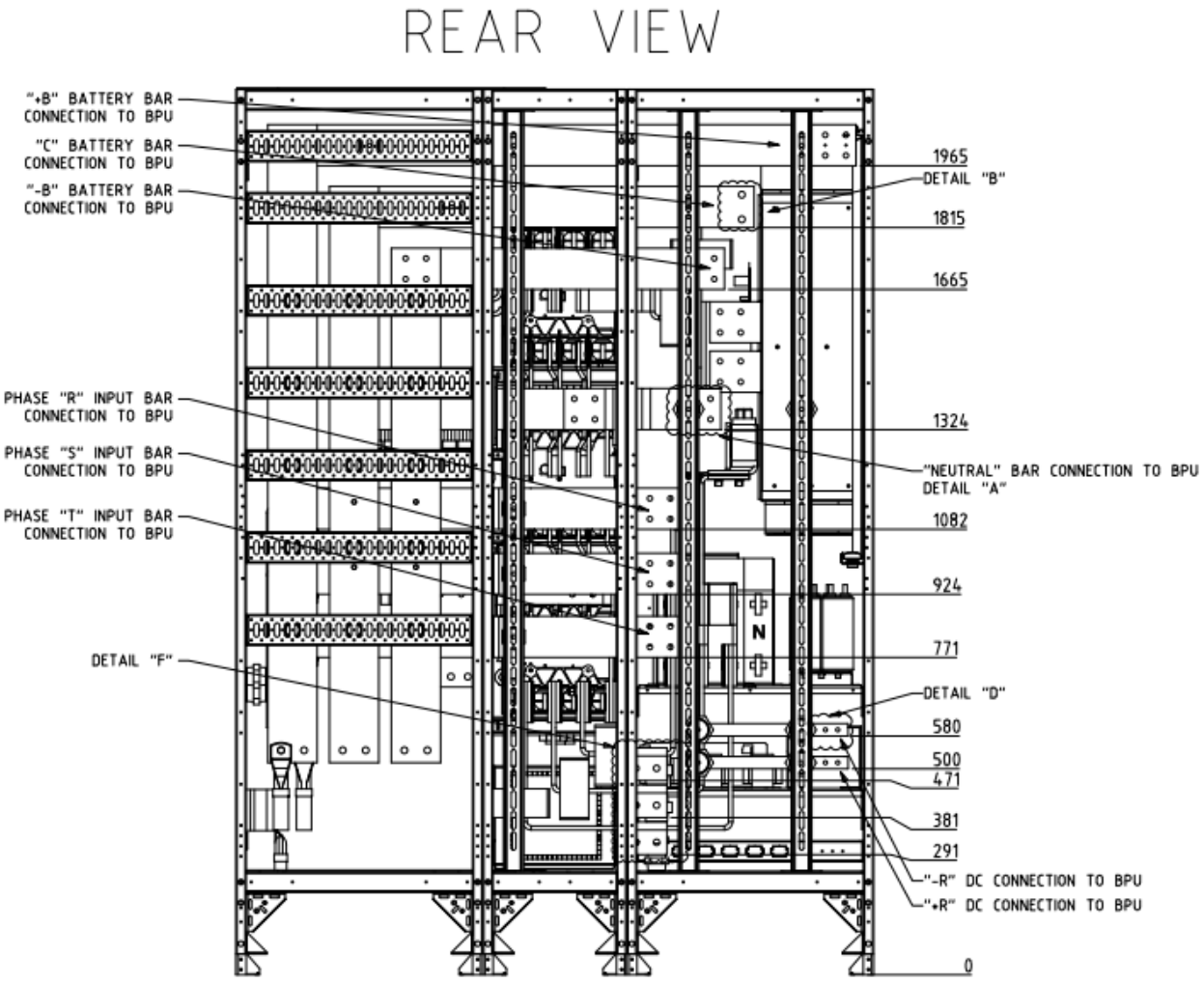
(*) For details “A”, “B”, “D” and “F” see pages 43-44-45

Picture 43 – IOBM with mains switches configuration “Top cable entry TNS system“



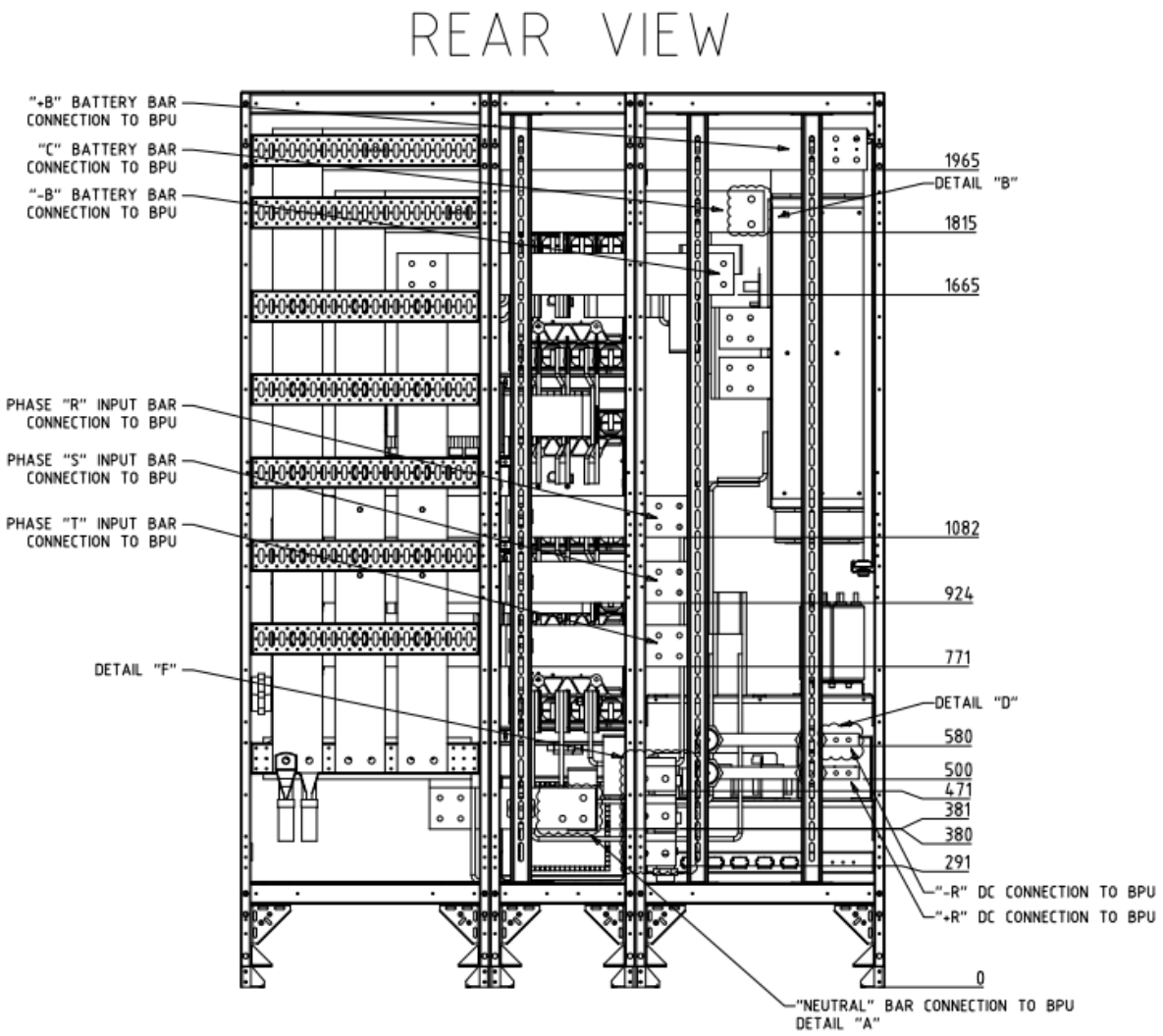
(*) For details “A”, “B”, “D” and “F” see pages 43-44-45

Picture 44 – IOBM with mains switches configuration “Top cable entry TNC system“



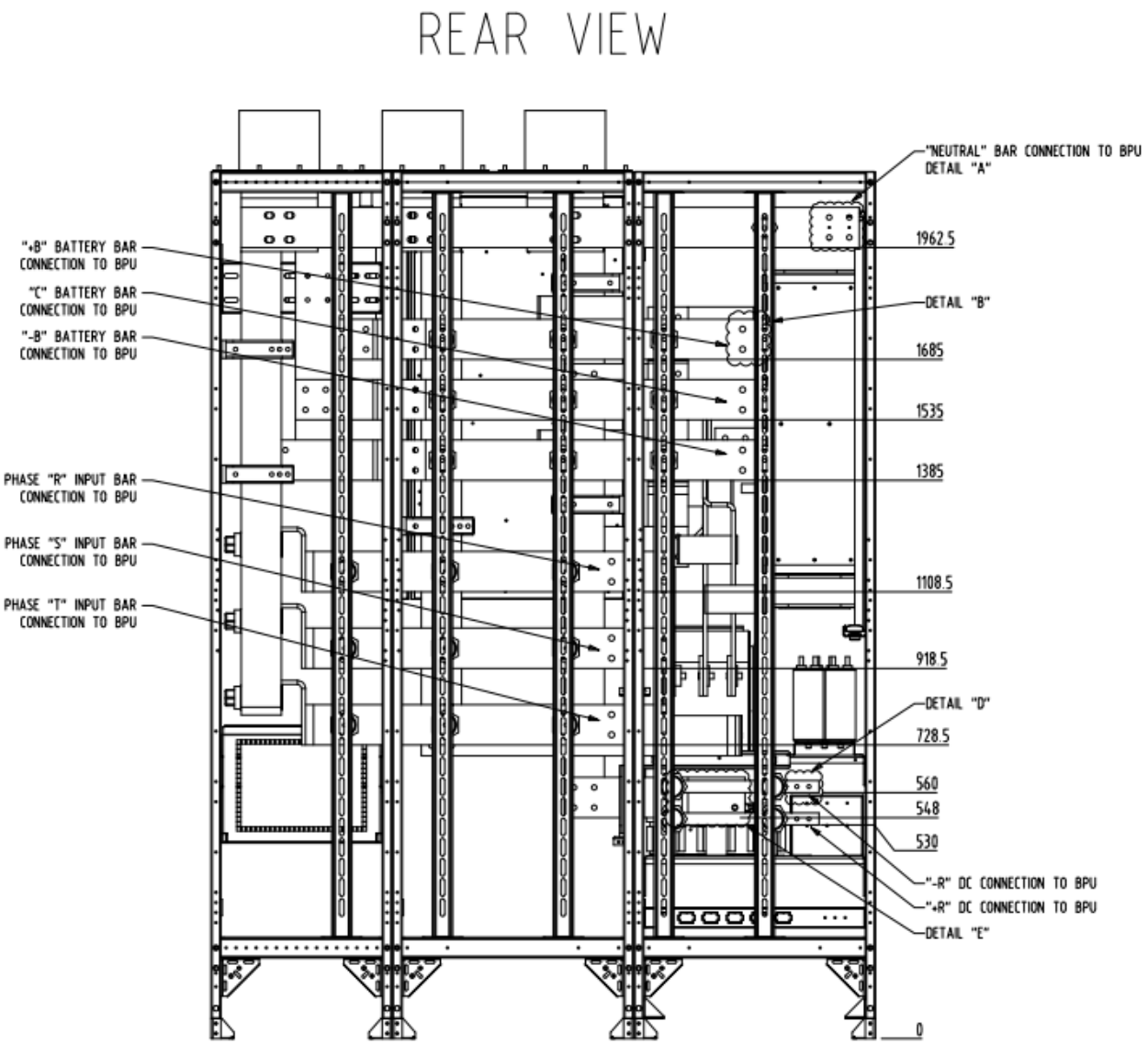
(*) For details “A”, “B”, “D” and “F” see pages 43-44-45

Picture 45 – IOBM with mains switches configuration “Bottom cable entry TNS system“



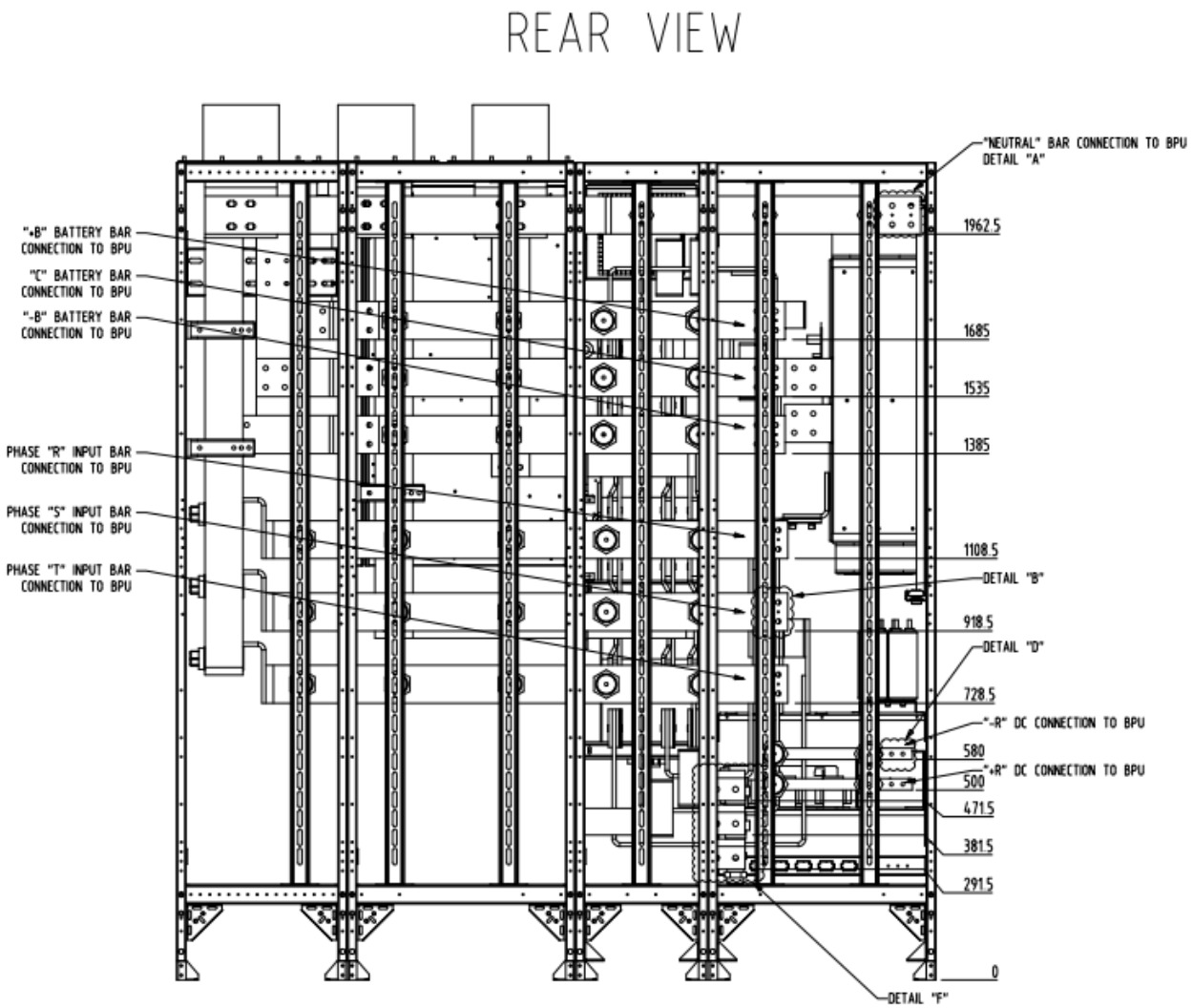
(*) For details “A”, “B”, “D” and “F” see pages 43-44-45

Picture 46 – IOBM with mains switches configuration “Bottom cable entry TNC system“



(*) For details “A”, “B”, “D” and “E” see pages 43-44-45

Picture 47 – IOBM blindo top busbar configuration “TNS-TNC system”



(*) For details “A”, “B”, “D” and “F” see pages 43-44-45

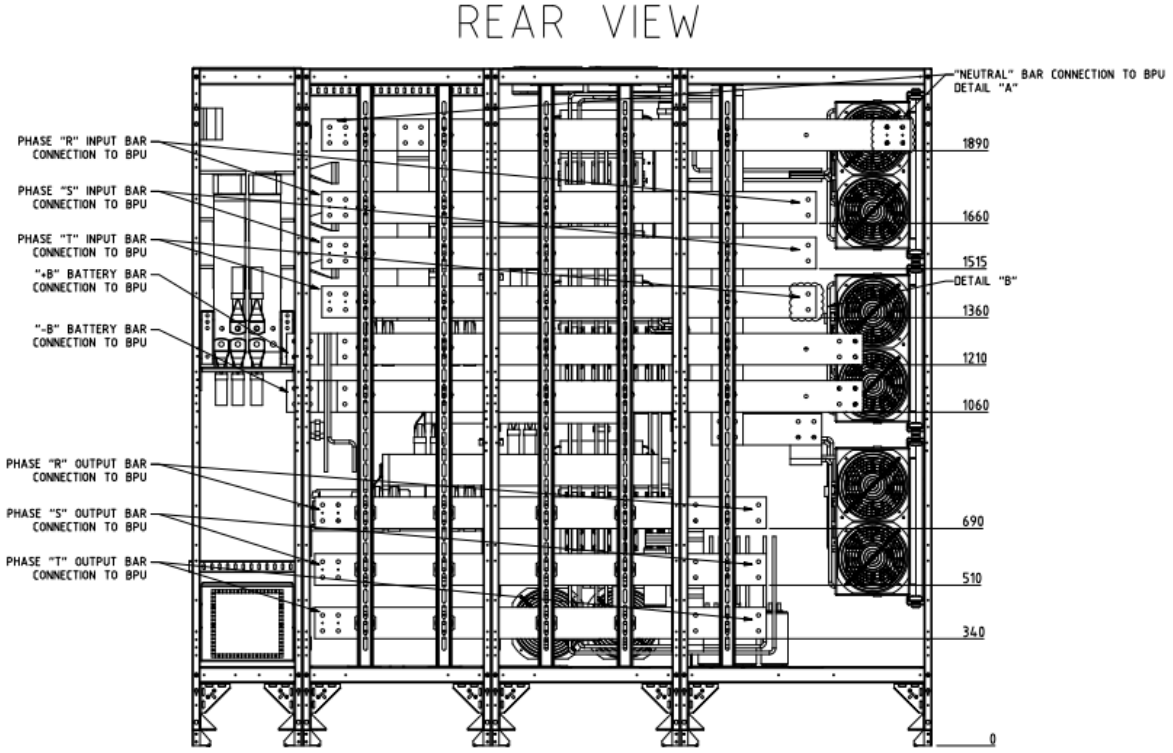
Picture 48 – IOBM blindo top busbar with mains switches configuration “TNS-TNC system”

2.6.3 IOBM “size 2” detail connection terminals

NOTE

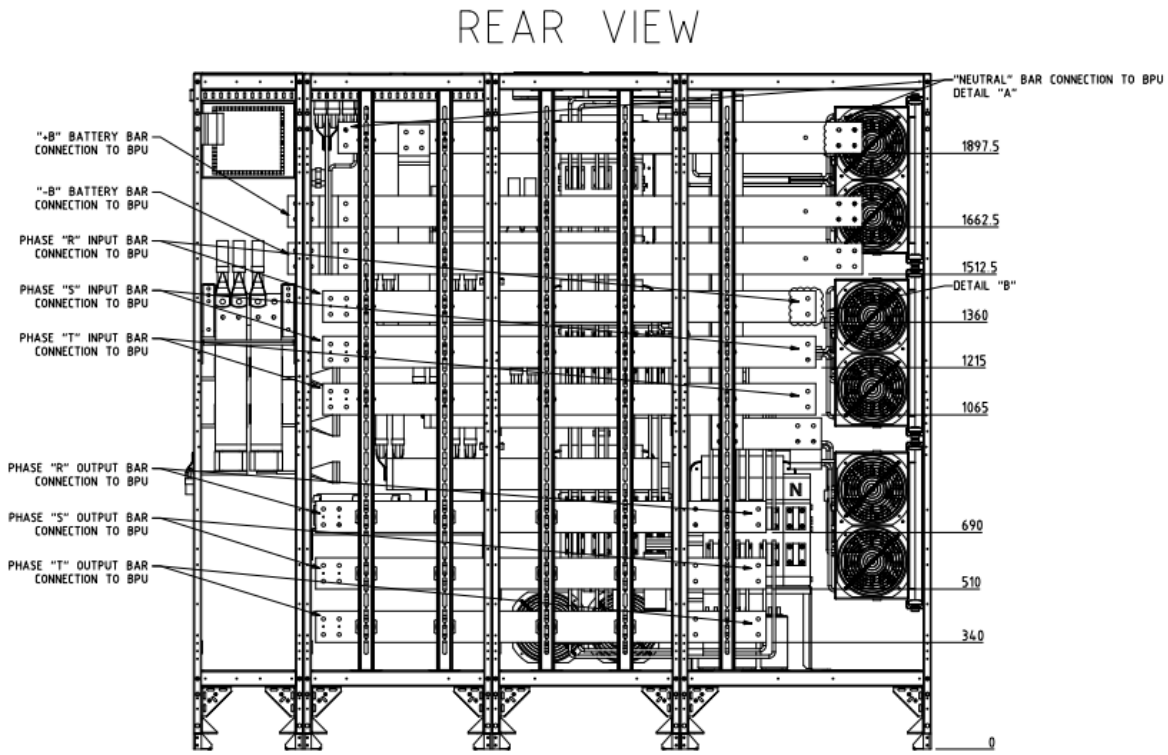
For “Distributed Battery” IOBM configuration, the battery bars are not installed inside the IOBM.

The details of connection between IOBM and PU are indicated below.



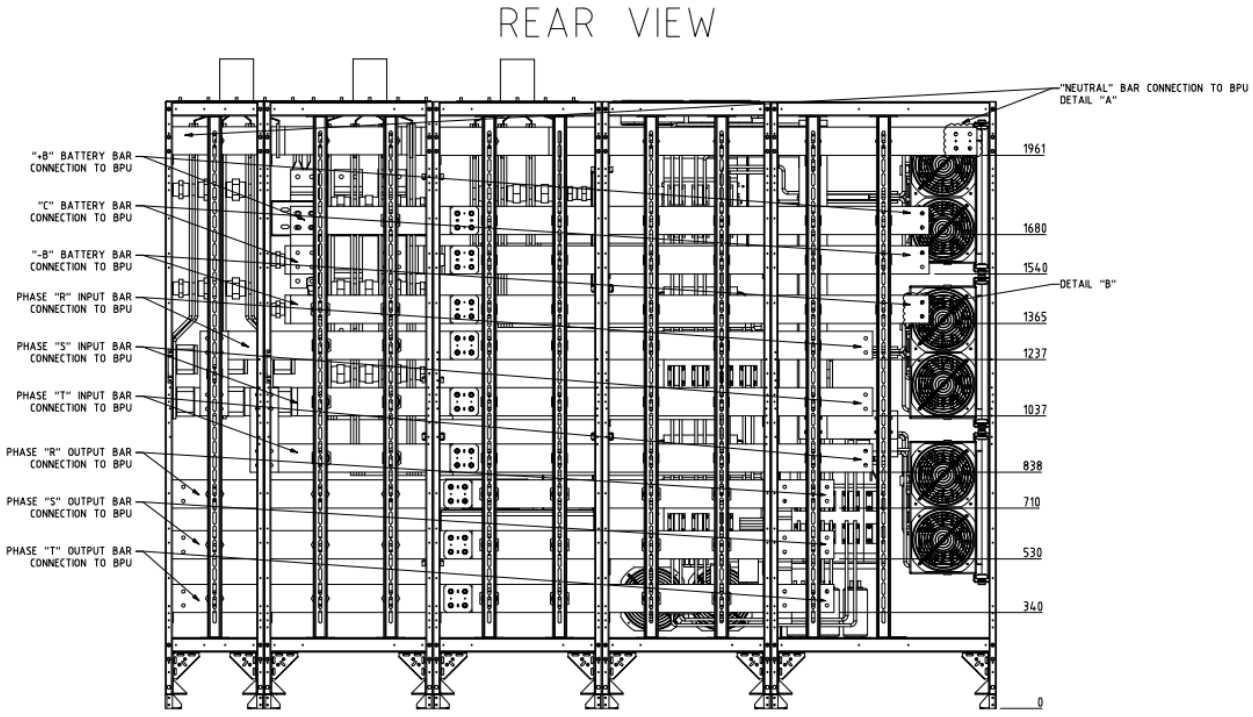
(*) For details “A” and “B” see page 43

Picture 49 – IOBM configuration with mains switches “Top cable entry TNS-TNC system”



(*) For details “A” and “B” see page 43

Picture 50 – IOBM configuration with mains switches “Bottom cable entry TNS-TNC system”



(*) For details “A” and “B” see page 43

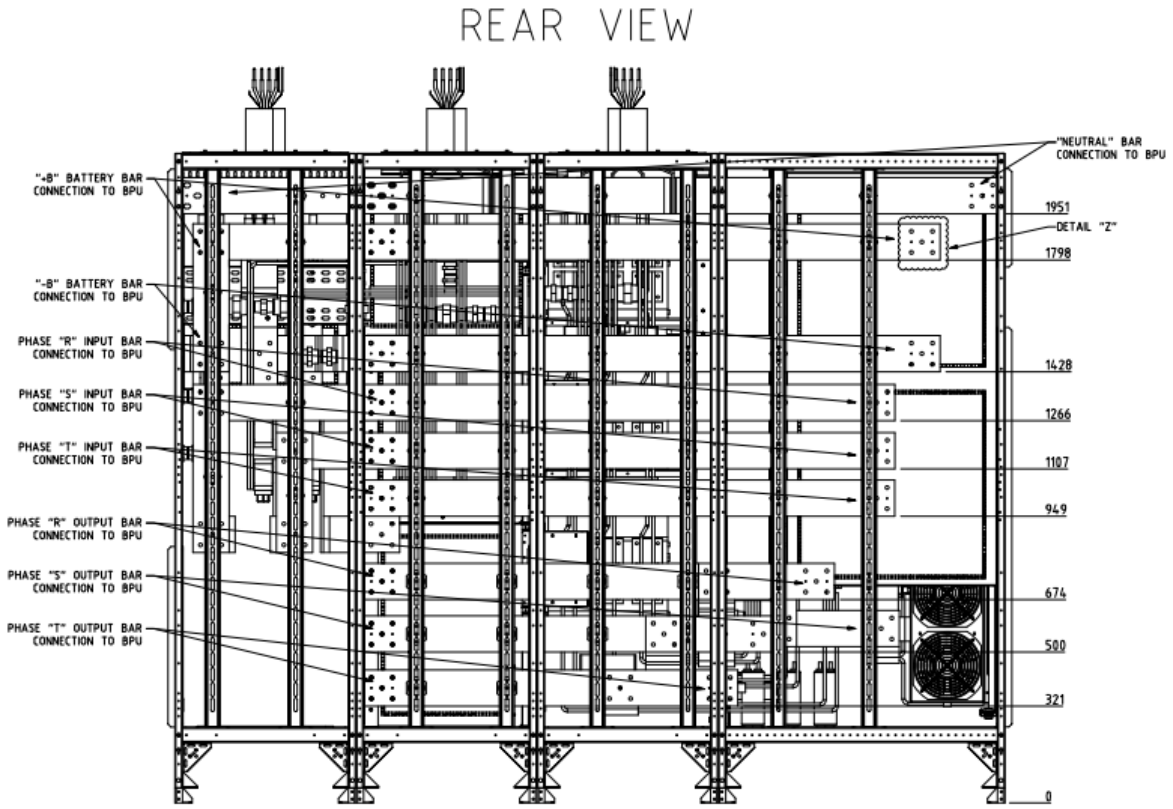
Picture 51 – IOBM blindo top busbar with mains switches configuration “TNS-TNC system”

2.6.4 IOBM “size 3” detail connection terminals

NOTE

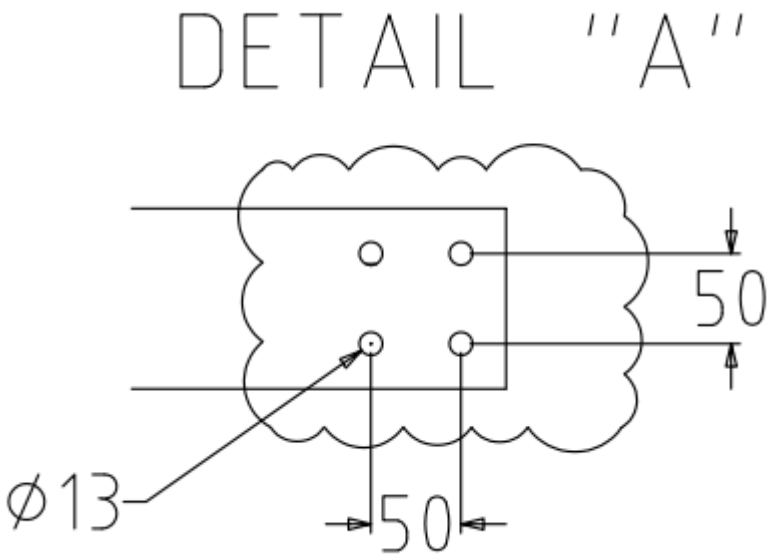
For “Distributed Battery” IOBM configuration, the battery bars are not installed inside the IOBM.

The details of connection between IOBM and PU are indicated below.

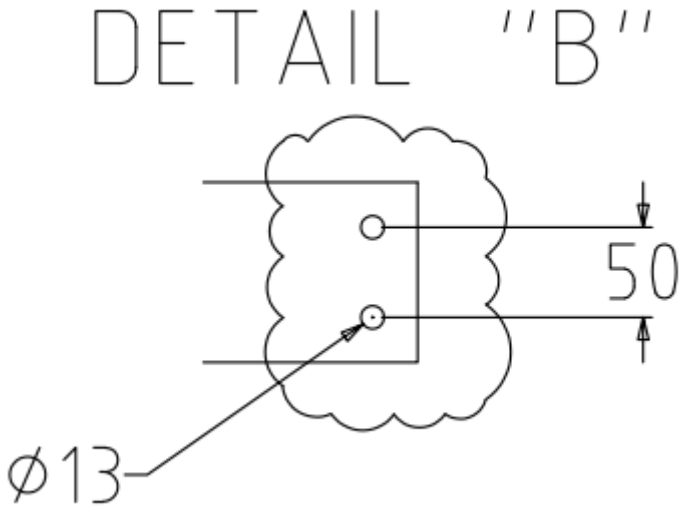


(*) For detail “Z” see page 46

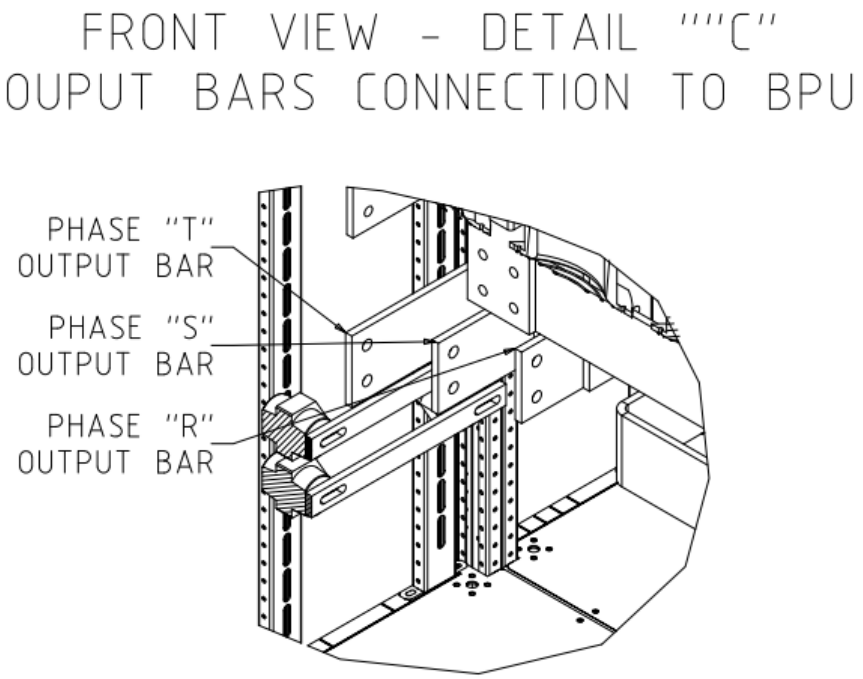
Picture 52 – IOBM blindo top busbar with mains switches configuration “TNS-TNC system”



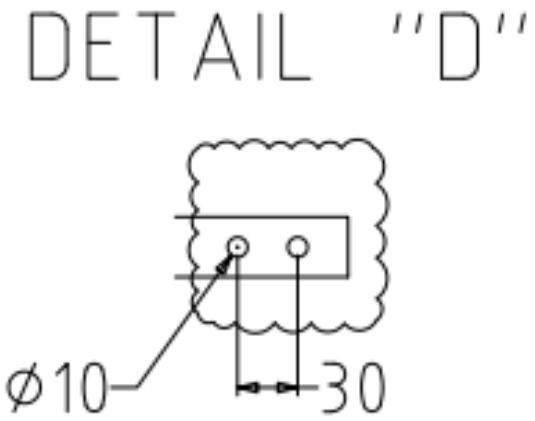
Picture 53 – Bar connection detail “A”



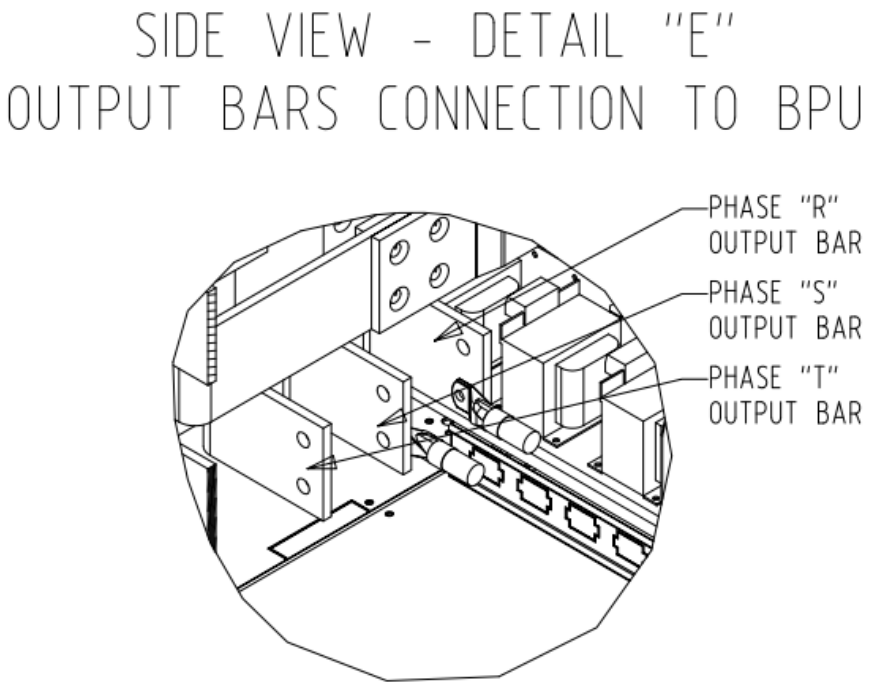
Picture 54 – Bars connection detail “B”



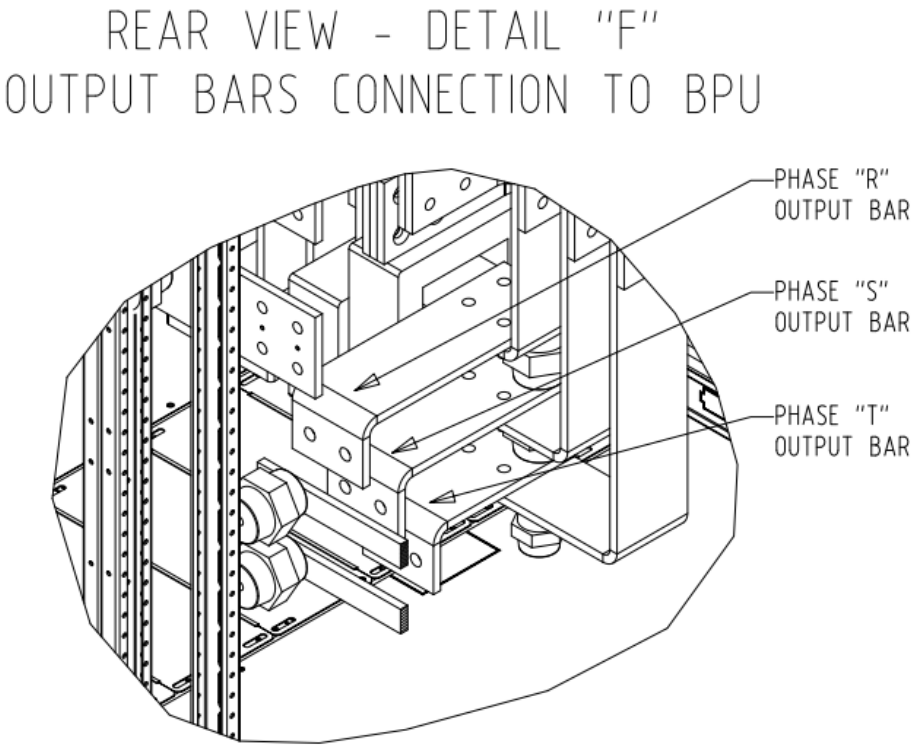
Picture 55 – Bars connection detail "C"



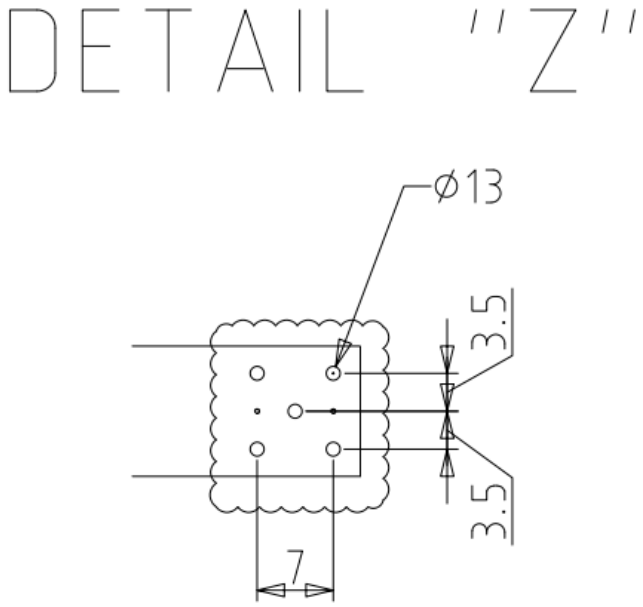
Picture 56 – Bars connection detail "D"



Picture 57 – Bars connection detail "E"



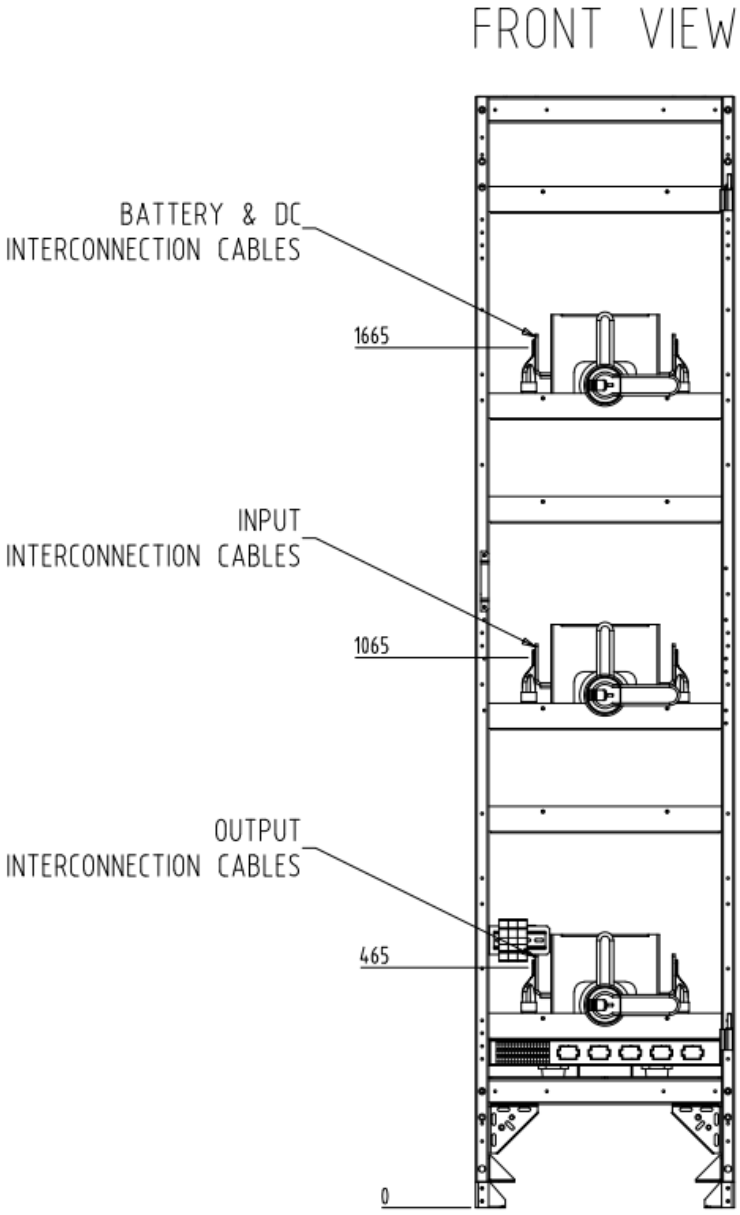
Picture 58 – Bars connection detail "F"



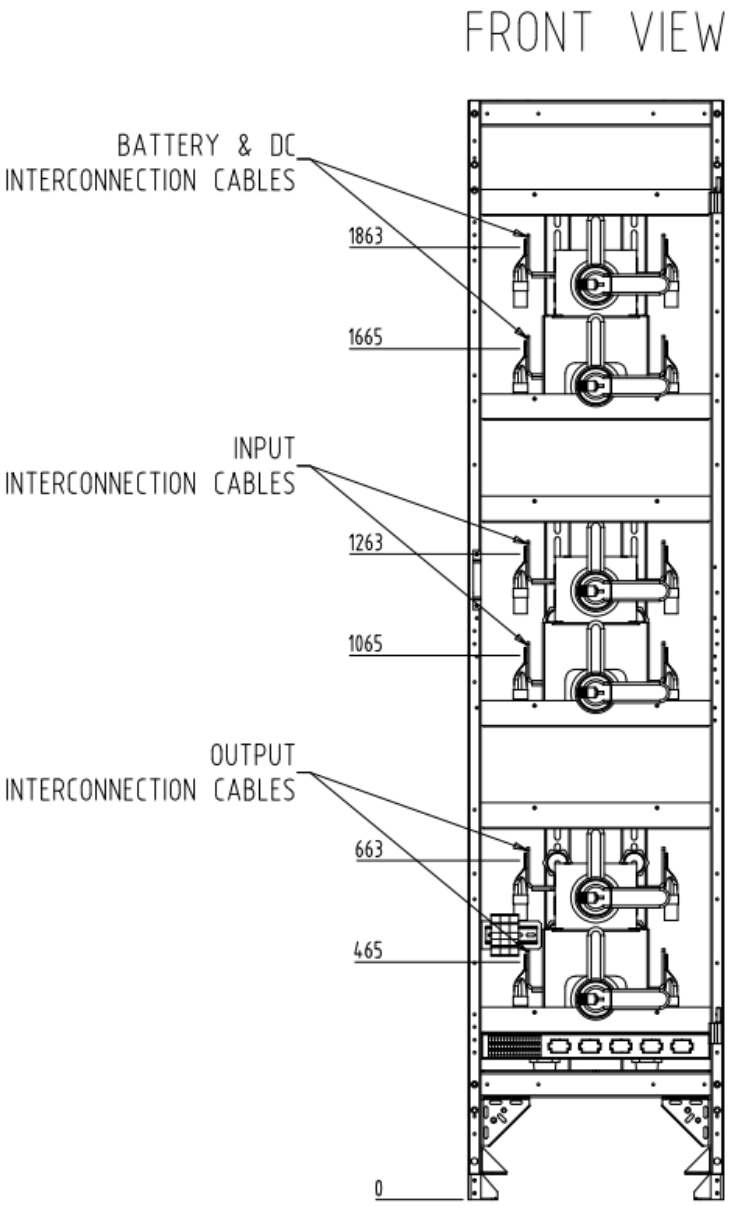
Picture 59 – Bars connection detail "Z"

2.6.5 Hot swap distribution IOBM detail connection terminals

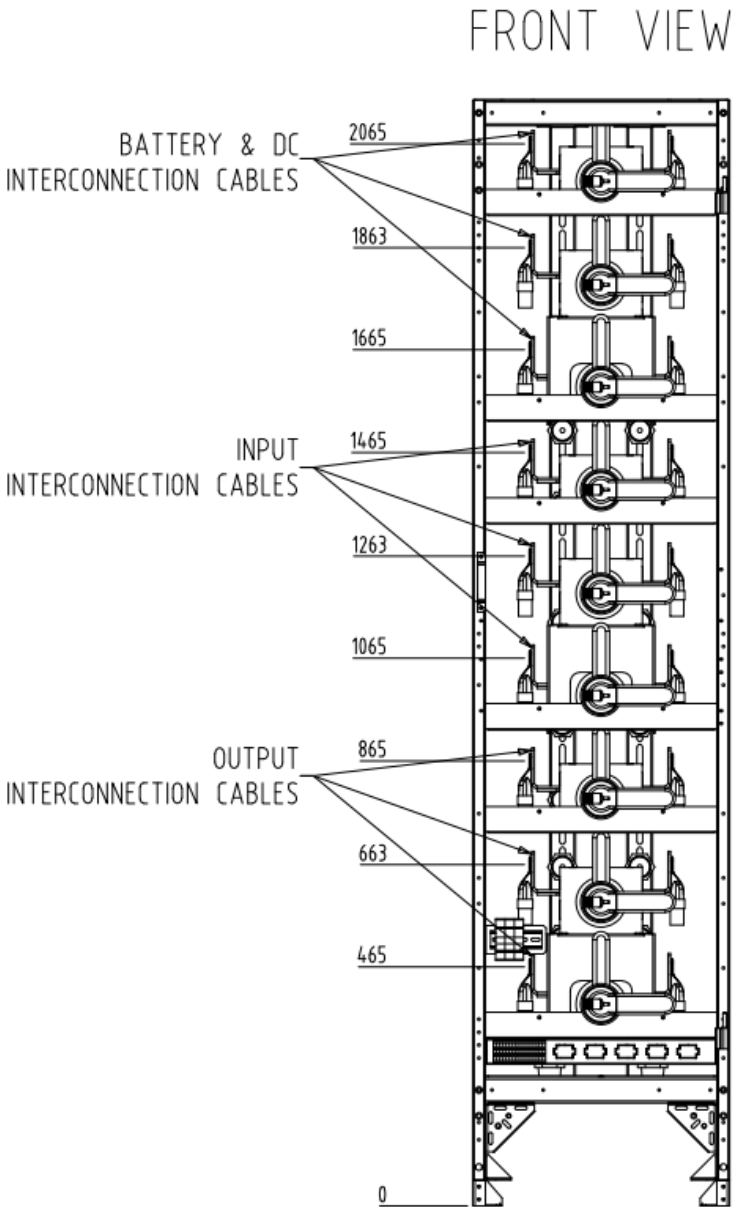
The details of connection between “Hot swap distribution” modules and PU are indicated below.



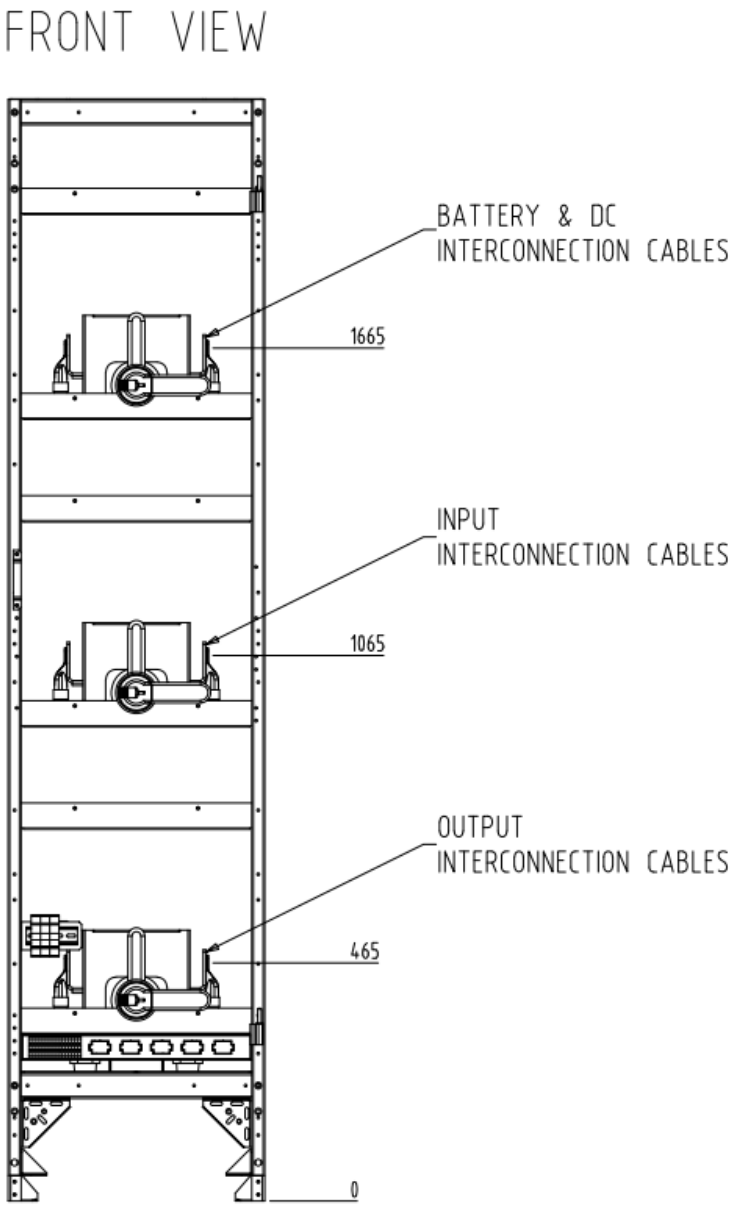
Picture 60 – “Hot swap distribution” module for one PU installed on the left side of the IOBM



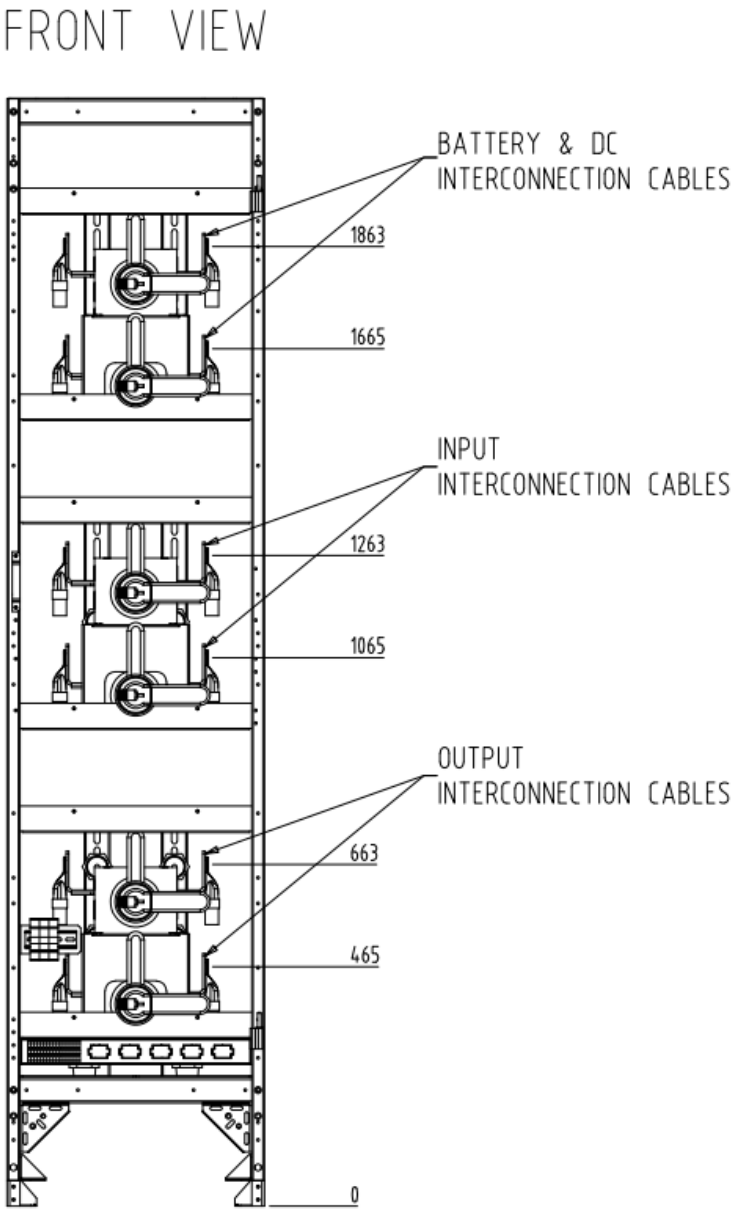
Picture 61 – "Hot swap distribution" module for two PU installed on the left side of the IOBM



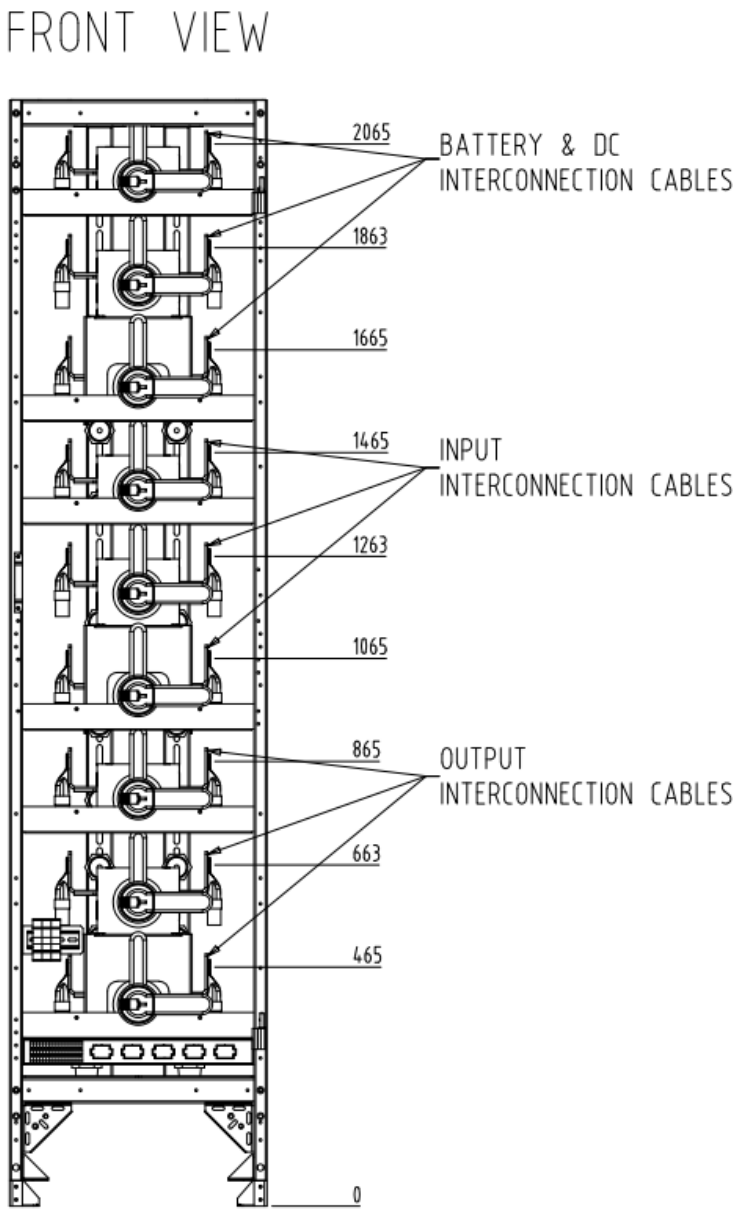
Picture 62 – "Hot swap distribution" module for three PU installed on the left side of the IOBM



Picture 63 – "Hot swap distribution" module for one PU installed on right IOBM side



Picture 64 – "Hot swap distribution" module for two PU installed on right IOBM side



Picture 65 – "Hot swap distribution" module for three PU installed on right IOBM side

3. POSITIONING OF THE POWER MODULES “PU”

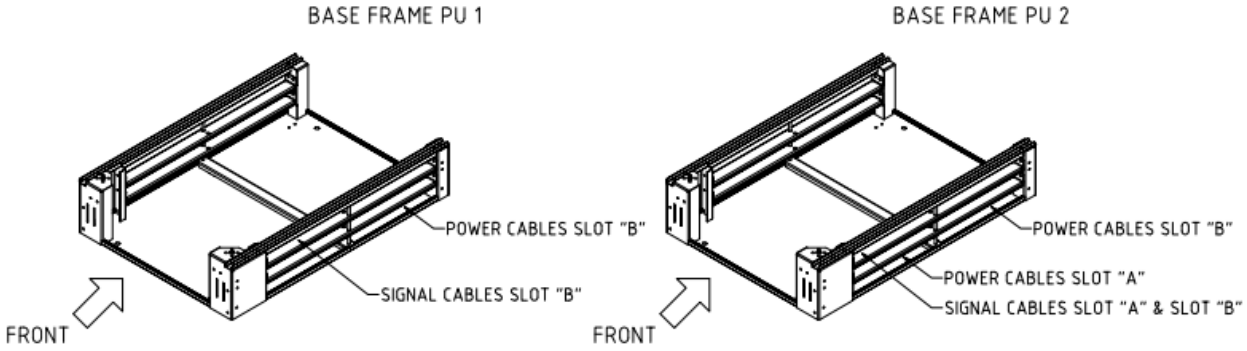
After having positioned the IOBM module is necessary place and fix to the floor the PU base frames, following the layout showed on “General Arrangement” of your system.

3.1 POWER UNIT CONNECTION

Proceed with the routing of the PU power and signal cables trought the base frames (please refer to interconnection diagrams DBBG7156 or DBBG7157).

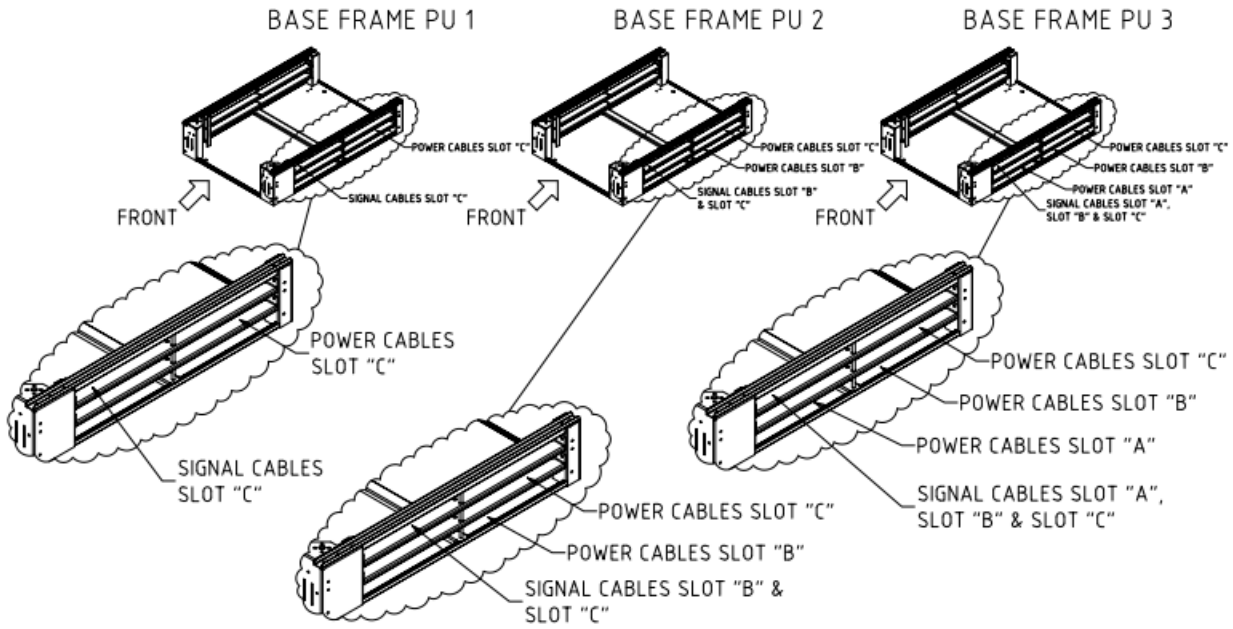
On the below pictures are showed all cables routing for power configuration.

3.1.1 Size 1 670KW – Routing cables



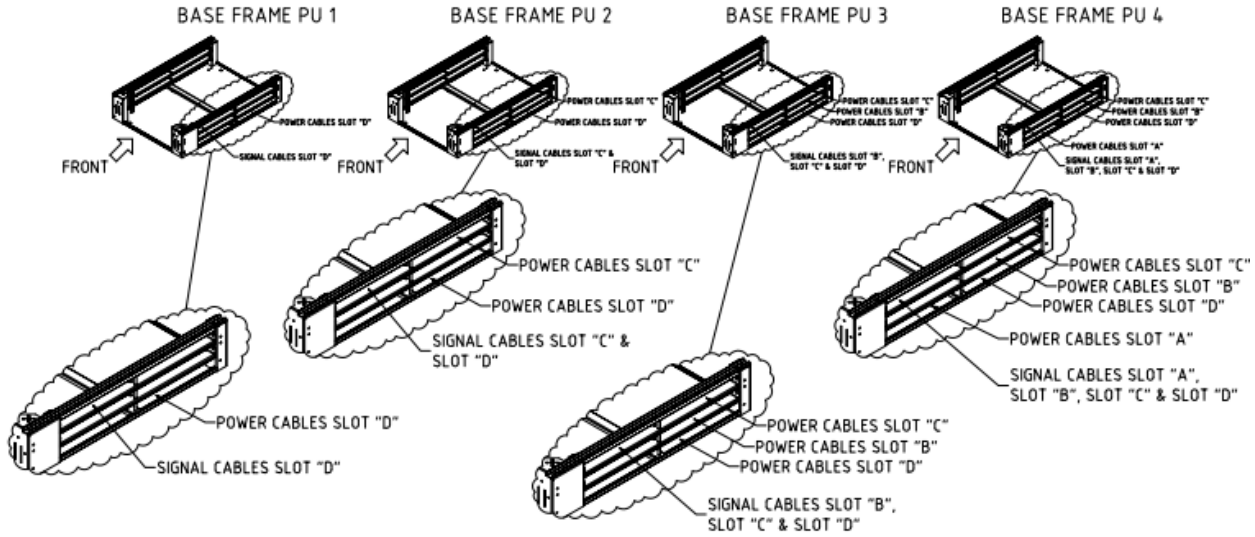
Picture 66 – Two PU installed on IOBM left side

3.1.2 Size 1 670KW “N+1 redundancy” or 1000kW – Routing cables



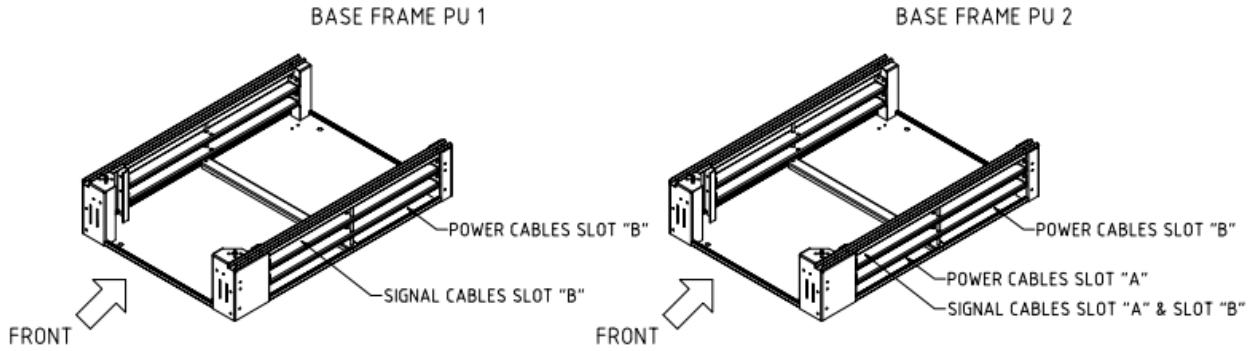
Picture 67 – Three PU installed on IOBM left side

3.1.3 Size 1 1000KW “N+1 redundancy” – Routing cables

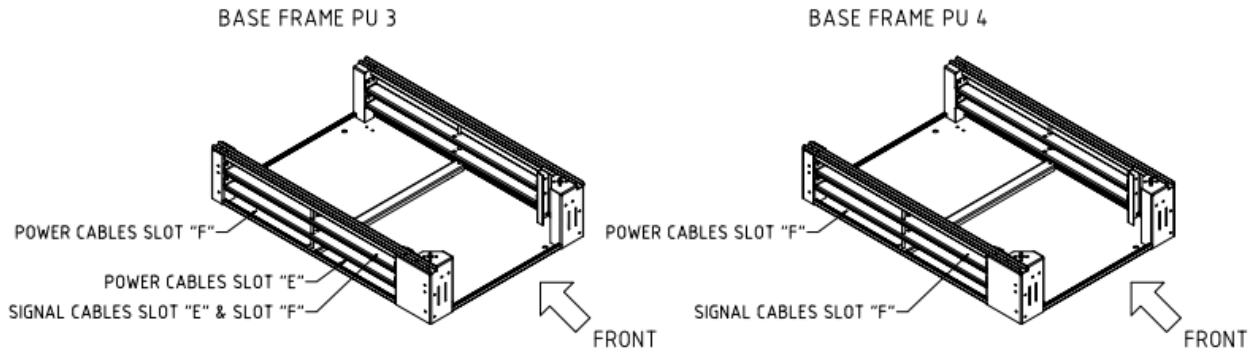


Picture 68 – Four PU installed on IOBM left side

3.1.4 Size 2 1340KW – Routing cables

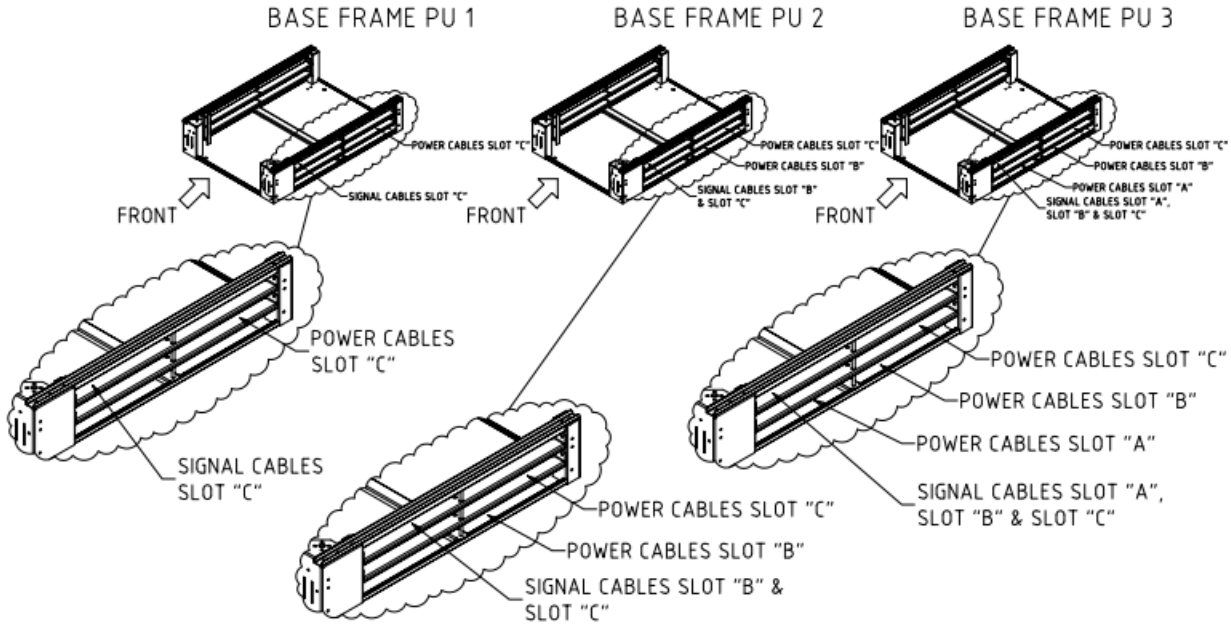


Picture 69 – Two PU installed on IOBM left side

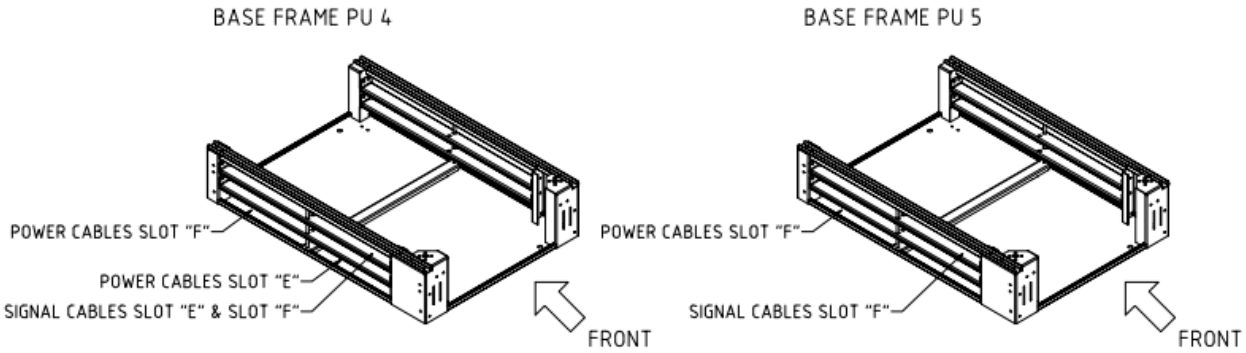


Picture 70 – Two PU installed on IOBM right side

3.1.5 Size 2 1340KW “N+1 redundancy” or 1670kW – Routing cables

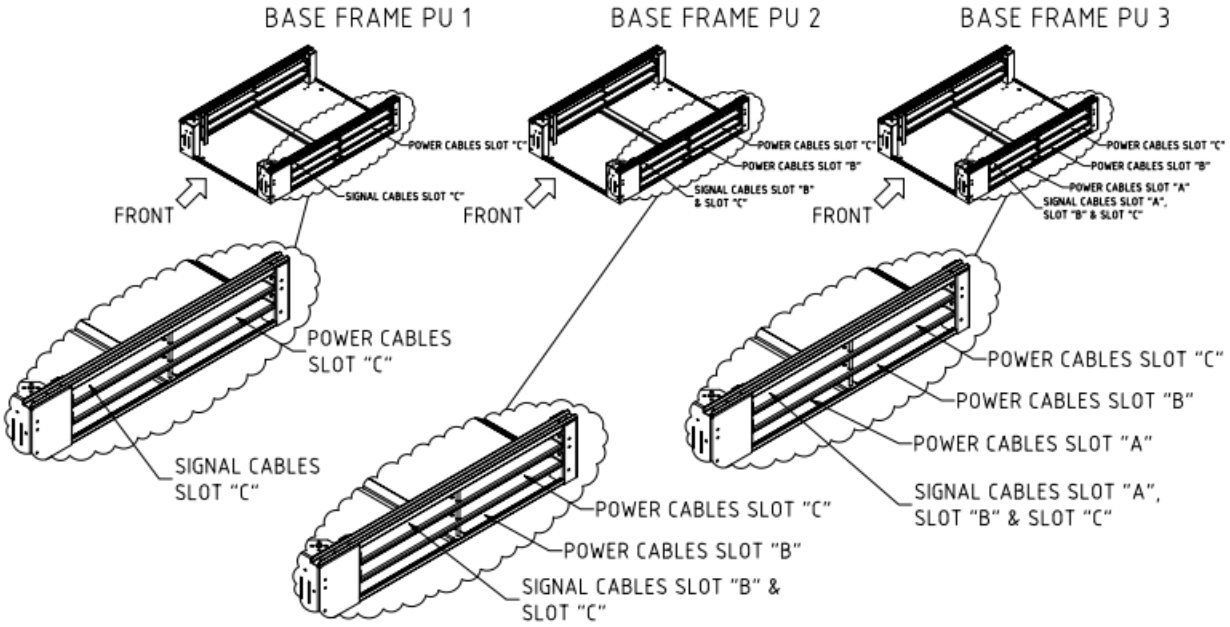


Picture 71 – Three PU installed on IOBM left side

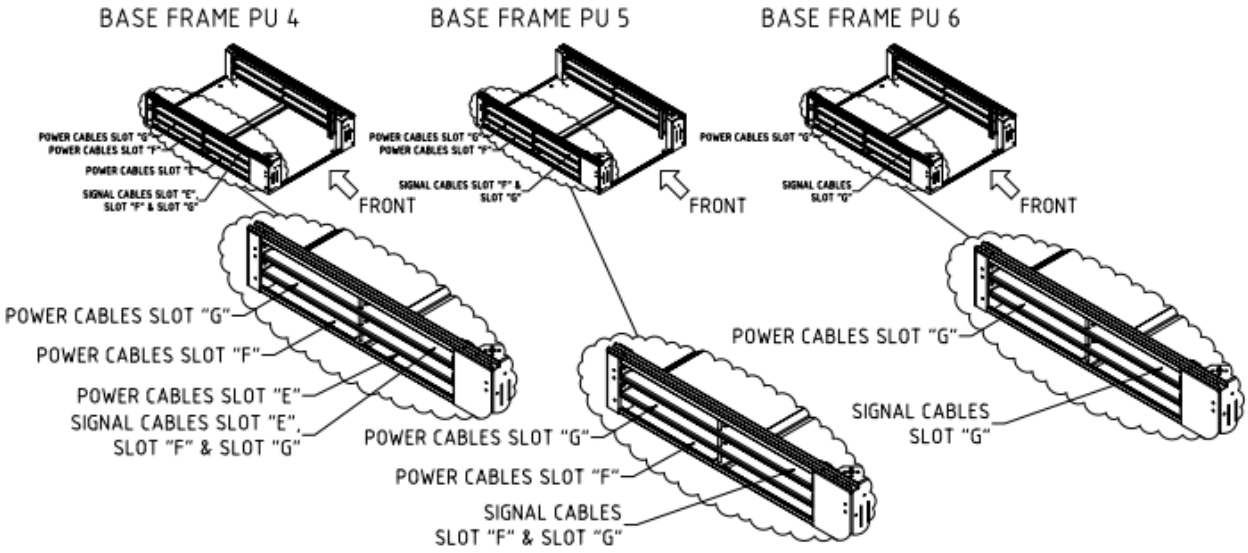


Picture 72 – Two PU installed on IOBM right side

3.1.6 Size 2 1670KW “N+1 redundancy” or size “3” 2000kW – Routing cables

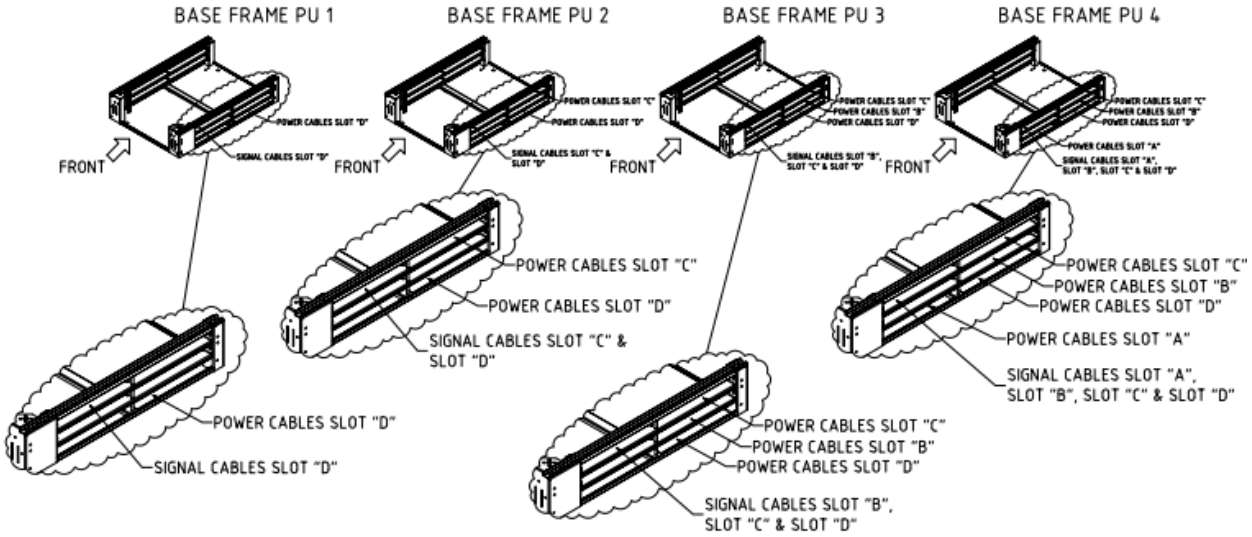


Picture 73 – Three PU installed on IOBM left side

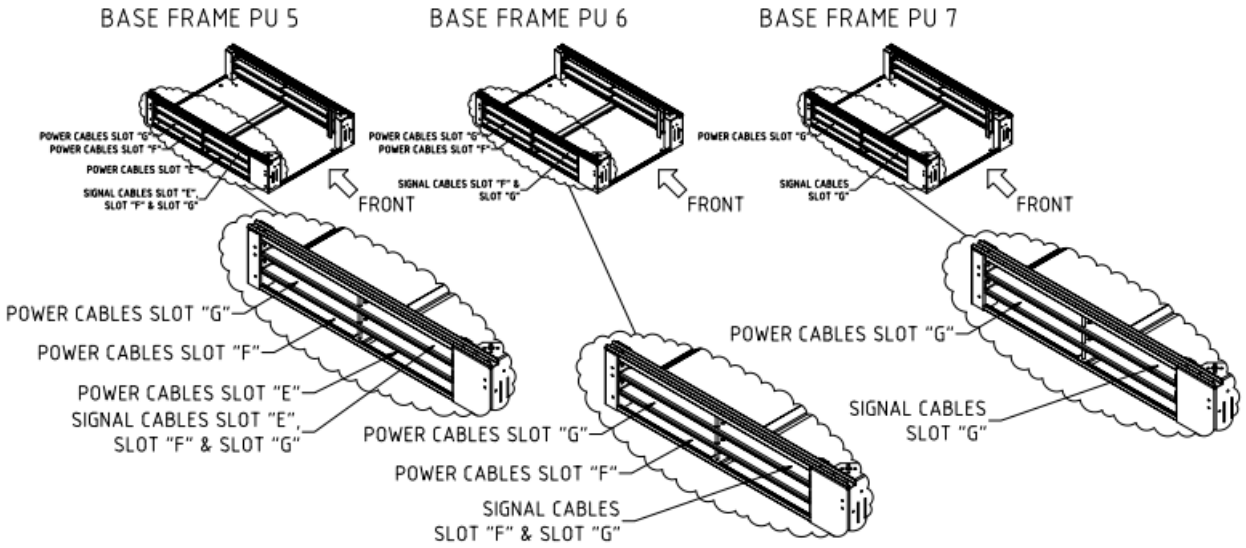


Picture 74 – Three PU installed on IOBM right side

3.1.7 Size 3 2000KW “N+1 redundancy” or 2340kW – Routing cables

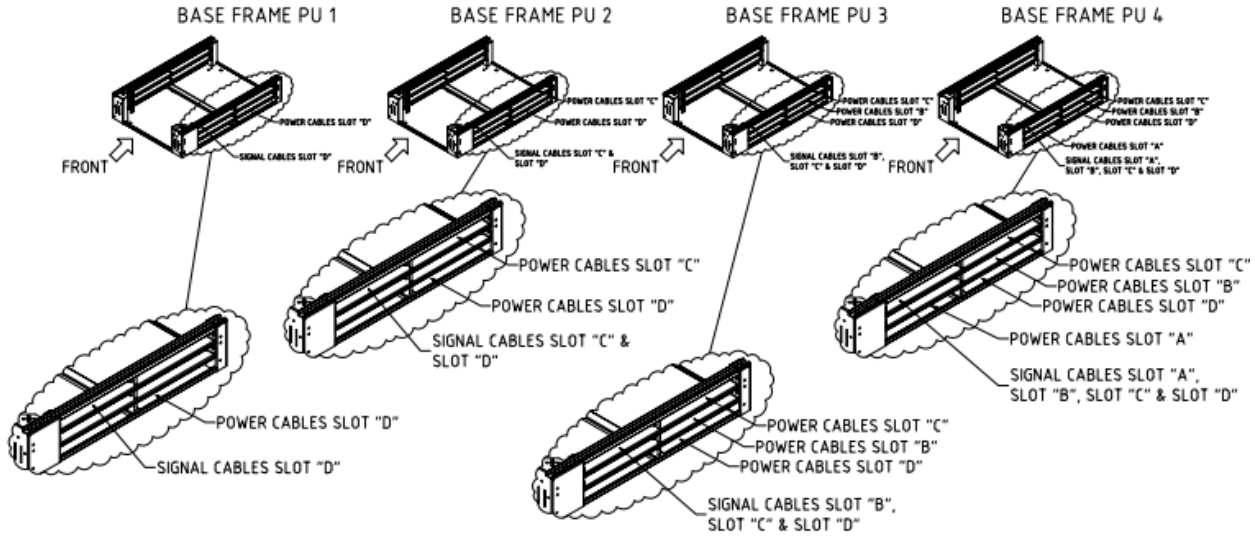


Picture 75 – Four PU installed on IOBM left side

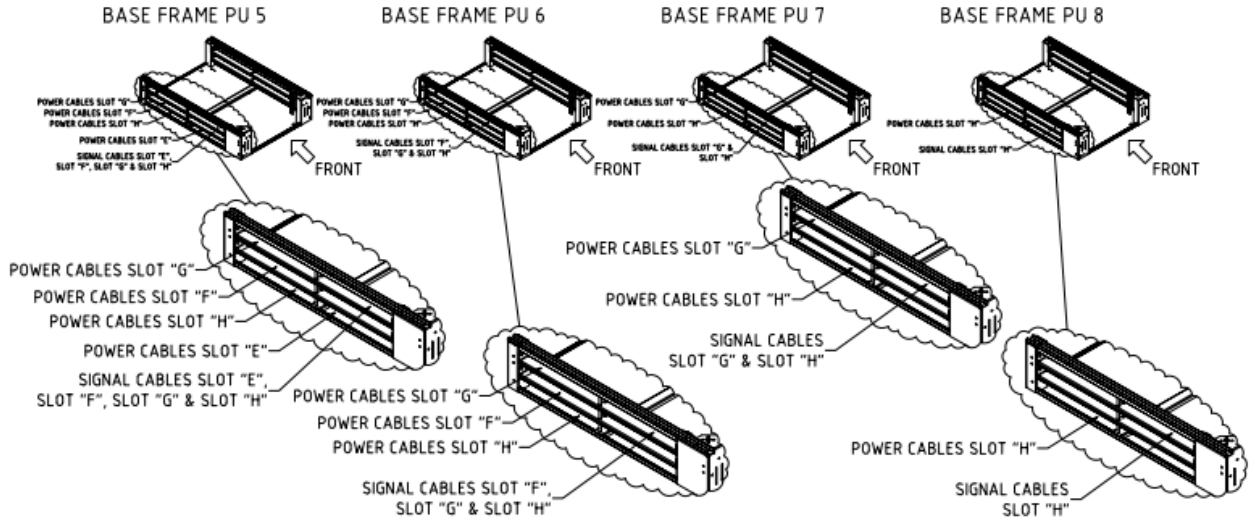


Picture 76 – Three PU installed on IOBM right side

3.1.8 Size 3 2340KW “N+1 redundancy” – Routing cables



Picture 77 – Four PU installed on IOBM left side



Picture 78 – Four PU installed on IOBM right side

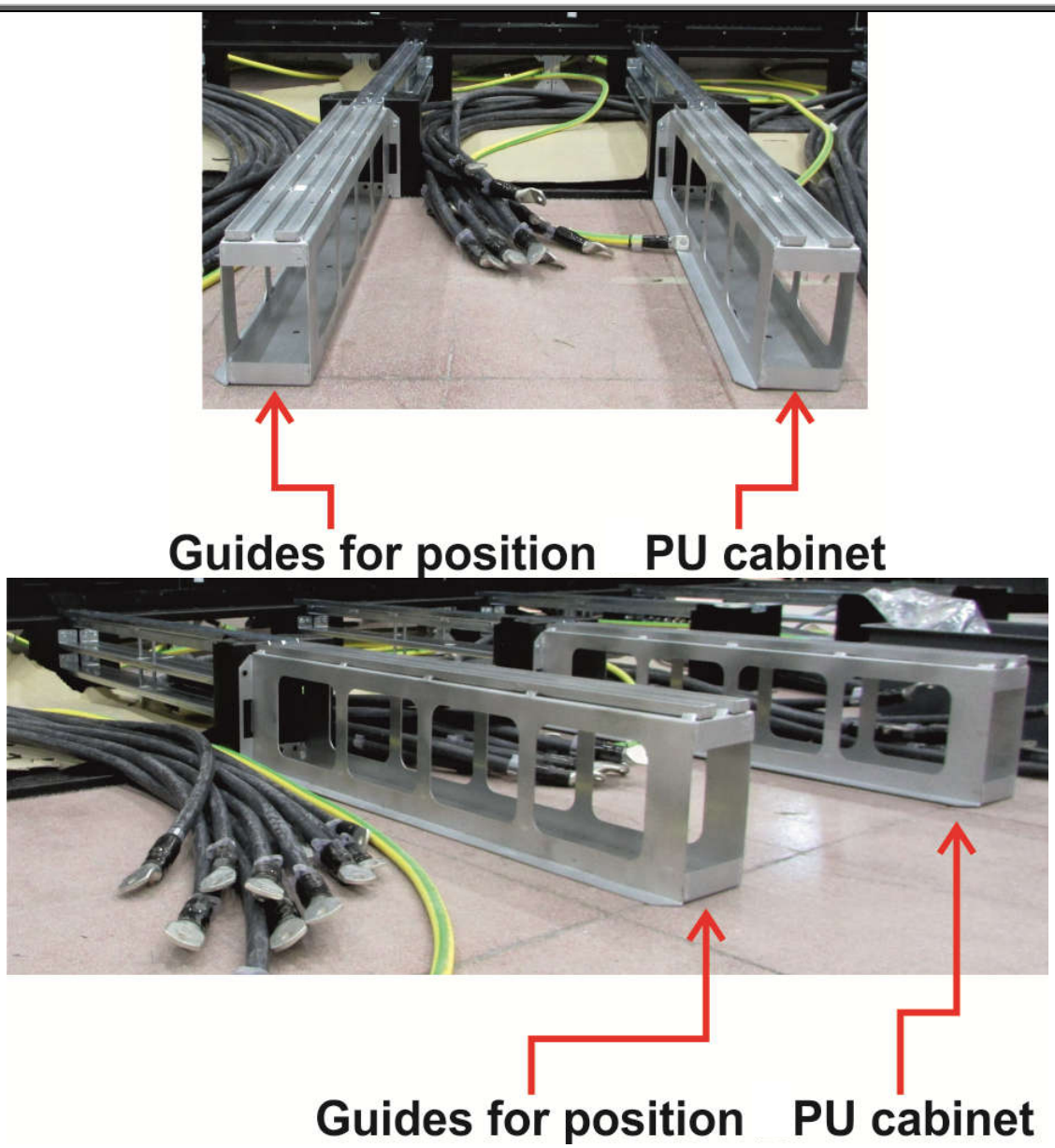
3.2 POSITIONING OF THE POWER MODULE “PU”

1 – Before positioning of the PU over the base frame is necessary install the guides in front of the base frame PU as showed in picture below and tighten the guides with the screws to the base plate.

RISK OF OVERTURNING DURING HANDLING OF POWER MODULES

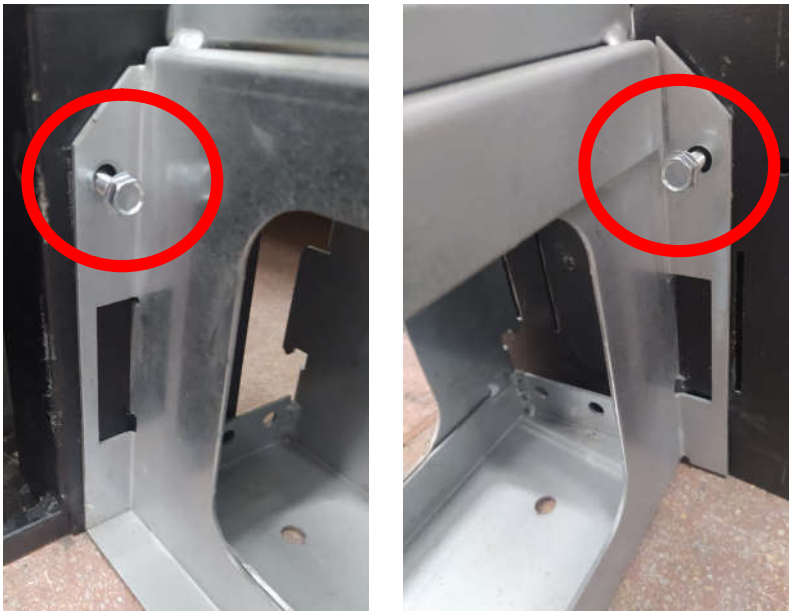
THE HANDLING MANEUVRES MUST BE PERFORMED BY AT LEAST TWO PEOPLE

HANDLING THE PU ONLY WITH POWER MODULES INSTALLED



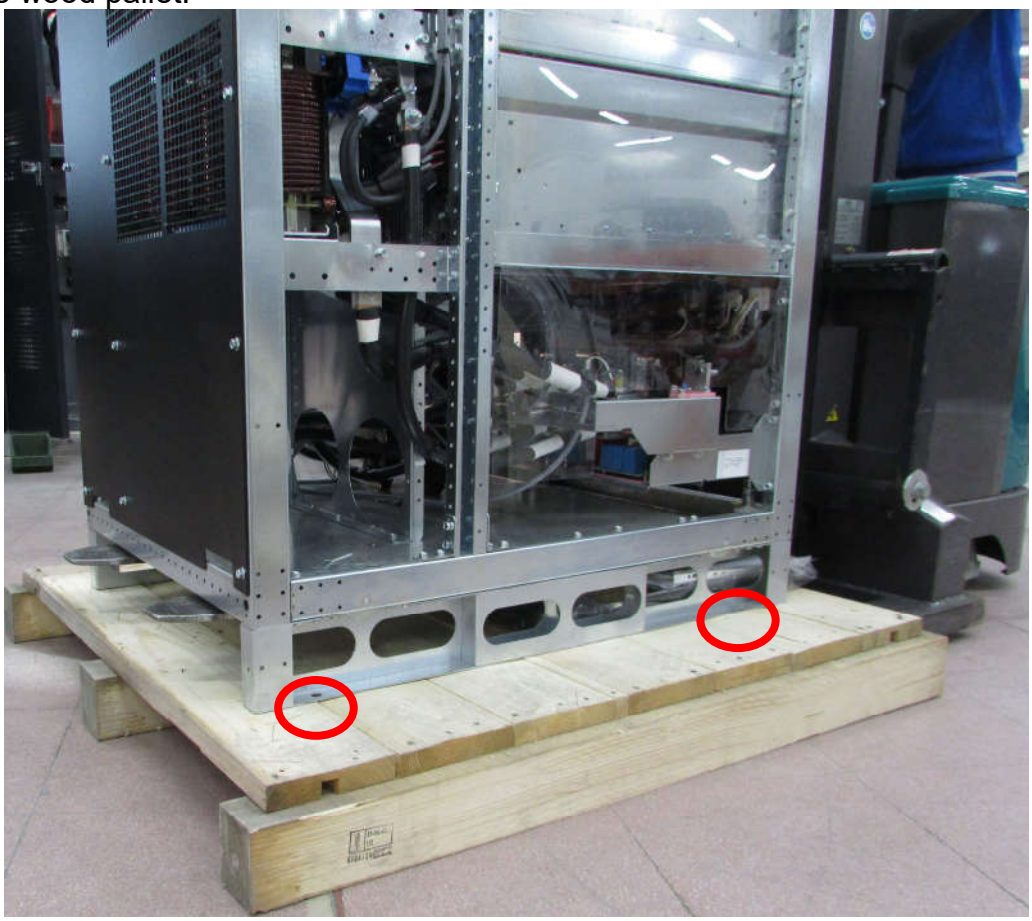
Picture 79 – Guide installation

2 – Tighten the guides with the screws to the base plate.



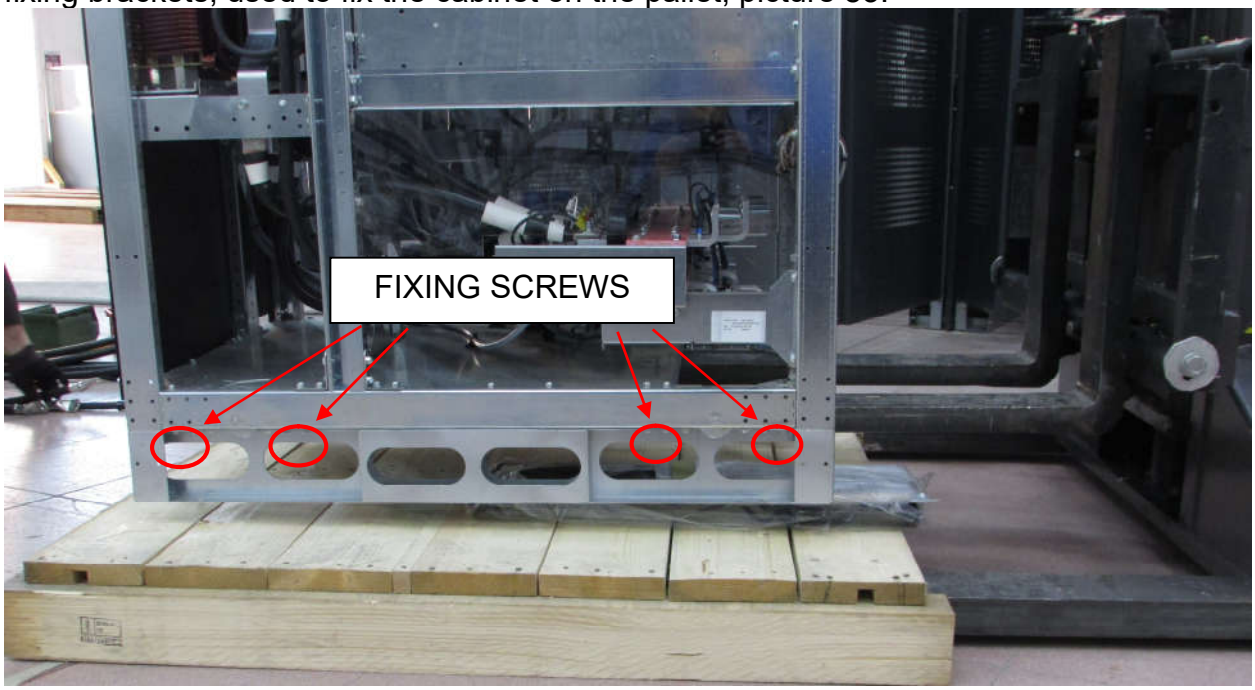
Picture 80 – Guide tighten

3 – To handle the PU remove the lower rear and front, than remove the fixing screws from the wood pallet.

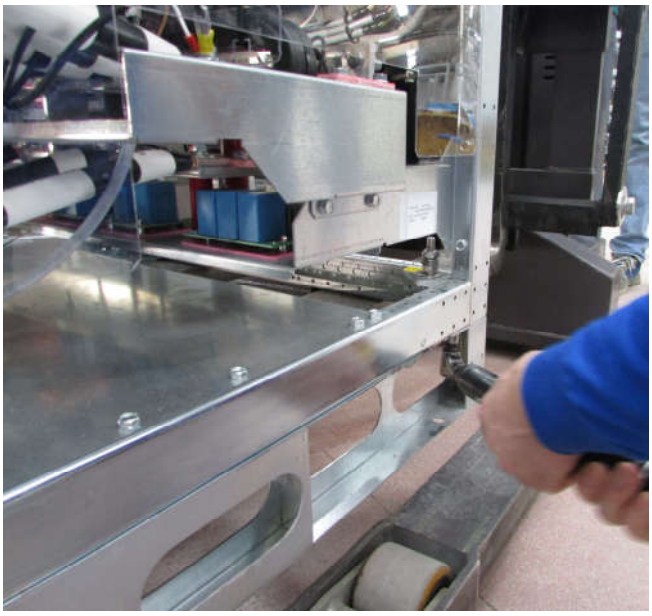


Picture 81 – Removal of fixing screws to the pallet

4 – Insert the forks of a fork lift as show in the picture 82 and lift the PU to remove the fixing brackets, used to fix the cabinet on the pallet, picture 83.

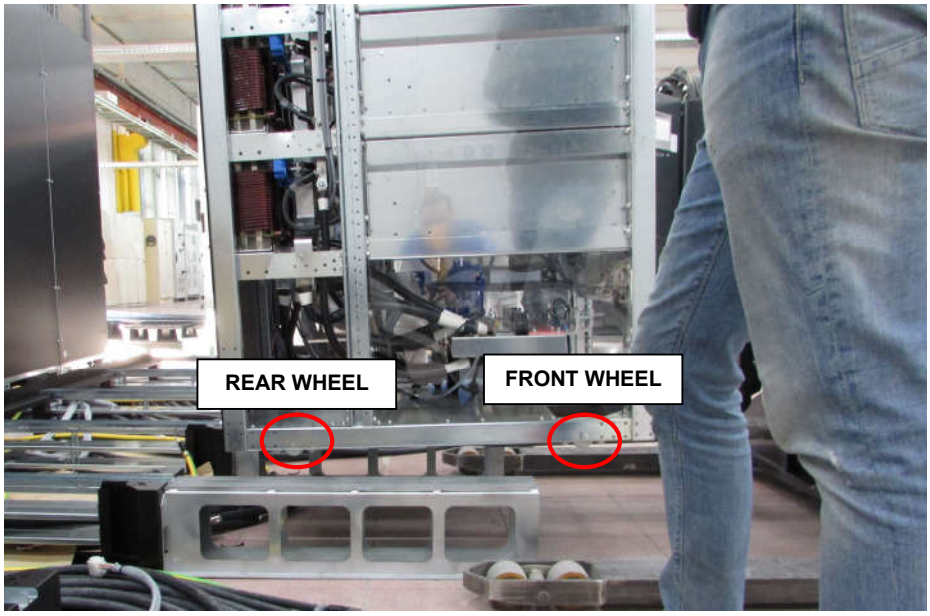


Picture 82 – Removal of fixing brackets to the pallet



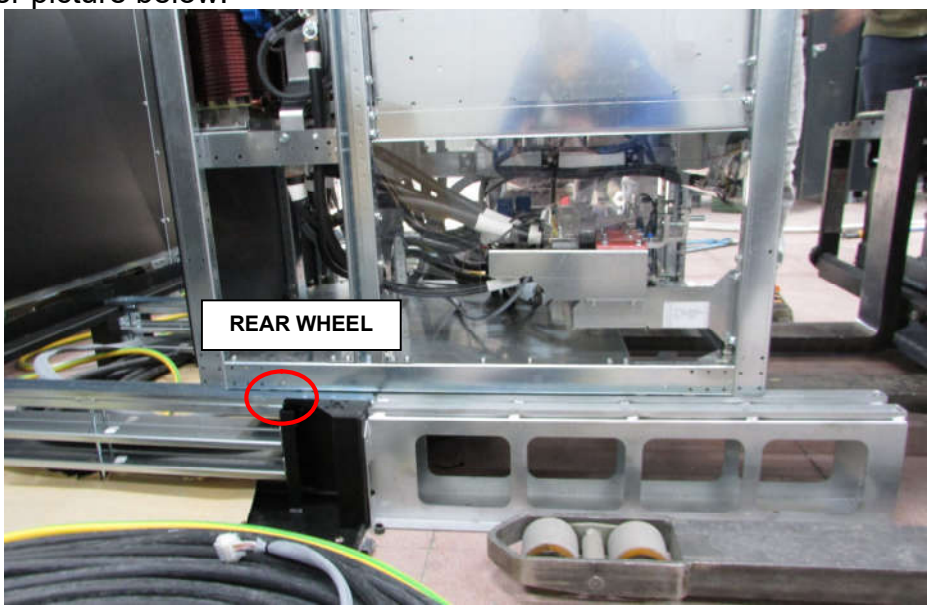
Picture 83 – Removal of fixing brackets to the pallet

5 – Lift up the PU until the wheels are upper the guide as per picture below and move the PU in the direction of base frame.



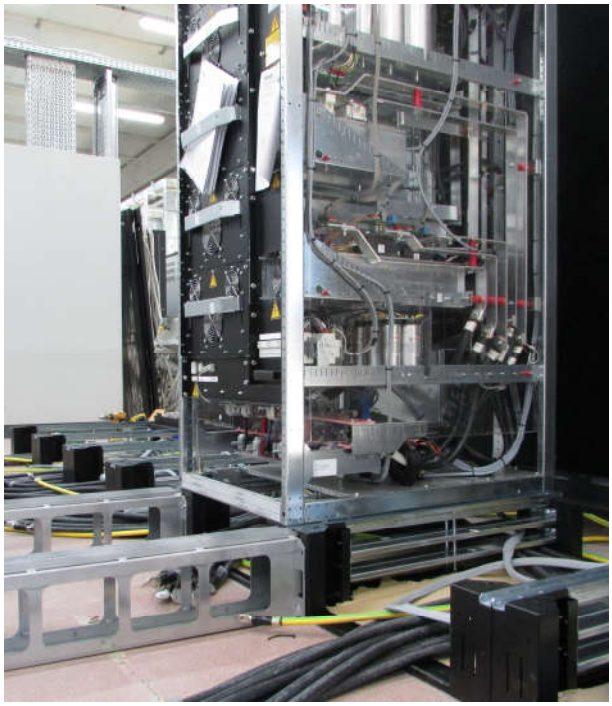
Picture 84 – PU handling

6 – To an easy handling, we suggest to place the rear wheels of the PU on the base frame as per picture below.

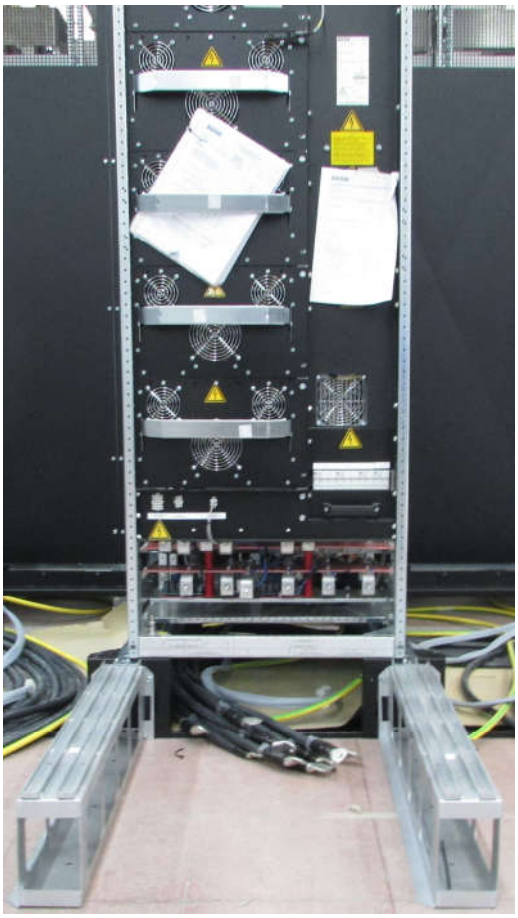


Picture 85 – PU handling

7 – Move the PU in the direction of base frame for all the length of the PU as per pictures 86 and 87.

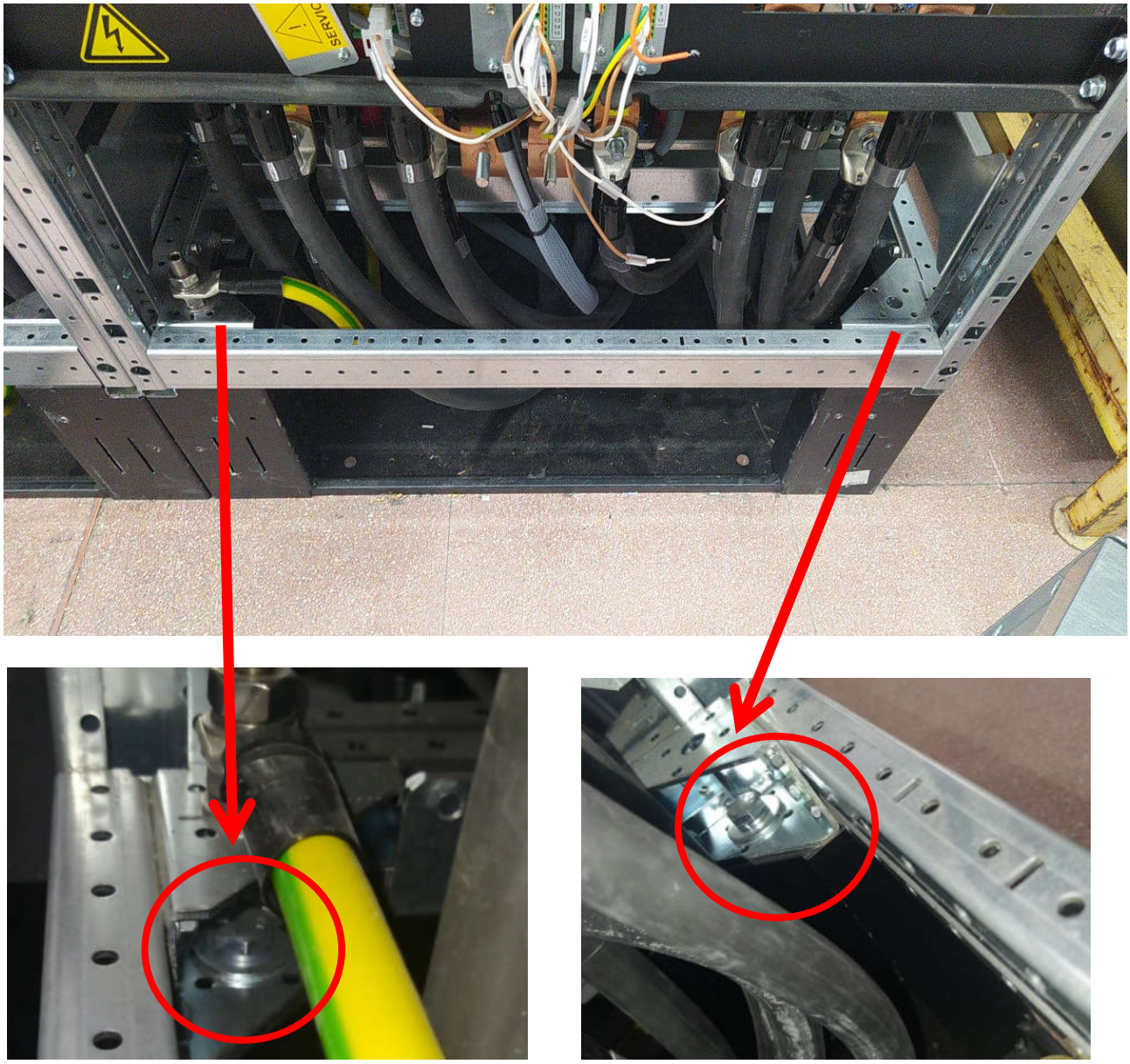


Picture 86 – PU handling



Picture 87 – PU handling

8 – Tighten the base frame of the PU to the base plate as per picture below.



Picture 88 – PU tighten

For each PU is necessary repeat the point from 1 to 8 of the paragraph 3.2.

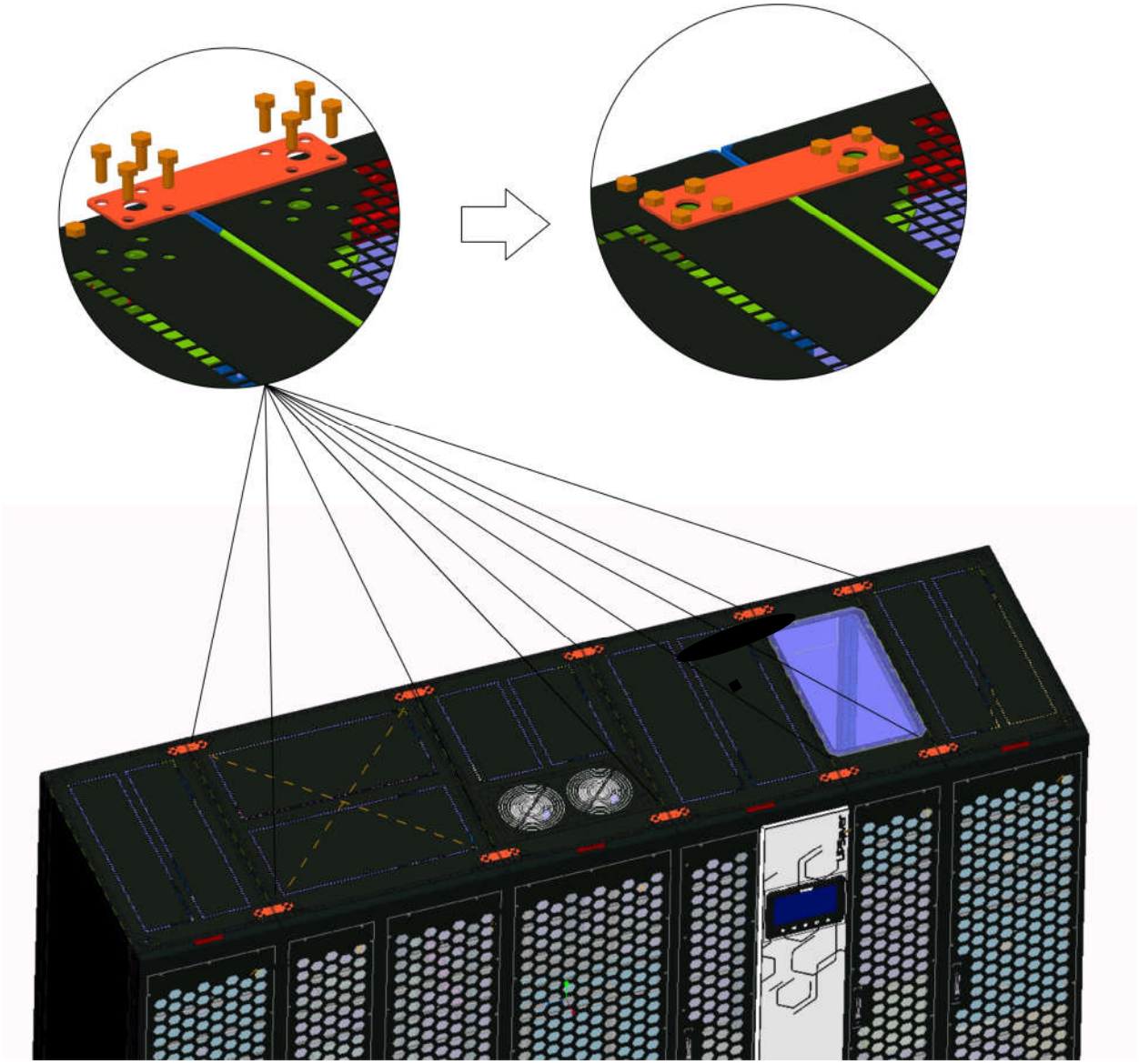
RISK OF OVERTURNING DURING HANDLING OF POWER MODULES

THE HANDLING MANEUVRES MUST BE PERFORMED BY AT LEAST TWO PEOPLE

HANDLING THE POWER UNIT ONLY WITH POWER MODULES INSTALLED

3.2.1 Cabinets alignment and fixing

Before connecting the power cables to the various modules it is strongly advised to align the cabinets and proceed with the mechanical fixing. The cabinets can be correctly aligned by connecting the upper cross bars through the specific metal plates. It is suggested to use nr. 8 M6x15 self-threading screws for each plate.



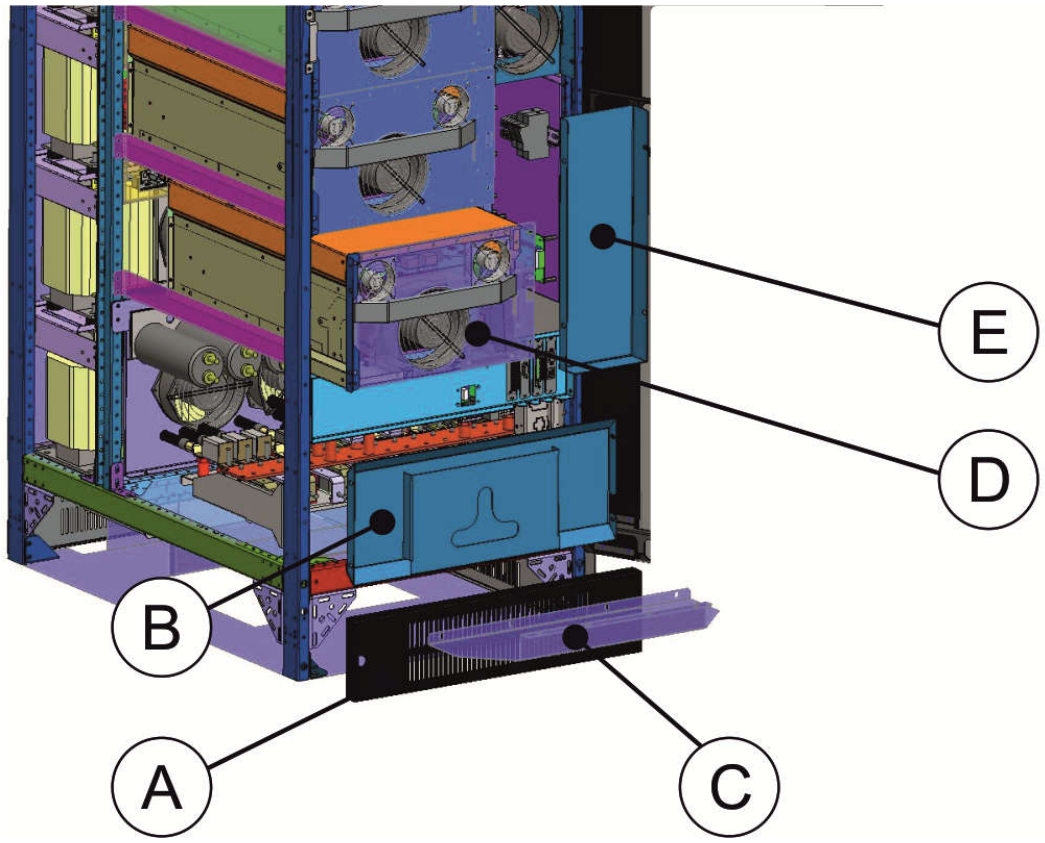
Picture 89 – UPS cabinets upper fixing

3.3 POWER MODULE (PU) ELECTRICAL CONNECTION

In order to connect the interconnection cables of the power module it is necessary to remove:

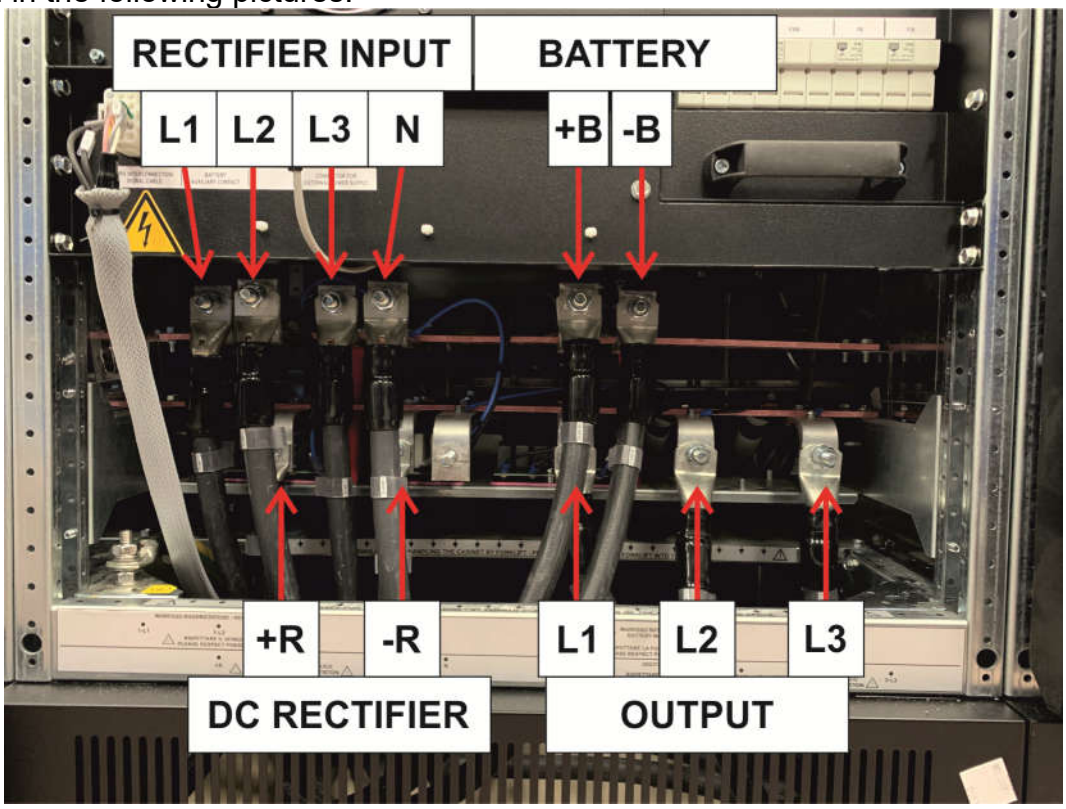
- front socket cover (A);
- terminals protection plate (B);
- cables passage covering plate (C).

In order to ease cables connection work it is advisable to remove the lower power conversion module (D)



Picture 90 – Parts to be removed for cables connection

The connection terminals are available on the front of the cabinet and located as shown in the following pictures.



Picture 91 – Power Unit terminal boards – Centralised Static Bypass configuration

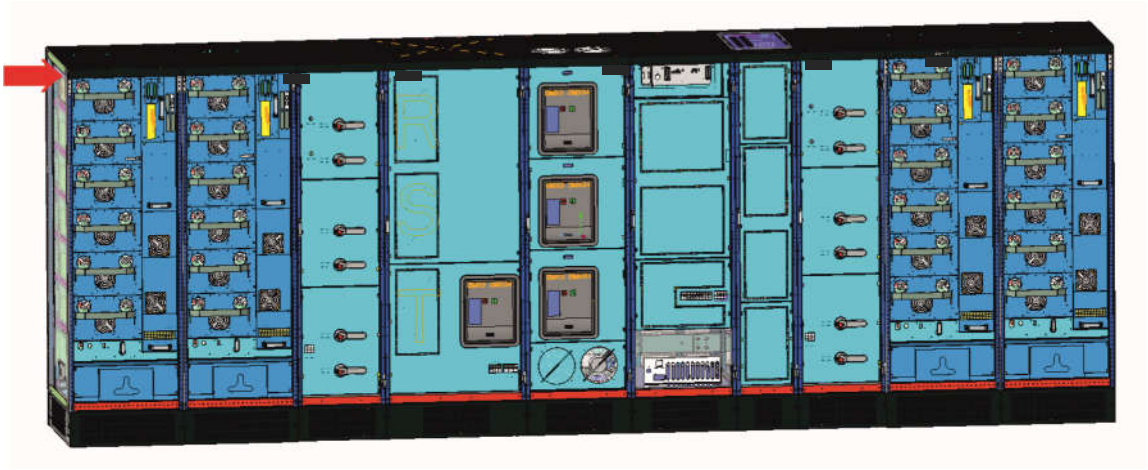
Interconnection terminals Centralised Static Bypass configuration			
I/O module (1)		**Power module**	
L1INP - Mx	→	1-L1	RECTIFIER
L2INP - Mx	→	1-L2	
L3INP - Mx	→	1-L3	
L1BYP - Mx	→	3-L1	OUTPUT
L2BYP - Mx	→	3-L2	
L3BYP - Mx	→	3-L3	
+R - Mx	→	+R	DC BUS
–R - Mx	→	–R	
+Bx	→	+B	BATTERY
–Bx	→	–B	

(1) In the distribution column the terminals are identified as "Mx", where "x" is the number which identifies which power module must be connected to those terminals.

4. IOBM & POWER MODULE “PU” SIGNAL CABLES CONNECTION

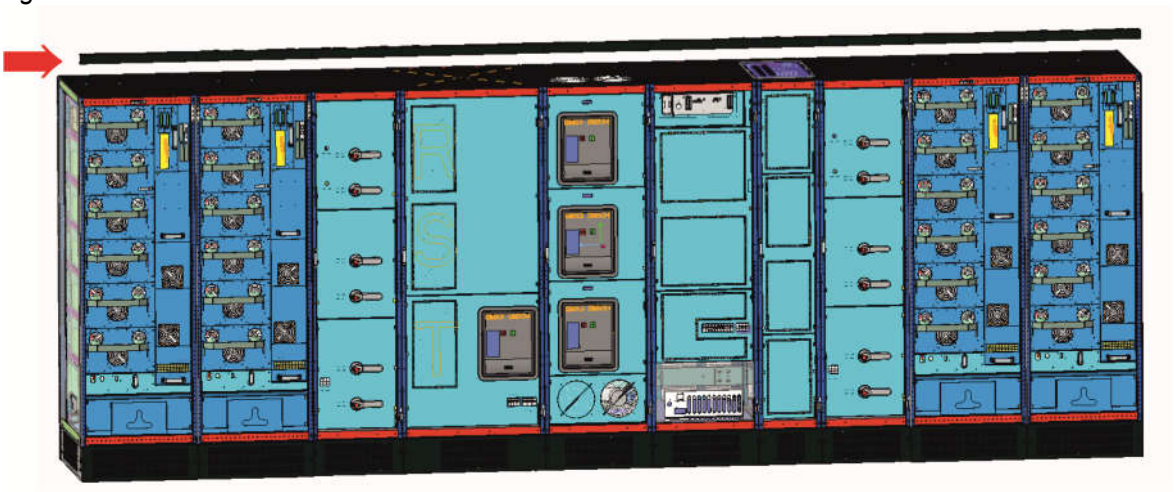
4.1 CONNECTING THE BUS CABLE

The connection of the bus cable is the last operation to be performed to accomplish the installation of the UPSaver system.
For the cable routing specific raceways above the cabinet front doors are provided, that must be removed.



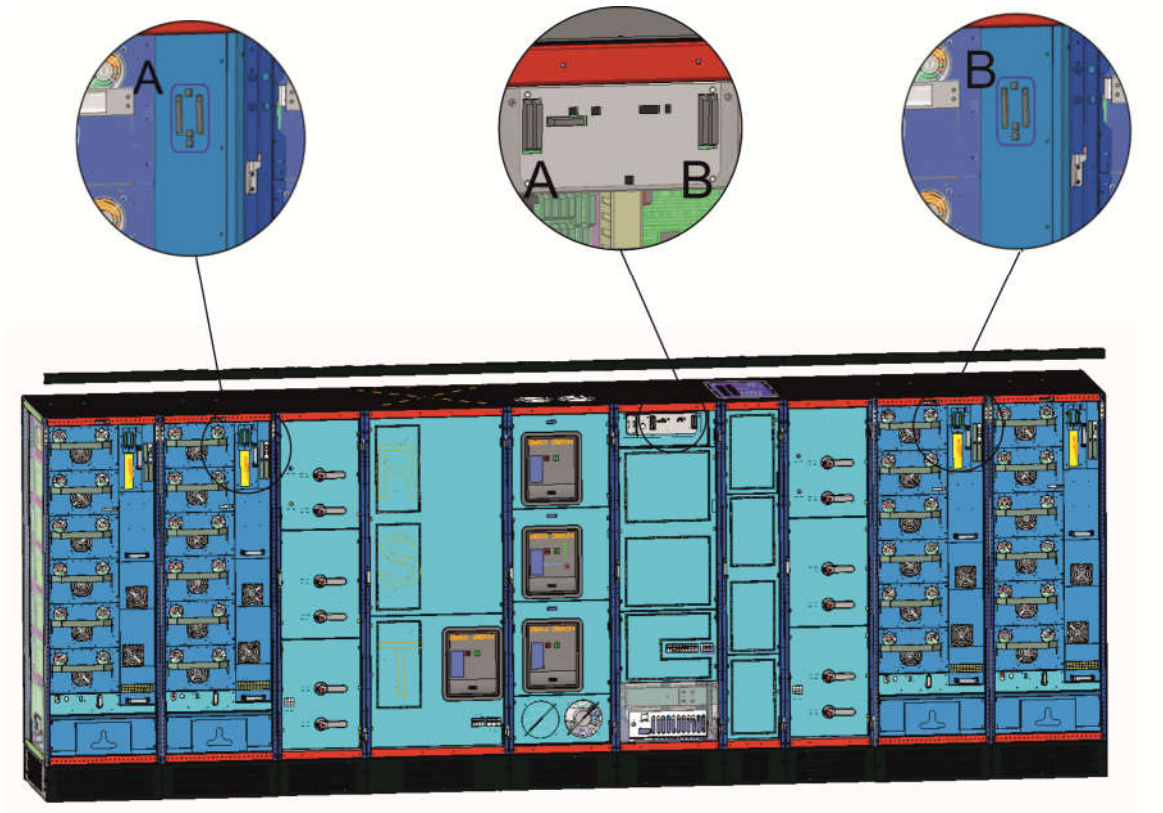
Picture 92 – Bus cable raceways

NOTE
The procedure for a 1330 kVA system with the related images is shown above.
This procedure should be considered as a guideline for bus cable connection in all the other configurations

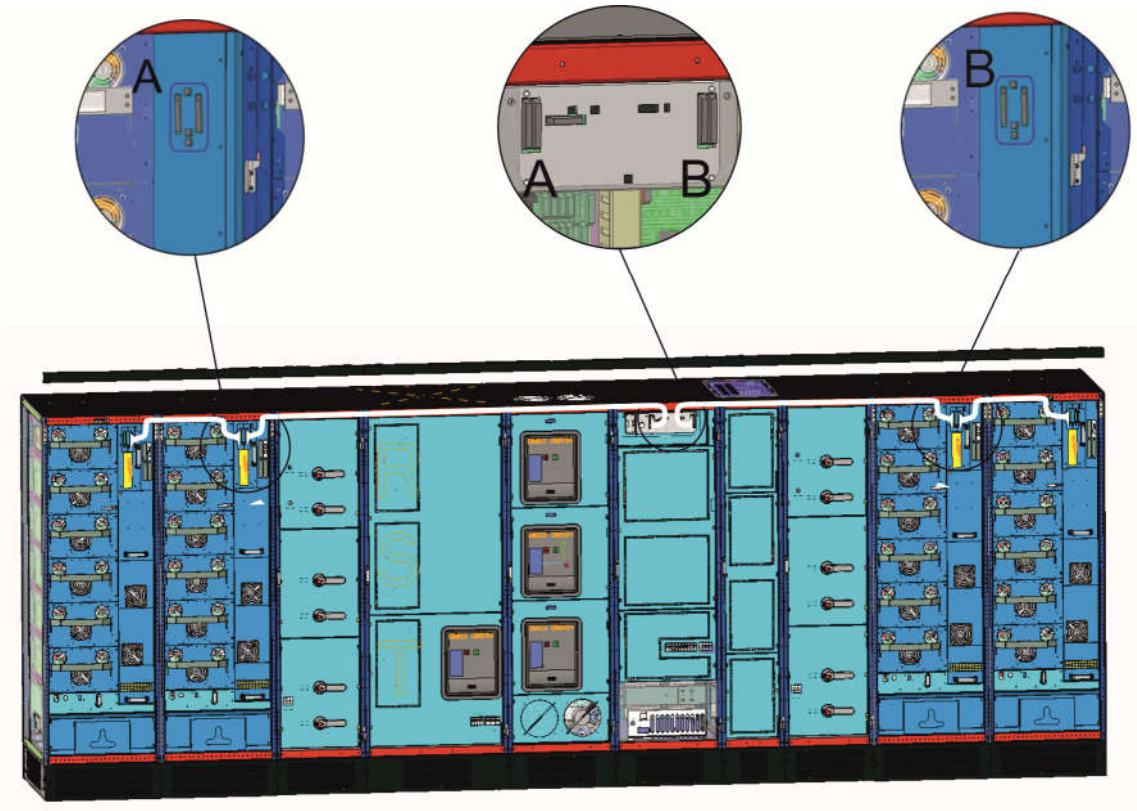


Picture 93 – Removing the bus cable raceways

Both the I/O module and the power modules are equipped with a specific connection card, provided with two connectors.

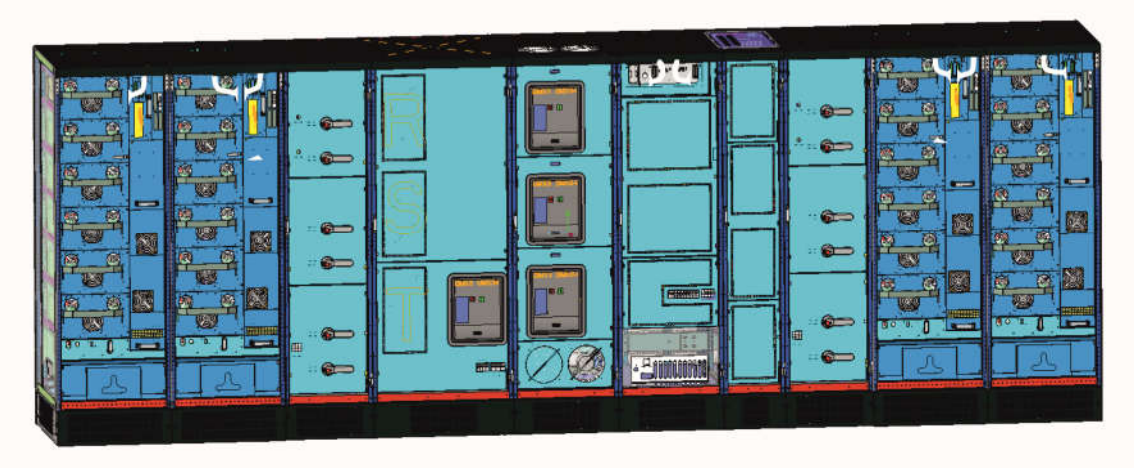


Picture 94 – Bus cable connection cards



Picture 95 – Connecting the bus cable

Once the cable has been connected, fix it to the cabinet upper cross-bars and put the metal raceways back in place.



Picture 96 – Raceways re-positioning

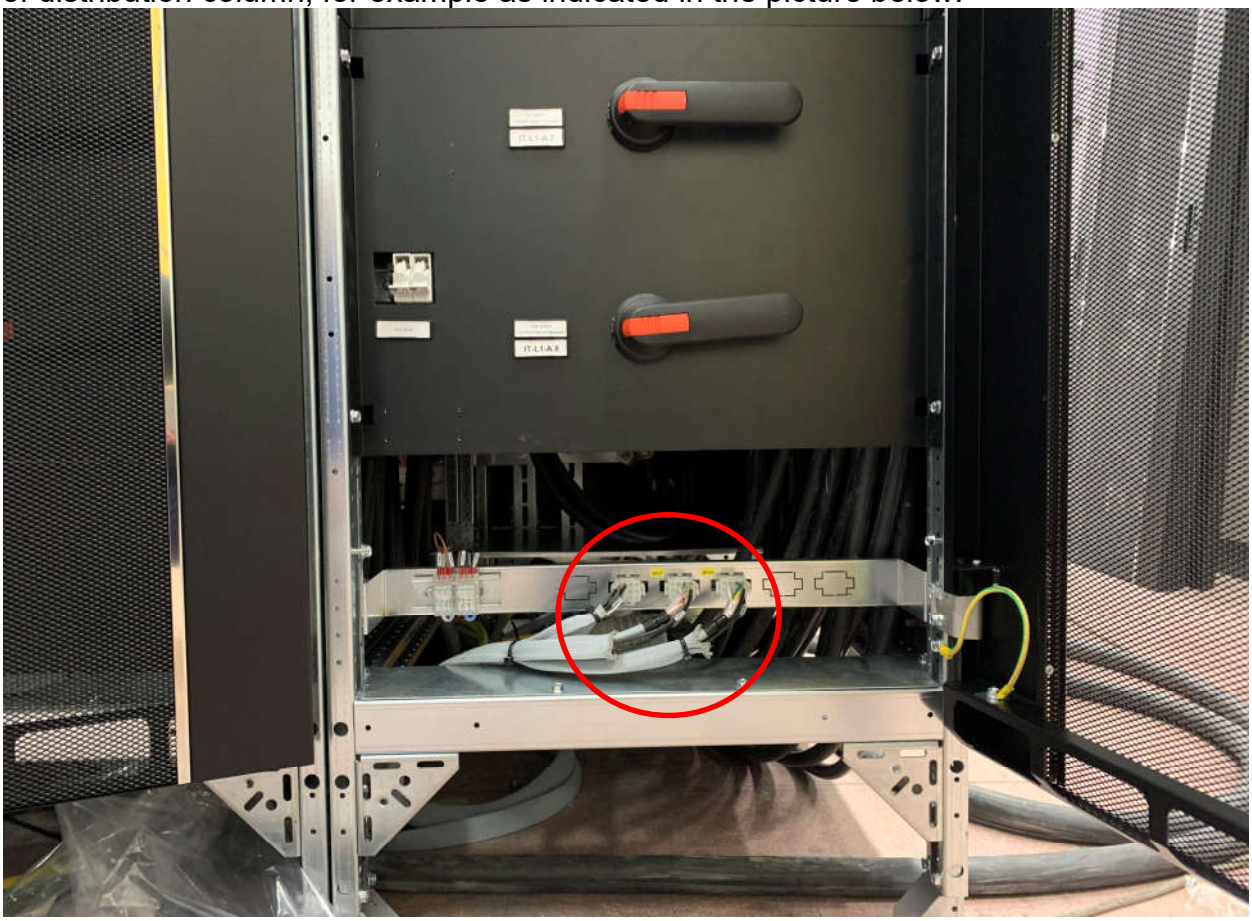
4.2 CONNECTING THE SIGNAL CABLES

The routing of the signal cables between the I/O module and the power modules can be carried out after the complete installation of the system. Simply for the matter of a easier execution of the routing it is recommended to lay the signal cables down before putting the power modules in place. In order to make the cables connection easier, sockets can be installed in the I/O module. For more details see also interconnection diagrams DBBG7156 or DBBG7157.

Signal cables interconnection table

I/O module		Power module		I/O module		Power module	
X31.1	→	CN1-1.5	MODULE 1	X35.1	→	CN1-5.5	MODULE 5
X31.2	→	CN1-1.6		X35.2	→	CN1-5.6	
XB1.1	→	CN1-1.7		XB5.1	→	CN1-5.7	
XB1.2	→	CN1-1.8		XB5.2	→	CN1-5.8	
X11.1	→	CN1-1.9		X15.1	→	CN1-5.9	
XL11.1	→	CN1-1.10		XL15.1	→	CN1-5.10	
+24V FANS PU1	→	CN1-1.11		+24V FANS PU5	→	CN1-5.11	
GND FANS1	→	CN1-1.12		GND FANS5	→	CN1-5.12	
X32.1	→	CN1-2.5	MODULE 2	X36.1	→	CN1-6.5	MODULE 6
X32.2	→	CN1-2.6		X36.2	→	CN1-6.6	
XB2.1	→	CN1-2.7		XB6.1	→	CN1-6.7	
XB2.2	→	CN1-2.8		XB6.2	→	CN1-6.8	
X12.1	→	CN1-2.9		X16.1	→	CN1-6.9	
XL12.1	→	CN1-2.10		XL16.1	→	CN1-6.10	
+24V FANS PU2	→	CN1-2.11		+24V FANS PU6	→	CN1-6.11	
GND FANS2	→	CN1-2.12		GND FANS6	→	CN1-6.12	
X33.1	→	CN1-3.5	MODULE 3	X37.1	→	CN1-7.5	MODULE 7
X33.2	→	CN1-3.6		X37.2	→	CN1-7.6	
XB3.1	→	CN1-3.7		XB7.1	→	CN1-7.7	
XB3.2	→	CN1-3.8		XB7.2	→	CN1-7.8	
X13.1	→	CN1-3.9		X17.1	→	CN1-7.9	
XL13.1	→	CN1-3.10		XL17.1	→	CN1-7.10	
+24V FANS PU3	→	CN1-3.11		+24V FANS PU7	→	CN1-7.11	
GND FANS3	→	CN1-3.12		GND FANS7	→	CN1-7.12	
X34.1	→	CN1-4.5	MODULE 4	X38.1	→	CN1-8.5	MODULE 8
X34.2	→	CN1-4.6		X38.2	→	CN1-8.6	
XB4.1	→	CN1-4.7		XB8.1	→	CN1-8.7	
XB4.2	→	CN1-4.8		XB8.2	→	CN1-8.8	
X14.1	→	CN1-4.9		X18.1	→	CN1-8.9	
XL14.1	→	CN1-4.10		XL18.1	→	CN1-8.10	
+24V FANS PU4	→	CN1-4.11		+24V FANS PU8	→	CN1-8.11	
GND FANS4	→	CN1-4.12		GND FANS8	→	CN1-8.12	

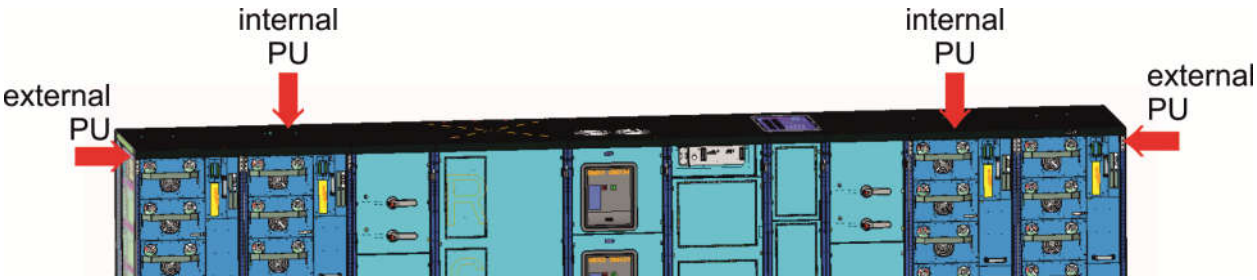
The signal terminal boards or connectors in the I/O module are located at the bottom of distribution column, for example as indicated in the picture below.



Picture 97 – Example I/O module signal position

4.3 DIP-SWITCH COMMUNICATION SETTINGS

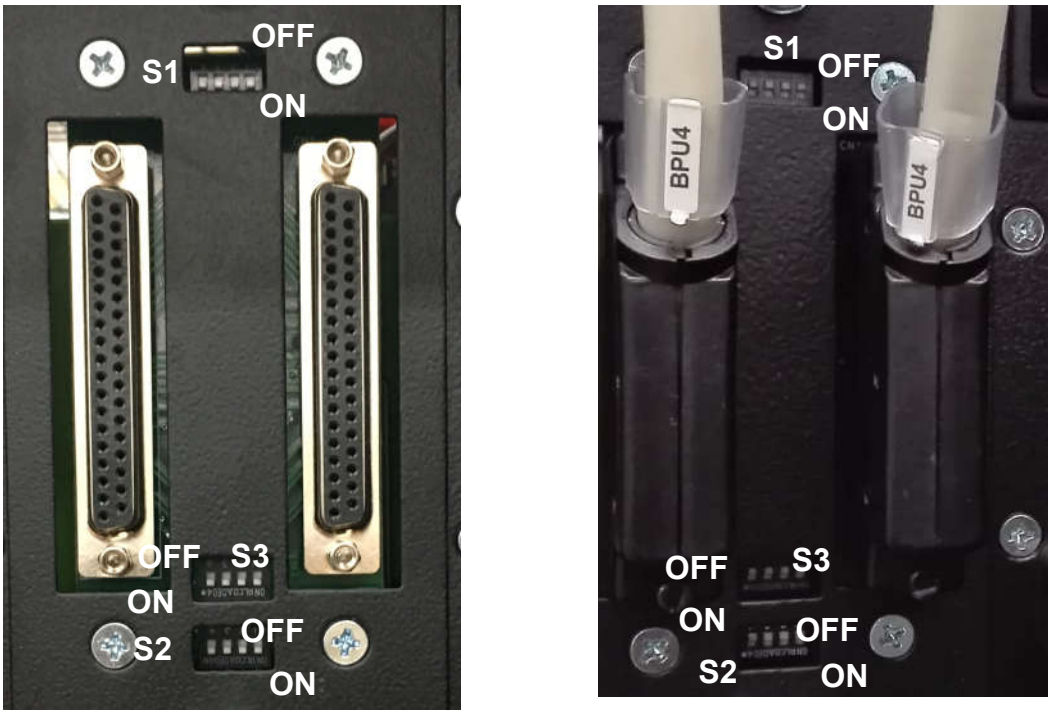
The external and internal PU of configuration must be settings as follow instruction:



Picture 98 – Communication settings

For external PU:
S1: 1,2,3,4 ON;
S3: 1,2,3,4 ON;
S2: 1,2,3,4 ON;

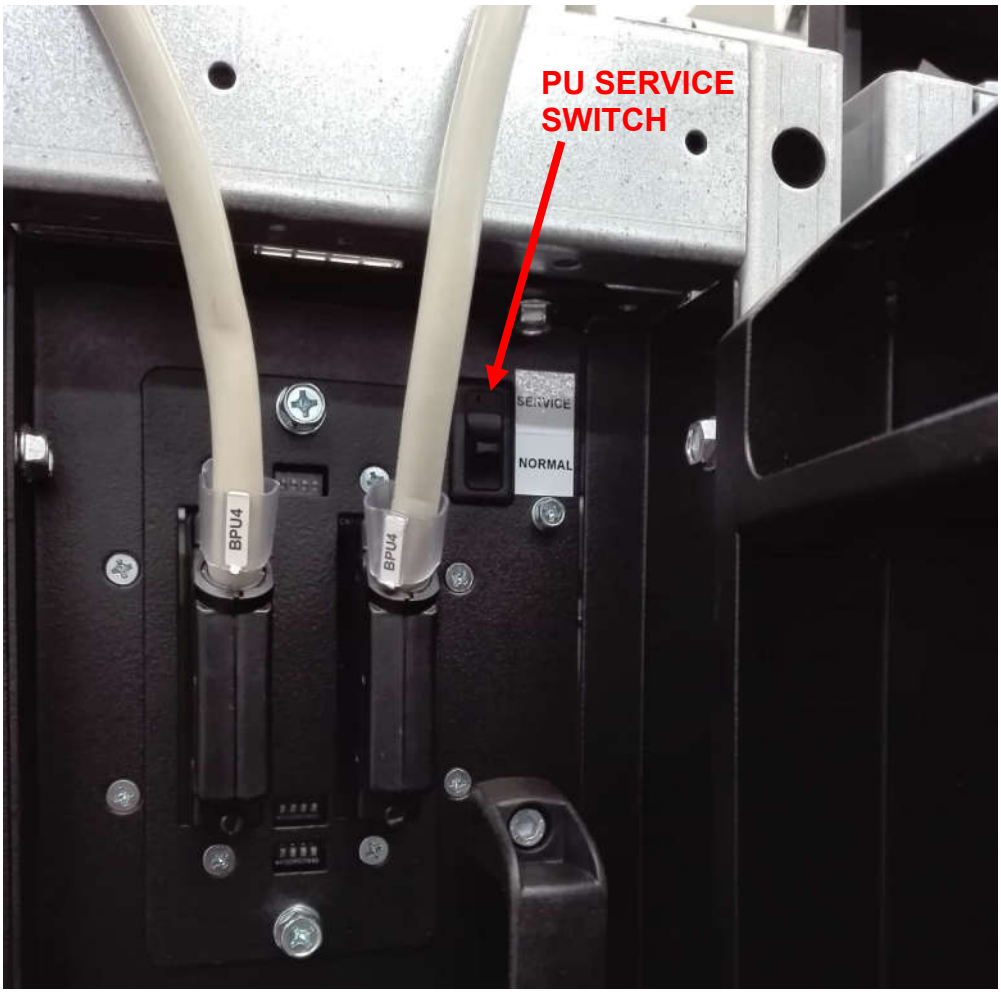
For internal PU:
S1: 1,2,3,4 OFF;
S3: 1,2,3,4 OFF;
S2:1,2,3,4 OFF;



Picture 99 – Dip switch configuration for external and internal PUs

On the IOBM all Dip-switch are OFF.

4.4 PU SERVICE SELECTOR



Picture 100 – Service switch PU

In standard operation the correct position of the selector is on NORMAL.
The selector can be moved on SERVICE position authorized personnel ONLY.

CONFIGURATIONS AND OPERATING MODE

Index

Index of the pictures

APPLICATION

The instructions outlined in this section of the manual are applicable to the uninterruptable static units of the UPSaver series in all power configurations.

Preservation of the documentation

This manual and all the remaining technical documentation to support the product must be preserved, and possibly made accessible to staff in the immediate vicinity of the UPS.

Additional information

If the information outlined in this manual is not exhaustive enough, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

1 RULES AND SAFETY WARNINGS

Danger of injuries following electric shock

Always comply with all the instructions on safety, in particular:

- All works on the device must be carried out by qualified staff;
- Access internal components only having disconnected the device from power sources;
- Always use specific protective equipment for each type of activity;
- Carefully follow the instructions in the manuals.

Danger of injuries following a device fault

If the UPS is faulty, potentially hazardous situations can be created.

- Do not use the device if visibly damaged.
- Regularly carry out maintenance interventions to detect possible anomalies.

Possible damage to the device

Before carrying out any intervention on the device, ensure all precautions are taken against electrostatic discharges which could damage the electronic part of the system.

Read the technical documentation

Before installing and using the equipment, ensure you have read and fully understood the instructions contained in this manual and the remaining support technical documentation.

2 DESCRIPTION OF MAIN UPS

UPSaver is the complete protection system of the highest efficiency, multi-functional and completely adaptable power supply.

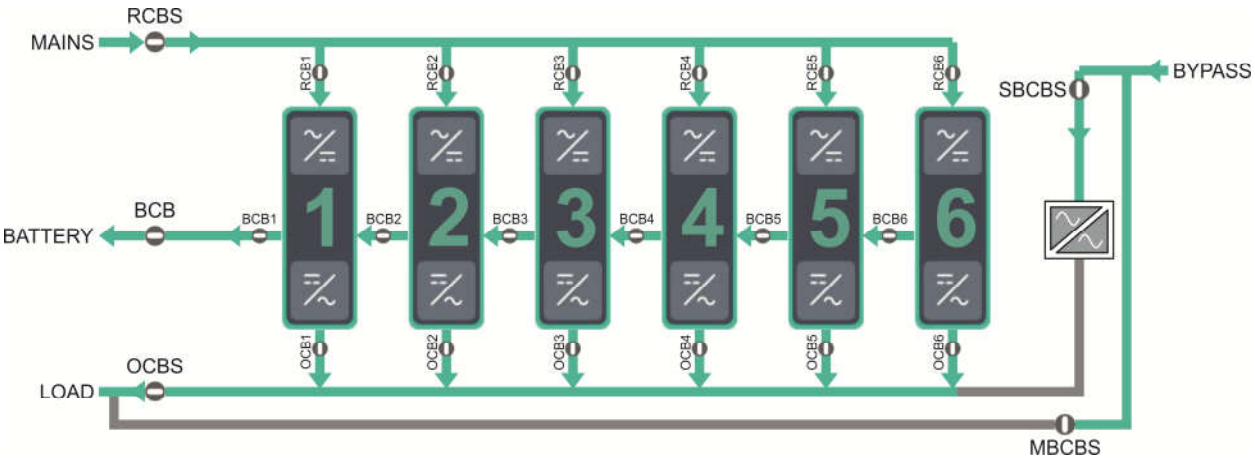
The flexibility of the system is obtained using power modules that can be added hot and expand the power in a very simple manner up to 2670 kVA.

The power modules of the UPSaver are manufactured using IGBT technology, with a high switching frequency, to allow low distortion of the current injected in the power supply and a high quality and stability of the output voltage. The components used guarantee high reliability, the highest efficiency and easy maintenance.

UPSaver can work in various ways, which can be defined by the user based on the quality of the power supply voltage and the type of loads powered by the system.

Output voltage present

The line connected with the output of the UPS is also powered in the absence of the network for which, according to the provisions of CEI EN62040-1-2, the installation technician should indicate the line or the sockets powered by the UPS, drawing the user's attention.



Picture 1 – Typical block diagram of the UPSaver 2000 kVA, (CB+CSB)

The previous figure shows a typical block diagram of the UPS UPSaver, in the configuration with 6 power modules parallel, suitable for powering loads up to 2000 kVA, or 1670 kVA with redundancy of a module. The configuration is defined CB + CSB, i.e. *Centralised Battery and Centralised Bypass Static Switch*.

The UPSaver system is fundamentally composed of two modular elements:

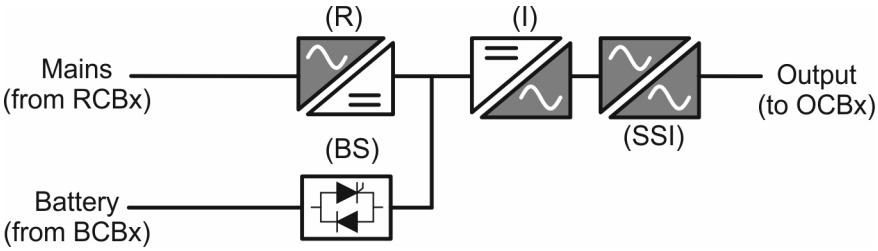
- *Power Module* (*PU*);
- *Input/Output Module* (*IOBM*).

The *IOBM* is formed by a central part containing the connection terminal boards, the sectioning units of the input and output lines and any centralised static switches. It is also equipped with distribution side columns containing the input/output switches of the *PU*.

2.1 POWER MODULE (PU)

The *Power Module*, part of the UPS UPSaver, is formed by the following main sections:

- *Rectifier / Battery Charger (R)*;
- *Inverter (I)*;
- *Battery Static Switch (BS)*;



Picture 2 – Power Module block diagram (PU)

The *Power Module* is not equipped with switches, which are all installed on the distribution columns on the sides of the *IOBM*.

2.1.1 Rectifier / Battery Charger

The *Rectifier* converts the three-phase voltage of the AC network in DC current and uses an IGBT three-phase bridge with low harmonic absorption.

The control electronics uses a μP 32 bit, latest generation which allows reduced distortion of the current absorbed by the network (THDi) at a value under 3%. This guarantees, regarding other loads, that the *Rectifier* does not distort the mains voltage and avoids overheating the cables due to circulation of harmonic currents.

The *Rectifier* is dimensioned to power the *Inverter* fully charged and the *Battery at maximum charge current*.

The *Battery Charger logic is integrated in the control electronics of the Rectifier*. The *Battery* undergoes a charge cycle, according to DIN41773, each time a partial or total discharge takes place. On restoring the complete capacity, it is disconnected from the DC bus via a SCR static switch to save energy and reduce the stress due to the AC ripple, all to increase the life expectancy. This operating mode is called *Green Conversion*.

It is however periodically charged, but the prevalent status is complete rest.

2.1.2 Inverter

The *Inverter* converts direct voltage from the *Rectifier* or from the DC *battery* to AC alternating voltage, stabilised in amplitude and frequency.

The *inverter* is manufactured with IGBT technology to work at a high switching frequency of approx. 8 kHz.

The control electronics use a μP 32 bit, latest generation which, thanks to its processing power, allows generation of a perfect output sine.

Furthermore, the completely digitalised control allows high performance to be reached, among those a very low voltage distortion also in the presence of strong distorting loads.

2.1.3 Battery Static Switch

The *Battery Static Switch* is supplied by two diode-SCR pairs in parallel, one for each polarity and allows controlled connection and disconnection of the DC bar *Battery*, to reduce loss and optimise the life expectancy of the accumulators.

2.2 UPSAVER CONFIGURATIONS

The combination of *Power Modules* with appropriate *IOBM* module allows you to obtain different types of system regarding the configuration of the *Battery*.

CB → Centralised Battery

A single *Battery* is planned for the UPS UPSaver. The connection is implemented in the *IOBM* module, but each *PU* is equipped with its own *Battery Static Switch.*

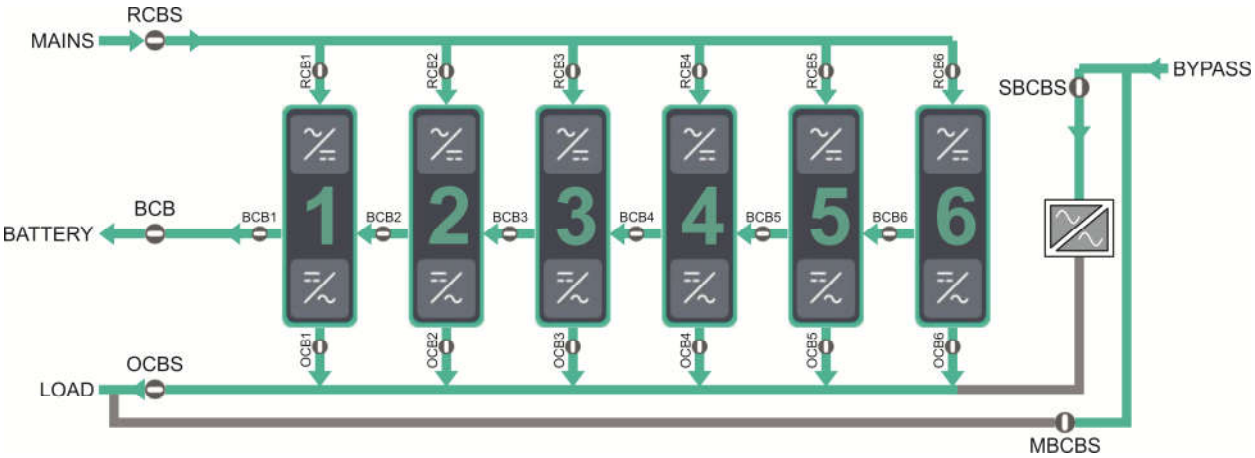
DB → Distributed Battery

It is equipped with a *Battery* for each *PU* composing the UPS UPSaver. Each *PU* is equipped with its own *Battery Static Switch*.

CSB → Centralised Bypass Static Switch

It is equipped with a single *Bypass Static Switch*, installed in the *IOBM* cabinet.

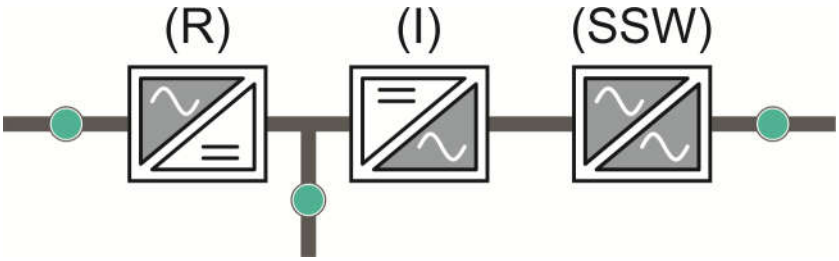
2.2.1 "CB+CSB" Configuration



Picture 3 – UPSaver 2000 kVA, (CB+CSB) Configuration

In configuration *CB+CSB*, the *Battery* is unique for the entire UPSaver system. Each power module is connected to the DC bar using the *BCBx* switches placed in the distribution columns to the sides of the *IOBM* and individually contribute to a fraction of the *Battery* current which is loaded parallel from all modules. The *Battery Static Switch* is installed inside each *PU*.

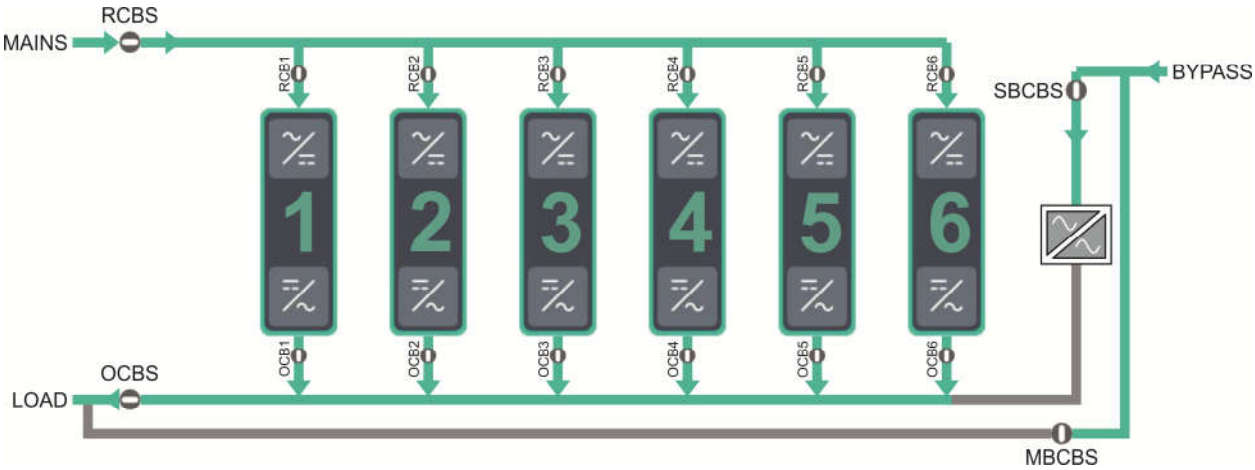
The *Bypass Static Switch* is unique and centralised, installed on the *IOBM* module.



Picture 4 –Configuration of the Power Module for UPSaver (CB+CSB)

The *PU* is not equipped with the *Bypass Static Switch*.

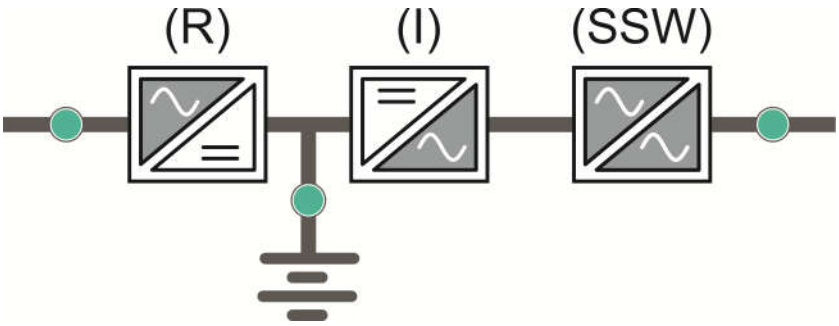
2.2.2 "DB+CSB" Configuration



Picture 5 – UPSaver 2000 kVA, (DB+CSB) Configuration

In *DB+CSB* configuration, the *Battery* is distributed, i.e. each *Power Module* is equipped with its own *Battery*. The *BCBx* switches, placed on the distribution columns on the sides of the *IOBM*, directly connect the DC bar of each module to the common DC bar. The *BCBbx* switches, placed outside the system, connect the individual *Battery* to the individual *PU*.

The *Bypass Static Switch* is unique and centralised, installed on the *IOBM* module.



Picture 6 – Configuration of the Power Module for UPSaver (DB+CSB)

The *PU* is equipped with a *Battery Static Switch* but is not equipped with a *Bypass Static Switch*.

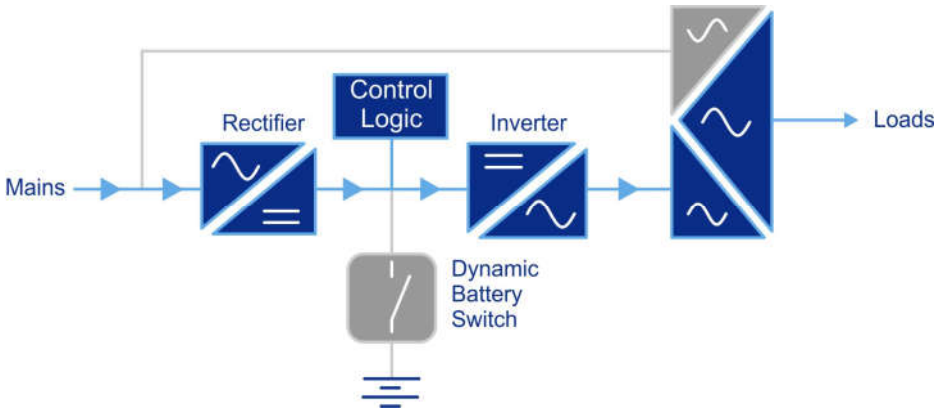
2.3 OPERATING MODE

The UPS UPSaver can be programmed to work in three different modes:

- DHE (Double High Efficiency)
- ECO
- UHE (Ultra High Efficiency)

2.3.1 DHE Mode – Double High Efficiency

The *DHE* mode is double conversion on-line operation (VFI – Voltage Frequency Independent), where the *Green Conversion* algorithm can be enabled to reduce loss and resulting increase in system performance.



Picture 7 – DHE Green Conversion mode

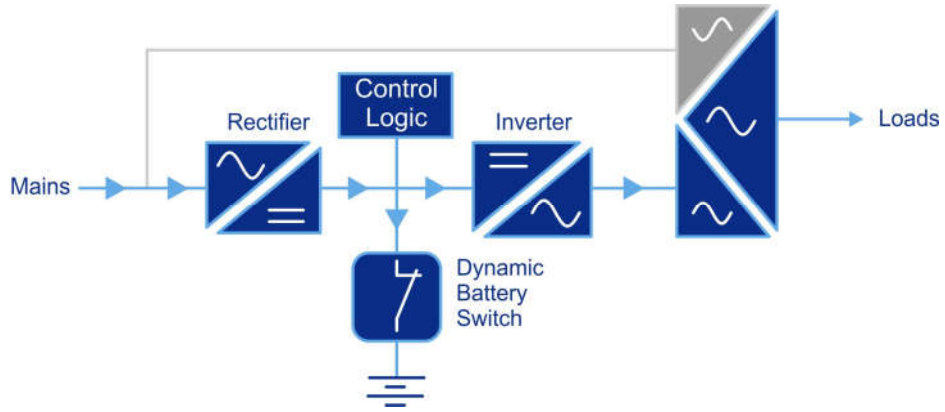
Alternating current loads are powered directly by the Inverter, i.e. parallel to the *Inverter* of the individual *Power Modules* (*PU*). When the *Green Conversion* algorithm is enabled, the *Rectifier* works at reduced DC voltage and only powers the *Inverter*, given the *Battery* is disconnected from the bar.

The battery loading condition is controlled by a specific algorithm. If there are no missing network events, and therefore battery discharge, the control logic executes a single charge cycle each number of programmable days. The *Battery Charger* restores lost capacity due to auto-discharge phenomena and remains in float charge for a further 12 hours (time settable in EEProm according to battery used). Once this time is up, the *Battery Static Switch* is opened and the *Battery* is again disconnected from the bar.

Instead, if there is a discharge event, the control logic will calculate the lost capacity during discharge; on restoring the network, a charge cycle is started at the end of which the *Rectifier* remains in float charge for a further 12 hours (time settable in EEProm according to the battery used).

Set the correct capacity value

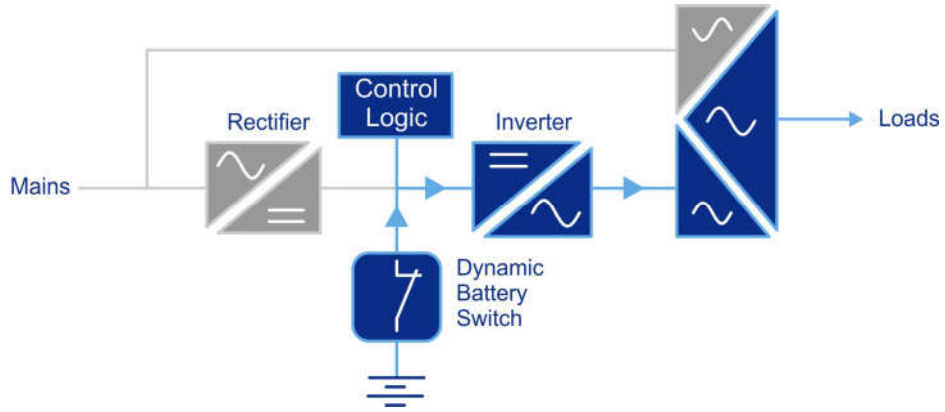
The front panel of the UPS enables setting the *Battery* parameters, including the nominal capacity. Considering the importance of this value for correct execution of the charging algorithm, you are advised to ensure the value set is correct.



Picture 8 – DHE with Battery charging

In the event of lacking network, the *Battery Static Switch* is immediately enabled (if the *Battery* was disconnected) and the load is powered by the *Inverter*.

The *Battery* voltage lowers based on the discharge current range; the drop in voltage has no effect on the output voltage which is held constant by varying the PWM modulation. An alarm is enabled when the *Battery* approaches the minimum discharge value.



Picture 9 – Battery almost flat

If the power supply is restored before the *Battery* is completely flat, the system automatic goes to normal operation. In the reverse case, the *Inverter* stops and charge transfers to the *Bypass* network (*Bypass* operation). If the *Bypass* network is not available or outside the tolerance limits, the power supply to the charges is shut off as soon as the *Battery* reaches the discharge limit threshold.

As soon as the power supply is restored, the Rectifier recharges the *Battery*. In the standard configuration, the power supply to the loads is reset as soon as the network is available again, and takes place via the static switch *SSB*. Start-up of the *Inverter* takes place when the *Battery* has reset part of its capacity.

In the event of an *Inverter* fault, or following manual activation of the *Bypass Switch* selector, the load is transferred to the *Bypass* line and powered using the *Bypass Static Switch*. Transfer to the *Inverter*, which in DHE operation represents the preferential source, takes place without shut off as soon as the fault is reset.

2.3.1.1 Efficiency optimisation by rotating the power modules

In *DHE* mode operation, the UPSaver system can be programmed for automatic management of *PU* redundancy.

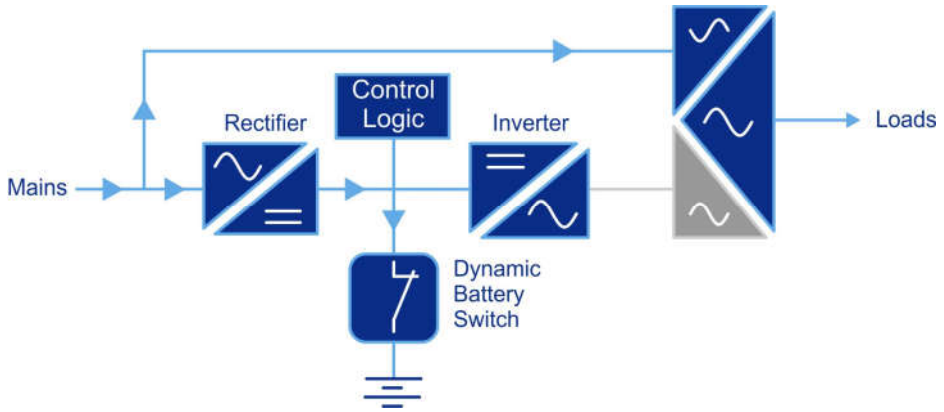
Based on the charge powered, the control logic calculates the number of modules necessary to guarantee maximum efficiency of the system, taking account of always having at least a number of redundant modules, which can be selected in EEProm. The redundant modules, defined by the user, are used to absorb any charge peaks to avoid system switching to *Bypass* if there is a sudden increase in output power.

Other than automatic switch on and off of the modules, the system also manages their rotation, to guarantee linear ageing of all parts. Each *PU* has an integrated timer that counts the working hours. When the rotation algorithm is activated, the control logic switches on all the modules, and then switches off those not working for most time. Rotation is obviously subordinate to the automatic redundancy algorithm previously explained, therefore it is only activated if the output load is such to allow at least one power module to be off.

2.3.2 ECO mode

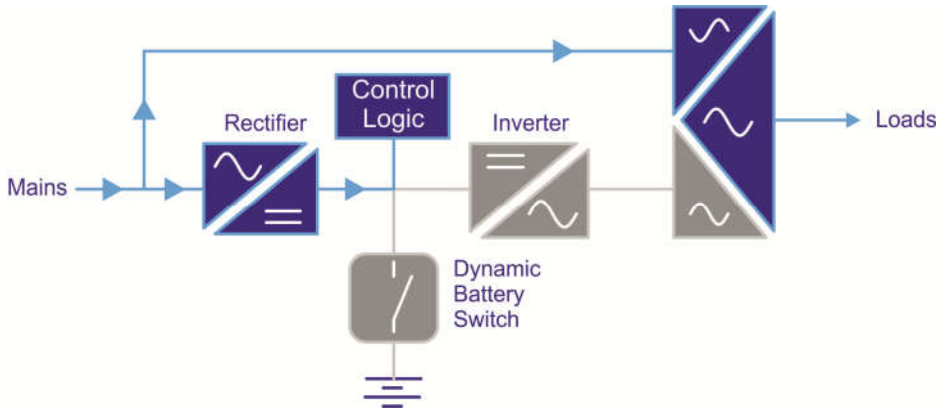
In *ECO* mode, the load is powered directly by the network and the *Inverter* is running; the UPS therefore does not implement any type of “conditioning” on the output voltage, which therefore depends on the variation in that of input (VFD – Voltage Frequency Dependent).

In the event of lacking network or transfer to the *inverter*, the transfer takes place with a continuous solution, in a maximum time of 10 ms.



Picture 10 – ECO mode

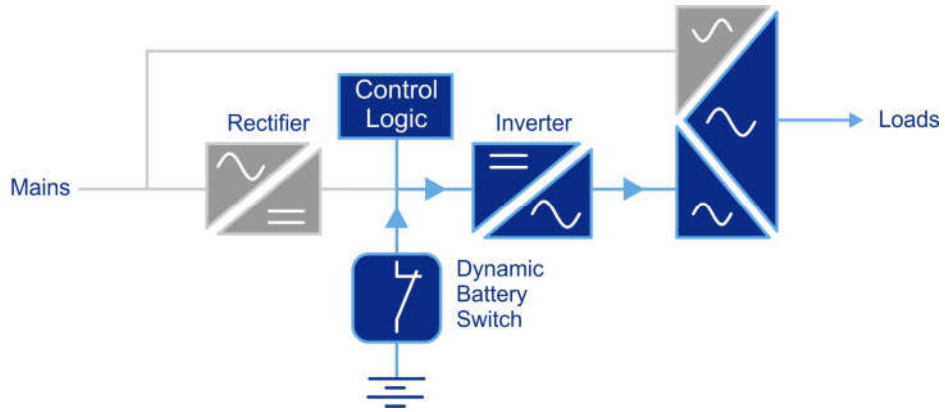
2.3.3 UHE Mode – Ultra High Efficiency



Picture 11 – UHE mode

UHE mode guarantees the best performance, given that in normal operation all the system converters (*Rectifier and Inverter*) are off and the loads are powered directly by the network through the static switch. This configuration includes permanent switch on of a rectifier section to power the control logic and avoid the *Battery* having to provide energy, even if very limited. Then, the *Battery Static Switch* is kept open and only intervenes in the event of lacking mains.

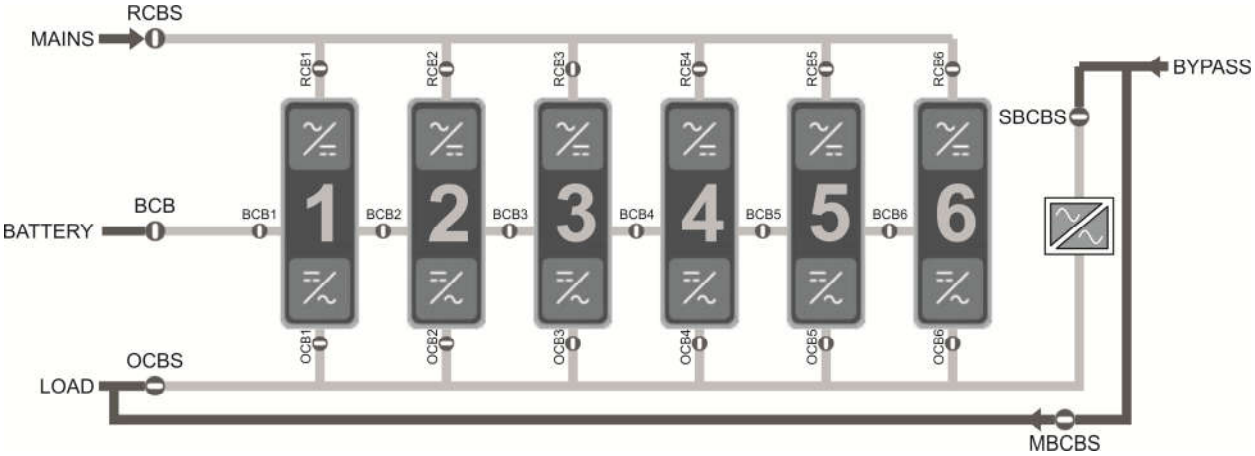
In the event of lacking mains, the *Inverter* starts and the load is transferred to the static switch. Output voltage disturbance is broadly covered in the limits defined by the ITIC (Information Technology Industry Council) and in curve 3 of the dynamic performances defined by standard EN 62040-3.



Picture 12 – UHE mode with network lacking

2.3.4 Manual Bypass

The manual *Bypass* function is necessary each time you want to test UPS functionality or during maintenance or repair works.



Picture 13 – Manual Bypass

In this condition, all the switches are generally open and the only closed switch is the *MBCBS*, both for general switches and those relevant to individual power modules.

Follow the procedures in the manual.

The *Manual Bypass* insertion and return manoeuvre must be carried out respecting the “Starting and stopping UPSaver” manual. No liability can be taken for damage deriving from wrong manoeuvres.

MANOEUVRE CONTROLS AND UNITS

"CENTRALISED BATTERY"

Index

Index of the pictures

1 MANOEUVRE CONTROLS AND UNITS

The manoeuvre controls and units of the UPS are listed below.

- *Rectifiers* line input switch (*RCBS*)
- *Bypass* line input switch (*SBCBS*)
- UPS output switch (*OCBS*)
- *Manual Bypass* switch (*MBCBS*)
- *Battery* sectioning device/switch (*BCBS*)
- Emergency stop button (EPO);
- *Bypass Switch*
- *Touch screen* control panel

In the *IOBM*, precisely to the distribution columns to the sides, there are switching units of the individual *Power Modules*, as indicated below.

- *Rectifier* input switch (*RCBx*)
- Module output switch (*OCBx*)
- *Battery* switch (*BCBx*)

Check staff training

Use of the manoeuvre and control units of the UPS is intended for authorised staff. You are advised to check staff training responsible for use and maintenance of the system.

1.1 SWITCHES

The switches planned on the UPS are used to isolate the power part of the device from the AC power network, from the battery of the accumulators and the loads.

Voltage in the terminals

The switches do not completely isolate the UPS, inside which voltages are still present of the AC network and the *Battery* on the terminals. Before carrying out any maintenance on the equipment, do as follows:

- Completely isolate the device using the external switches;
- Wait at least 5 minutes to discharge the capacitors.

Isolation of power modules

The sectioning units of the *Power Modules* are installed in the *IOBM*, therefore the *PU* are isolated by the input/output lines when the switches are open. Before carrying out any maintenance intervention on the individual *Power Modules,* wait at least 5 minutes to discharge the capacitors.

1.2 EMERGENCY STOP CONTROL (EPO)

The emergency stop control is used to immediately disconnect the UPS output by disconnecting the loads from power and also switching off the *Rectifier* and the *Inverter*.

Activate the control only in the event of a real emergency

The system components are highly stressed in the event of an emergency stop control manoeuvre under charge.

- Use the emergency stop control only in the event of a real emergency.

Restore power supply

Restore the output power supply only when the causes that led to emergency stop have been eliminated and you are sure that there are no hazards to people or property.

1.3 BYPASS SWITCH SELECTOR

The *Bypass Switch* selector is assembled on the *IOBM*. It must be used during the *Manual Bypass* procedure, when you can isolate the UPS for maintenance or repair. If set to **NORMAL** select as output for the load to the *Inverter* line, if set to **Bypass** select as output for the *Bypass* line load.

Follow the procedures in the manual

The *Bypass Switch* selector must only be manoeuvred in compliance with the installation and start-up procedures. No liability can be taken for damage deriving from wrong manoeuvres.

1.4 *TOUCH SCREEN* CONTROL PANEL

The control panel of the UPS is used to:

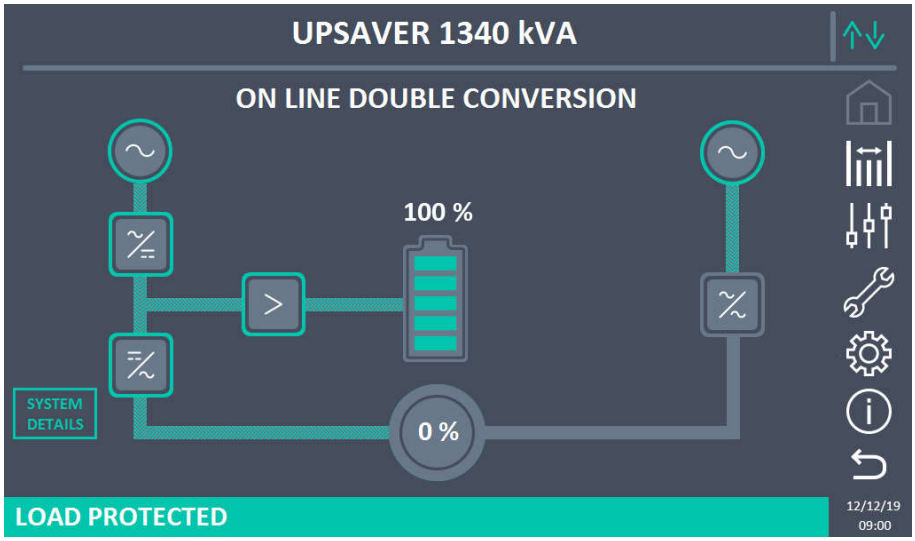
- Check the functional parameters of the device
- Check the alarms present
- Access the events log
- Show the information on the device
- Change the operating parameters

The menu that allows the parameters to be changed is password protected to avoid access by unauthorised staff.

2 CONTROL PANEL

The control panel of the UPS is a *touch screen* 10.1”, which communicates with control logic of the *IOBM*. The main page (***HOME***) displays the system flow diagram.

To view the status of each power unit click on the SYSTEM DETAILS button.



Picture 1 – Home page – Flow diagram of the UPSaver system

2.1 ICONS

Browsing through the pages of the *touch screen* is possible through the seven icons provided on the right hand side; the icon with the up-down arrows controls the display communication.

Description of the icon	Icon	Assigned functions
Home		*Home* page is currently displayed.
		Goes back to the *Home* page.
Measures		A page of the *Measures* section is currently displayed.
		Enters the *Measures* section.
Controls		A page of the *Controls* section is currently displayed.
		Enters the *Controls* section.
Alarms		No active alarms. A page of the *Alarms* section is currently displayed.
		No active alarms. Enters the *Alarms* section.
		At least one alarm is active. Enters the *Alarms* section and resets the buzzer if activated.
Settings		A page of the *Settings* section is currently displayed.
		Enters the *Settings* section.
Info		A page of the *Info* section is currently displayed.
		Enters the *Info* section.
Back		Goes back one page.
Communication		Controls the communication between the panel and the UPS electronics (Communication Ok).
		Controls the communication between the panel and the UPS electronics (Communication Ko, in case of communication error between the *touch screen* and the UPS control logic).

2.2 STATUS BAR

The status bar at the bottom provides an indication of the load's power status.
It can appear in different colors:

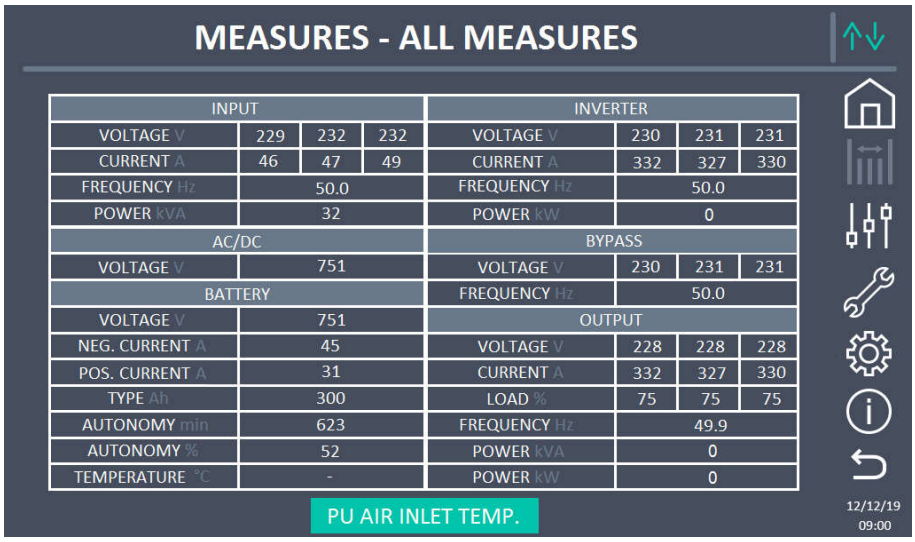
- *Green*: load protected;
- *Orange*: load not secured;
- *Red*: load not supplied.

3 *TOUCH SCREEN* – UPS MANAGEMENT

Data can be displayed and the parameters managed of the UPS by entering the various sections of the control panel directly from the ***HOME*** page.

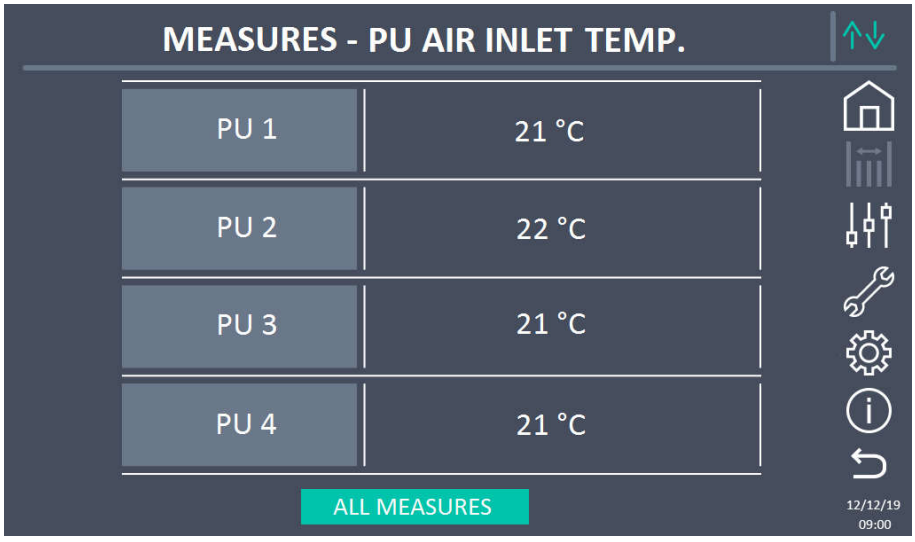
3.1 MEASUREMENTS DISPLAY

Pressing the ***MEASUREMENTS*** icon, you access the page displaying a table with all the measurements acquired by the UPSaver and visible to the user.



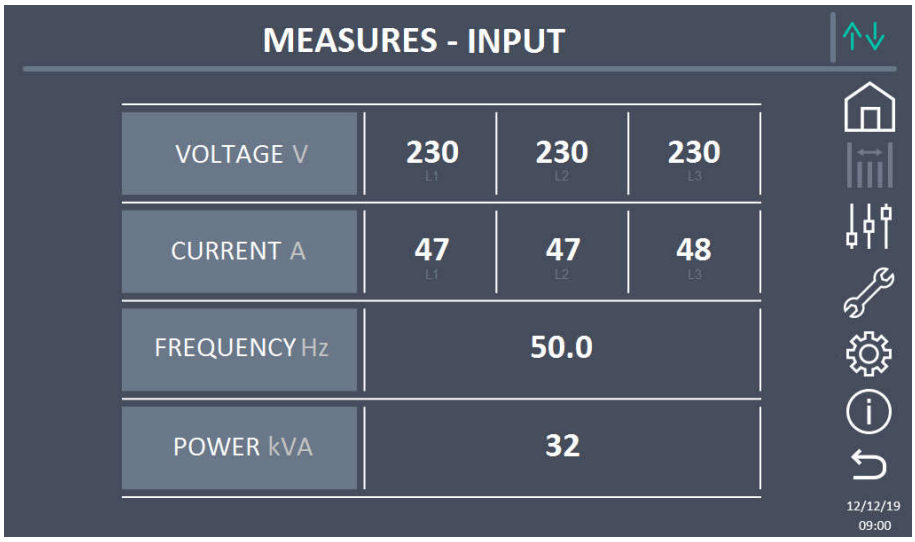
Picture 2 – Measures section – All measures

Pressing the ***PU AIR INLET TEMPERATURES*** icon opens the page relevant to the temperature measurements of the *PU* from which you return to ***ALL MEASUREMENTS*** pressing the corresponding icon.



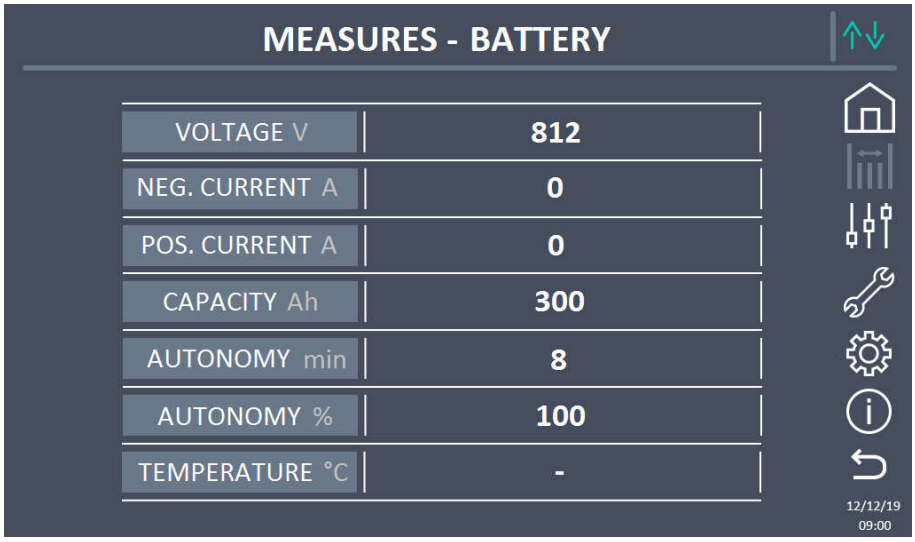
Picture 3 – Measures section – Power Unit air inlet temperatures

Pressing the ***MAINS*** icon of ***HOME*** opens the page relevant to the input measurements.



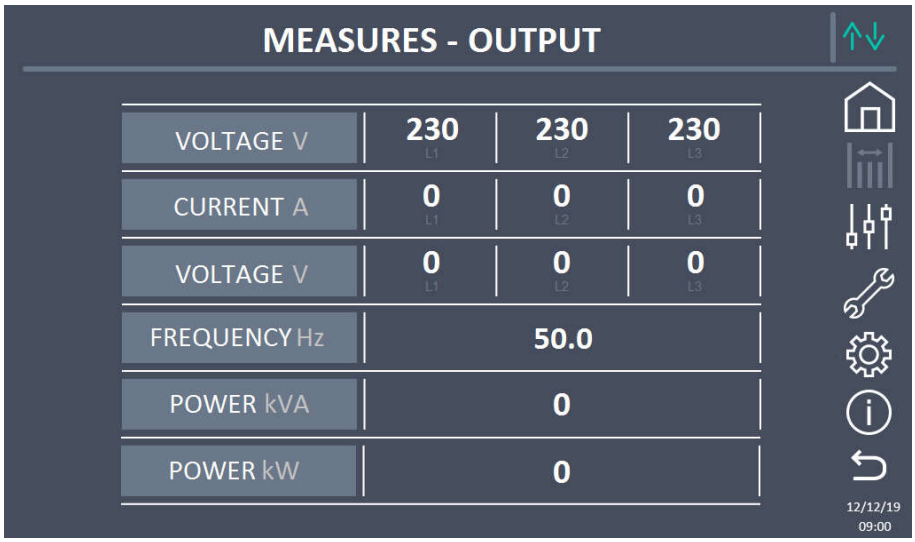
Picture 4 – Measures section – Input

Pressing the ***BATTERY*** icon of ***HOME*** opens the page relevant to the *Battery* measurements.



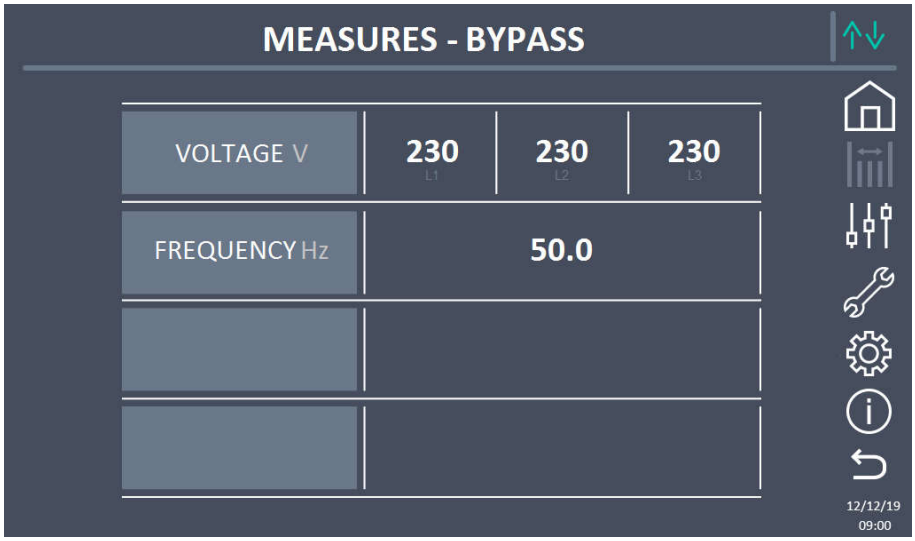
Picture 5 – Measures section – Battery

Pressing the ***LOAD*** icon of ***HOME*** opens the page relevant to the output measurements.



Picture 6 – Measures section – Output

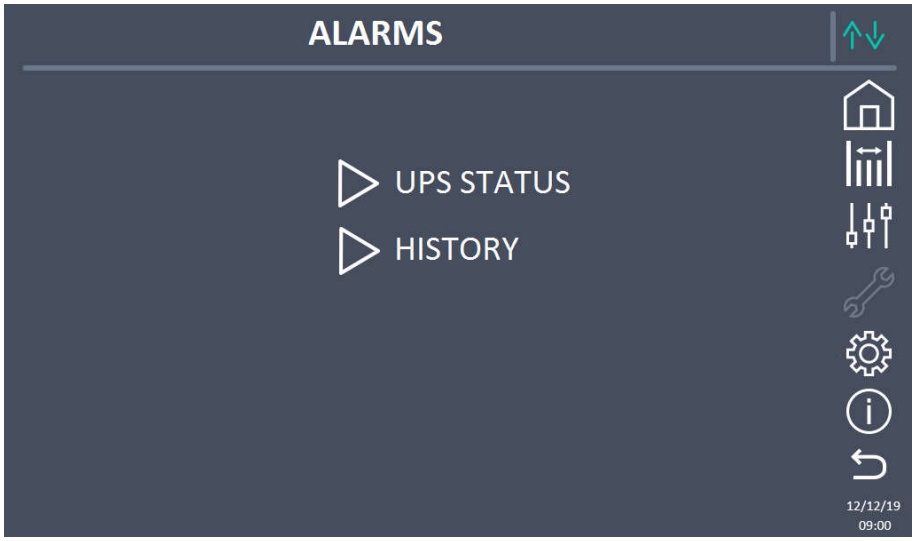
Pressing the ***BYPASS*** icon of ***HOME*** opens the page relevant to the *Bypass* measurements.



Picture 7 – Measures section – Bypass

3.2 BASIC DIAGNOSTICS

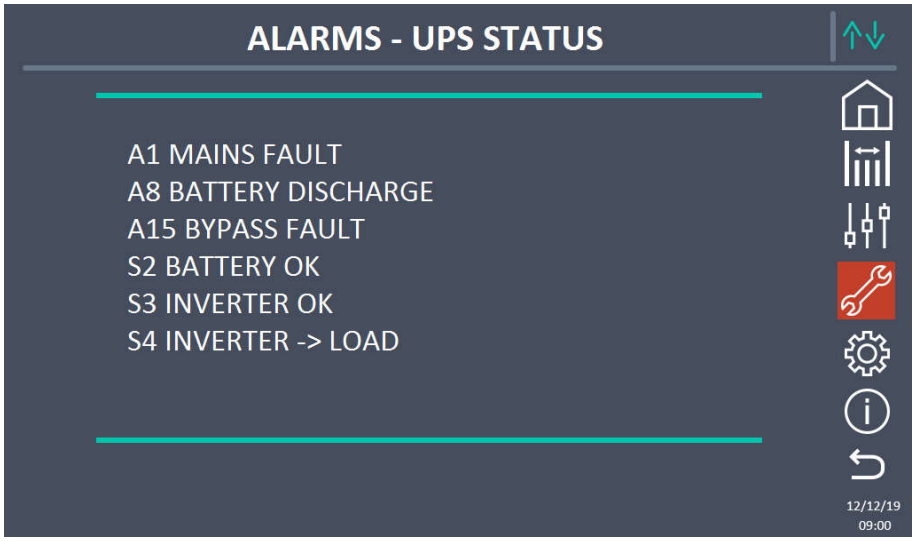
Pressing the ***ALARMS*** icon, the page is displayed relating to the operating status of the UPS and the events log.



Picture 8 – Alarms section

3.2.1 Operating status

The **UPS STATUS** icon displays the status of UPS, including any alarms present.



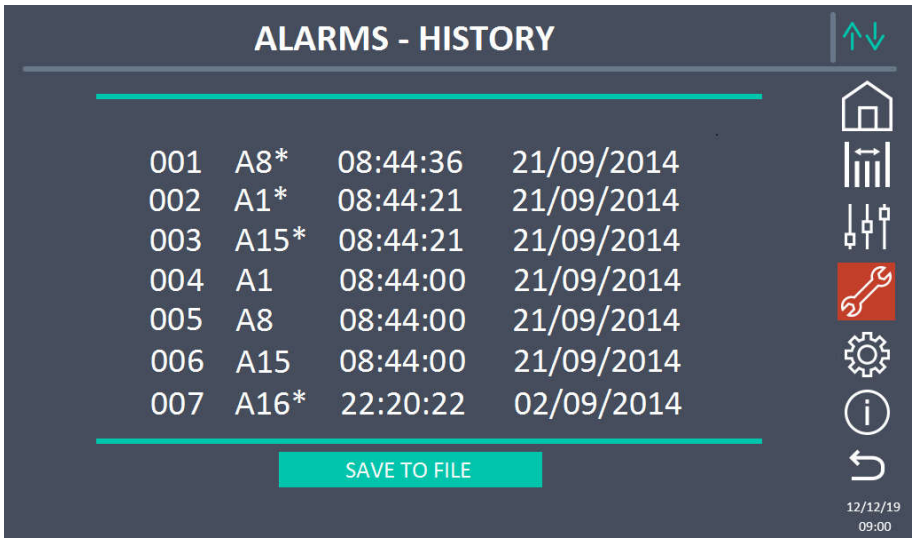
Picture 9 – Alarms section – Ups status

The list can be scrolled using a slide on the screen.

Alarms automatic deletion

If an alarm presents and then the conditions that caused it are eliminated, deletion is automatic.

3.2.2 Alarms log display



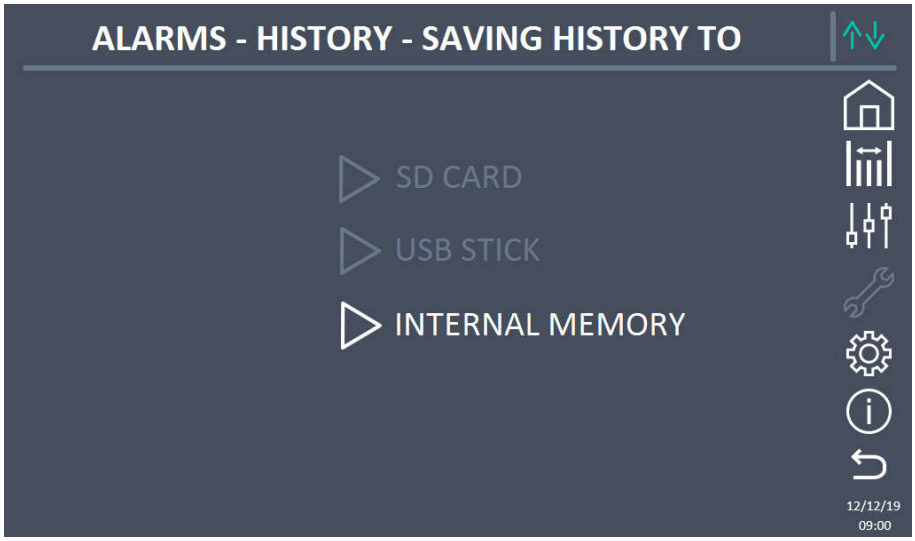
Picture 10 – Alarms section – History log

The first event displayed is the last one in order of time; a new event automatically causes all the others to move a position down.

Each line displays: the position on the list, the alarm code, the date and time; an asterisk indicates the alarm automatic reset.

The maximum number of events displayable is equal to 500 and the list can be scrolled with a slide on the screen.

Pressing the ***SAVE TO FILE*** button opens the following page.



Picture 11 – Alarms section – Save the history log

The touch screen automatically recognises insertion of external memory media (UBS stick or SD card) and enables the respective icon.

A text file is saved that outlines all the same information available on the screens, integrated with a description of the event.

3.2.3 List of Alarms and Statuses

Alarms display and registration mode

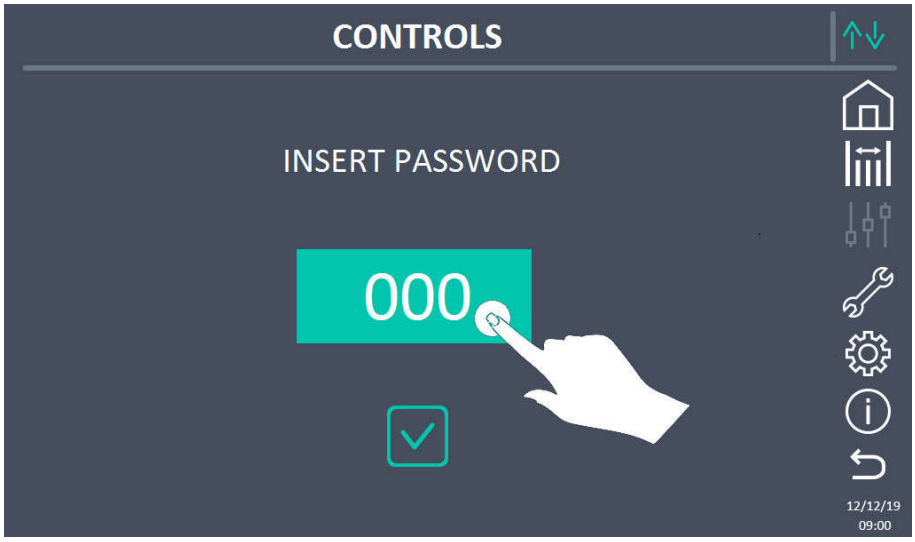
- When entering in the ***ALARMS - STATUSES*** section, the statuses are displayed in increasing order.
- The alarms are displayed when they activate and are accompanied, if enabled, by a buzzer sound.
- The alarms remain visible until they are present and are automatically logged on the log memory, with the date and time.

Description of Alarms and Statuses

For an in-depth description of the Alarms and Statuses, refer to the “UPSaver - Alarms and Statuses” document.

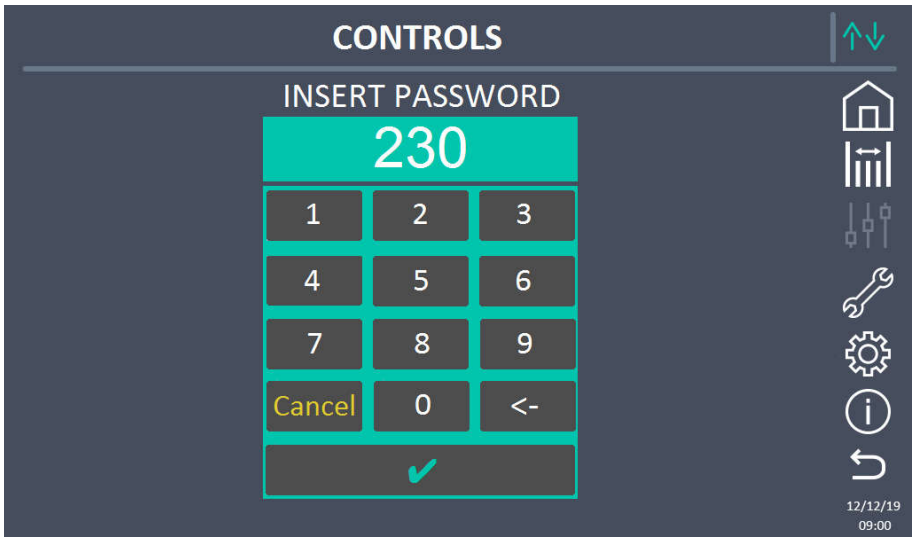
3.3 CONTROLS AND ADVANCED OPERATIONS

Pressing the ***CONTROLS*** icon displays the access pages to the controls section, protected by password.



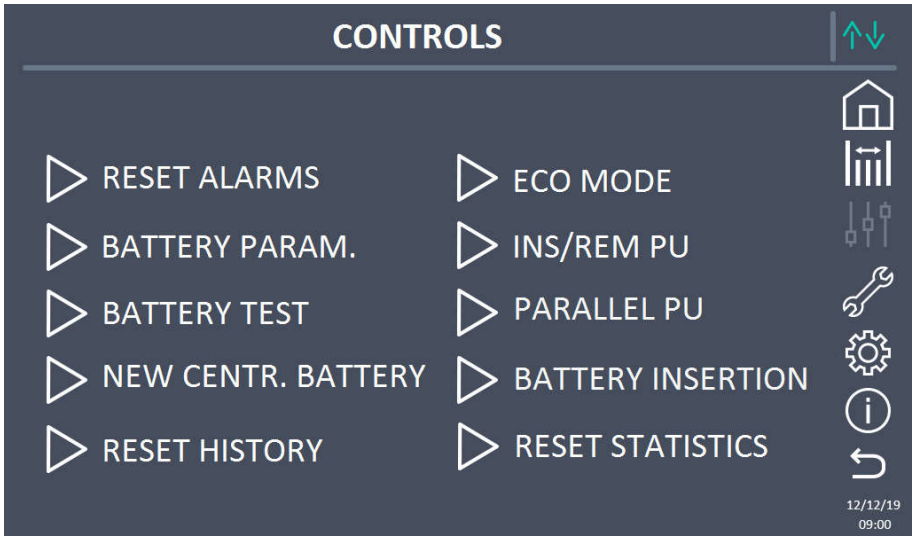
Picture 12 – Controls section – Insert password

Press in the section indicated in the image above to set the password.



Picture 13 – Controls section – Insert password

Then set the correct password and confirm.



Picture 14 – Controls section

Password protected access

The ***CONTROLS*** section is password protected, set by the manufacturer to prevent access to unauthorised staff.

- You are advised to minimise distribution of the access password.
- Changes to the operating parameters and the start operations on the UPS can be potentially hazardous for the device and for people.

3.3.1 Reset alarms

The UPS is equipped with internal protections which can block the system or some of its sections. Using the ***RESET ALARMS*** menu, you can reset normal operation. If the fault persists, the UPS returns to the previous lock position.

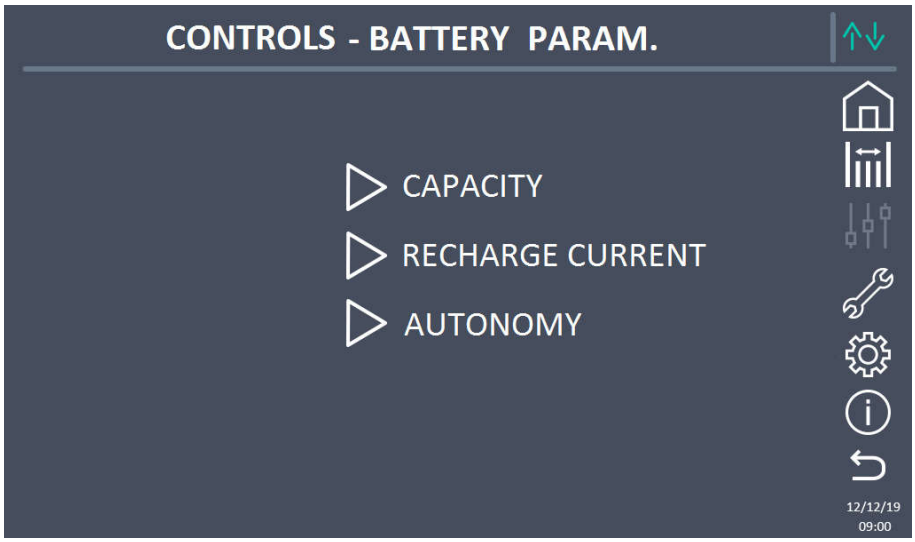
In some cases, RESET is necessary to simply restore a fault signal, therefore the UPS continues to work.

There are particular locking conditions of the individual modules which must be restored by directly entering the ***CONTROL*** section of the individual modules (refer to the “UPSaver - Alarms and Statuses” section).

Refer to the document "UPSaver - Alarms and States" to learn about anomalies or lockout conditions that can be reset from the display.

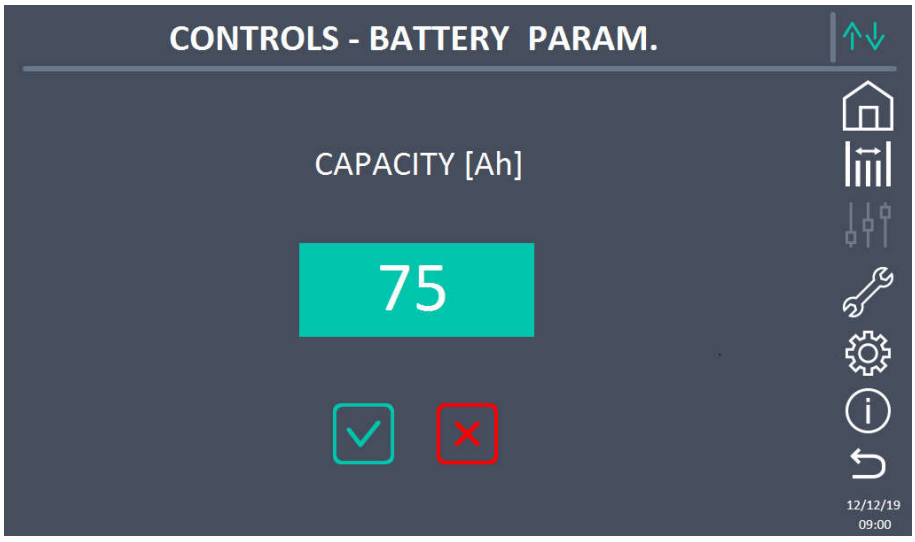
3.3.2 Battery parameters

If the UPS was tested without the characteristic data known of the accumulators battery, the ***BATTERY PARAM.*** section allows their setting. You access the individual parameters settable from the following screen.



Picture 15 – Controls section – Battery parameters

The various setting screens of the parameters are similar to one another and requires entry of the values and confirmation; as a reference, the configuration screen of the battery capacity is outlined.



Picture 16 – Controls section – Battery capacity

3.3.3 Battery test: allows you to perform a battery efficiency test

The ***BATTERY TEST*** section allows you to run a battery discharge test. It allows you to execute an efficiency test of the battery. If the battery is not efficient, at the end of the test, an alarm will be generated.

Possible power loss

If the battery is not fully charged, this test can be risky for charge continuity.

3.3.4 New centralised battery: inserting a new battery

The ***NEW CENTR. BATTERY*** section is used if, by connecting a fully charged battery to the UPS you want to manually communicate to the control unit to initialise the algorithm to calculate the autonomy and set the charge level to 100%.

To set the autonomy 100%, you must access the page and confirm the testing screen operation.

3.3.5 Reset history

To delete the events log, select the ***RESET HISTORY*** section and confirm the operation on the next screen.

Data loss

The events log contains a lot of very important data to monitor the behaviour of the device over time. You are advised to save the data before deleting it.

3.3.6 Eco mode: Changing operating mode

The ***ECO MODE*** section allows you to change the operating mode of the UPS from VFI – Voltage Frequency Independent operation (on-line double conversion) to VFD – Voltage Frequency Dependent (ECO *STANDARD or UHE*). By doing so, the load is powered directly by the AC network and the inverter is on, in *ECO STANDARD*, or off, in *UHE*, ready to sub-enter in the event of a network fault. Switching takes place in a maximum time equal to 10 ms.

The stability of the AC network is controlled by a specific algorithm that includes automatically disabling the ***ECO MODE*** if the voltage or the frequency are non-compliant with the scheduled requirements.

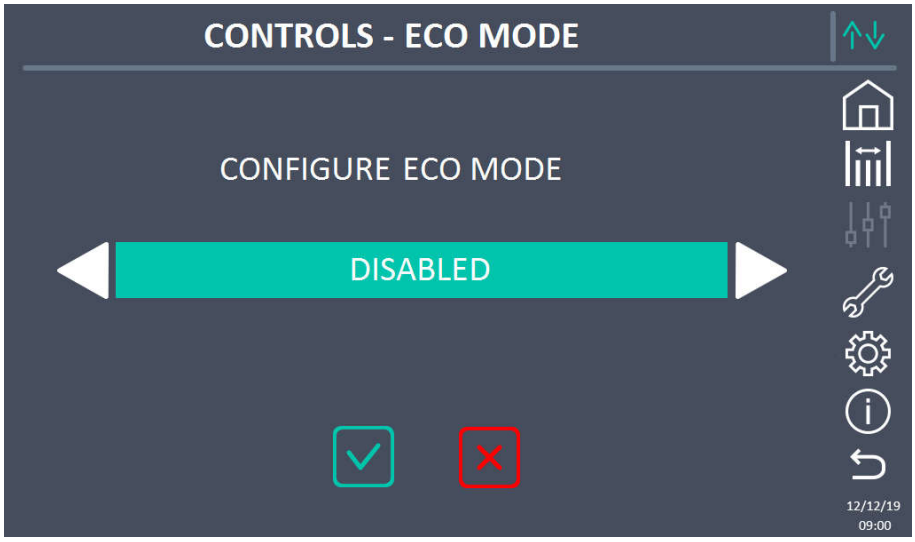
Changing the operating mode of the UPS – ECO MODE

The changing operation of the operating mode of the UPS is reserved for trained staff.

Before setting the ***ECO MODE***, check the load is suitable for that mode and, if necessary, that it supports voltage cuts lasting less than 10 ms.

You are advised to work under the supervision of the manufacturer’s staff or according to their specific instructions.

The manufacturer cannot be held in any way liable for any damage due to lack of expertise or inexperience of staff responsible for manoeuvres.

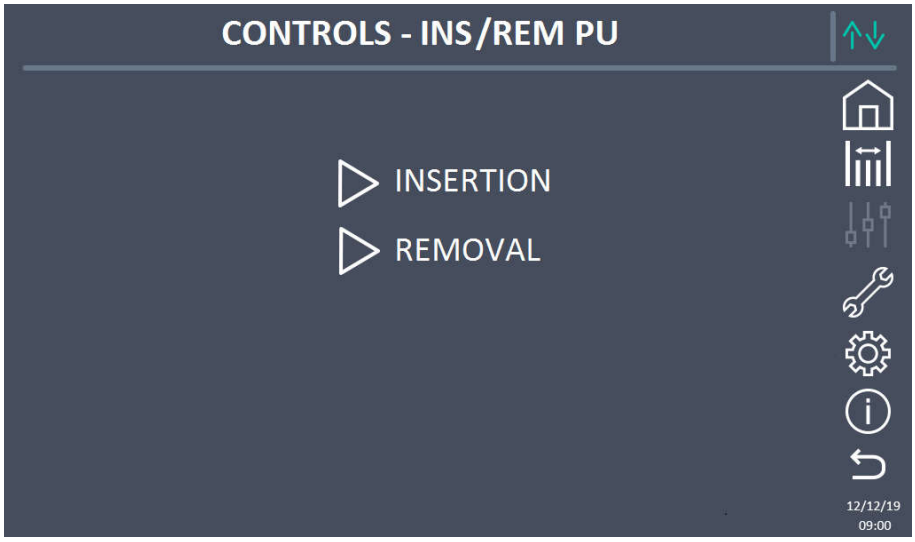


Picture 17 – Controls section – Eco mode

Pressing the side arrows, you can select the following modes:

- ***STANDARD:*** ECO mode, with load powered by *Bypass* line. The *Inverter* and the *Rectifier are on*.
- ***UHE:*** ECO mode, with high efficiency. The load is powered by the *Bypass,* the *Inverter* and the *Rectifier* are off.
- ***DISABLED:*** Double conversion online mode (DHE).

3.3.7 Add/rem power unit



Picture 18 – Controls section – Insertion/Removal Power Unit

Using this menu, you can remove a PU from the system, or insert one. The inclusion/exclusion manoeuvres are delicate operations and potentially hazardous and must be carried out by qualified staff. For more in-depth details on the procedures, refer to the “Start-up & shut.down UPSaver” manual.

3.3.8 Parallel power unit: logical change of PU redundancy

The ***PARALLEL PU*** allows you to change the redundancy logic of the *PU*. This operation is reserved to staff who have specific training on the product.

Logical change of Power Modules redundancy

The change operation of the redundancy logic of the modules is reserved for trained staff.

Before changing the logic, check the load is stable and permits the change.

You are advised to work under the supervision of the manufacturer’s staff or according to their specific instructions.

The manufacturer cannot be held in any way liable for any damage due to lack of expertise or inexperience of staff responsible for manoeuvres.

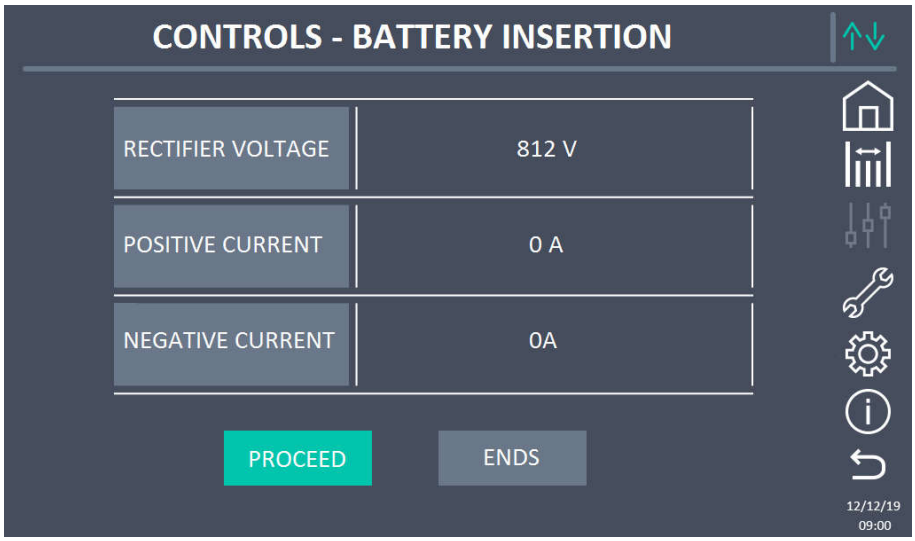
Pressing the side arrows, you can select the desired redundancy.

Picture 19 – Controls section – Parallel Power Unit

In a *UPSaver* system composed of N modules, you can select one of the following redundancy values: *AUTO, ENHANCED EFFICIENCY MODE, POWER, R + 1, … R + (N - 1).*

3.3.9 Battery insertion

Using the ***BATTERY INSERTION*** you can execute the procedure to insert the *Battery* in the system.



Picture 20 – Controls section – Battery insertion

Pressing the ***CONTINUE*** button, the voltage of *Rectifier* will be lowered to a lower level than that of the *Battery*. At this point, you can close the *BCBS* switch connecting the battery to the DC bar.

During this phase, the ***CONTINUE*** button remains disabled and the ***END*** button is enabled. Once the battery is connected, pressing the ***END*** button, the voltage of the *Rectifier* will be brought to the value set in *EEPROM.*

The measurement of the DC voltage and the current values of the battery are outlined on the display.

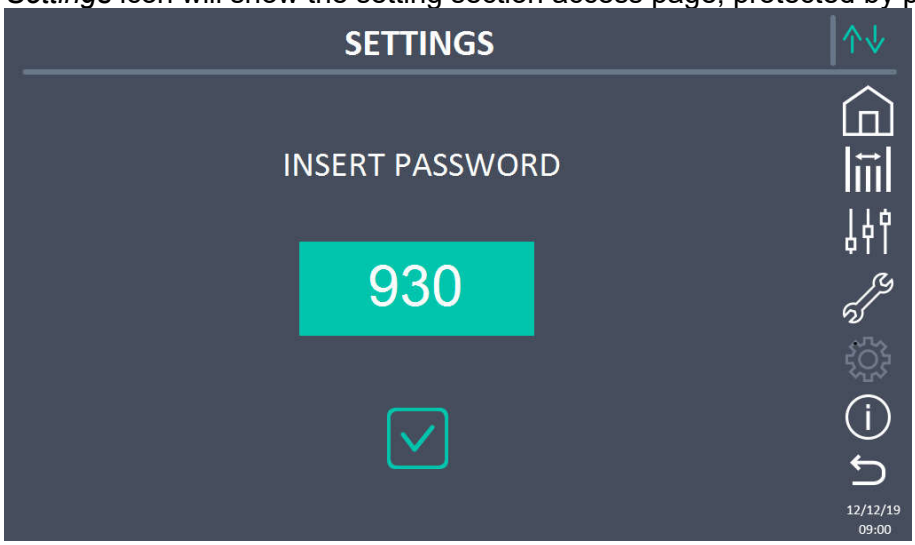
The reduction and increase operations of the DC voltage obtained by pressing the two ***CONTINUE*** and ***END*** keys request confirmation, on the display, by the user.

3.3.10 Reset statistics

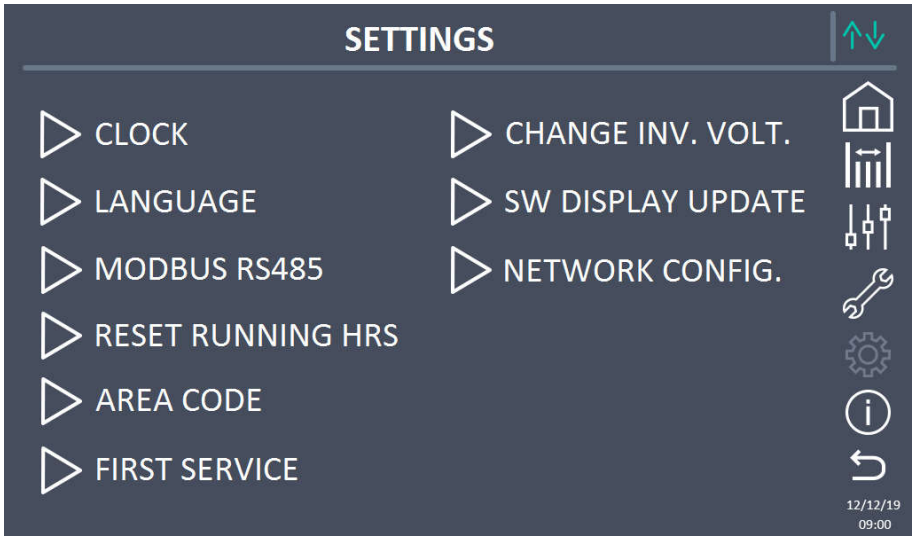
To delete the statistics, select the ***RESET STATISTICS*** section and confirm the operation on the next screen.

3.4 SETTINGS AND ADVANCED OPERATIONS

Pressing the *Settings* icon will show the setting section access page, protected by password.



Picture 21 – Settings section – Insert password



Picture 22 – Settings section

The EXTERNAL SYNC and LOAD SYNC menus may also be present in the screen above.
The EXTERNAL SYNC or LOAD SYNC will be visible only if the hardware to use the relative option is present.

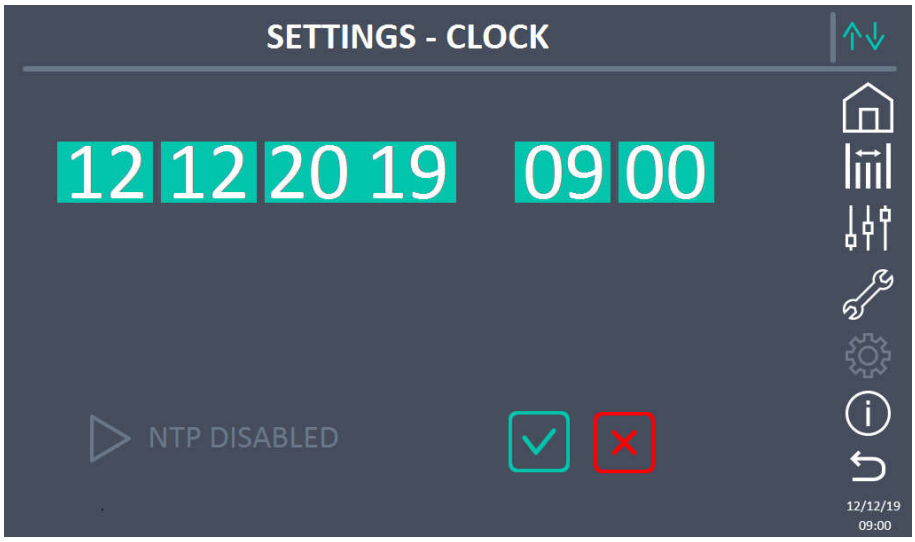
Password-protected access

The SETTINGS menu is protected by a password set by the factory in order to prevent access to unauthorized personnel.

- We recommend minimum disclosure of the access password.
- Changes to the operating parameters and starting operations on the UPS may be potentially dangerous for the device and for persons.

3.4.1 Clock: setting the date and time

The date and time can be set by the ***CLOCK*** page.

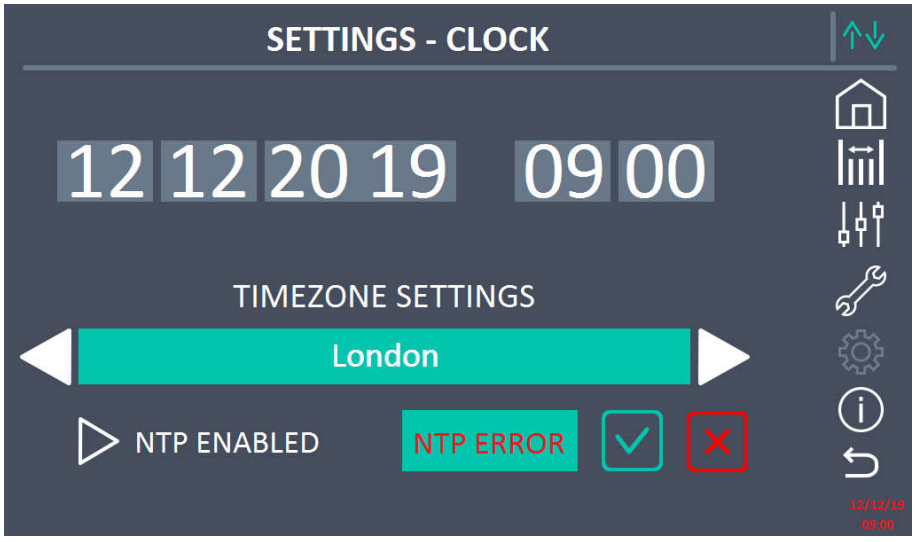


Picture 23 – Settings section – Clock – Manual setting of date and time

Setting current date and time correctly

The correct setting of the date and time is fundamental for the registration of the events log.

The system also allows setting of a NTP server for date and time synchronisation. Pressing the ***DISABLED*** button enables this configuration mode and it is not possible to set the data manually.



Picture 24 – Settings section – Clock – Automatic setting of date and time

The access parameters to the NTP server can be configured by the ***NETWORK CONFIGURATION*** section of the ***SETTINGS*** menu. If there is no response from the server, or a LAN connection is missing, the following error message appears ***NTP ERROR***.

3.4.2 Languages

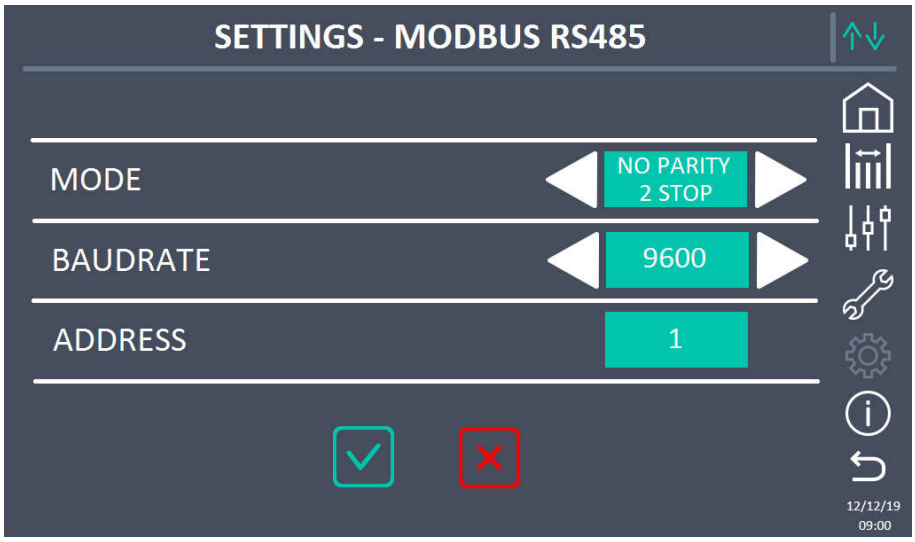
The following screen displays the languages settable for the display.

Picture 25 – Settings section – Languages

The language is selected by pressing one of the flags.

3.4.3 Modbus RS485

Inside the ***MODBUS RS485*** menu, the parameters can be set relating to communication via MODBUS RS485 protocol.

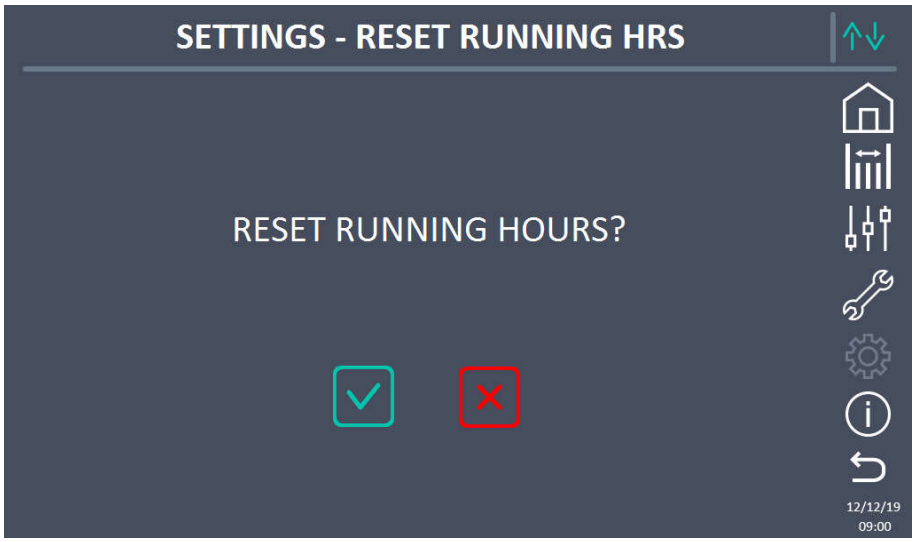


Picture 26 – Settings section – ModBus RS485

The configurable parameters are:

- ***MODE:*** The following modes can be selected*: no parity 1 stop bit, no parity 2 stop bit, even parity 1 stop bit, even parity 2 stop bit, odd parity 1 stop bit, odd parity 2 stop bit.*
- ***BAUDRATE:*** Baudrate *9600 and 19200 are settable.*
- ***MODBUS ADDRESS:*** The ModBus address must be between *1* and *247.*

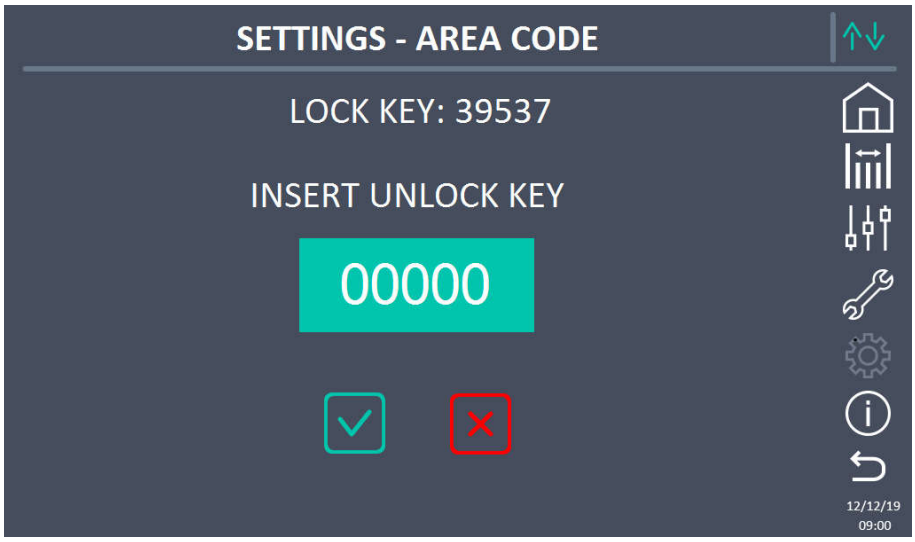
3.4.4 Reset running hours



Picture 27 – Settings section – Reset running hours

Using this menu, you can reset to zero the working hours of the UPS. The Power Modules have an internal hours counters which is used in the Enhanced Efficiency Mode algorithm. Resetting the UPS hours counter does not influence the hours counter of the PU. To reset the hours counter of the *PU* to zero, directly use the menu dedicated to it.

3.4.5 Area code



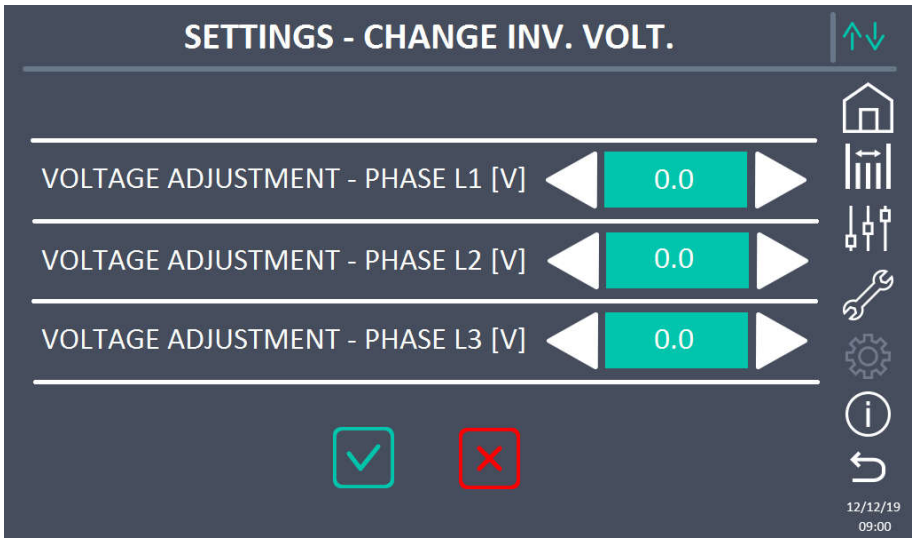
Picture 28 – Settings section – Area code

This menu gives the service operator the necessary authorisations to connect to the UPS with the diagnostic software, to avoid unauthorised staff carrying out maintenance on the machine. The procedure includes contacting the service office and communicating the ***LOCK CODE*** (which changes on each access to the menu). The service office provides the operator with the relevant ***UNLOCK CODE***, thereby enabling communication between the UPS and the diagnostics software.

3.4.6 First service

After a certain number of working hours, the UPS enables a warning to remind the user to carry out routine maintenance of the apparatus. Once maintenance is carried out, the service operator communicates to the service office the 5-digit code which is obtained entering in this menu and via the unlock code obtained the warning can be reset. The menu is only accessible when the first support warning is enabled, otherwise it remains disabled.

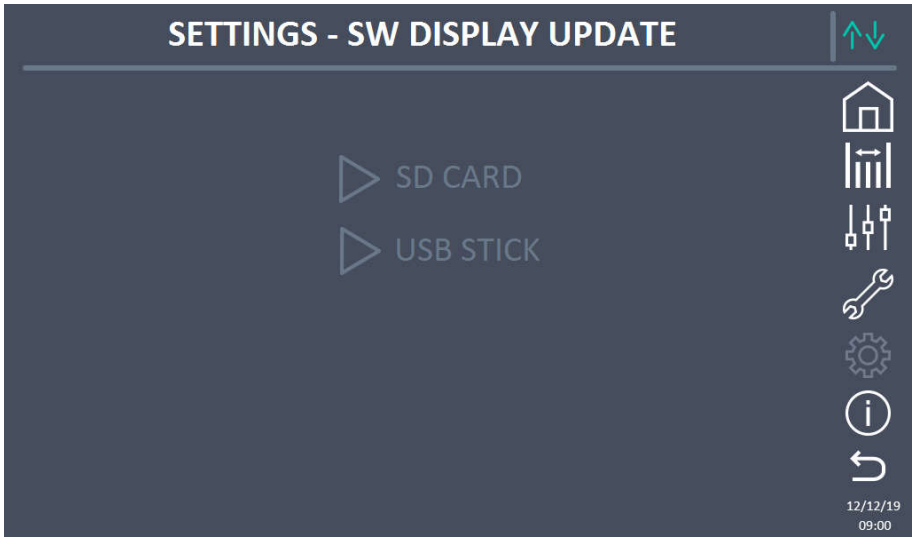
3.4.7 Change inv. volt.



Picture 29 – Settings section – Change inverter voltages

Using the arrows, you can increase or decrease the *Inverter* voltage on each phase independently, in steps of 0.5 V. Once the voltage compensation to apply is selected, the green tick should be pressed to make the changes effective.

3.4.8 Sw display update

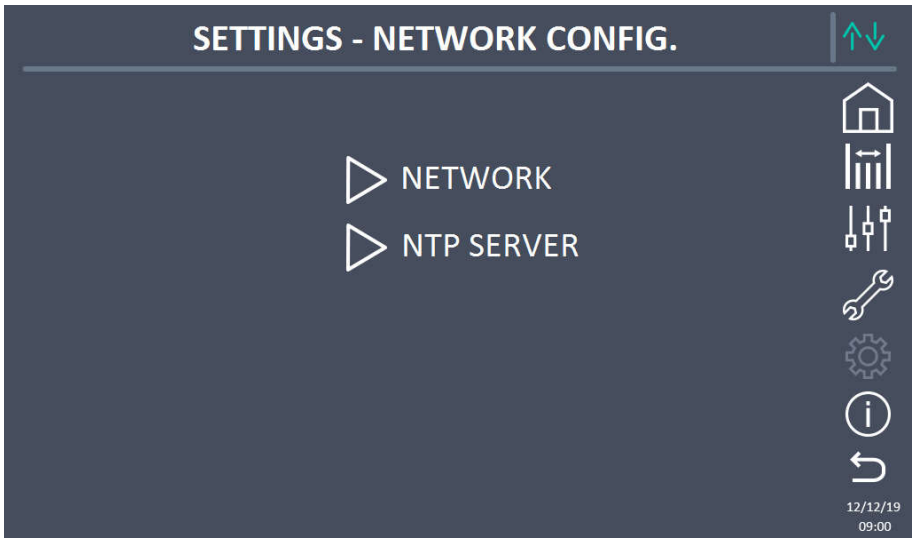


Picture 30 – Settings section – Touch display software upgrade screen

The Touch Display software can be upgraded using this menu. Having inserted the SD card or the USB stick containing the upgrade software, the control unit will automatically recognise the physical medium and highlight one of the two items. Clicking on it, you reach an automatic upgrade procedure which will guide the user in the various steps necessary for the operation.

3.4.9 Network config.: network parameters setting on the touch screen

Using the ***NETWORK CONFIG.,*** you can configure the parameters relating to the LAN network and the synchronisation servers of the system time.

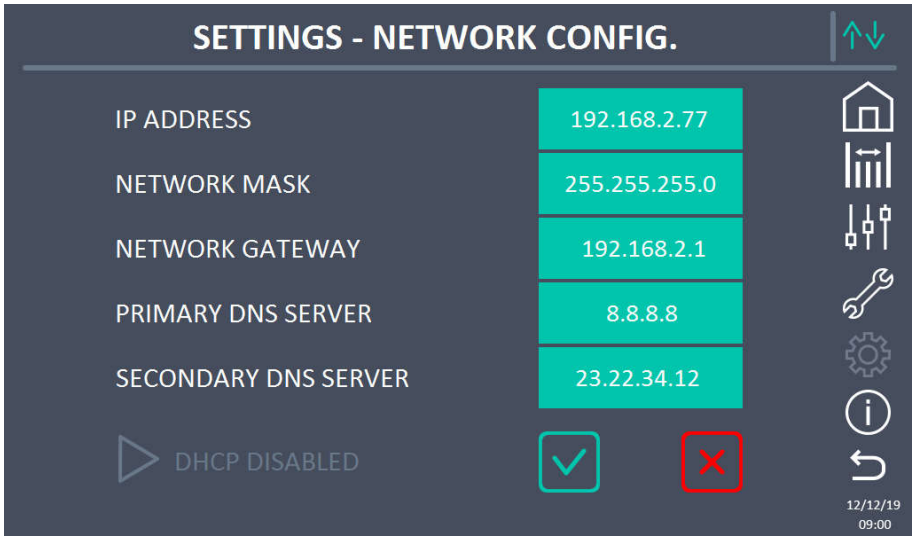


Picture 31 – Settings section – Touch screen network parameters setting

3.4.9.1 Network: LAN parameters setting

The configurable parameters are:

- ***IP ADDRESS***
- ***NETWORK MASK***
- ***NETWORK GATEWAY***
- ***PRIMARY DNS SERVER***
- ***SECONDARY DNS SERVER***
- ***DHCP: ENABLED/DISABLED***



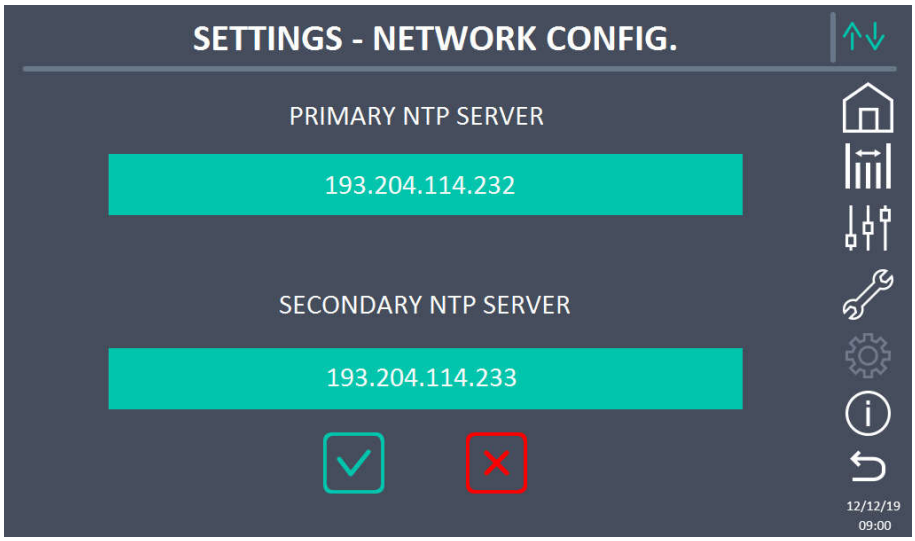
Picture 32 – Settings section – LAN parameters setting

3.4.9.2 NTP parameters setting

For the NTP service, the configurable parameters are:

- Primary NTP server
- Secondary NTP server

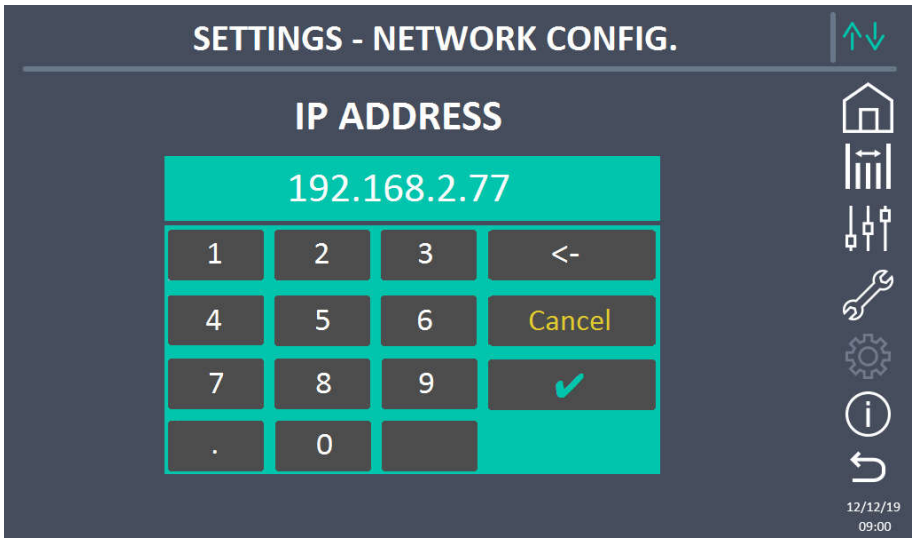
Enabling / disabling NTP is done in the *SETTINGS - CLOCK* menu.



Picture 33 – Settings section – NTP parameters setting

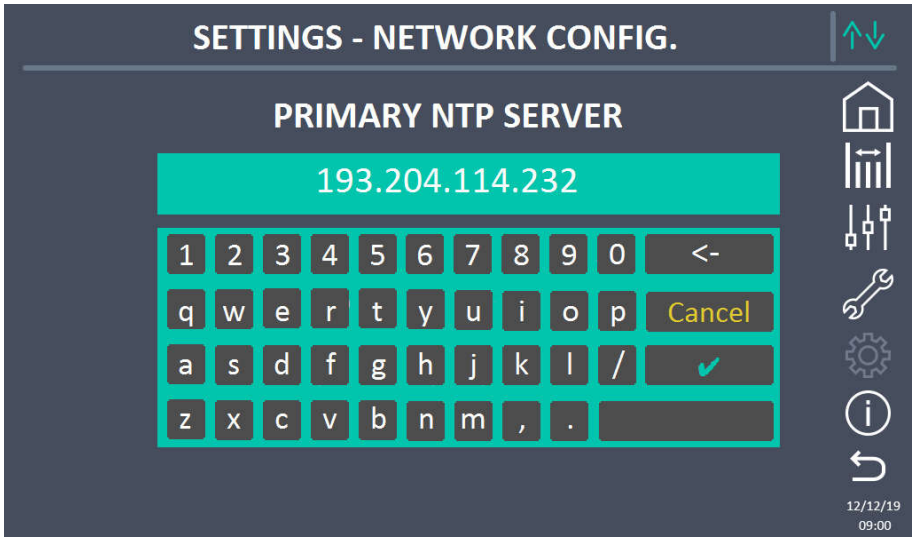
3.4.9.3 Modifying the parameters

The modification of the parameters is performed pressing on the field that is to be modified; the parameter will be displayed on the editable string in the upper part of the page, together with a keypad.



Picture 34 – Settings section – Modification of numerical parameters

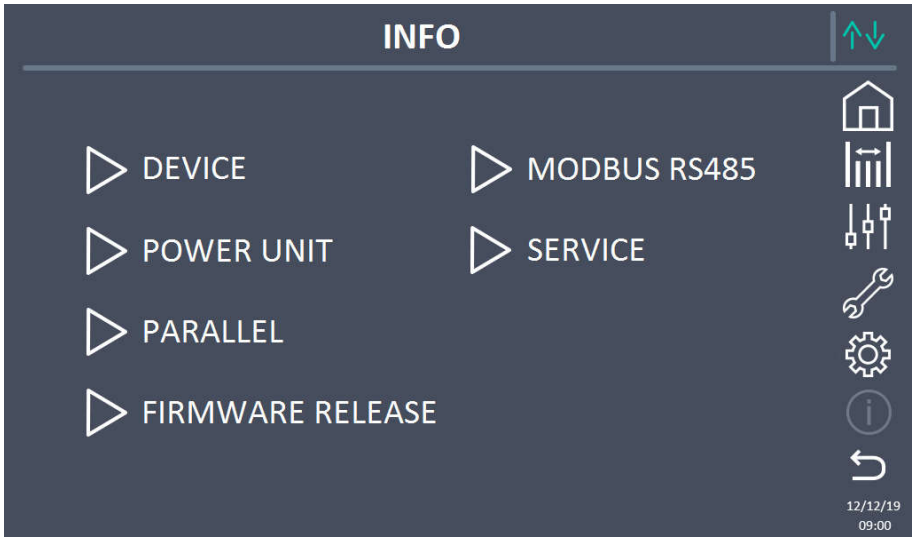
The fields related to the NTP servers may either be numerical (IP address of the remote server) or alphanumerical when the remote server can be reached via a web address. In such case the keypad that will appear in the page is complete.



Picture 35 – Settings section – Modification of NTP address parameters

3.5 INFORMATION ON THE SYSTEM

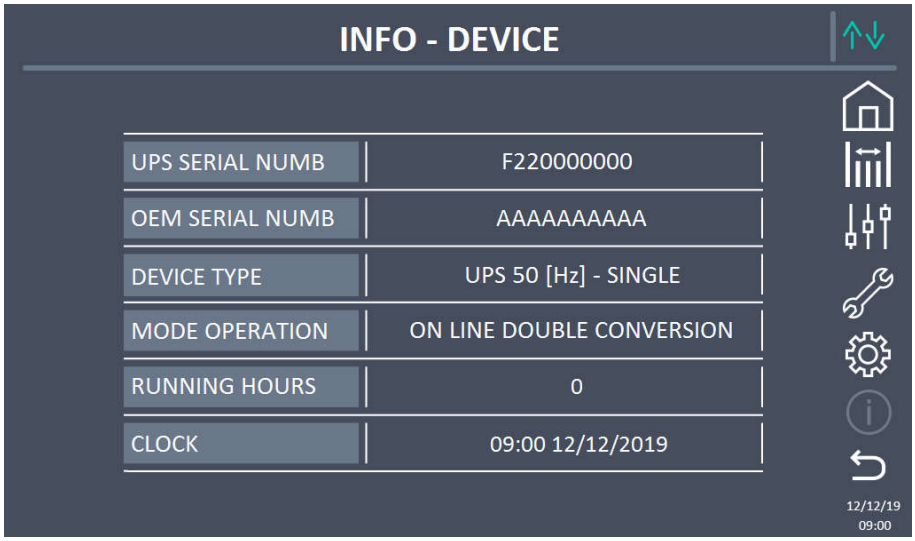
The ***INFO*** menu provides overall information on the UPS; press the relevant icon to access the main screen.



Picture 36 – Info section

All the data displayed inside the various sections are set by default using the specific interface software and cannot be edited except by people authorised by the manufacturer.

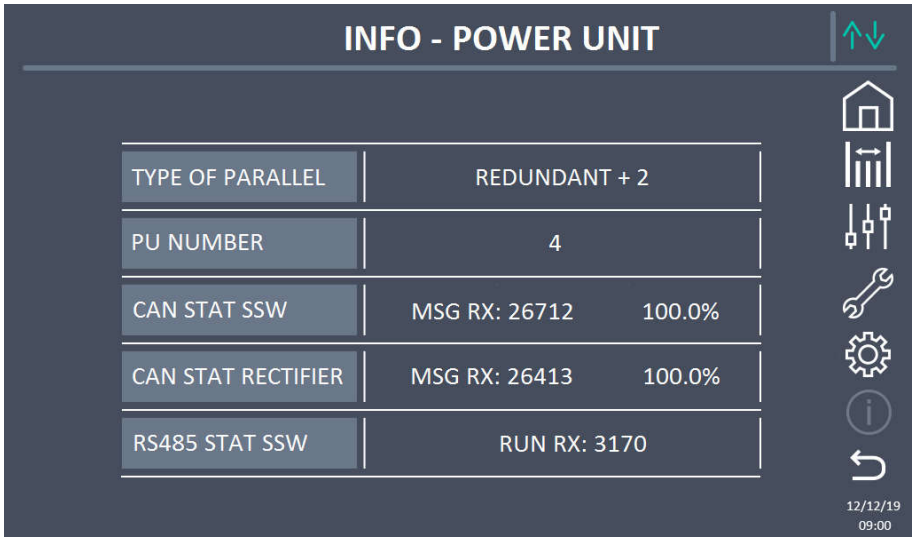
3.5.1 Device



Picture 37 – Info section – Device

DATA DISPLAYED	DESCRIPTION
UPS/OEM SERIAL NUMBER	The serial number of the device assigned by the manufacturer or possible distributor (OEM).
DEVICE TYPE	It can be ***SINGLE*** or ***PARALLEL*** if the system is in parallel with other UPS *UPSaver.*
MODE OPERATION	The mode of operation are ON LINE DOUBLE CONVERSION, ECO, etc..
RUNNINGS HOURS	Data relative to the number of IOBM working hours.
CLOCK	Actual setting of the system date and time.

3.5.2 Power unit



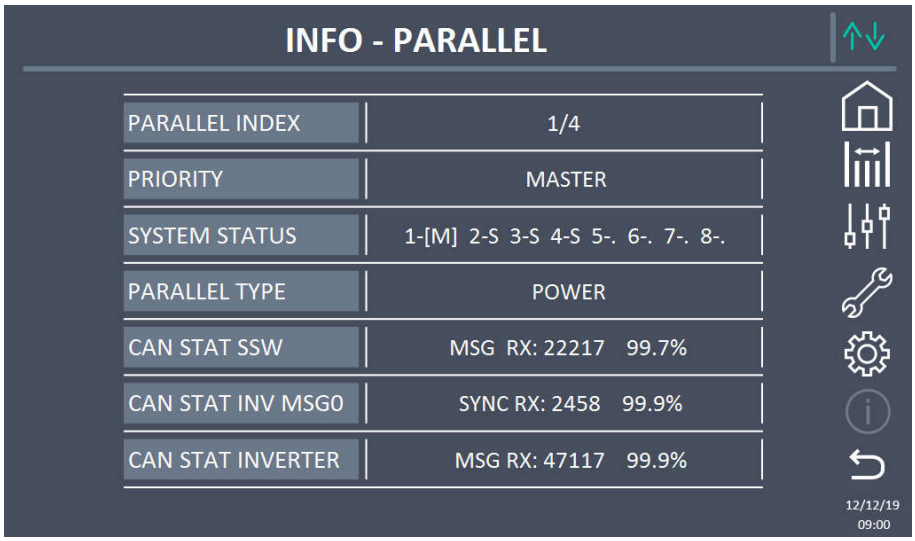
Picture 38 – Info section – Power Unit

The screen provides information on the composition of the system and the operating modes of the *PU*. In the example in the figure, the system is formed by 4 PU (1340 kVA) which work in "***REDUNDANT +2***" mode.

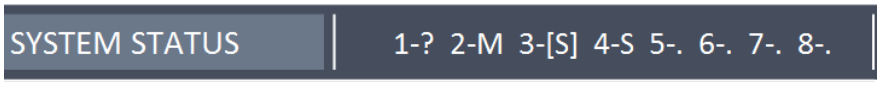
The lines relating to the statistics provide information on the quality of communication between the *Power Unit* and *IOBM*.

3.5.3 Parallel

The page containing the information about the parallel is only enabled if the system UPSaver is in parallel with others UPSaver.

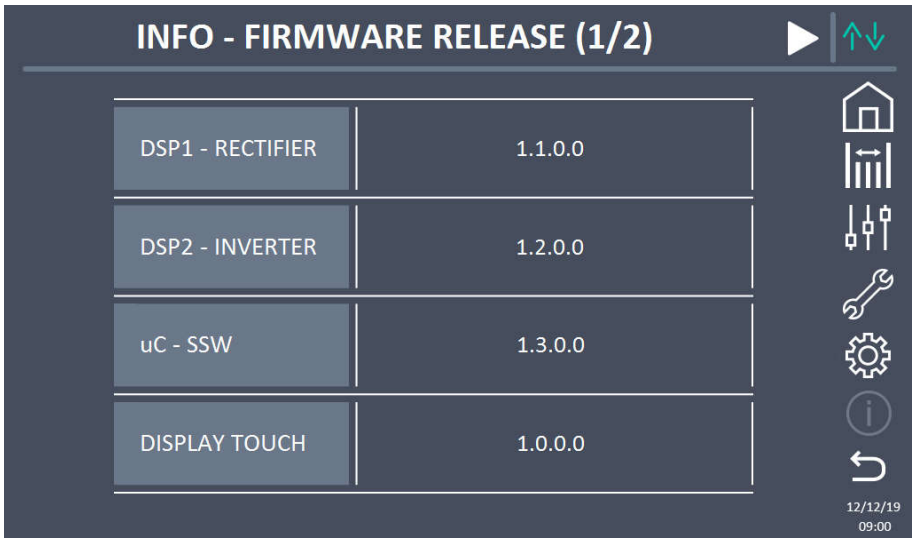


Picture 39 – Info section – Parallel

DATA DISPLAYED	DESCRIPTION
PARALLEL INDEX	The first number identifies the *position* of that specific UPSaver within the parallel system. The second number represents the total number of *UPSaver* units.
PRIORITY	The string on the second line may have two values, “MASTER” or “SLAVE”. Only one *MASTER UPSaver* can be present in the system; if not there will be a conflict on the data communication bus.
SYSTEM STATUS	This field gives a general indication regarding the communication between the UPSaver composing the system. ➢ The numbers represent the single UPSaver units. ➢ The letters M and S stand for MASTER and SLAVE respectively. ➢ The brackets [ ] around a letter indicate that we are working on that specific UPSaver unit. ➢ A question mark next to a number indicates that that UPSaver unit is not communicating on the data bus. Let us assume to have the following situation: ➢ system composed of 4 UPSaver units; ➢ UPSaver2 is currently the MASTER UPSaver; ➢ we are checking the data communication on UPSaver3; ➢ UPSaver1 is not communicating. The section will be as shown below.  *Picture 40 – Info section – Parallel bus communication status*

PARALLEL TYPE	The string may have three values, “POWER”, “REDUNDANT+x” or “AUTO”. ➢ POWER means that the parallel system is so set as to require the presence of all the UPSaver units to feed the load. ➢ REDUNDANT+x means that the system is redundant and the redundancy index is indicated by number “X”. For example, in a system composed of 3 UPSaver units, “REDUNDANT+2” means that only one of the UPSaver units is sufficient to feed the load. ➢ AUTO: redundancy automatically calculated by the cpu depending on UPSaver load.
CAN STAT SSW	Number of messages received and percentage of reception accuracy regarding the status of the static switches. The messages are exchanged between all the UPSaver units, therefore the number will increase on all of them.
CAN STAT INV MSG0	Number of messages received and percentage of reception accuracy regarding the synchronism signals. The messages are sent by the MASTER UPSaver, therefore the number will only increase on the SLAVE UPSaver units.
CAN STAT INVERTER	Number of messages received and percentage of reception accuracy regarding the status of the system. The messages are exchanged between all the UPSaver units, therefore the number will increase on all of them.

3.5.4 Firmware version

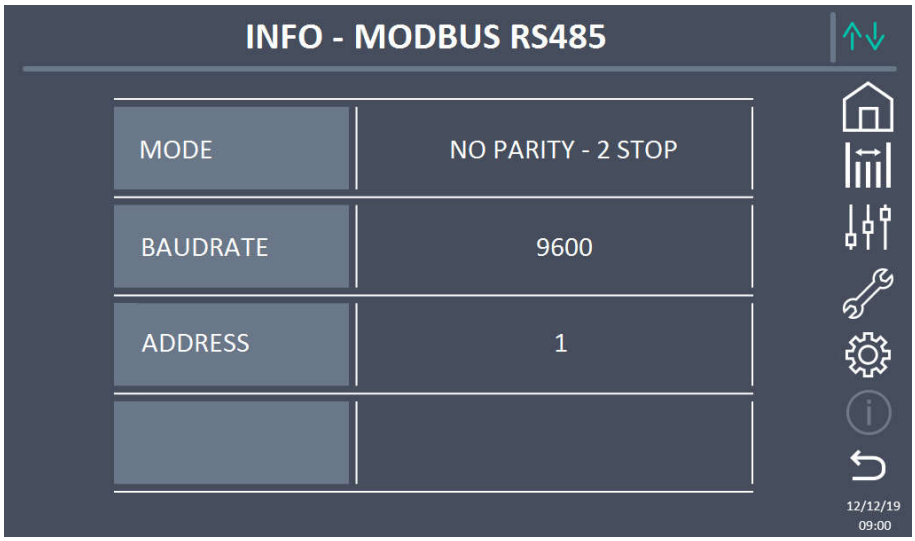


Picture 41 – Info section – Firmware version

The second information page relating to the firmware version installed contains the licence contact of the touch screen operating software.

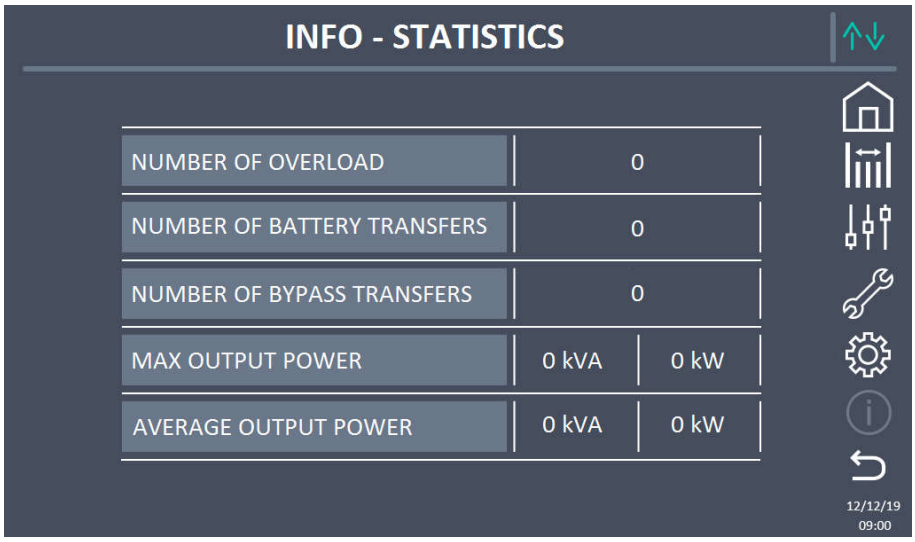
3.5.5 Modbus RS485

This menu contains the information relating to the ModBus - RS485 communication which can be set in the ***SETTINGS*** menu.



Picture 42 – Info section – Modbus RS485

3.5.6 Statistics



Picture 43 – Info section – System statistics

This menu displays the following system statistics:

DATA DISPLAYED	DESCRIPTION
OVERLOAD NUMBER	Totals the number of system overloads.
NUMBER OF TRANS. IN BATTERY	Totals the number of transfers in *Battery*, i.e. the times the *Inverter* is powered by the *Battery*.
NUMBER OF TRANS. IN BYPASS	Totals the number of times the system transfers the load on *Bypass*.
MAXIMUM OUTPUT POWER	Displays the maximum output power saved, in kW and in kVA.
AVERAGE OUTPUT POWER	Displays the daily average power, in kW and in kVA.

The statistics are contained in a buffered memory, therefore they are also saved if the UPSaver is off. Statistics can be reset (all the values are reset to zero) from the ***RESET STATISTICS*** menu in the *CONTROL* section.

3.5.7 Service: information relating to support

The ***SERVICE*** menu provides information relating to technical support on the UPSaver. The information is displayed using a text string that outlines the main contact details.

However, reference should be made to the addresses and the contact numbers outlined in this manual.

TOUCH SCREEN – MANAGEMENT OF THE PU

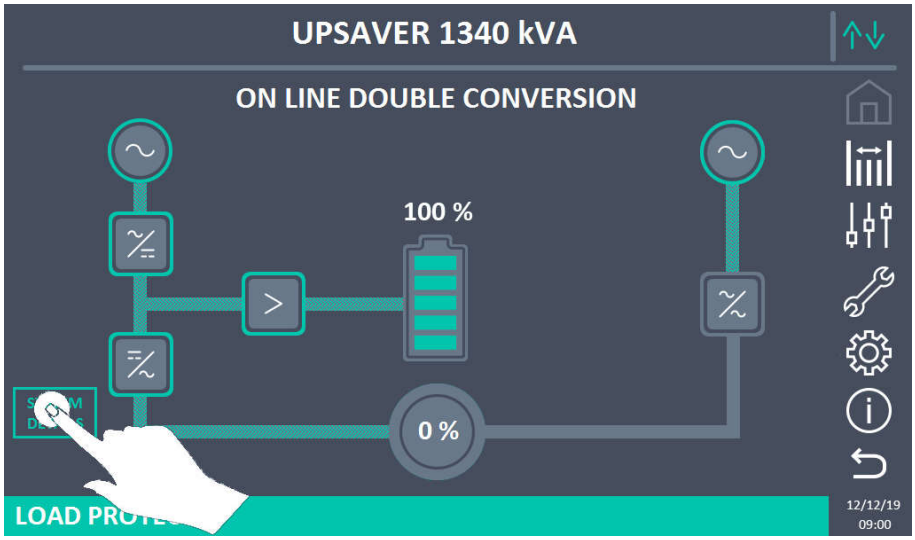
“CENTRALISED BATTERY”

Index

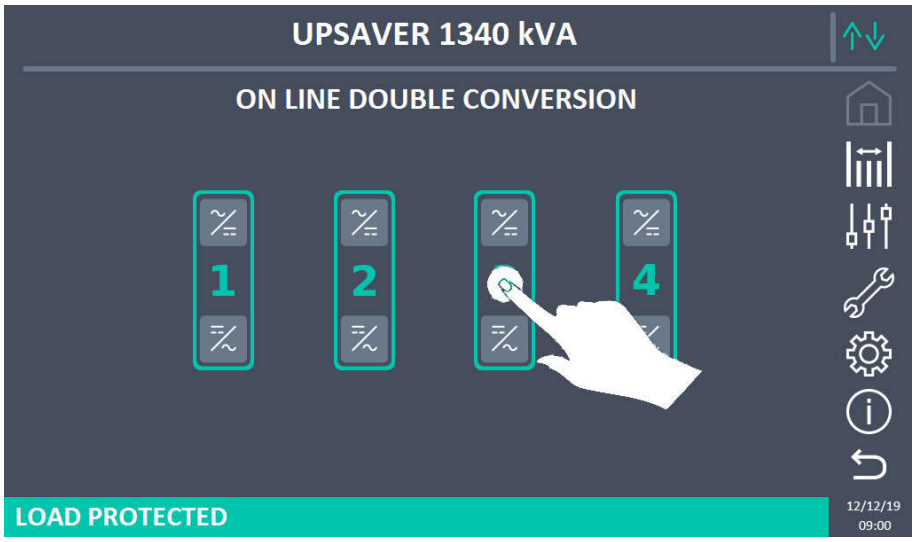
Index of the pictures

1 MANAGEMENT OF THE POWER UNIT

Management of the individual *PU* parameters is possible by clicking on *SYSTEM DETAILS* button in ***HOME*** and then on the relevant icon as visible in the pictures below.

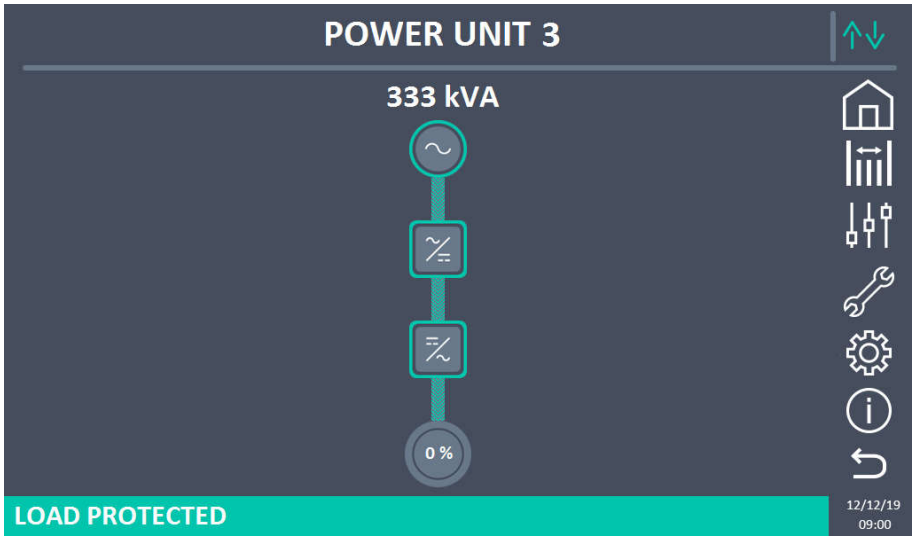


Picture 1 – Access to the PU sections



Picture 2 – PU visualization screen

The screen is displayed with the synoptic diagram of the *Power Unit*, where you can access the ***MEASURES***, ***CONTROLS***, ***ALARMS***, ***SETTINGS*** and ***INFO*** sections relating to the same module.



Picture 3 – Home page of the PU

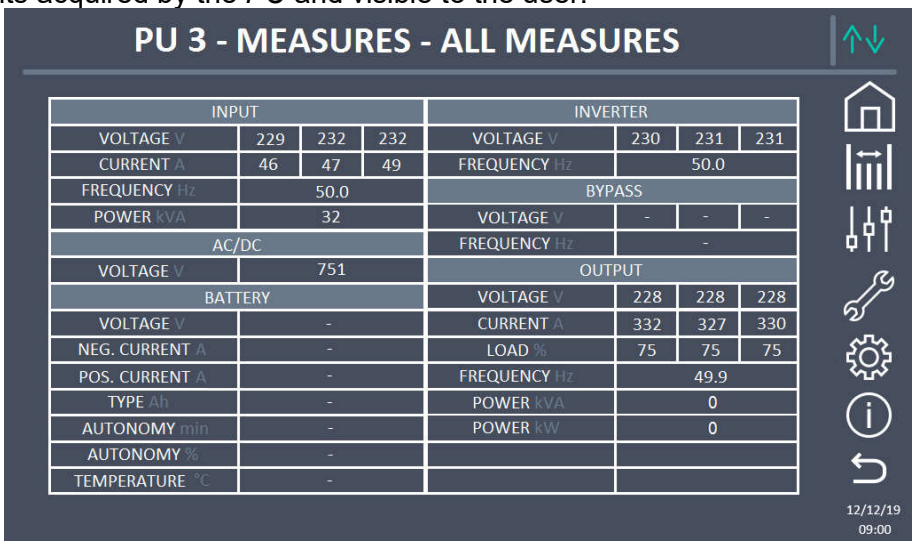
1.1 ICONS

When we are in the ***HOME*** page of the PU, the seven icons on the right side of the screen allow navigation between the various menus of the PUx.

Description of the icon	Icon	Assigned functions
Home		Goes back to the *Home* page.
Measures		A page of the PUx *Measures* section is currently displayed.
		Enters the PUx *Measures* section.
Controls		A page of the PUx *Controls* section is currently displayed.
		Enters the PUx *Controls* section.
Alarms		No active PUx alarms. A page of the PUx *Alarms* section is currently displayed.
		No active PUx alarms. Enters the PUx *Alarms* section.
		At least one PUx alarm is active. Enters the PUx *Alarms* section and resets the buzzer if activated.
Settings		A page of the PUx *Settings* section is currently displayed.
		Enters the PUx *Settings* section.
Info		A page of the PUx *Info* section is currently displayed.
		Enters the PUx *Info* section.
Back		Goes back one page.

2 MEASURES DISPLAY

Pressing the ***MEASURES*** icon, you access the page displaying a table with all the measurements acquired by the *PU* and visible to the user.



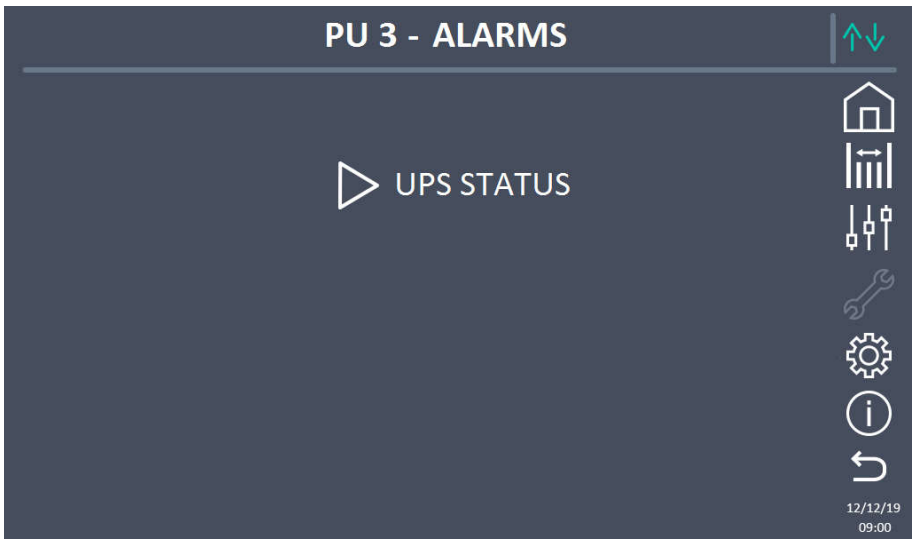
INPUT			
VOLTAGE V	229	232	232
CURRENT A	46	47	49
FREQUENCY Hz	50.0		
POWER kVA	32		
AC/DC			
VOLTAGE V	751		
BATTERY			
VOLTAGE V	-		
NEG. CURRENT A	-		
POS. CURRENT A	-		
TYPE Ah	-		
AUTONOMY min	-		
AUTONOMY %	-		
TEMPERATURE °C	-		

INVERTER			
VOLTAGE V	230	231	231
FREQUENCY Hz	50.0		
BYPASS			
VOLTAGE V	-	-	-
FREQUENCY Hz	-		
OUTPUT			
VOLTAGE V	228	228	228
CURRENT A	332	327	330
LOAD %	75	75	75
FREQUENCY Hz	49.9		
POWER kVA	0		
POWER kW	0		

Picture 4 – PU measures section – All measures

3 BASIC DIAGNOSTICS

Pressing the ***ALARMS*** icon displays the screen relating to the section of the PU operating status.



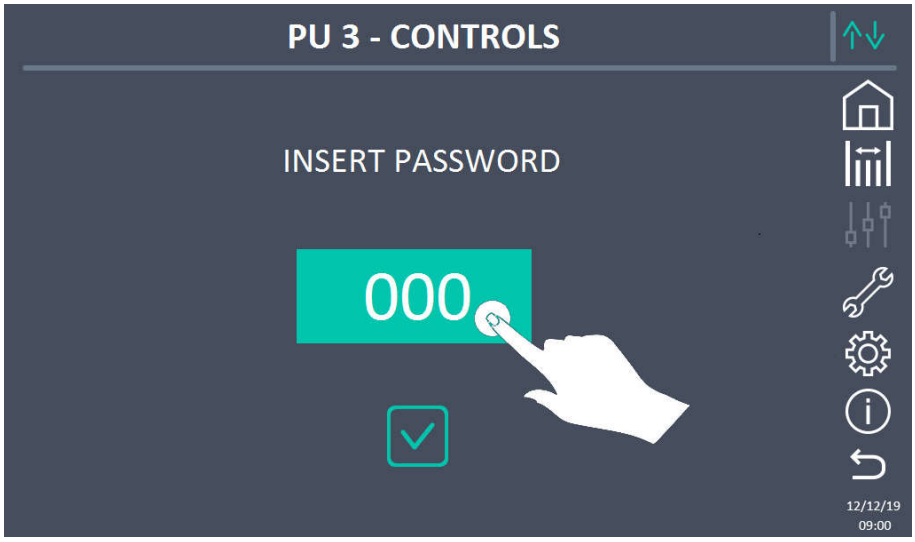
Picture 5 – PU alarms section

Pressing on **UPS STATUS** displays the status of PU operating status, including any alarms present.

The actual status of the PU is displayed, which can be scrolled with a slide on the screen if the lines cannot be contained within the first screen.

4 CONTROLS AND ADVANCED OPERATIONS

Pressing the ***CONTROLS*** icon displays the access screen to the controls menu, protected by password.



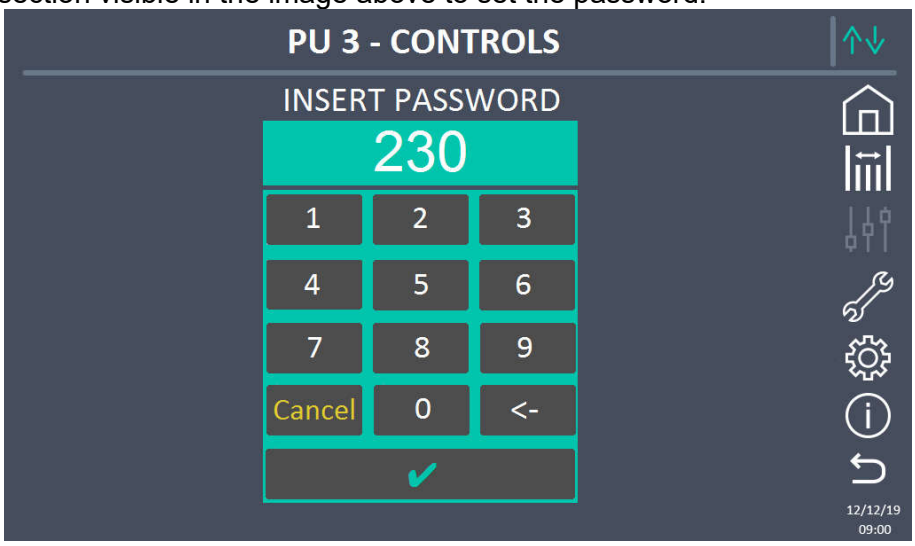
Picture 6 – PU controls section – Insert password

Password protected access

The ***CONTROLS*** menu is password protected, set by default to prevent access by unauthorised staff.

- You are advised to minimise distribution of the access password.
- Changes to the operating parameters of the PU can be potentially hazardous for the device and for people.

Press in the section visible in the image above to set the password.



Picture 7 – PU controls section – Insert password

Enter the correct password to access the screen of the various controls that can be changed.

Picture 8 – PU controls section

The ***NEW BATTERY*** menu is only available for *DB* configurations.

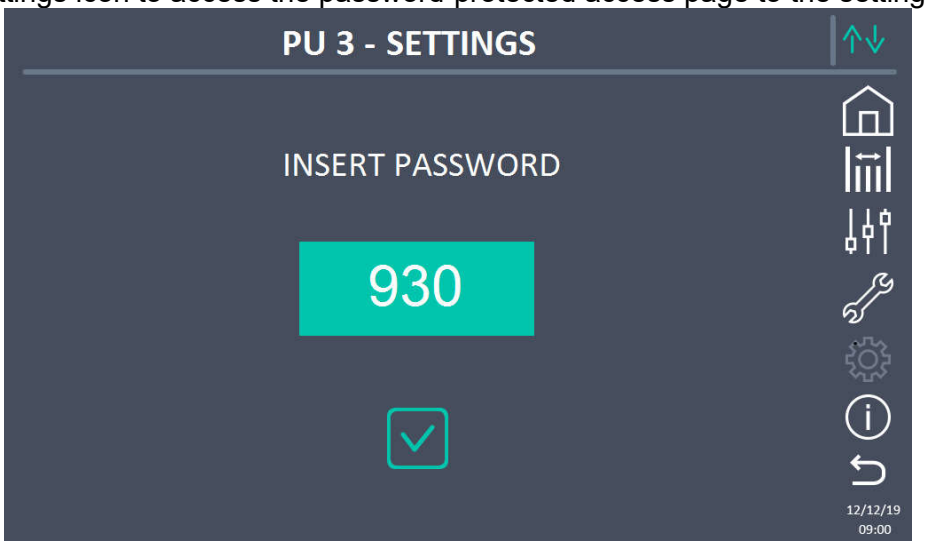
4.1 RESET ALARMS

The *PU* is equipped with internal protections which can block it or some of its sections. Using the ***RESET ALARMS*** menu, you can unlock the alarm and reset normal operation.

Refer to the document "UPSaver - Alarms and Statutes" to learn about anomalies or lockout conditions that can be reset from the display.

5 SETTINGS AND ADVANCED OPERATIONS

Press the settings icon to access the password-protected access page to the settings section.



Picture 9 – PU settings section – Insert password

Enter the correct password to access the following screen.

Picture 10 – PU settings section

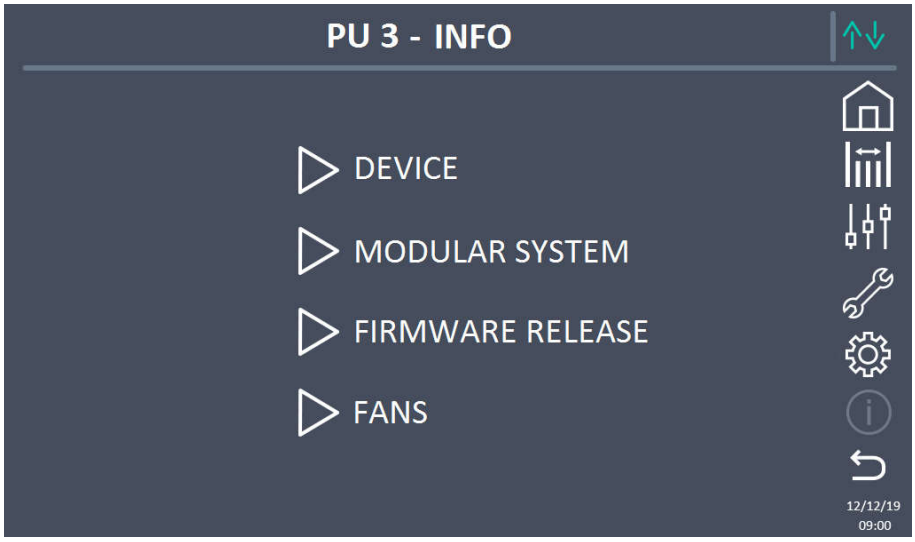
The ***MASK PU*** and ***UNMASK PU*** are only available for *DB configurations*.

5.1 RESET RUNNING HOURS

This menu allows you to reset the operating hours counter of the *Power Unit* to zero.
Once selected, confirmation is requested to proceed to zero reset.

6 POWER UNIT INFORMATION

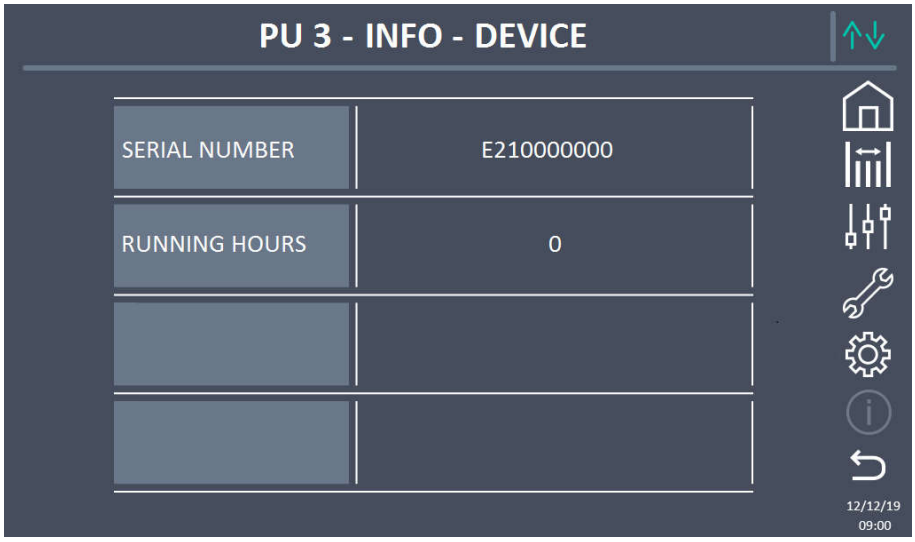
The ***INFO*** menu provides overall information on the Power Unit; press the relevant icon to access the main screen.



Picture 11 – PU info section

All the data displayed inside the various sections are set by default using the specific interface software and cannot be edited except by people authorised by the manufacturer.

6.1 DEVICE INFORMATION

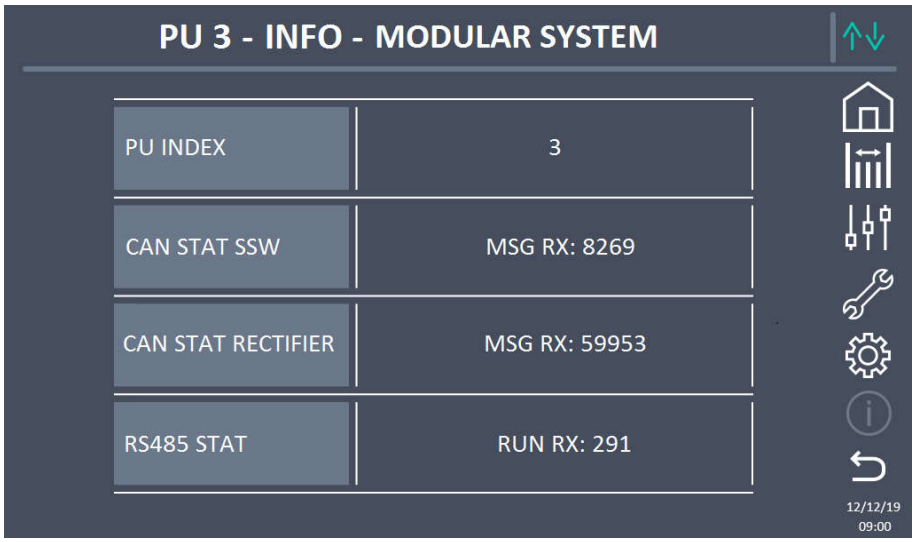


Picture 12 – PU info section – Device

The ***DEVICE*** section provides the following information:

- Serial number of the *PU*
- Working hours of the *PU*

6.2 MODULAR SYSTEM INFORMATION

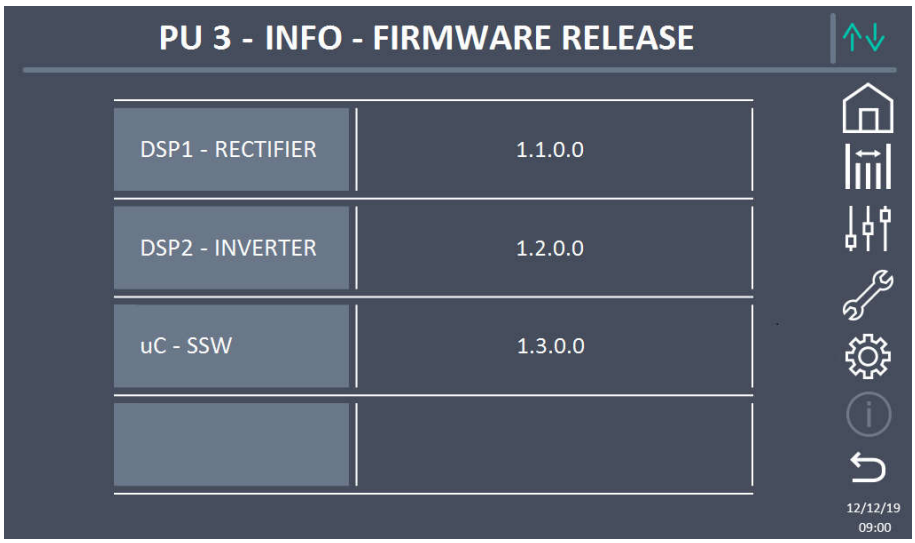


Picture 13 – PU info section – Modular system

The ***MODULAR SYSTEM*** section provides the following information:

- Index (position) of the *PU* in the *UPSaver system*
- Communication bus control with control unit, with the statistics relevant to the various CAN channels

6.3 FIRMWARE RELEASE INFORMATION



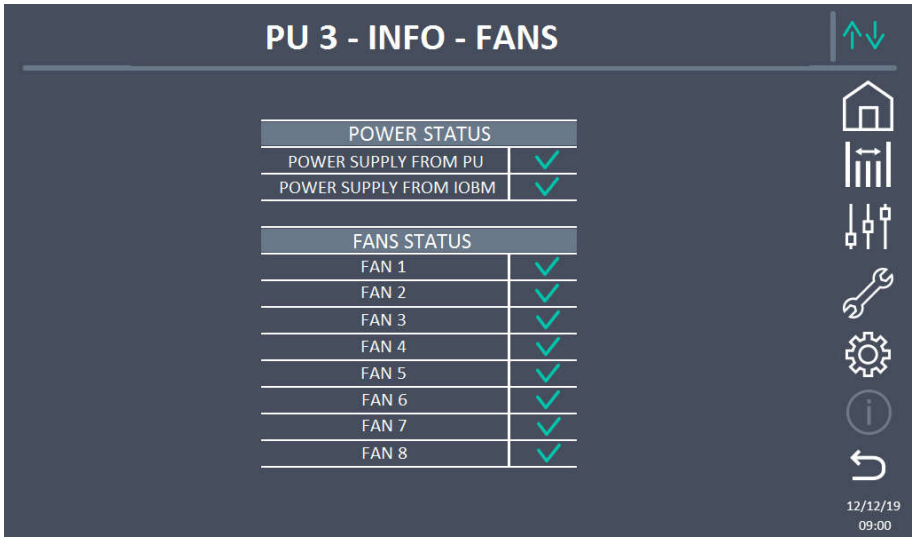
Picture 14 – PU info section – Firmware release

The ***FIRMWARE RELEASE*** section provides information relevant to the firmware installed on the module control logic:

- *Rectifier* micro-controller firmware (*DSP1 – RECTIFIER*)
- *Inverter* micro-controller firmware (*DSP2 – INVERTER*)
- *SSW* micro-controller firmware (*uC – SSW*)

6.4 FANS INFORMATION

The ***FANS*** section provides the status of the redundant power supplies used by the fan control board and the status of each individual fan of the PU.



Picture 15 – PU info section – Fans

ALARMS AND STATUSES

Index

1 INTRODUCTION

The UPSaver system is provided with basic diagnostics which allow immediate visualization of the operating conditions.

The *Alarms* icon turns red and the acoustic signal is activated (if enabled). In the *UPS Status* page both the alarm code and a brief description are shown.

Usually an alarm on a PU generates also an alarm on the UPS control unit; some conditions, on the other hand, are processed on the basis of the set power redundancy.

1.1 ALARMS AND STATUSES (IOBM)

ALARMS

A1	MAINS FAULT
A2	INPUT WRONG SEQUENCE
A3	BOOSTER STOPPED
A4	BOOSTER FAULT
A5	DC VOLTAGE FAULT
A6	BATTERY IN TEST
A7	BCB PU OPEN
A8	BATTERY DISCHARGE
A9	BATTERY AUTONOMY END
A10	BATTERY FAULT
A11	SHORT CIRCUIT
A12	STOP TIMEOUT SHORT-CIRCUIT
A13	INVERTER OUT OF TOLERANCE
A14	BYPASS WRONG SEQUENCE
A15	BYPASS FAULT
A16	BYPASS --> LOAD
A17	RETRANSFER BLOCKED
A18	MBCBS CLOSED
A19	OCB PU OPEN
A20	OVERLOAD
A21	THERMAL IMAGE
A22	BYPASS SWITCH
A23	EPO PRESSED
A24	HIGH TEMPERATURE
A25	INVERTER OFF
A26	COMMUNICATION ERROR
A27	EEPROM ERROR
A28	CRITICAL FAULT
A29	MAINTENANCE REQUIRED
A30	COMMON ALARM
A31	MBCBS BUS CLOSED
A32	LINE INTERACTIVE KO
A33	ASYMMETRIC LOAD
A34	SERVICE REQUIRED
A35	DIESEL MODE
A36	DC FASTSHUTDOWN
A37	BCBb OPEN
A38	INVERTER --> LOAD
A39	LINE INTERACTIVE BLOCKED
A40	BATTERY FUSE OPEN
A41	RECTIFIER VOLTAGE LOOP ERROR
A42	BCBS GENERAL OPEN
A43	OCBS GENERAL OPEN
A44	PU PARAM RECEPTION FAILED
A45	HIGH TEMPERATURE SSW
A46	REDUNDANCY LOSS
A47	SEND PARAMETERS ERROR
A48	FAILED RECEPTION OF E2P PARAM.
A49	TEST MODE ERROR
A50	ONE PARALLEL CABLE DISCONN.
A51	BATTERY TEMPERATURE
A52	INVERTER BLOCKED
A53	FIRMWARE ERROR
A54	CAN ERROR
A55	GBMS ALARM
A56	MAINS UNBALANCED
A57	INPUT CURRENT UNBALANCED
A58	INVERTER CURRENT UNBALANCED
A59	RELAY BACKFEED ON
A60	FMC ALARM
A61	POWER SUPPLY RED. LOST
A62	INTERNAL RS485 ERROR
A63	STARTING SEQUENCE BLOCKED
A64	CASTELL KEY ACTIVE

STATUSES

S1	BOOSTER OK
S2	BATTERY OK
S3	INVERTER OK
S4	INVERTER --> LOAD
S5	INVERTER BYPASS SYNCHRONIZED
S6	BYPASS OK
S7	BYPASS --> LOAD
S8	INV. MASTER GROUPS SYNCHR.
S10	RECTIFIER STANDBY
S11	INVERTER STANDBY
S12	BATTERY TEST
S13	UHE CONDITION KO
S14	BATTERY CHARGE I
S15	BATTERY CHARGE U
S16	GREEN CONVERSION
S17	LINE INTERACTIVE
S18	EXTERNAL SYNC INVERTER SYNCHR.
S19	EXTERNAL SYNC INHIBITED
S20	EXTERNAL SYNC OK
S21	MONITORING LINE INTERACTIVE
S22	RECT. IN LINE INTERACTIVE
S23	RTC
S25	IOBM STARTUP SEQUENCE
S26	BATTERY RECHARGE HALVED
S27	BATTERY CHARGING DISABLED
S28	LOAD SYNC INHIBITED
S32	EXTERNAL RAM

1.2 ALARMS AND STATUSES (PU)

ALARMS

A1 MAINS FAULT
A2 INPUT WRONG SEQUENCE
A3 BOOSTER STOPPED
A4 BOOSTER FAULT
A5 DC VOLTAGE FAULT
A7 BCB OPEN
A11 SHORT CIRCUIT
A12 STOP TIMEOUT SHORT-CIRCUIT
A13 INVERTER OUT OF TOLERANCE
A14 BYPASS WRONG SEQUENCE
A15 BYPASS FAULT
A16 BYPASS --> LOAD
A19 OCB OPEN
A20 OVERLOAD
A21 THERMAL IMAGE
A23 BYPASS SWITCH
A24 EPO PRESSED
A25 HIGH TEMPERATURE
A26 INVERTER OFF
A27 COMMUNICATION ERROR
A28 EEPROM ERROR
A30 COMMON ALARM
A33 ASYMMETRIC LOAD
A36 DC FASTSHUTDOWN
A37 BCBb OPEN
A38 INVERTER --> LOAD
A40 BATTERY FUSE OPEN
A41 RECTIFIER VOLTAGE LOOP ERROR
A44 FAILED RECEPT. OF IOBM PARAM.
A45 HIGH TEMPERATURE SSW
A47 SEND PARAMETERS ERROR
A48 FAILED RECEPTION OF E2P PARAM.
A49 TEST MODE ERROR
A50 PARALLEL CABLE DISCONNECTED
A52 UNDER VOLTAGE LOCKOUT
A53 FIRMWARE ERROR
A54 CAN / SPIA ERROR
A56 MAINS UNBALANCED
A57 INPUT CURRENT UNBALANCED
A58 INVERTER CURRENT UNBALANCED
A60 FMC ALARM
A63 STARTING SEQUENCE BLOCKED

STATUSES

S1 BOOSTER OK
S3 INVERTER OK
S4 INVERTER --> LOAD
S6 BYPASS OK
S7 BYPASS --> LOAD
S17 LINE INTERACTIVE
S23 RTC
S24 MODULE STARTUP SEQUENCE
S32 EXTERNAL RAM

1.3 OPERATING STATUSES DEFINITION (IOBM)

Status	S1	BOOSTER OK
Description	The number of operating rectifiers of the PU ensures the required minimum redundancy.	
Operating condition	The rectifiers of the PU feed the inverters and keep the battery/batteries charged.	

Status	S2	BATTERY OK
Description	Centralised battery: the battery is connected to the UPS and the A10 alarm isn't present. Distribuited battery: at least one battery is connected to the UPS and the A10 alarm isn't present.	
Operating condition	The battery is kept charged by the rectifier and is ready to feed the inverter.	

Status	S3	INVERTER OK
Description	The number of operating inverters of the PU ensures the required minimum redundancy.	
Operating condition	The inverter is ready to feed the load.	

Status	S4	INVERTER → LOAD
Description	The inverter feeds the load.	
Operating condition	The load is fed via the inverter source.	

Status	S5	INVERTER BYPASS SYNCHRONIZED
Description	The PU inverter are synchronized with the bypass line.	
Operating condition	The synchronization between the inverter and the bypass is locked.	

Status	S6	BYPASS OK
Description	The bypass voltage and frequency are within the allowed range.	
Operating condition	The bypass line is available to feed the load, if request.	

Status	S7	BYPASS → LOAD
Description	Only for ECO and UHE mode. The bypass feeds the load.	
Operating condition	The load is fed by the bypass.	

Status	S8	INV. MASTER GROUPS SYNCHR.
Description	Only for parallel systems: the SLAVE is synchronised with the MASTER.	
Operating condition	This status is present only on the SLAVE UPS and shows that the inverters of the SLAVE are synchronised with the inverter of the MASTER.	

Status	S10	RECTIFIER STANDBY
Description	The rectifier stage is in UHE mode	
Operating condition	The rectifier is off and ready for power on, in the case of output from UHE mode.	

Status	S11	INVERTER STANDBY
Description	The inverter stage is in UHE mode	
Operating condition	The inverter is off and ready for power on, in the case of output from UHE mode.	

Status	S12	BATTERY TEST
Description	Only on request, otherwise A6 alarm is active. The battery test is in progress.	
Operating condition	The rectifier voltage is decreased to start-up a short controlled battery discharge.	

Status	S13	UHE CONDITION KO
Description	The conditions to work in UHE mode are not satisfied	
Operating condition	The UPS works on double conversion online mode.	

Status	S14	BATTERY CHARGE I
Description	The battery is charging.	
Operating condition	The battery is in the first phase of the I/U charging mode (DIN 41773), with constant current and increasing voltage.	

Status	S15	BATTERY CHARGE U
Description	The battery is charging.	
Operating condition	The battery is in the second and final phase of the I/U charging mode (DIN 41773), with constant voltage and decreasing current.	

Status	S16	GREEN CONVERSION
Description	The system is running in *GREEN CONVERSION* mode.	
Operating condition	The static battery switch is open and the system works to DC voltage reduced.	

Status	S17	LINE INTERACTIVE
Description	The system is running in *LINE INTERACTIVE* mode.	
Operating condition	The inverter is in parallel to the bypass line.	

Status	S18	EXTERNAL SYNC INVERTER SYNCHR.
Description	The inverter stage is synchronised with external synchronisation signal.	
Operating condition	The inverter stage has reached the synchronisation with the external signal.	

Status	S19	EXTERNAL SYNC INHIBITED
Description	The acquisition of the external synchronisation signal is is disabled At the end of the start-up sequence the status can be activated.	
Operating condition	The inverter stage isn't synchronised with external signal.	

Status	S20	EXTERNAL SYNC OK
Description	The external synchronisation signal is acquired correctly and it's in a valid range to be accepted.	
Operating condition	The inverter stage can perform the synchronisation with the external signal.	

Status	S21	MONITORING LINE INTERACTIVE
Description	The conditions to switching to LINE INTERACTIVE mode are monitored.	
Operating condition	The UPS can switch on LINE INTERACTIVE mode.	

Status	S22	RECT. IN LINE INTERACTIVE
Description	The rectifier stage is on LINE INTERACTIVE mode.	
Operating condition	The rectifier stage works to the LINE INTERACTIVE voltage.	

Status	S23	RTC
Description	UPS internal clock.	
Operating condition	The UPS clock isn't working correctly.	

Status	S25	IOBM STARTUP SEQUENCE
Description	The UPS has not yet completed the start-up sequence.	
Operating condition	The UPS start-up sequence is in progress.	

Status	S26	BATTERY RECHARGE HALVED
Description	Only if C10/C20 option is activated: the external auxiliary contact C20 is activated.	
Operating condition	The battery recharge current is halved.	

Status	S27	BATTERY CHARGING DISABLED
Description	Only if C10/C20 option is activated: the external auxiliary contact C20 is activated.	
Operating condition	The battery recharge current is disabled.	

Status	S28	LOAD SYNC INHIBITED
Description	Only on LOADSYNC mode: the loadsync mode is inhibited.	
Operating condition	The inverter stage of the SLAVE doesn't synchronise with the MASTER.	

Status	S32	EXTERNAL RAM
Description	External RAM.	
Operating condition	Possible loss of the data on the external RAM.	

1.4 TROUBLESHOOTING (IOBM)

Alarm	A1	MAINS FAULT
Description	The voltage or frequency of the input line are out of tolerance.	
Possible causes	➢ Mains instability or failure. ➢ Wrong phase rotation.	
Solutions	1. Check the connections to the mains. 2. Check the stability of mains voltage. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A2	INPUT WRONG SEQUENCE
Description	The phase rotation on the rectifier input line is wrong.	
Possible causes	➢ Wrong connection of power cables.	
Solutions	1. Check the phase rotation. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A3	BOOSTER STOPPED
Description	The rectifier has been temporarily disconnected and the inverter is fed by the battery.	
Possible causes	➢ Instability of the AC line voltage or frequency. ➢ Fault in the rectifier control circuit.	
Solutions	1. Check the parameters of the AC line voltage. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A4	BOOSTER FAULT
Description	The rectifier has been disconnected due to an internal fault.	
Possible causes	➢ Fault in the rectifier control circuit.	
Solutions	1. Check which alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A5	DC VOLTAGE FAULT
Description	The measured DC voltage is out of tolerance.	
Possible causes	➢ The battery has reached the discharge voltage due to a power failure. ➢ Measuring circuit failure.	
Solutions	1. Check the actual value of the measured DC voltage. 2. In case of mains failure, wait for the AC voltage to be restored. 3. Check which alarms are present and carry out the indicated solutions. 4. If the alarm persists, contact our Technical Support Service.	

Alarm	A6	BATTERY IN TEST
Description	If S12 status is present, the alarm isn't active. The rectifier voltage is decreased to start-up a short, controlled battery discharge.	
Possible causes	➢ A battery test has been started automatically (if set), or manually by the user.	
Solutions	1. Wait for the test to end and check the possible battery faults.	

Alarm	A7	BCB PU OPEN
Description	The battery switch of at least a PU module is open.	
Possible causes	➢ BCB switch of at least a PU module open.	
Solutions	1. Check the status of the BCB switches of the PU. 2. Check the functionality of the auxiliary contact of the BCB switches of the PU. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A8	BATTERY DISCHARGE
Description	The battery is discharging.	
Possible causes	➢ The battery is discharging due to a mains failure. ➢ Rectifier failure.	
Solutions	1. Check which alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A9 BATTERY AUTONOMY END
Description	The battery has reached the pre-alarm discharge level close to inverter shutdown.
Possible causes	➢ The battery is discharging due to a mains failure. ➢ Rectifier failure.
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A10 BATTERY FAULT
Description	Fault following a battery test.
Possible causes	➢ Battery fault.
Solutions	1. Check the battery stage. 2. Reset the alarm trough the dedicated display menu 3. If the alarm persists, contact our Technical Support Service.

Alarm	A11 SHORT CIRCUIT
Description	The current sensor has detected a short-circuit at the output.
Possible causes	➢ Problem on the load. ➢ Measuring circuit failure. ➢ Temporary current peak.
Solutions	1. Check the loads connected to the UPS output. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A12 STOP TIMEOUT SHORT-CIRCUIT
Description	Inverter shutdown due to an extended short-circuit due to bypass fault.
Possible causes	➢ Short-circuit on the loads due to bypass fault ➢ Inverter bridge fault.
Solutions	1. Check the loads connected to the output UPS. 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A13	INVERTER OUT OF TOLERANCE
Description	The inverter voltage or frequency are out of tolerance.	
Possible causes	➢ Inverter shutdown due to an alarm. ➢ Inverter failure.	
Solutions	1. Check which alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A14	BYPASS WRONG SEQUENCE
Description	The phase rotation of the bypass line is wrong.	
Possible causes	➢ Wrong connection of power cables.	
Solutions	1. Check the phase rotation. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A15	BYPASS FAULT
Description	The voltage or frequency of the bypass line are out of tolerance.	
Possible causes	➢ Bypass line instability or failure. ➢ Wrong phase rotation.	
Solutions	1. Check the connections to the bypass line. 2. Check the stability of the bypass line voltage. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A16	BYPASS --> LOAD
Description	The load is fed by the bypass line.	
Possible causes	➢ Temporary changeover due to inverter source fault.	
Solutions	1. Verify the inverter status 2. Check whether alarms are present and carry out the indicated solutions. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A17	RETRANSFER BLOCKED
Description	The load is blocked on the bypass line.	
Possible causes	➢ Very frequent changeovers due to load in-rush currents. ➢ Static switch problems.	
Solutions	1. Reset the alarm trough the dedicated display menu. 2. Check the in-rush currents of the loads. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A18 MBCBS CLOSED
Description	The manual bypass switch is closed.
Possible causes	➢ Manual bypass switch closed.
Solutions	1. Check the status of the manual bypass switch. 2. Check the functionality of the auxiliary contact of the switch. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A19 OCB PU OPEN
Description	The OCB switch of at least one PU module is open.
Possible causes	➢ OCB switch of one PU open.
Solutions	1. Check the status of the OCB switch of the PU. 2. Check the functionality of the auxiliary contacts of the switches. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A20 OVERLOAD
Description	The current sensor has detected an overload at the output. If the alarm persists, the thermal image protection will be activated (alarm A21).
Possible causes	➢ Output overload. ➢ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. Contact our Technical Support Service.

Alarm	A21 THERMAL IMAGE
Description	The thermal image protection has been activated after an extended inverter overload.
Possible causes	➢ Extended output overload. ➢ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. Should you need to restore the inverter supply immediately, reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A22 BYPASS SWITCH
Description	The “Normal/Bypass” selector has been operated.
Possible causes	➢ Maintenance operation.
Solutions	1. Check the selector position. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A23 EPO PRESSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	➢ Activation of the emergency power off button.
Solutions	1. Release the emergency power off button and reset the alarm trough the dedicated display menu. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A24 HIGH TEMPERATURE
Description	The thermal switch protection on the modules of one or more PU is open due to high temperature.
Possible causes	➢ Fans failure of the PU. ➢ The room temperature or cooling air temperature is too high.
Solutions	1. Check the functionality of the auxiliary contact of the thermal switch. 2. Check the fans functioning 3. Clean the ventilation grids and the air filters, if any 4. Check the air conditioning system (if present). 5. If the alarm persists, contact our Technical Support Service.

Alarm	A25 INVERTER OFF
Description	The inverter is blocked due an operation failure.
Possible causes	➢ Present Inverter proctection. ➢ Inverter failure.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A26 COMMUNICATION ERROR
Description	Internal error
Possible causes	➢ Problem in the internal communication among the microprocessors.
Solutions	1. If the alarm persists, contact our Technical Support Service.

Alarm	A27 EEPROM ERROR
Description	Internal error.
Possible causes	➢ Wrong parameters entered during programming. ➢ Control logic board failure.
Solutions	1. Contact our Technical Support Service.

Alarm	A28	CRITICAL FAULT
Description	The alarm is activated if at least one of the following alarms persist for more 3 minutes: A4, A5, A12, A13, A26.	
Possible causes	➢ UPS failure.	
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A29	MAINTENANCE REQUIRED
Description	It is necessary to carry out maintenance work.	
Possible causes	➢ The time limit since the last maintenance work has elapsed.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A30	COMMON ALARM
Description	Common alarm.	
Possible causes	➢ At least one alarm is present.	
Solutions	1. Check whether alarms are present and carry out the indicated solutions.	

Alarm	A31	MBCBS BUS CLOSED
Description	The UPS has acquired the closed signal of the manual bypass switch.	
Possible causes	➢ Manual bypass switch closed.	
Solutions	1. Check the MBCB switch status 2. Check the auxiliary contact of the switch 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A32	LINE INTERACTIVE KO
Description	The bypass voltage and frequency are out of tolerance and the Line-Interactive mode can't be enabled.	
Possible causes	➢ Bypass voltage and frequency out of tolerance.	
Solutions	1. Check the bypass status.	

Alarm	A33	ASYMMETRIC LOAD
Description	The positive and negative voltages measured on the DC capacitors towards the middle point are different.	
Possible causes	➢ Failure on the measuring circuit. ➢ Fault of DC capacitors. ➢ Output load with DC current draw	
Solutions	1. Check the UPS output load 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A34	SERVICE REQUIRED
Description	The technical support personnel intervention is necessary.	
Possible causes	➢ Possible UPS fault.	
Solutions	1. If the alarm persists, contact our Technical Support Service.	

Alarm	A35	DIESEL MODE
Description	The UPS is supplied by the diesel generator.	
Possible causes	➢ The auxiliary contact which activates the diesel generator connected to the UPS is closed and imposes this operating mode.	
Solutions	1. Wait for the diesel generator to stop as soon as the mains voltage is restored. 2. Check the connection of the auxiliary contact which signals the diesel generator start. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A36	DC FASTSHUTDOWN
Description	Inverter shutdown due to the operation of the protection sensor as a result of DC voltage.	
Possible causes	➢ DC voltage fualt.	
Solutions	1. Check the DC voltage. 2. Check the battery status 3. Reset the alarm trough the dedicated display menu. 4. If the alarm persists, contact our Technical Support Service.	

Alarm	A37 BCBb OPEN
Description	Only for distribuited battery: The BCBb switch of at least a PU module is open.
Possible causes	➢ BCBb switch of at least a PU module open.
Solutions	1. Check the status of the BCBb switches of the PU. 2. Check the functionality of the auxiliary contacts of the switches. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A38 INVERTER → LOAD
Description	The Inverter feeds the load. Activated alarm on the UPS in *ECO/UHE* mode, where the primary source to feed the load is the bypass line.
Possible causes	➢ Temporary changeover on inverter due to bypass line failure
Solutions	1. Check the bypass line status. 2. Check whether alarms are present and carry out the indicated solutions. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A39 LINE INTERACTIVE BLOCKED
Description	The UPS, after various tentative, cannot reach Line Interactive mode.
Possible causes	➢ Bypass voltage and frequency out of tolerance.
Solutions	1. Check the bypass status. 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A40 BATTERY FUSE OPEN
Description	The alarm signals a battery fuses fault.
Possible causes	➢ Battery fuse fault. ➢ Fuses auxiliary contacts fault. ➢ Inverter fault. ➢ Rectifier fault. ➢ Battery fault.
Solutions	1. Check the fuses auxiliary contacts. 2. Check the fuses and replace if necessary. 3. Check whether alarms are present and carry out the indicated solutions. 4. If the alarm persists, contact our Technical Support Service.

Alarm	A41 RECTIFIER VOLTAGE LOOP ERROR
Description	The controller is unable to accurately adjust the DC output voltage rectifier.
Possible causes	➢ Failure on the measuring circuit. ➢ Control logic board failure.
Solutions	1. Check the DC voltage. 2. Check the DC voltage measure on the control logic board. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A42 BCBS GENERAL OPEN
Description	Only for centralised battery: The BCBS switch is open.
Possible causes	➢ BCBS switch open.
Solutions	1. Check the BCBS switch status 2. Check the auxiliary contact 3. Check the connection between the auxiliary contact switch and auxiliary terminals of the UPS 4. If the alarm persists, contact our Technical Support Service.

Alarm	A43 OCBS GENERAL OPEN
Description	The OCBS switch is open.
Possible causes	➢ OCBS switch open.
Solutions	1. Check the CCBS switch status 2. Check the auxiliary contact 3. If the alarm persists, contact our Technical Support Service.

Alarm	A44 PU PARAM RECEPTION FAILED
Description	Internal error.
Possible causes	➢ Communication problems between IOBM and one or more PU.
Solutions	1. Check the connection cable from IOBM to PU. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A45 HIGH TEMPERATURE SSW
Description	High temperature of the bypass heat sink. High temperature of the PU heat sink. Fans failure signalization.
Possible causes	➢ Fault of the heat sink cooling fans. ➢ The room temperature or cooling air temperature is too high.
Solutions	1. Check the fans operation. 2. Clean the ventilation grids and the air filters, if any. 3. Check the air conditioning system (if present). 4. If the alarm persists, contact our Technical Support Service.

Alarm	A46 REDUNDANCY LOSS
Description	Configurable alarm, as per customer request. The alarm signals the load redundancy loss on the load.
Possible causes	➢ The total load exceeds the minimun level to guarantee redundancy. ➢ Failure on the measuring circuit.
Solutions	1. Check that the system feeds the load. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A47 SEND PARAMETERS ERROR
Description	Internal error.
Possible causes	➢ Control logic board failure.
Solutions	1. Contact our Technical Support Service.

Alarm	A48 FAILED RECEPTION OF E2P PARAM.
Description	Internal error.
Possible causes	➢ Control logic board failure.
Solutions	1. Contact our Technical Support Service.

Alarm	A49 TEST MODE ERROR
Description	Internal error.
Possible causes	➢ Control logic board failure.
Solutions	1. Contact our Technical Support Service.

Alarm	A50	ONE PARALLEL CABLE DISCONN.
Description	The alarm is activated when the parallel bus cable is disconnected.	
Possible causes	➢ Internal or external parallel cable disconnected	
Solutions	1. Check the parallel cable connection 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A51	BATTERY TEMPERATURE
Description	The battery temperature is out of tolerance. The alarm is active only if the battery thermal probe is installed.	
Possible causes	➢ Anomalous temperature in the battery cabinet. ➢ Failure on the measuring circuit.	
Solutions	1. Check the temperature on the batteries. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A52	INVERTER BLOCKED
Description	At least one PU inverter is off due to a fault on the control logic board.	
Possible causes	➢ Internal fault	
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. Reset the alarm trough the dedicated display menu. 3. Contact our Technical Support Service.	

Alarm	A53	FIRMWARE ERROR
Description	Internal error.	
Possible causes	➢ Control logic board failure.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A54	CAN ERROR
Description	Internal error.	
Possible causes	➢ Parallel cable disconnected. ➢ Control logic board failure.	
Solutions	1. Check the bus and parallel cables connection. 2. Contact our Technical Support Service.	

Alarm	A55 GBMS ALARM
Description	Available only for lithium batteries. General error of the battery monitoring system.
Possible causes	➢ GBMS fault. ➢ Battery failure from BMS. ➢ Communication cable from GBMS and IOBM fault. ➢ Control logic board failure.
Solutions	1. Check the GBMS status. 2. Check the batteries status. 3. Check the connection of the communication cable. 4. Contact our Technical Support Service.

Alarm	A56 MAINS UNBALANCED
Description	The rectifier input voltages are unbalanced.
Possible causes	➢ The rectifier input voltages are unbalanced. ➢ Control logic board failure.
Solutions	1. Check the input voltage. 2. Contact our Technical Support Service.

Alarm	A57 INPUT CURRENT UNBALANCED
Description	The PU input currents are unbalanced.
Possible causes	➢ Rectifier failure on one or more PU.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. Reset the alarm trough the dedicated display menu. 3. Contact our Technical Support Service.

Alarm	A58 INVERTER CURRENT UNBALANCED
Description	The PU inverter currents are unbalanced.
Possible causes	➢ Inverter failure on one or more PU.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. Reset the alarm trough the dedicated display menu. 3. Contact our Technical Support Service.

Alarm	A59	RELAY BACKFEED ON
Description	The external backfeed protection has been activated.	
Possible causes	➢ Bypass static switch fault.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A60	FMC ALARM
	Fans failure on one or more PU.	
Description	➢ PU fans faliure. ➢ Redundant power supply of the fans monitoring boards. ➢ Fans monitoring boards failure.	
Possible causes	1. Check the fans and replace the defective ones. 2. Check the fuses F1-x and replace the defective ones. 3. Check the fans monitoring boards. 4. Contact our Technical Support Service.	

Alarm	A61	POWER SUPPLY RED. LOST
Description	One of the IOBM power supplies is faulty.	
Possible causes	➢ Power supply board failure.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A62	INTERNAL RS485 ERROR
Description	Internal error.	
Possible causes	➢ Communication cable IOBM <-> PU disconnected. ➢ Control logic board failure.	
Solutions	1. Check the communication cable. 2. Contact our Technical Support Service.	

Alarm	A63	STARTING SEQUENCE BLOCKED
Description	During the UPS start-up a failure prevented the proper execution of the sequence.	
Possible causes	➢ Control devices in wrong position or operated improperly. ➢ Control logic board failure.	
Solutions	1. Make sure the position of the control devices is as specified in the “Installation and start-up” section of this manual. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A64 CASTELL KEY ATTIVO
Description	Only if the option “Castell key” is present. The Castell Key is activated to carry out the manual bypass procedure
Possible causes	➢ Manual bypass procedure start-up. ➢ Castell Key auxiliary contact fault.
Solutions	1. Check the Castell Key status. 2. Check the Castell Key auxiliary contact. 3. If the alarm persists, contact our Technical Support Service.

1.5 OPERATING STATUS DEFINITION (PU)

Status	S1	BOOSTER OK
Description	The rectifier is working properly.	
Operating condition	The rectifier supplies the inverter and keeps the battery charged.	

Status	S3	INVERTER OK
Description	The inverter is ok, the inverter voltage and frequency are within the allowed range.	
Operating condition	The inverter is ready to feed the load.	

Status	S4	INVERTER --> LOAD
Description	The inverter feeds the load.	
Operating condition	The load is fed via the static inverter switch.	

Status	S6	BYPASS OK
Description	The bypass voltage and frequency are within the allowed range.	
Operating condition	The bypass line is available to feed the load if request.	

Status	S7	BYPASS → LOAD
Description	Only for ECO and UHE mode. The bypass feeds the load.	
Operating condition	The load is fed by the bypass.	

Status	S17	LINE INTERACTIVE
Description	The system is in LINE INTERACTIVE mode	
Operating condition	The inverter is in parallel with the bypass.	

Status	S23	RTC
Description	Internal clock of the PU.	
Operating condition	The PU clock is not working properly.	

Status	S24	MODULE STARTUP SEQUENCE
Description	The startup sequence of the PU is not yet completed.	
Operating condition	The PU startup sequence is in progress.	

Status	S32	EXTERNAL RAM
Description	External RAM	
Operating condition	Parameter loss loaded in external RAM	

1.6 TROUBLESHOOTING (PU)

Alarm	A1	MAINS FAULT
Description	The voltage or frequency of the input line are out of tolerance.	
Possible causes	➢ Mains instability or failure. ➢ Wrong phase rotation.	
Solutions	1. Check the connections to the IOBM. 2. Check the stability of mains voltage. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A2	INPUT WRONG SEQUENCE
Description	The phase rotation on the rectifier input line is wrong.	
Possible causes	➢ Wrong connection of power cables.	
Solutions	1. Check the phase rotation. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A3	BOOSTER STOPPED
Description	The rectifier has been temporarily disconnected and the inverter is fed by the battery.	
Possible causes	➢ Instability of the AC line voltage or frequency. ➢ Fault in the rectifier control circuit.	
Solutions	1. Check the parameters of the AC line voltage. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A4	BOOSTER FAULT
Description	The rectifier has been disconnected due to an internal fault.	
Possible causes	➢ Fault in the rectifier control circuit.	
Solutions	1. Check which alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A5	DC VOLTAGE FAULT
Description	The measured DC voltage is out of tolerance.	
Possible causes	➢ The battery has reached the discharge voltage due to a power failure. ➢ Measuring circuit failure.	
Solutions	1. Check the actual value of the measured DC voltage. 2. In case of mains failure, wait for the AC voltage to be restored. 3. Check which alarms are present and carry out the indicated solutions. 4. If the alarm persists, contact our Technical Support Service.	

Alarm	A7	BCB OPEN
Description	The PU BCB switch is open.	
Possible causes	➢ PU BCB switch open.	
Solutions	1. Check the status of the BCB switch. 2. Check the functionality of the auxiliary contact of the switch. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A11	SHORT CIRCUIT
Description	The current sensor has detected a short-circuit at the output.	
Possible causes	➢ Load problem. ➢ Measuring circuit failure. ➢ Temporary current peak	
Solutions	1. Check the loads connected to the UPS output. 2. If the alarm persists, contact our Technical Support Service.	

Allarme	A12	STOP TIMEOUT CORTO CIRCUITO
Descrizione	Arresto dell'inverter per corto circuito prolungato in assenza della rete di bypass.	
Possibili cause	➢ Corto circuito sui carichi in assenza della rete di bypass. ➢ Guasto del ponte inverter.	
Soluzioni	1. Verificare i carichi connessi all'uscita dell'UPS. 2. Resettare l'allarme tramite l'apposito menu a display. 3. Se l'allarme persiste contattare il servizio di Assistenza Tecnica.	

Alarm	A12	STOP TIMEOUT SHORT-CIRCUIT
Description	Inverter shutdown due to an extended short-circuit due to bypass fault.	
Possible causes	➢ Short-circuit on the loads due to bypass fault ➢ Inverter bridge fault.	
Solutions	1. Check the loads connected to the output UPS. 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A13	INVERTER OUT OF TOLERANCE
Description	The inverter voltage or frequency are out of tolerance.	
Possible causes	➢ Inverter shutdown due to an alarm. ➢ Inverter failure.	
Solutions	1. Check which alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A14 BYPASS WRONG SEQUENCE
Description	The phase rotation of the bypass line is wrong.
Possible causes	➢ Wrong connection of power cables.
Solutions	1. Check the phase rotation. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A15 BYPASS FAULT
Description	The voltage or frequency of the bypass line are out of tolerance.
Possible causes	➢ Bypass line instability or failure. ➢ Wrong phase rotation.
Solutions	1. Check the connections to the bypass line. 2. Check the bypass voltage stability. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A16 BYPASS --> LOAD
Description	The load is fed by the bypass line.
Possible causes	➢ Temporary changeover due to inverter source fault.
Solutions	1. Verify the inverter status 2. Check whether alarms are present and carry out the indicated solutions. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A19 OCB OPEN
Description	The PU OCB switch is open.
Possible causes	➢ PU OCB switch open.
Solutions	1. Check the status of the OCB switch. 2. Check the functionality of the auxiliary contact of the switch. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A20 OVERLOAD
Description	The current sensor has detected an overload at the output. If the alarm persists, the thermal image protection will be activated (alarm A21).
Possible causes	➢ Output overload. ➢ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. Contact our Technical Support Service.

Alarm	A21 THERMAL IMAGE
Description	The thermal image protection has been activated after an extended inverter overload.
Possible causes	➢ Extended output overload. ➢ Measuring circuit failure.
Solutions	1. Check the loads connected to the UPS output. 2. Should you need to restore the inverter supply immediately, reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A23 EPO PRESSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	➢ Activation of the emergency power off button.
Solutions	1. Release the emergency power off button and reset the alarm trough the dedicated display menu. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A24 HIGH TEMPERATURE
Description	The thermal switch protection on the modules of the PU is open due to high temperature.
Possible causes	➢ Fans failure of the PU. ➢ The room temperature or cooling air temperature is too high.
Solutions	1. Check the functionality of the auxiliary contact of the thermal switch. 2. Check the fans functioning. 3. Clean the ventilation grids and the air filters, if any. 4. Check the air conditioning system (if present). 5. If the alarm persists, contact our Technical Support Service.

Alarm	A25 INVERTER OFF
Description	L'inverter è bloccato per anomalia di funzionamento.
Possible causes	➢ Intervento di una protezione di inverter. ➢ Guasto dell'inverter.
Solutions	1. Verificare quali allarmi sono presenti e seguire le soluzioni indicate. 2. Se l'allarme persiste contattare il servizio di Assistenza Tecnica.

Alarm	A25 INVERTER OFF
Description	The inverter is blocked due an operation failure.
Possible causes	➢ Inverter proctection present. ➢ Inverter failure.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A26 COMMUNICATION LOST
Description	Internal error
Possible causes	➢ Problem in the internal communication among the microprocessors.
Solutions	1. If the alarm persists, contact our Technical Support Service.

Allarme	A27 EEPROM ERROR
Descrizione	Internal error.
Possibili cause	➢ Wrong parameters entered during programming. ➢ Control logic board failure.
Soluzioni	1. Contact our Technical Support Service.

Alarm	A28 CRITICAL FAULT
Description	The alarm is activated if at least one of the following alarms persist for more 3 minutes: A4, A5, A12, A13, A26.
Possible causes	➢ UPS failure.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A30 COMMON ALARM
Description	Common alarm.
Possible causes	➢ At least one alarm is present.
Solutions	1. Check which alarms are present and carry out the indicated solutions.

Alarm	A33	ASYMMETRIC LOAD
Description	The positive and negative voltages measured on the DC capacitors towards the middle point are different.	
Possible causes	➢ Failure on the measuring circuit. ➢ Fault of DC capacitors. ➢ Output load with DC current draw	
Solutions	1. Check the UPS output load 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A36	DC FASTSHUTDOWN
Description	Inverter shutdown due to the operation of the protection sensor as a result of DC voltage.	
Possible causes	➢ DC voltage fault.	
Solutions	1. Check the DC voltage. 2. Check the battery status (for distribuited battery configuration PU) 3. Reset the alarm trough the dedicated display menu. 4. If the alarm persists, contact our Technical Support Service.	

Alarm	A37	BCBb OPEN
Description	Only for distribuited battery. The PU BCBb switch is open.	
Possible causes	➢ PU BCBb switch open.	
Solutions	1. Check the status of the BCBb switch. 2. Check the functionality of the auxiliary contact of the switch. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A38	INVERTER → LOAD
Description	The Inverter feeds the load. Activated alarm on the UPS in *ECO/UHE* mode, where the primary source to feed the load is the bypass line.	
Possible causes	➢ Temporary changeover on inverter due to bypass line failure	
Solutions	1. Check the bypass line status. 2. Check whether alarms are present and carry out the indicated solutions. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A40 BATTERY FUSE OPEN
Description	The alarm signals a battery fuses fault.
Possible causes	➢ Battery fuse fault. ➢ Fuses auxiliary contacts fault. ➢ Inverter fault. ➢ Rectifier fault. ➢ Battery fault.
Solutions	1. Check the fuses auxiliary contacts. 2. Check the fuses and replace if necessary. 3. Check whether alarms are present and carry out the indicated solutions. 4. If the alarm persists, contact our Technical Support Service.

Alarm	A41 RECTIFIER VOLTAGE LOOP ERROR
Description	The controller is unable to accurately adjust the DC output voltage rectifier.
Possible causes	➢ Failure on the measuring circuit. ➢ Control logic board failure.
Solutions	1. Check the DC voltage. 2. Check the DC voltage measure on the control logic board. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A44 FAILED RECEPT. OF IOBM PARAM.
Description	Internal error.
Possible causes	➢ Communication problems between PU and IOBM.
Solutions	1. Check the connection cable from IOBM to PU. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A45 HIGH TEMPERATURE SSW
Description	High temperature of the inverter static heat sink. High temperature of the battery static heat sink.
Possible causes	➢ Fault of the heat sinks cooling fans. ➢ The room temperature or cooling air temperature is too high.
Solutions	1. Check the fans operation. 2. Clean the ventilation grids and the air filters, if any. 3. Check the air conditioning system (if present). 4. If the alarm persists, contact our Technical Support Service.

Alarm	A47	SEND PARAMETERS ERROR
Description	Internal error.	
Possible causes	➢ Control logic board failure.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A48	FAILED RECEPTION OF E2P PARAM.
Description	Internal error.	
Possible causes	➢ Control logic board failure.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A49	TEST MODE ERROR
Description	Internal error.	
Possible causes	➢ Control logic board failure.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A50	PARALLEL CABLE DISCONNECTED
Description	The alarm is activated when the parallel bus cable is disconnected.	
Possible causes	➢ Internal or external parallel cable disconnected	
Solutions	1. Check the parallel cable connection 2. Reset the alarm trough the dedicated display menu. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A52	INVERTER BLOCKED
Description	At least one PU inverter is off due to a fault on the control logic board.	
Possible causes	➢ Internal fault	
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. Reset the alarm trough the dedicated display menu. 3. Contact our Technical Support Service.	

Alarm	A53 FIRMWARE ERROR
Description	Internal error.
Possible causes	➢ Control logic board failure.
Solutions	1. Contact our Technical Support Service.

Alarm	A54 CAN/SPIA ERROR
Description	Internal error.
Possible causes	➢ Parallel cable disconnected. ➢ Control logic board failure.
Solutions	1. Check the bus cables connection. 2. Contact our Technical Support Service.

Alarm	A56 MAINS UNBALANCED
Description	The rectifier input voltages are unbalanced.
Possible causes	➢ The rectifier input voltages are unbalanced. ➢ Control logic board failure.
Solutions	1. Check the input voltage. 2. Contact our Technical Support Service.

Alarm	A57 INPUT CURRENT UNBALANCED
Description	The input currents are unbalanced.
Possible causes	➢ Rectifier failure.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. Reset the alarm trough the dedicated display menu. 3. Contact our Technical Support Service.

Alarm	A58 INVERTER CURRENT UNBALANCED
Description	The inverter currents are unbalanced.
Possible causes	➢ Inverter failure.
Solutions	1. Check whether alarms are present and carry out the indicated solutions. 2. Reset the alarm trough the dedicated display menu. 3. Contact our Technical Support Service.

Alarm	A60 FMC ALARM
	Fans failure.
Description	➢ Fans faliure. ➢ Redundant power supply of the fans monitoring boards. ➢ Fans monitoring boards failure.
Possible causes	1. Check the fans and replace the defective ones. 2. Check the PU fuses F1-x and replace if open 3. Check the fans monitoring board. 4. Contact our Technical Support Service.

Alarm	A63 STARTING SEQUENCE BLOCKED
Description	During the UPS start-up a failure prevented the proper execution of the sequence.
Possible causes	➢ Control devices in wrong position or operated improperly. ➢ Control logic board failure.
Solutions	1. Make sure the position of the control devices is as specified in the “Installation and start-up” section of this manual. 2. If the alarm persists, contact our Technical Support Service.

START-UP & SHUT-DOWN

“CENTRALISED BATTERY”

Index

Index of the pictures

1 START-UP & SHUT-DOWN UPSAVER

Read the technical documentation

Before installing and using the equipment, ensure you have read and fully understood the instructions contained in this manual and the remaining support technical documentation.

Additional information

If the information outlined in this manual is not exhaustive enough, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

1.1 PRELIMINARY TESTS

Before initiating the start-up procedure, check that:

- all the installation and connection works were carried out to standard;
- all the power and control cables are correctly and firmly connected to the specific terminal boards;
- the ground conductor is correctly connected;
- the *battery* polarity is correct and the voltage within the operating values;
- the cyclic direction of the network is correct and voltage in tolerance with the operating values;
- the *EPO* emergency stop button, if installed, is not pressed (on the contrary, bring it to the rest position).

1.2 START-UP PROCEDURE

First start of the system

During the first start-up of the *UPSaver* system, configuration is carried out of the *I/O Module* and the *Power Modules* and the redundancy of the system defined (if planned by the client).

The first start-up is carried out by the manufacturer's technical staff or authorised support centres.

***EPO* button and phases cyclic direction**

Before starting the *UPSaver*, check that:

1) the *EPO* emergency stop button, if installed, is not pressed; on the contrary, bring it to the rest position;
2) the cyclic direction of the input and output phases is correct.

***BCBS* switch**

Closure of the main *BCBS* switch, if carried out before being requested by the touch screen, can seriously damage the equipment and/or the *battery*.

System start-up is completely guided; the information available on the touch screen allows you to understand the various phases and carry out the necessary operations in the correct sequence.

It is however required that the manoeuvres on the sectioning devices are only carried out under the supervision and control of staff authorised to operate on electrical circuits.

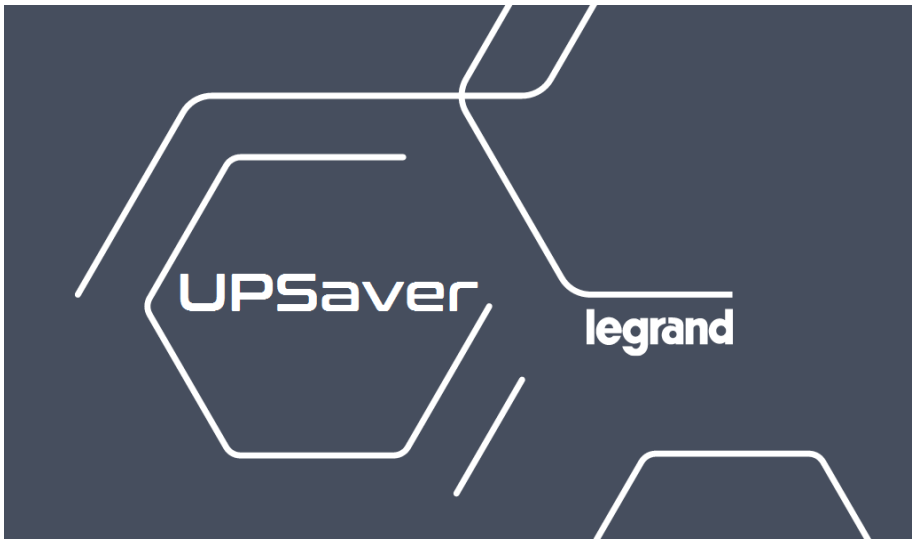
Avail of qualified staff only

All the electrical manoeuvres must be carried out by qualified and trained staff.

Start-up of the system is essentially composed of three phases:

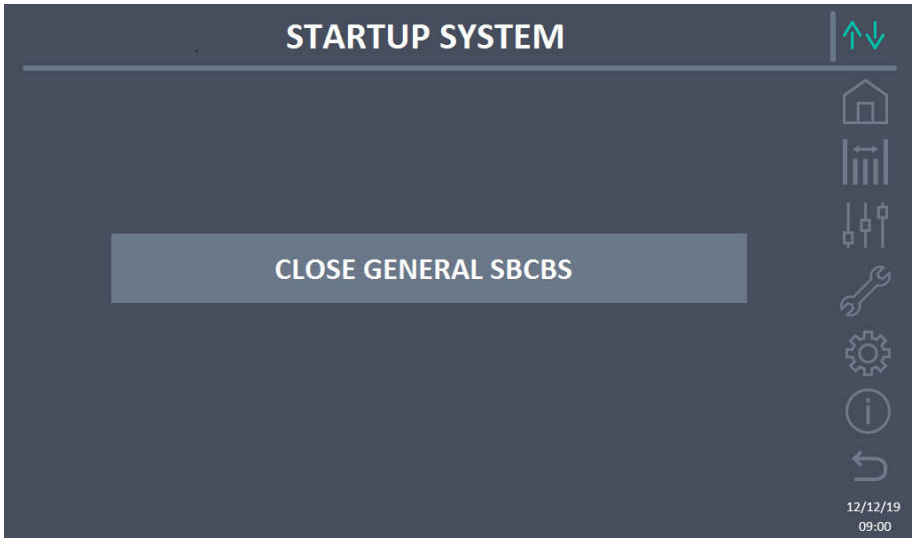
- power supply of the *I/O Module* (*IOBM*) and start-up of the control logic;
- start-up of the *Power Modules* (*PU*) with closure of the switches placed on the distribution columns to the sides of the *I/O Module*;
- closure of the main switches inside the *I/O Module*.

1) Close the *RCBS* main switch. After a few seconds, the touch screen will start and display the start screen with the *UPSaver* logo.



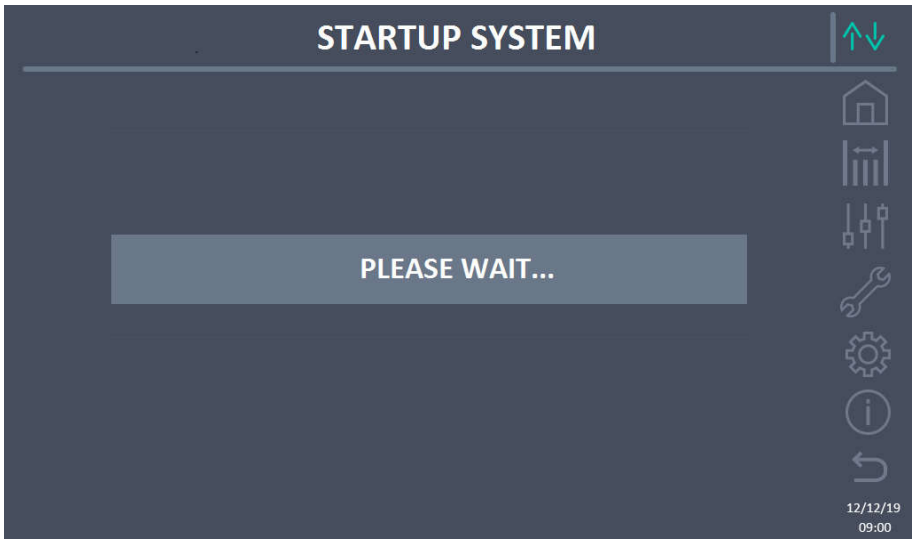
Picture 1 – Start screen of Touch Screen UPSaver

2) After the loading phase of the software, the system acquires the system status and closure of the *RCBS* switch and provides the first operating indication in as shown in the next figure. As requested, close the SBCBS main switch.



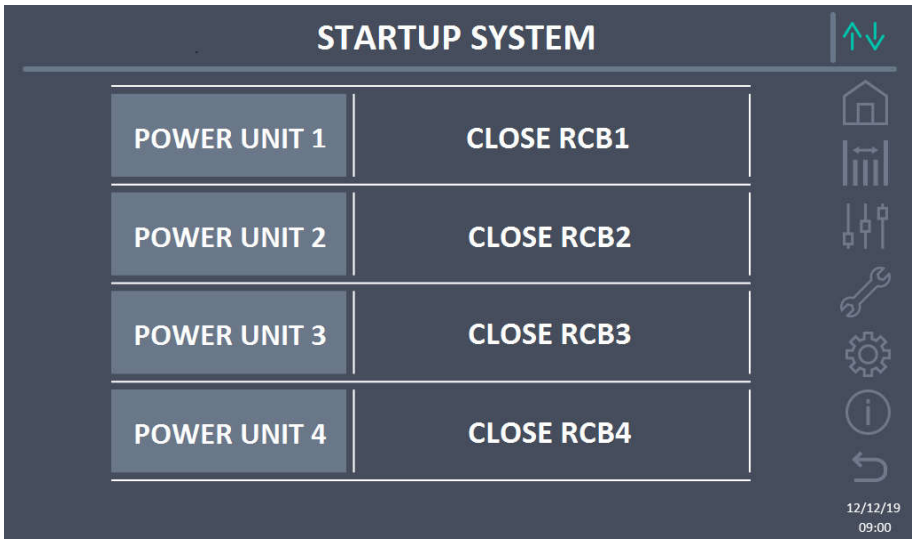
Picture 2 – Close of the SBCBS main switch

3) Wait for the *Bypass* line to be correctly validated by the *I/O Module*.



Picture 3 – Bypass line validation standby

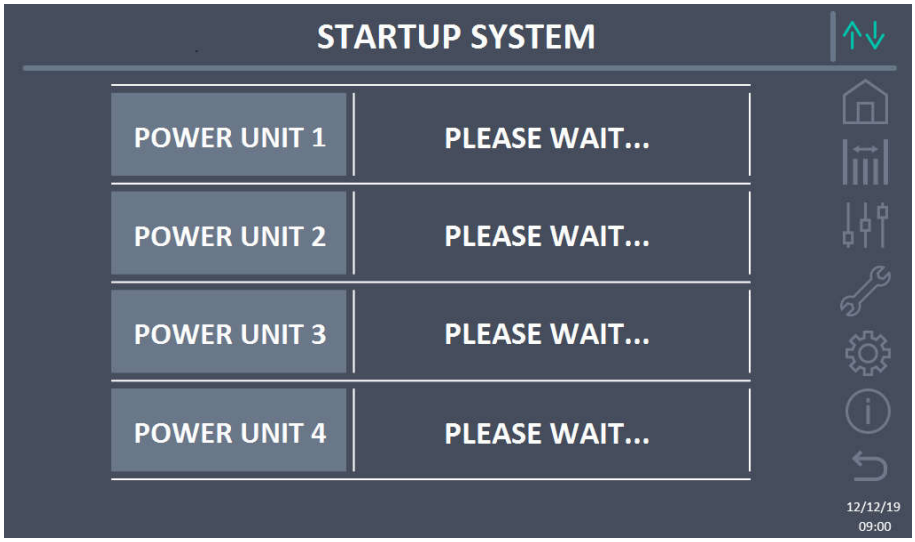
4) A screen will be displayed allowing you to start the *Power Unit* in the system individually or simultaneously.
Each line of the table will indicate the operation to carry out for each *PU*.



Picture 4 – Simultaneous start-up of the PU

5) As displayed in the previous figure, you will be asked to close the *RCBx* switch of the *PU* or the *PU* to start.
If you want to start a *PU*, keep the relevant switches open.
If a *PU* was previously removed from the system, the following writing will be displayed: ***PU NOT PRESENT IN THE SYSTEM***. To start again, you must terminate the start sequence and follow the start-up procedure of *switching on and inserting a PU in the system*, described in the next chapters.

6) Closing the *RCBx* switches, the *Rectifier* and the *Inverter* of the *PU* are started in sequence.



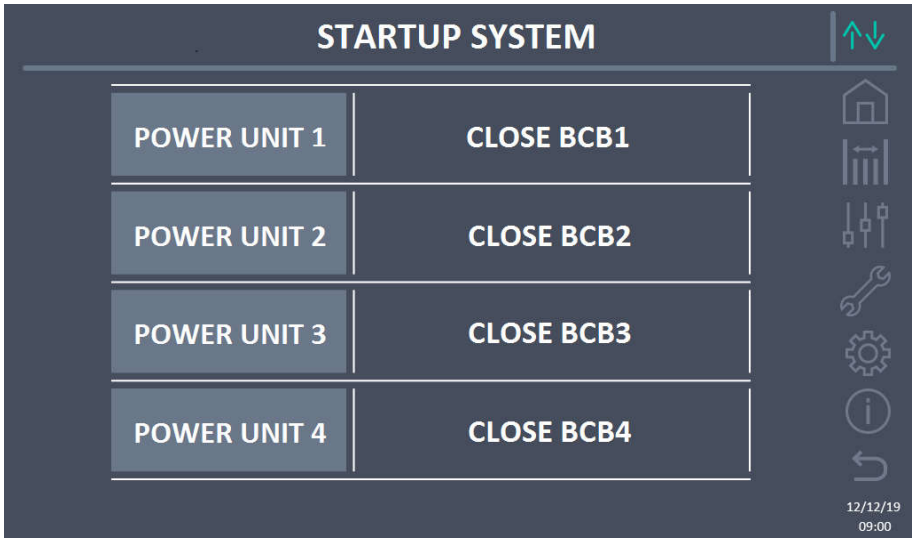
Picture 5 – Start Rectifier and Inverter of the PU

7) Having terminated start-up of the *Rectifiers* and the *Inverters*, the correctness is examined of the DC bus voltage and, if positive, the green light switches on, beside the *BCBx* switches.

Closure of the *BCBx* switches

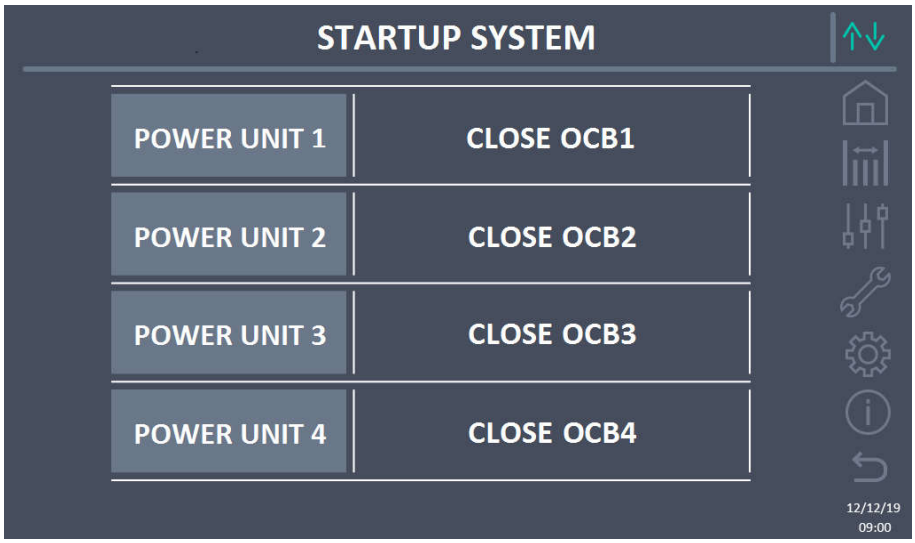
Closure of the *BCBx* switches placed on the distribution columns can only be carried out if the relevant light is on. If carried out before the request from the touch screen, it can cause serious damage to the equipment and/or the *Battery*.

8) Close the *BCBx* switches as requested.



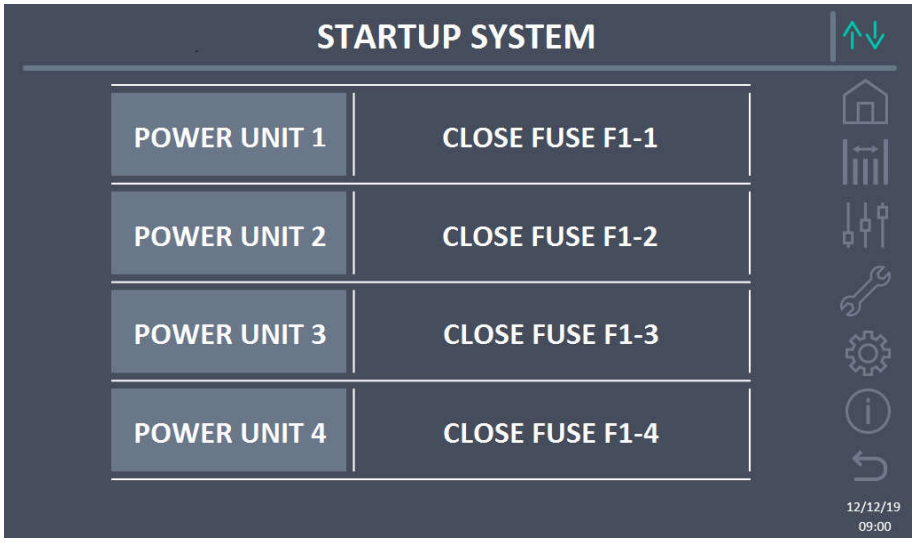
Picture 6 – Closure of the BCBx switches of the PU

9) Close the *OCBx* switches to connect the output of the *PU* to the output common bar in the *I/O Module*.



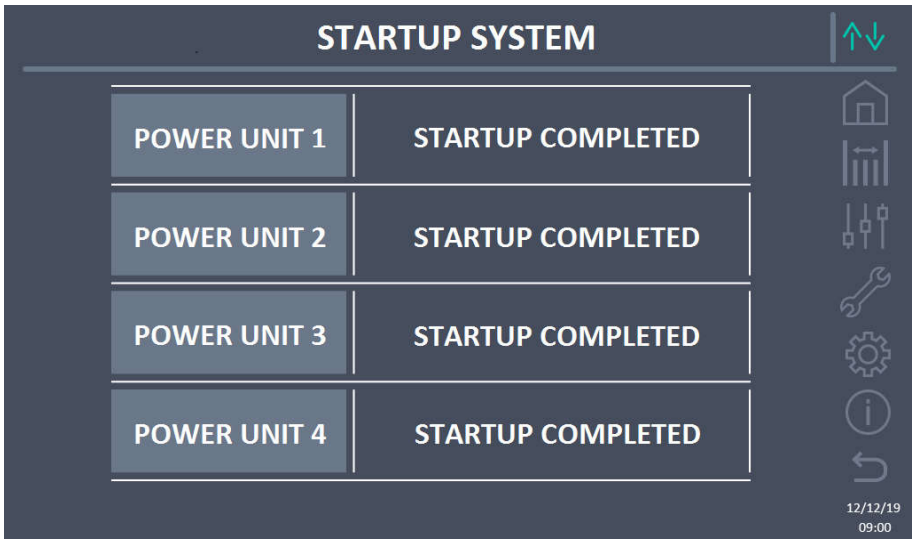
Picture 7 – Closure of the OCBx switches of the PU

10) Close the *F1-x* fuse boxes as requested.



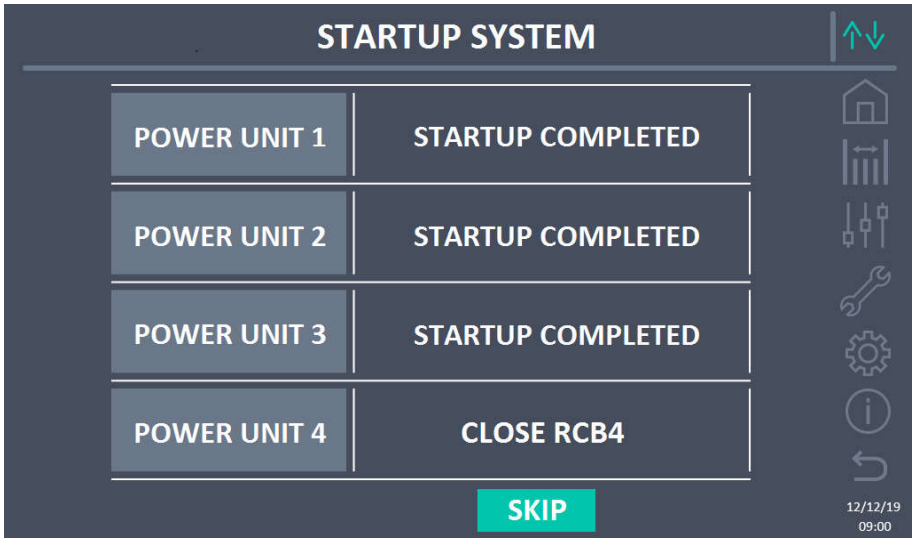
Picture 8 – Closure of the F1-x fuse boxes

11) Having terminated start-up of all the *PU* on the system, the start-up sequence will automatically proceed to the next phase.



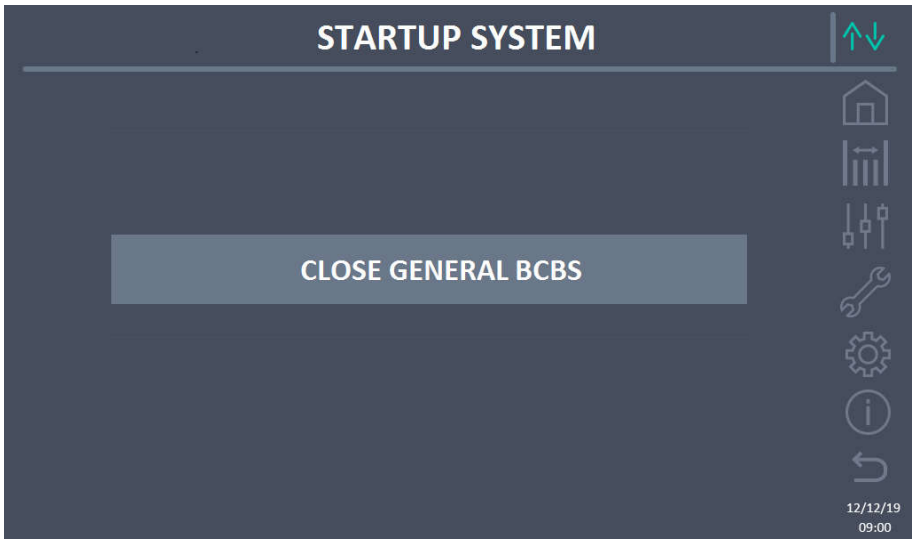
Picture 9 – Start-up of the PU terminated

12) If you have chosen not to start one or more of the *PU*, as soon as a *PU* will reach the terminated status, a ***SKIP*** key will be displayed. Pressing the key or waiting 5 minutes, you continue to the next start-up phase. The *PU* not started will be eliminated by the system. To proceed with their start-up, you must terminate the start sequence and follow the start-up procedure of *switching on and inserting a PU in the system*, described in the next chapters. An example follows in the figure below.



Picture 10 – Bypassing the PU x during system start-up

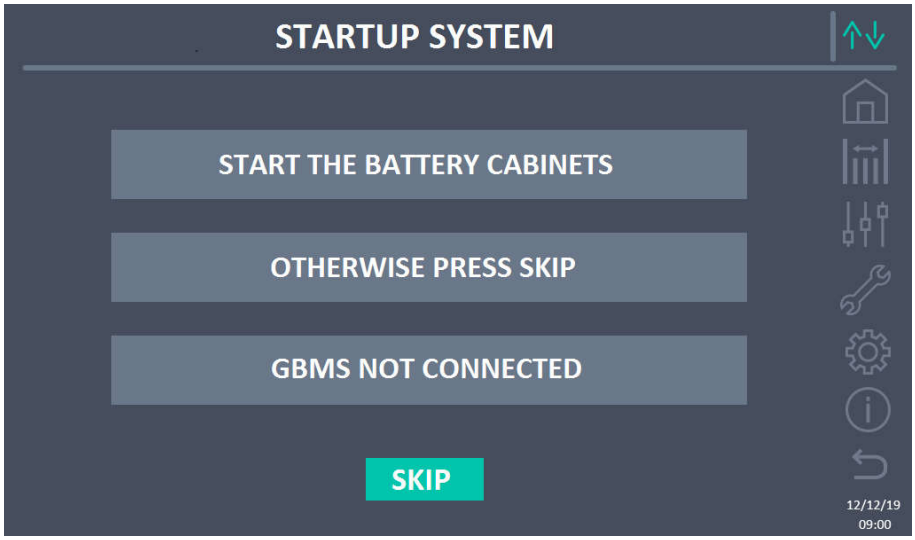
13) All the desired *PU* are now running. Close the *Battery BCBS* switch to connect the *battery* to the *UPSaver* system.



Picture 11 – Starting the Battery

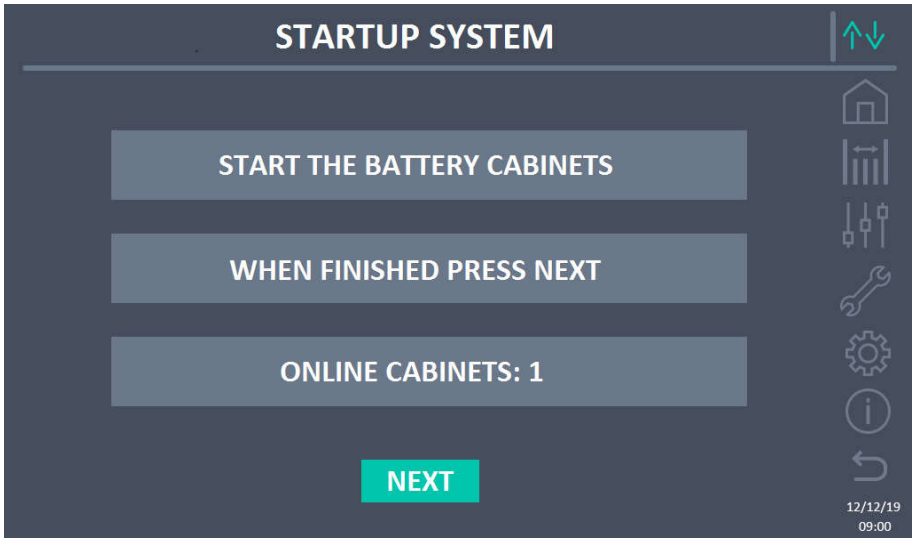
14) If a *Vision Lithium Battery* is used, follow the points below, otherwise proceed to the description of the closure phase of the *OCBS* main switch.

15) In this phase, you can start the cabinets of the *Vision Lithium Battery*. If you want to start, press the ***SKIP*** key or wait 5 minutes to proceed to the description of the closure phase of the *OCBS* main switch.



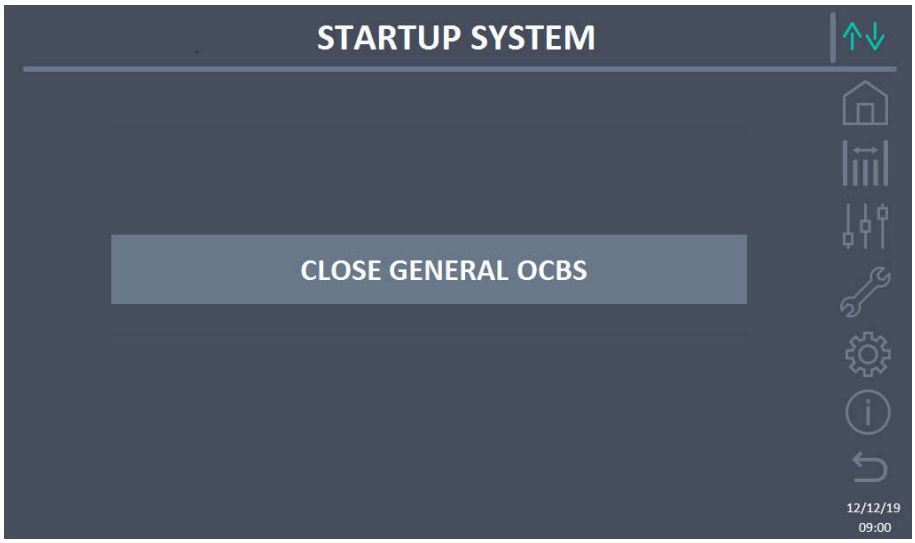
Picture 12 – Requesting to start the Vision Lithium Battery cabinets

16) Starting the *Vision Lithium Battery* once correct communication is established between the *UPSaver* and *GBMS*, the number of the *Cabinet Online* will be displayed on the touch screen. If the number of the *Cabinet Online* corresponds to the number entered in *EEProm,* the system will automatically proceed to the next phase, otherwise proceed to pressing the ***NEXT*** key or wait 5 minutes after the last cabinet is inserted.



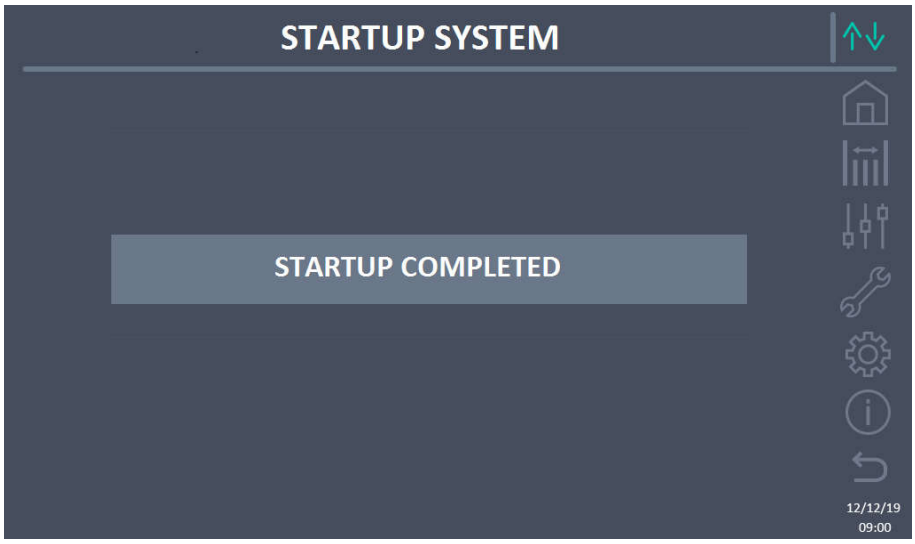
Picture 13 – Starting the Vision Lithium Battery cabinets

17) Close the *OCBS* main switch to connect the *UPSaver* system to charge.



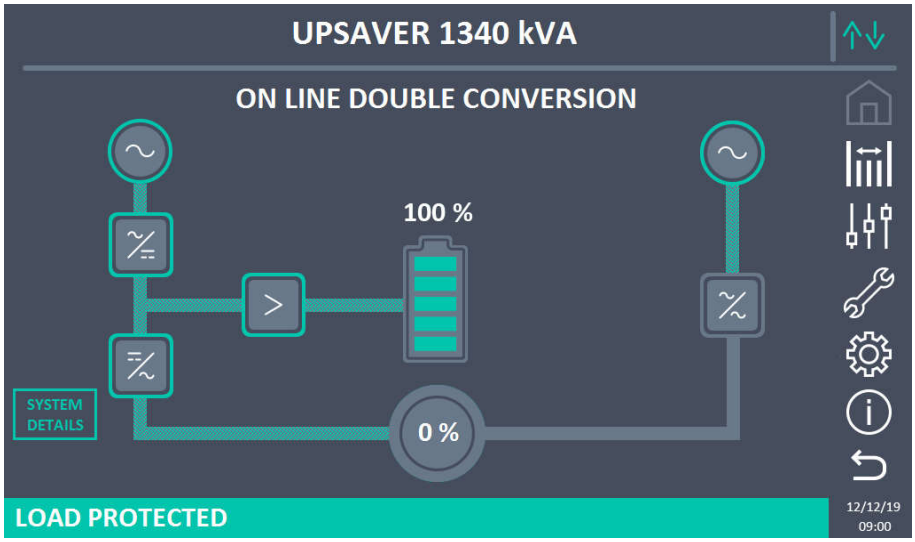
Picture 14 – System connection to charge

18) The start sequence has terminated.



Picture 15 – Start-Up of the UPSaver System terminated

19) The touch screen displays the system flow diagram.



Picture 16 – UPSaver System flow diagram

To view the status of each power unit click on the SYSTEM DETAILS button.

1.3 SHUTDOWN PROCEDURE

To shutdown the UPSaver system, proceed as indicated below:

1) Open the *OCBS* main switch.
2) Open the *SBCBS* main switch.
3) Open the *BCBS* main switch.
4) Open the *RCBS* main switch.
5) Open all the *OCBx* switches of the *PU*.
6) Open all the *BCBx* switches of the *PU*.
7) Open all the *RCBx* switches of the *PU*.
8) Open the *F1-x* fuse boxes of the *PU*.

EPO button

In the event of an emergency, to shutdown the system, press the EPO button and then proceed with opening the switches as described above.

1.4 TRANSFER PROCEDURE ON MANUAL BYPASS

The load transfer operation on the Manual Bypass takes place without discontinuity of the power supply on the loads. In this configuration, using the return from charge procedure on *Manual Bypass*, you can also restart the system without having to disconnect the loads.

Manual Bypass

To execute the transfer procedure correctly, check there are no alarms on the system.

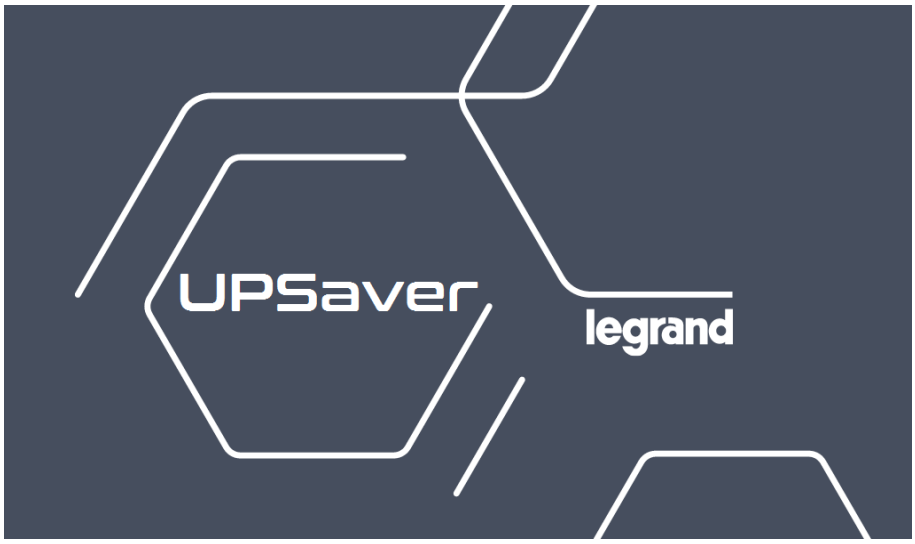
In *Manual Bypass*, the load is powered directly by the input mains, therefore continuity cannot be guaranteed of the power supply to the loads.

1) Move the *Bypass - Switch* selector to the **BYPASS** position.
2) Close switch *MBCBS*.
3) Open the *SBCBS* main switch.
4) Open the *OCBS* main switch.
5) Open the *BCBS* main switch.
6) Open the *RCBS* main switch.
7) Open all the *OCBx* switches of the *PU*.
8) Open all the *BCBx* switches of the *PU*.
9) Open all the *RCBx* switches of the *PU*.
10) Open the *F1-x* fuse boxes of the *PU*.

1.5 START FROM MANUAL BYPASS

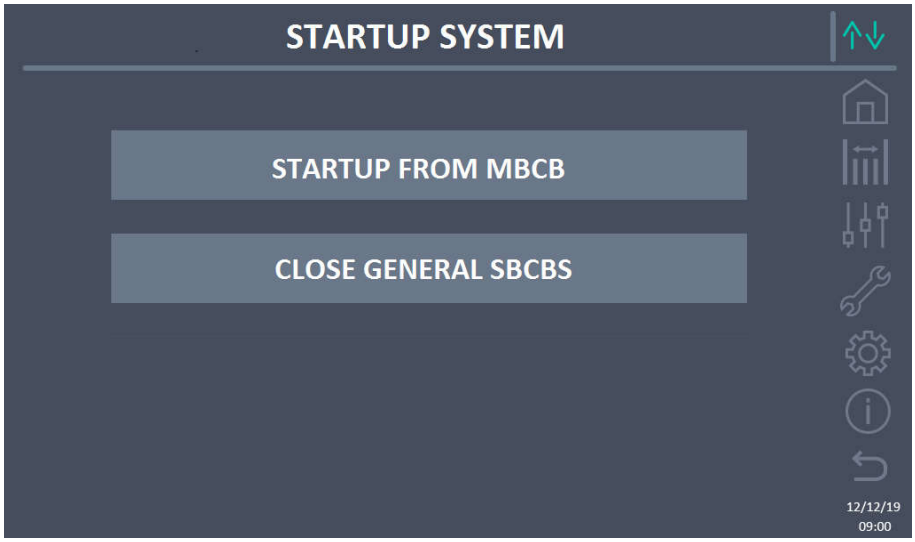
1) Before restarting the *UPSaver* from *Manual Bypass*, check the *Bypass - Switch* selector is in the **BYPASS** position and the MBCBS switch is closed.

2) Close the *RCBS* main switch. After a few seconds, the touch screen will start and display the start screen with the *UPSaver* logo.



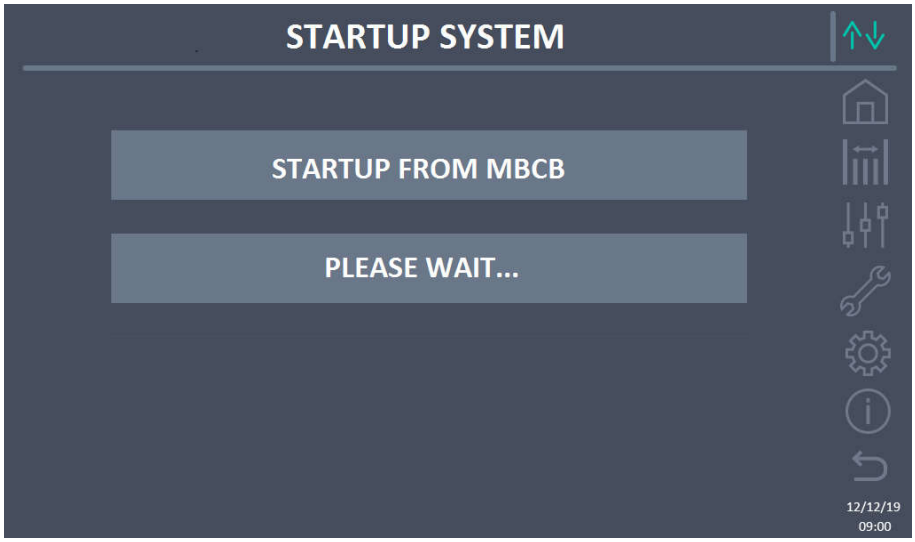
Picture 17 – Starting from Manual Bypass, Touch Screen start screen

3) After the loading phase of the software, the system acquires the system status and closure of the *RCBS* switch and provides the first operating indication in as shown in the next figure. As requested, close the *SBCBS* main switch.



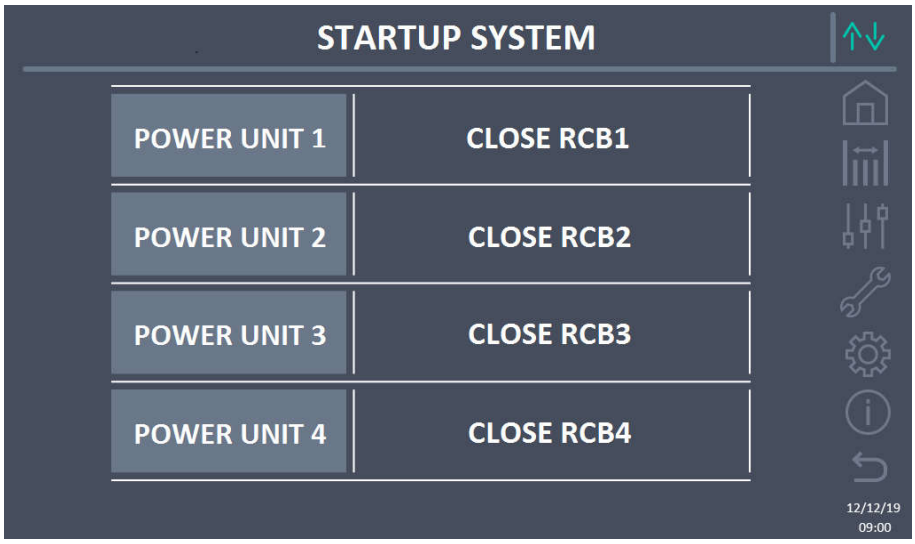
Picture 18 – Starting from Manual Bypass, SBCBS main switch closure

4) Wait for the *Bypass* line to be correctly validated by the *I/O Module*.



Picture 19 – Starting from Manual Bypass, standby for Bypass line validation

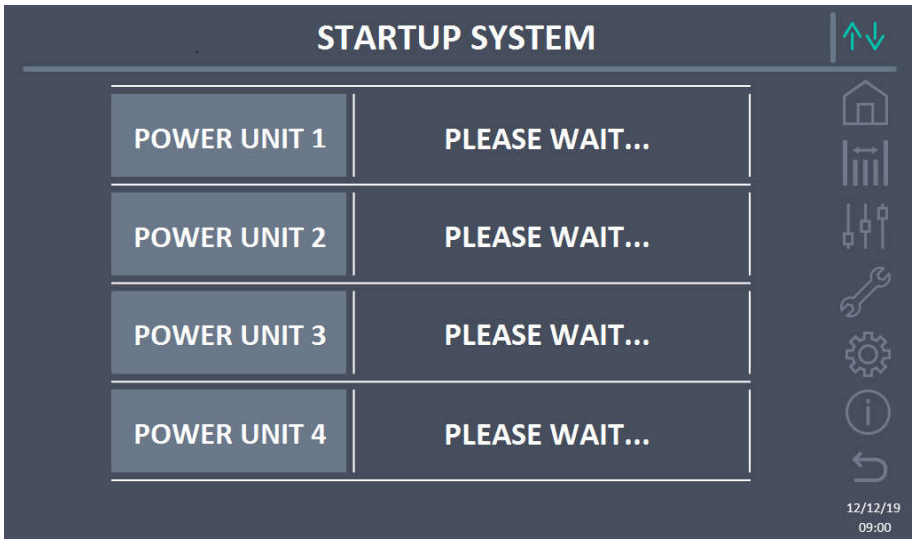
5) A screen will be displayed allowing you to start the *Power Modules* in the system individually or simultaneously.
Each line of the table will indicate the operation to carry out for each *PU*.



Picture 20 – Starting from Manual Bypass, simultaneous start-up of the PU

6) As displayed in the previous figure, you will be asked to close the *RCBx* switch of the *PU* or the *PU* to start.
If you want to start a *PU*, keep the relevant switches open.
If a *PU* was previously removed from the system, the following writing will be displayed: ***PU NOT ON SYSTEM***. To start again, you must terminate the start sequence and follow the start-up procedure of *switching on and inserting a PU in the system*, described in the next chapters.

7) Closing the *RCBx* switches, the *Rectifiers* start of the *PU*.



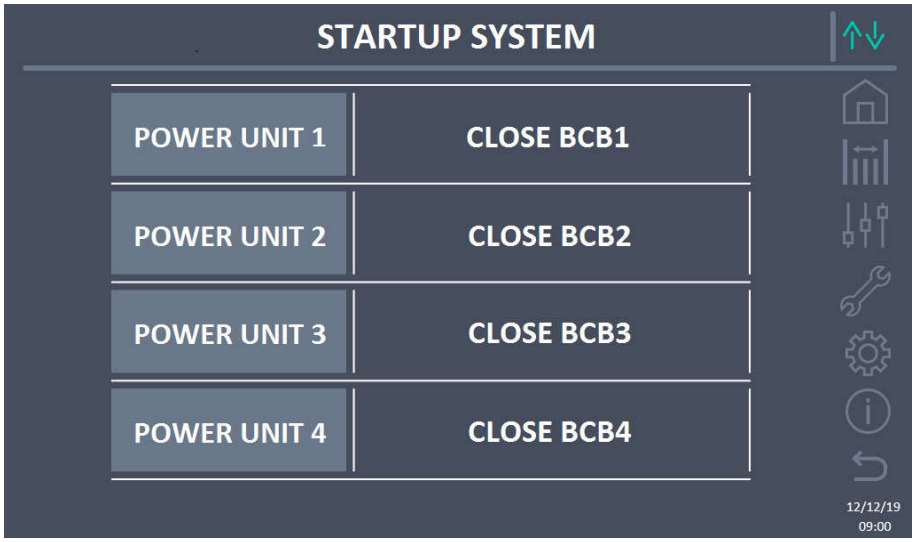
Picture 21 – Starting from Manual Bypass, start-up of the PU Rectifiers

8) Having terminated start-up of the *Rectifiers*, the correctness is examined of the DC bus voltage and the green light switches on, beside the *BCBx* switches.

Closure of the *BCBx* switches

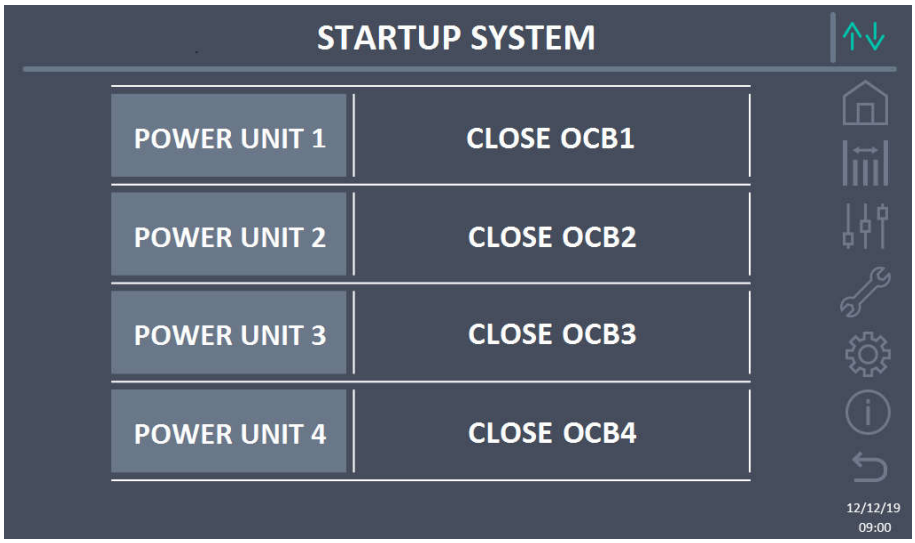
Closure of the *BCBx* switches placed on the distribution columns can only be carried out if the relevant light is on. If carried out before the request from the touch screen, it can cause serious damage to the equipment and/or the *Battery*.

9) Close the *BCBx* switches as requested.



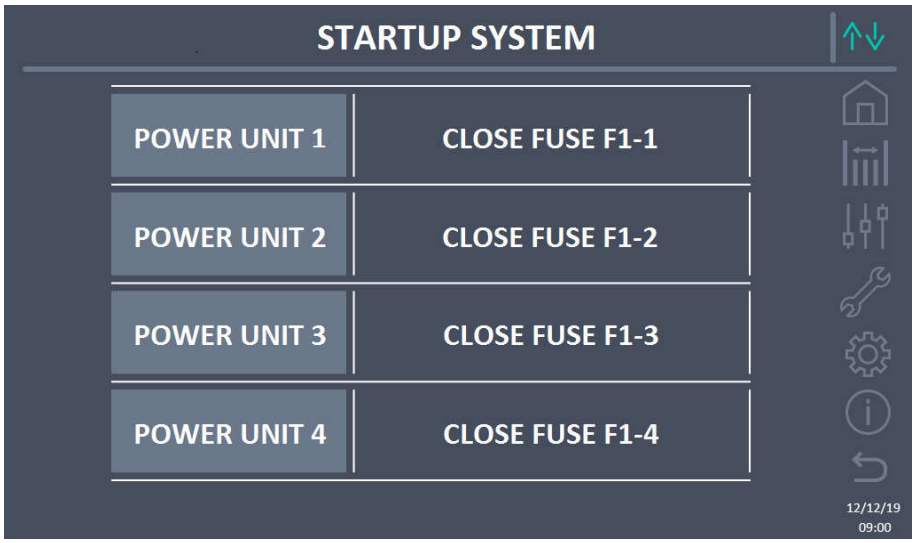
Picture 22 – Starting from Manual Bypass, closure of the PU BCBx switches.

10) Close the *OCBx* switches to connect the output of the *PU* to the output common bar in the *I/O Module*.



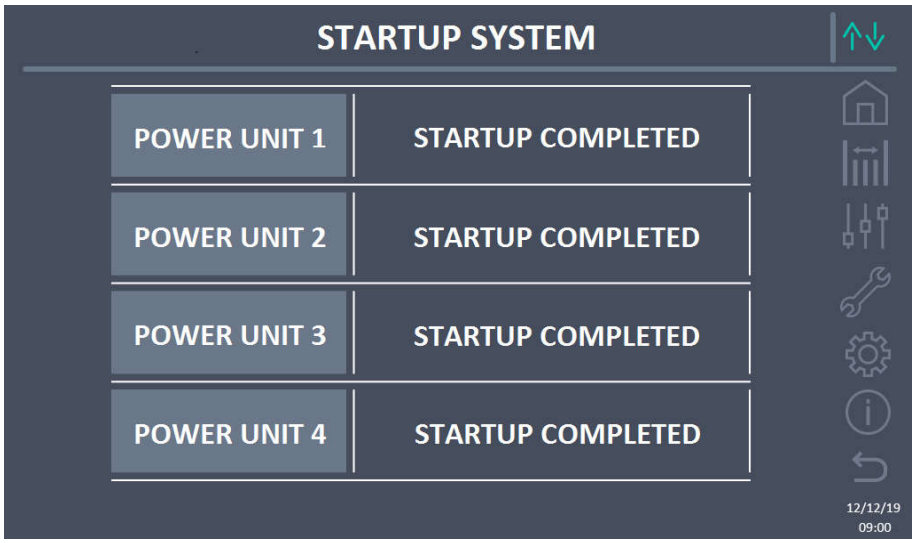
Picture 23 – Starting from Manual Bypass, closure of the PU OCBx

11) Close the *F1-x* fuse boxes as requested.



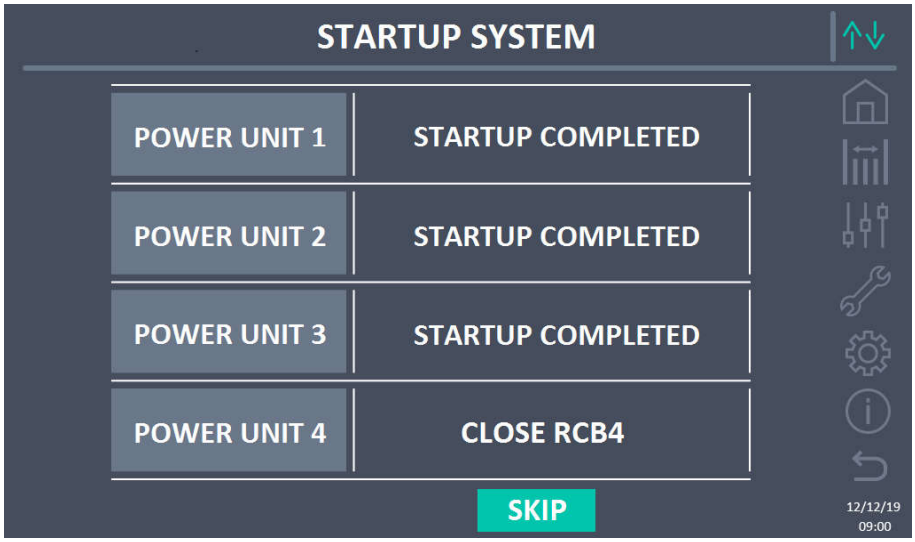
Picture 24 – Starting from Manual Bypass, closure of the F1-x fuse box

12) Having terminated start-up of all the *PU* on the system, the start-up sequence will automatically proceed to the next phase.



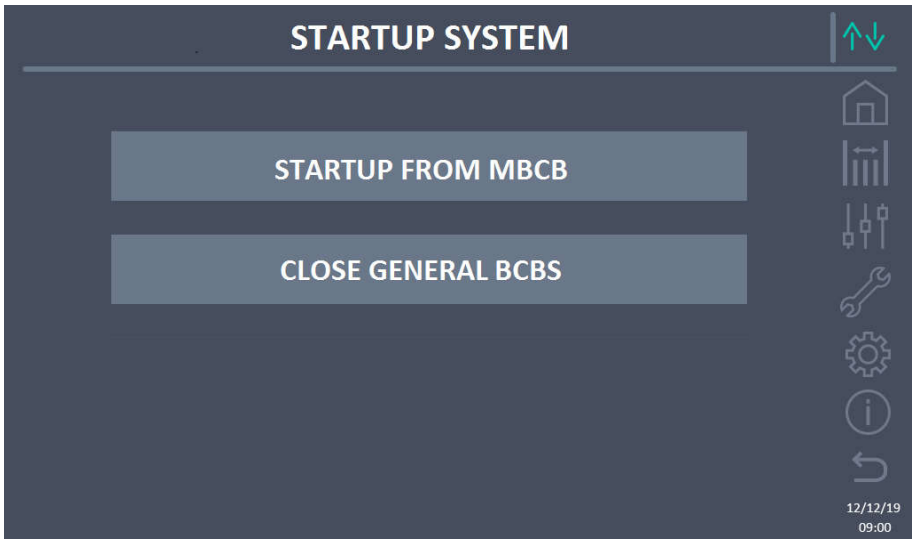
Picture 25 – Starting from Manual Bypass, start-up of the terminated PU

13) If you have chosen not to start one or more of the *PU*, as soon as a *PU* will reach the terminated status, a ***SKIP*** key will be displayed. Pressing the key or waiting 5 minutes, you continue to the next start-up phase. The *PU* not started will be eliminated by the system. To proceed with their start-up, you must terminate the start sequence and follow the start-up procedure of *switching on and inserting a PU in the system*, described in the next chapters. An example follows in the figure below.



Picture 26 – Starting from Manual Bypass, bypassing the PU x during system start-up

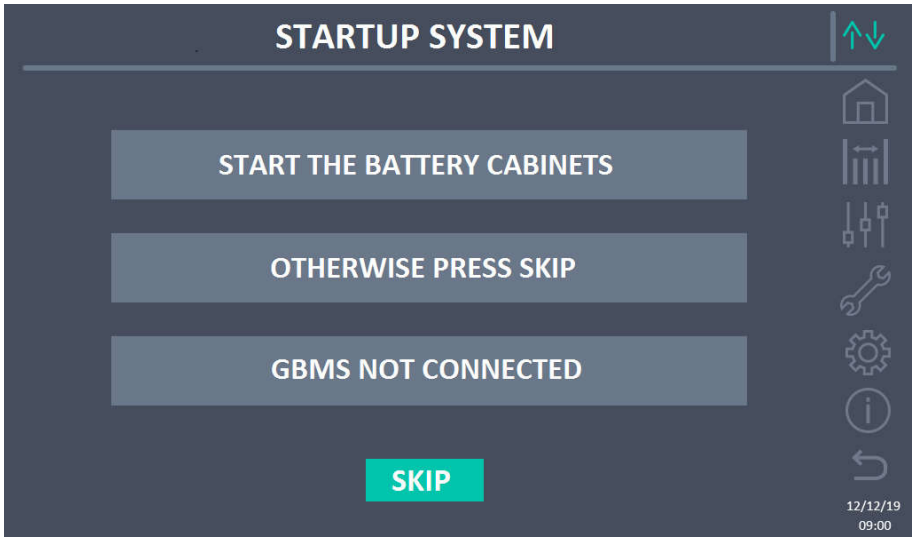
14) All the desired *PU Rectifiers* are now running. Close the *BCBS* switch to connect the *battery* to the *UPSaver* system.



Picture 27 – Starting from Manual Bypass, starting the battery

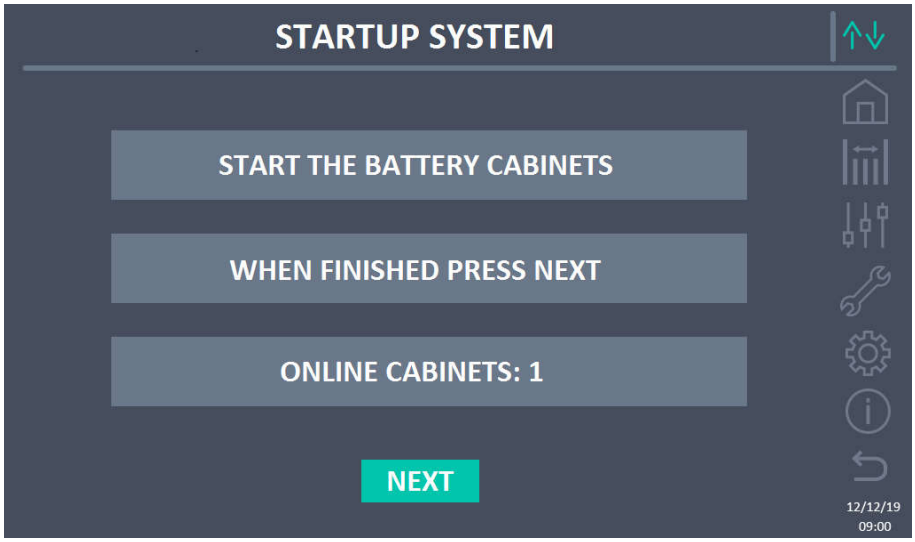
15) If a *Vision Lithium Battery* is used, follow the points below, otherwise proceed to the description of the closure phase of the *OCBS* main switch.

16) In this phase, you can start the cabinets of the **Vision Lithium Battery**. If you want to start, press the ***SKIP*** key or wait 5 minutes to proceed to the description of the closure phase of the *OCBS* main switch.



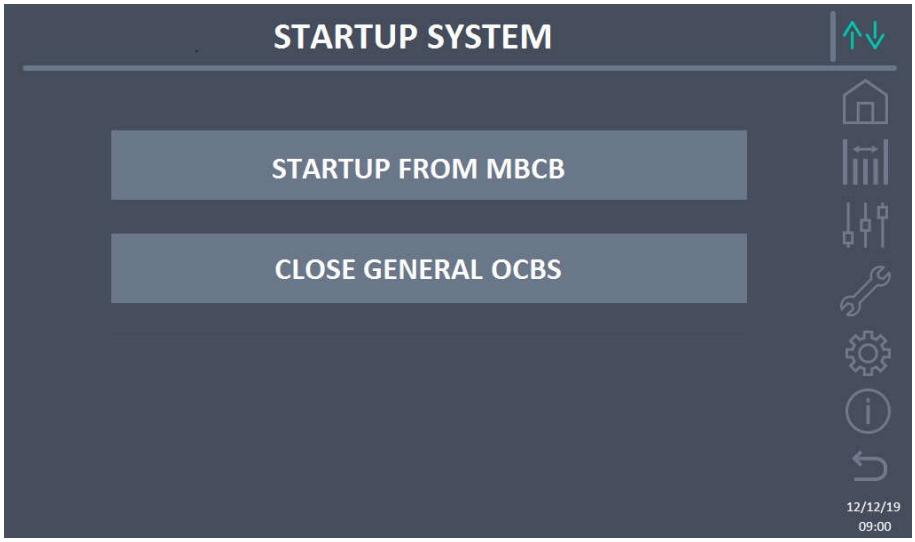
Picture 28 – Starting from Manual Bypass, request to start the Vision Lithium Battery cabinets

17) Starting the *Vision Lithium Battery* once correct communication is established between the *UPSaver* and *GBMS*, the number of the *Cabinet Online* will be displayed on the touch screen. If the number of the *Cabinet Online* corresponds to the number entered in *EEProm,* the system will automatically proceed to the next phase, otherwise proceed to pressing the ***NEXT*** key or wait 5 minutes after the last cabinet is inserted.



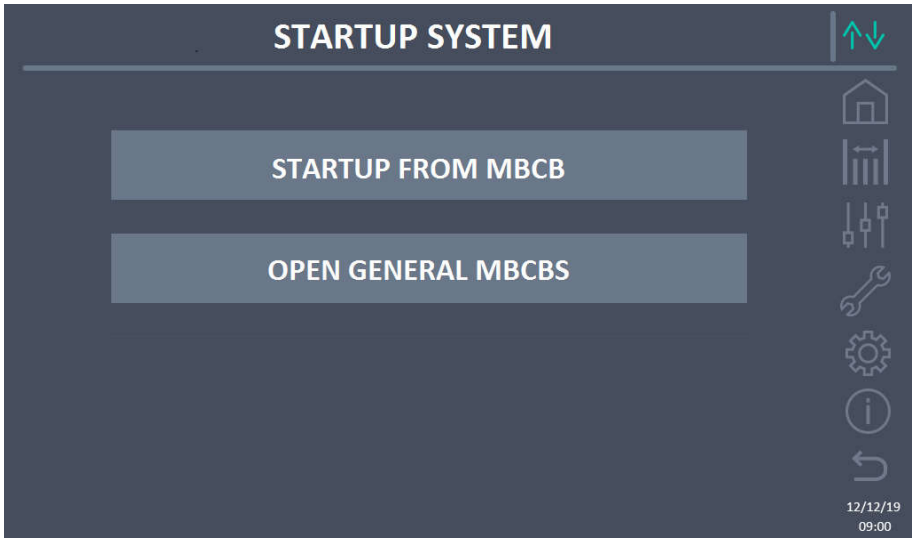
Picture 29 – Starting from Manual Bypass, starting the Vision Lithium Battery cabinets

18) Close the OCBS main switch to connect the *UPSaver* system to charge.



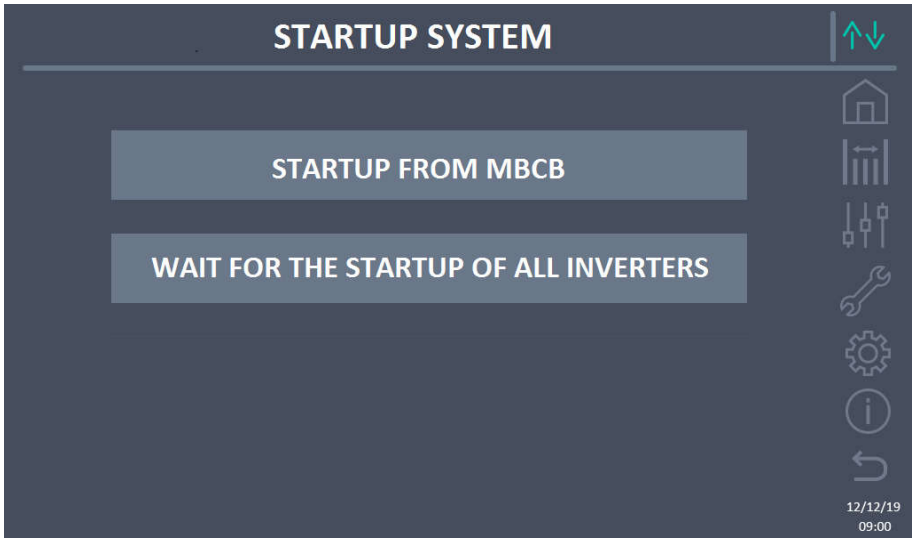
Picture 30 – Starting from Manual Bypass, OCBS main switch closure

19) At this point, the load is powered both via the *MBCBS* switch and through the *Bypass Static Switch.* Open the *MBCBS* switch as requested.



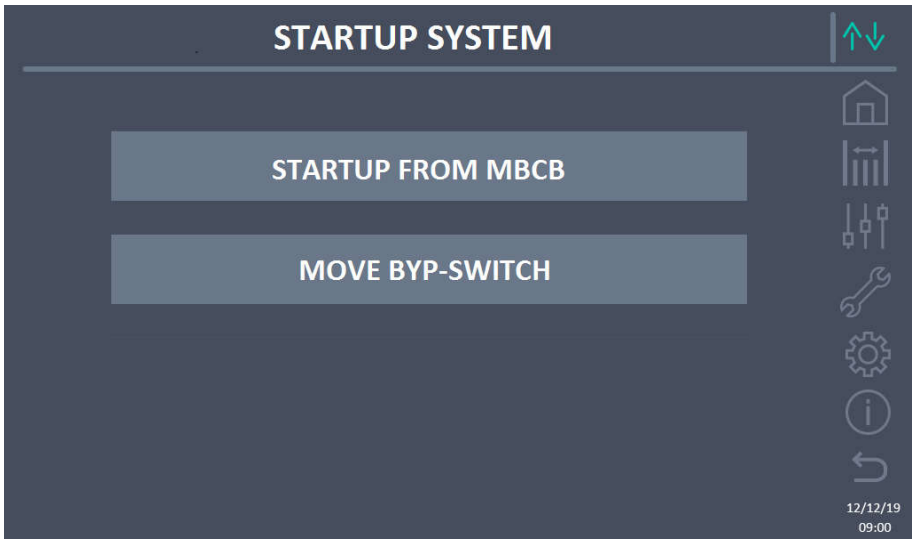
Picture 31 – Starting from Manual Bypass, MBCBS main switch opening

20) Opening of the *MBCBS* switch enables start-up of the *Inverters* on all the *PU*, which start and synchronise with the *Bypass* line.



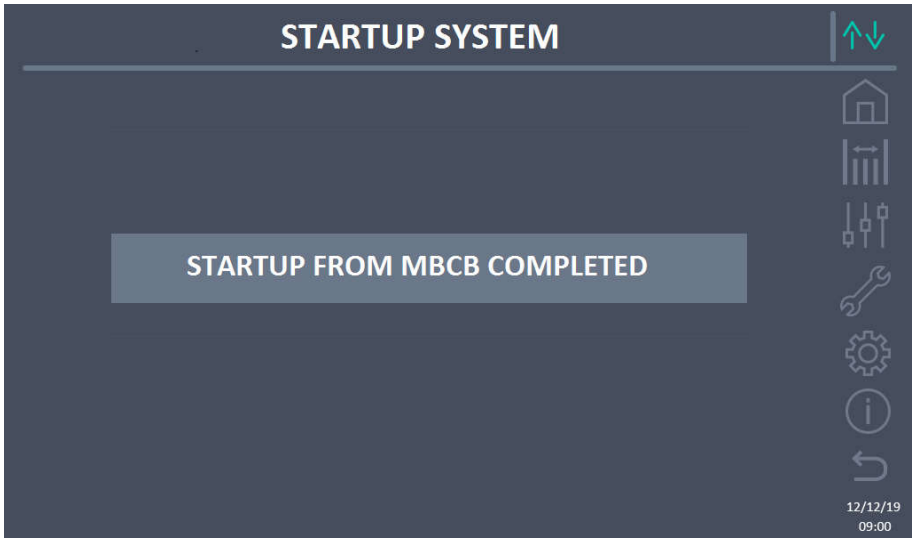
Picture 32 – Starting from Manual Bypass, start-up of the PU inverters

21) On completion of *PU* Inverter start-up and their synchronisation with the *Bypass* line, movement is requested of the *Bypass* – *Switch* selector to the **NORMAL** position to transfer the load to the *Inverters*. Follow the instructions on touch screen.



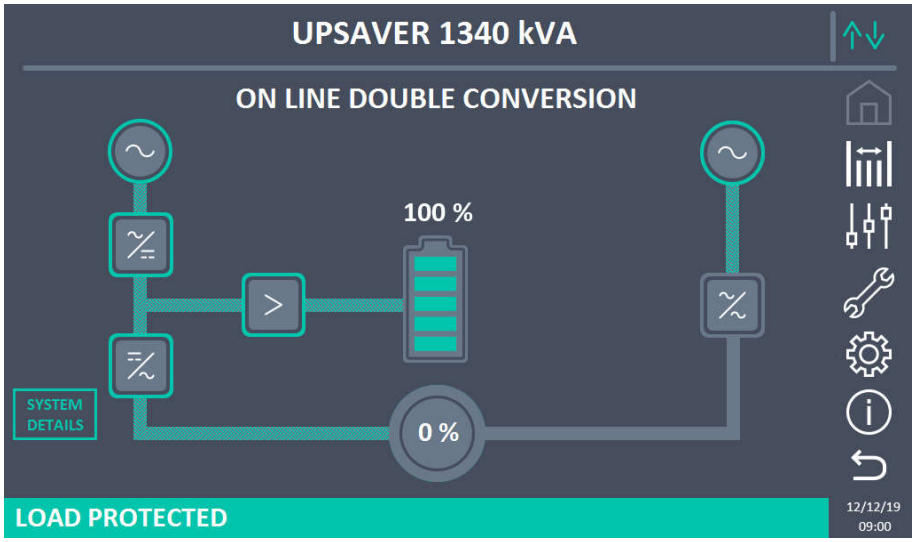
Picture 33 – Starting from Manual Bypass, transfer of the load on Inverter

22) The *Manual Bypass* start sequence has terminated.



Picture 34 – Start from Manual Bypass terminated

23) The touch screen displays the system flow diagram.



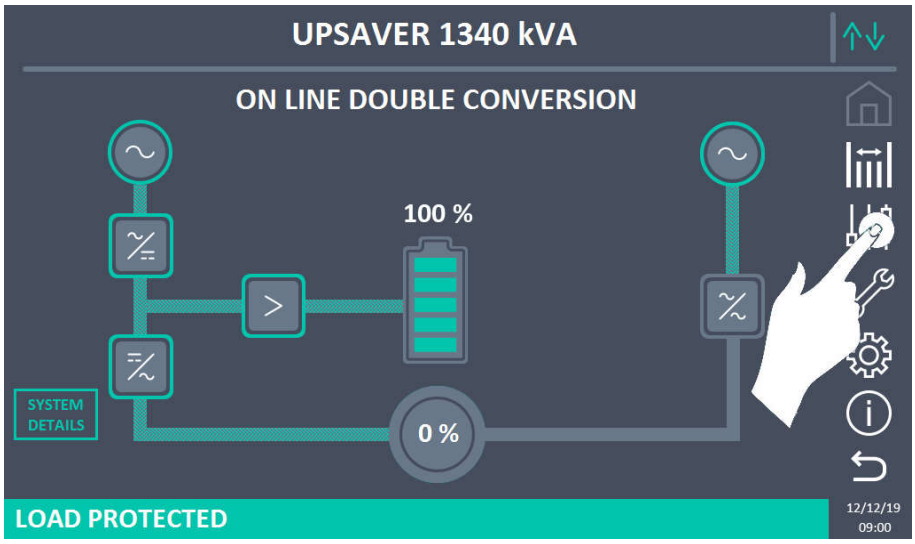
Picture 35 – Flow diagram of the UPSaver System

To view the status of each power unit click on the SYSTEM DETAILS button.

1.6 SWITCHING OFF AND REMOVAL FROM THE SYSTEM OF A PU

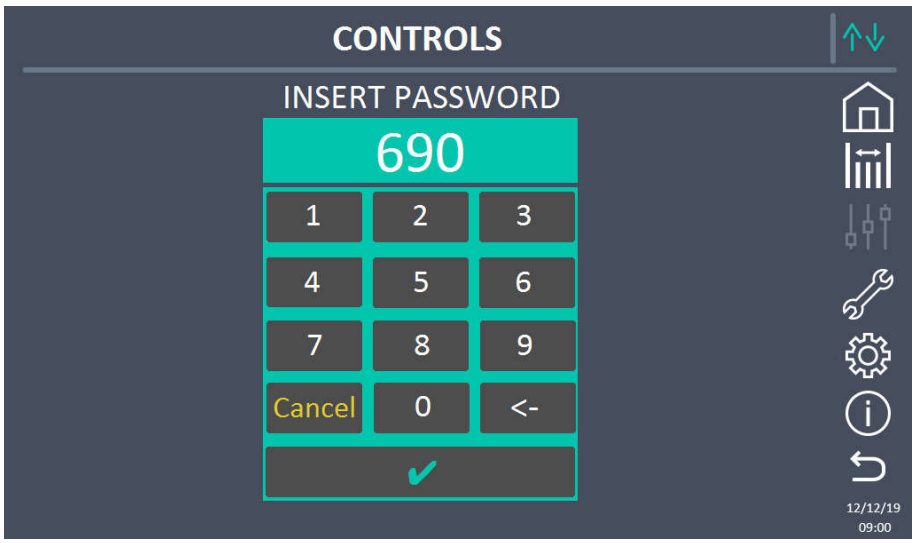
You can switch off a *PU* following the touch screen instructions, according to the following procedure.

1) From the main screen (flow diagram), press the ***CONTROL*** button.



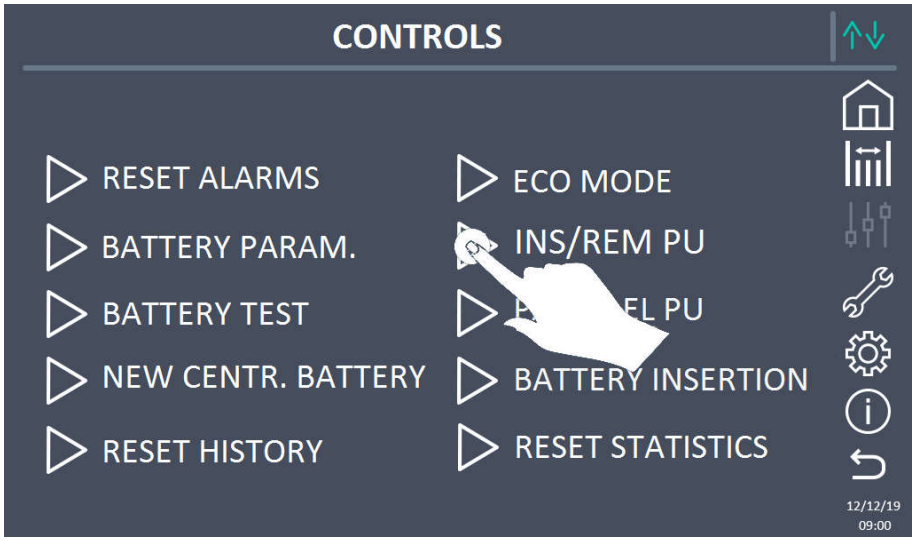
Picture 36 – Switching off and removal from the system of a PU

2) Enter the password to access the ***CONTROL*** menu.



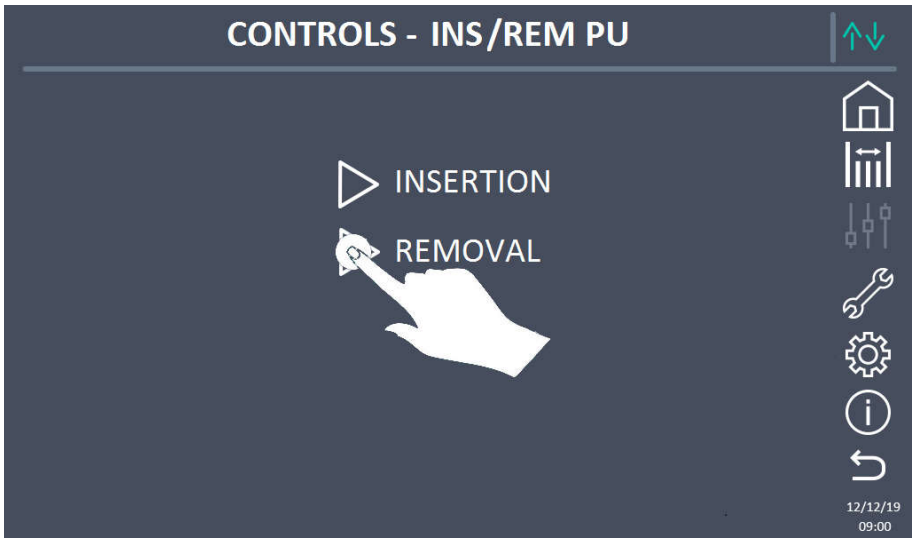
Picture 37 – Entering the password

3) Select the ***INS/REM PU*** menu.



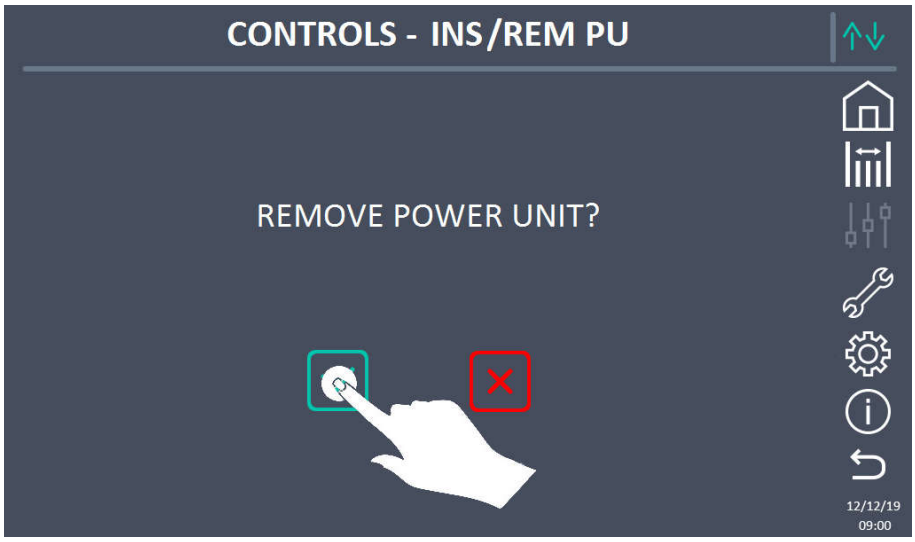
Picture 38 – Controls menu – Ins/Rem PU

4) Select the ***REMOVAL*** menu.



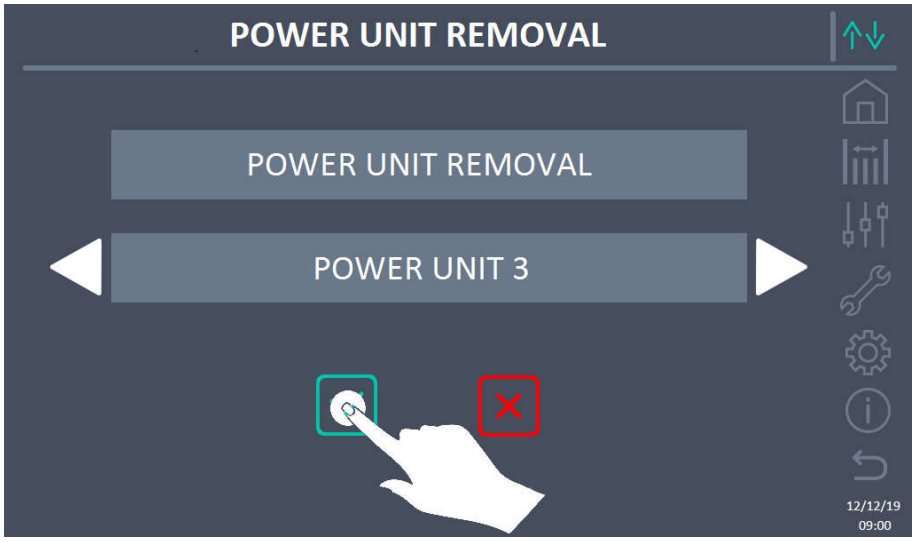
Picture 39 – Controls menu – Ins/Rem PU - Removal

5) Confirm the choice by selecting the button with the green tick.



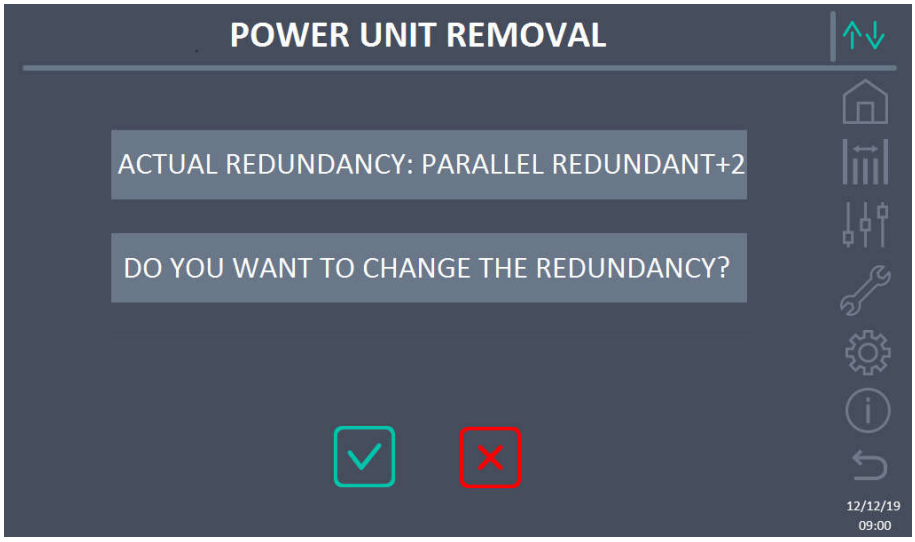
Picture 40 – Confirming PU removal

6) Using the left and right arrow, select the *POWER UNIT* to remove and confirm using the button with the green tick.



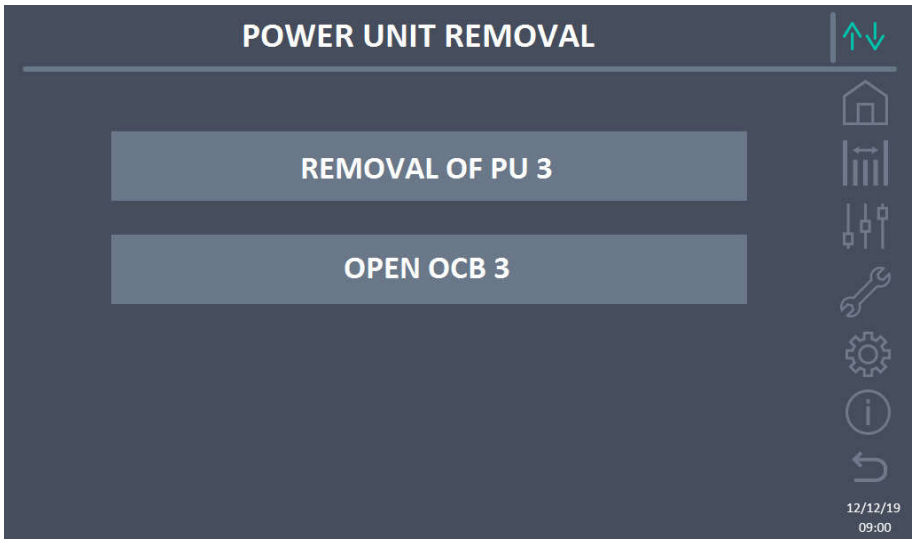
Picture 41 – Selecting the POWER UNIT to switch off and remove

7) Having selected the *POWER UNIT* to remove, you can edit the redundancy of the system.



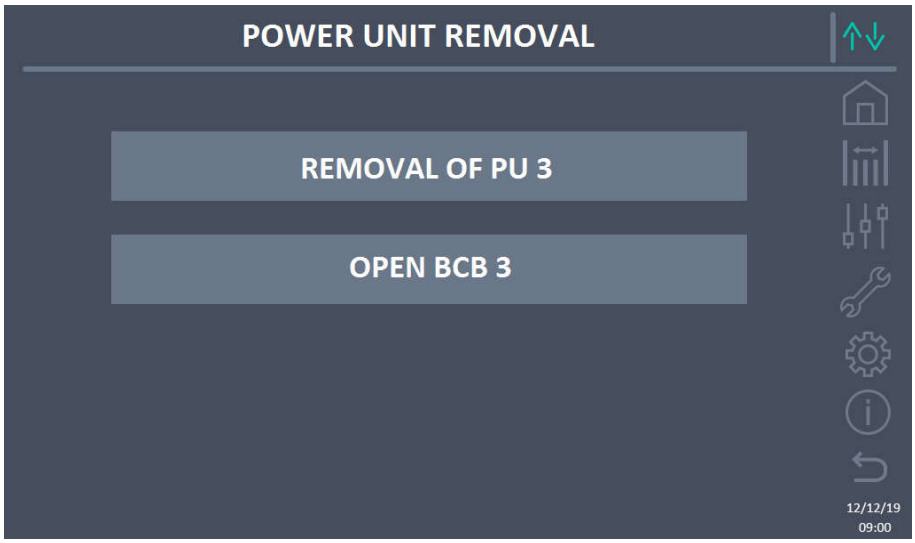
Picture 42 – Removing POWER UNIT - Request to edit redundancy

8) To remove the *POWER UNIT*, open the *OCBx* switch as requested.



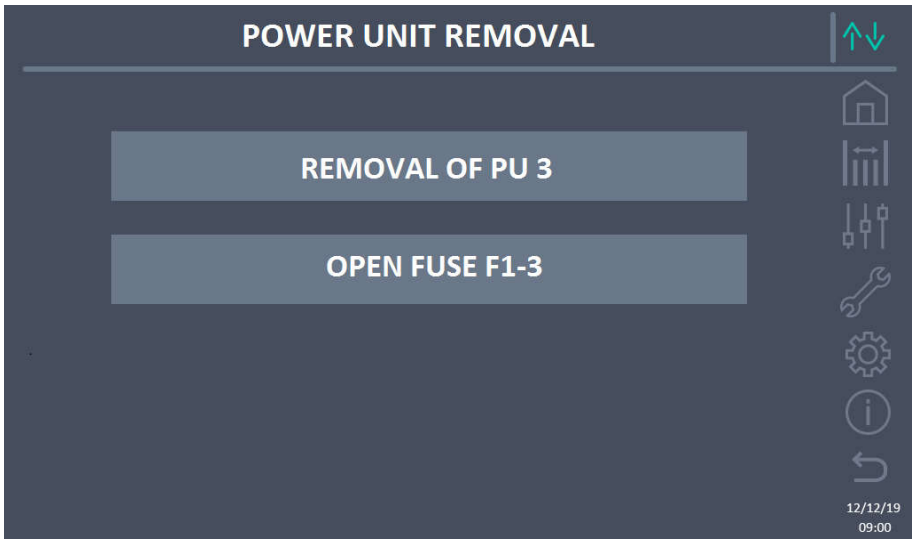
Picture 43 – Opening the OCBx switch of the PU to switch off and remove from the system

9) Open the *BCBx* switch as requested.



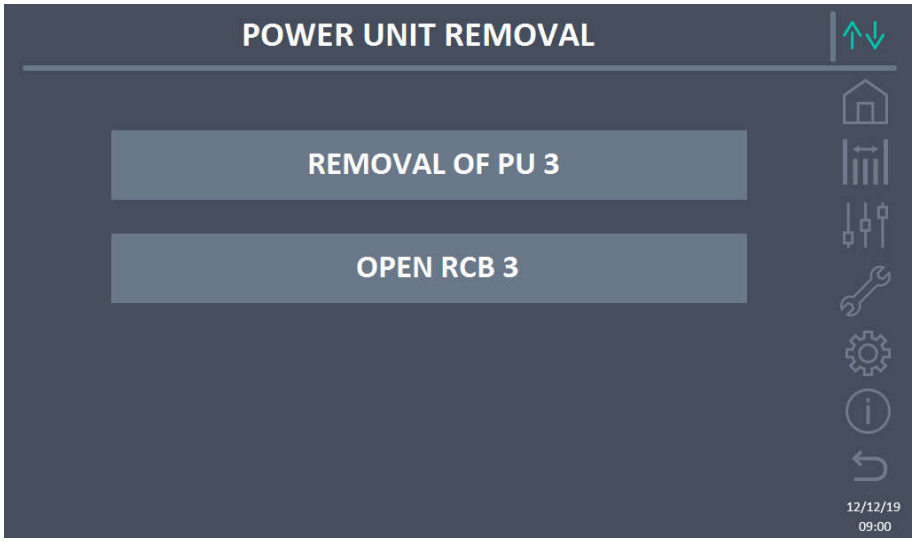
Picture 44 – Opening the BCBx switch of the PU to switch off and remove from the system

10) Close the *F1-x* fuse box as requested.



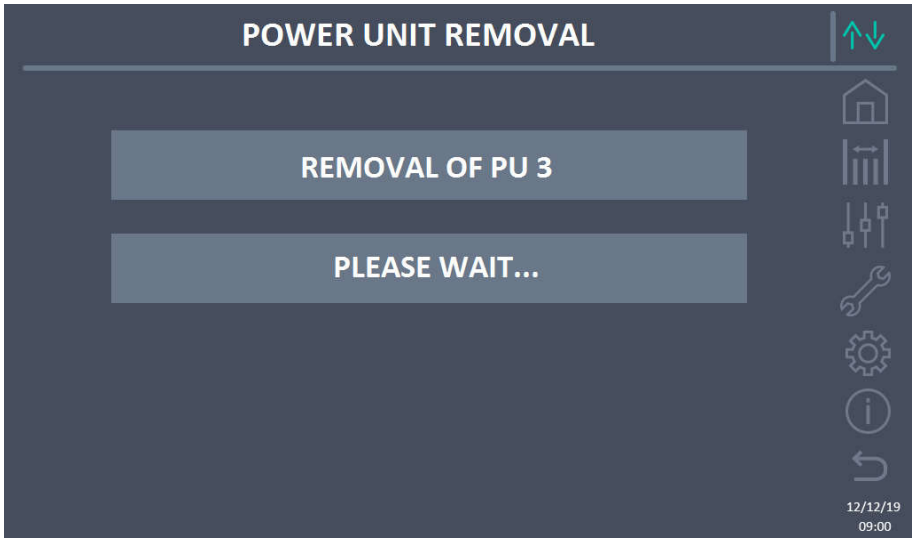
Picture 45 – Opening the F1-x fuse box of the PU to switch off and remove from the system

11) Open the *RCBx* switch as requested.



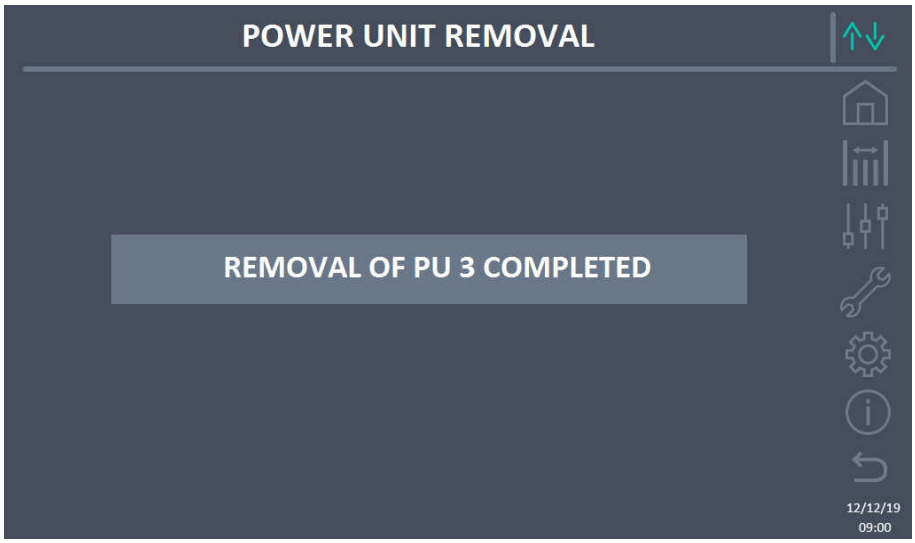
Picture 46 – Opening the RCBx switch of the PU to switch off and remove from the system

12) Wait for the *PU x* logic to switch off completely.



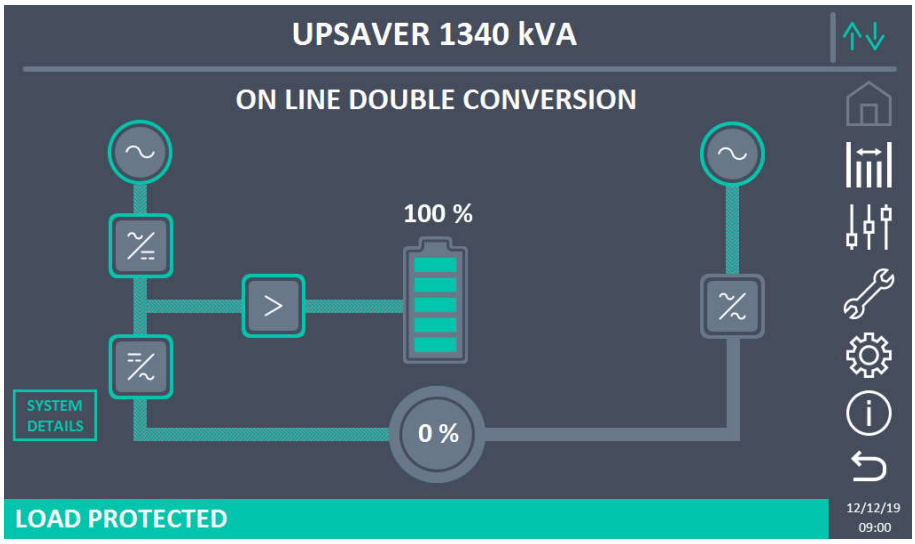
Picture 47 – Standing by for switch off and removal of the selected POWER UNIT

13) Removal of the *POWER UNIT* has terminated.



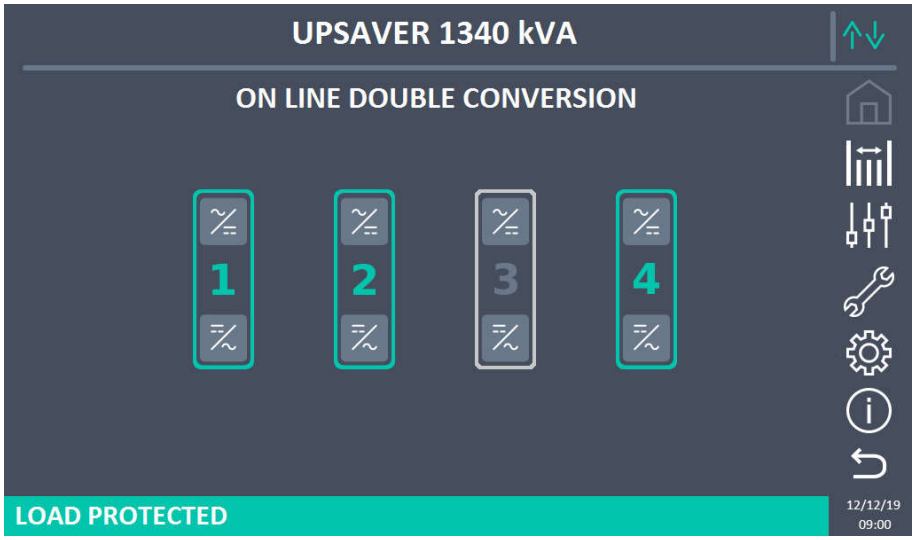
Picture 48 – Switching off and removal of the selected PU terminated

14) The touch screen displays the system flow diagram.



Picture 49 – Flow diagram of the UPSaver system.

15) To view the status of each power unit click on the SYSTEM DETAILS button. The POWER UNIT switched off and removed from the system is grey and cannot be clicked on.

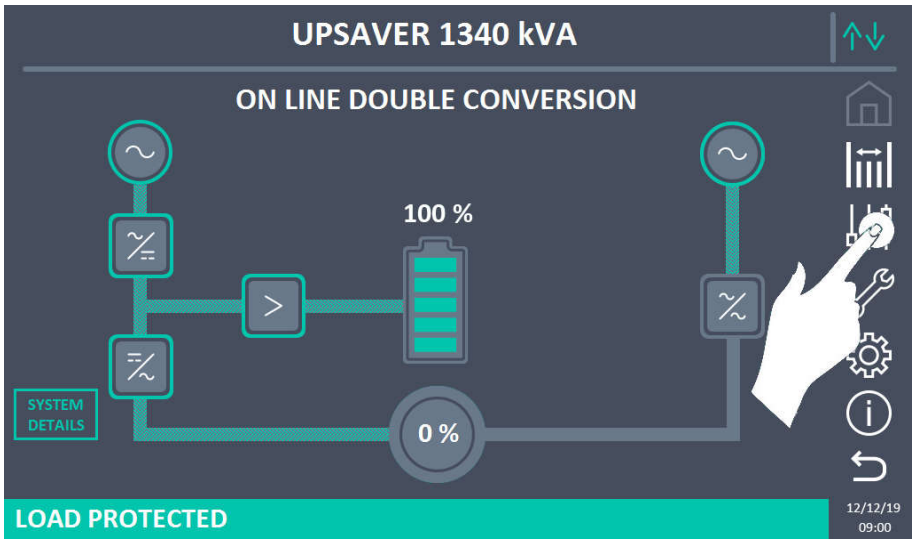


Picture 50 – System details of the UPSaver system with PU removed.

1.7 STARTING UP AND INSERTION OF A PU ON THE SYSTEM

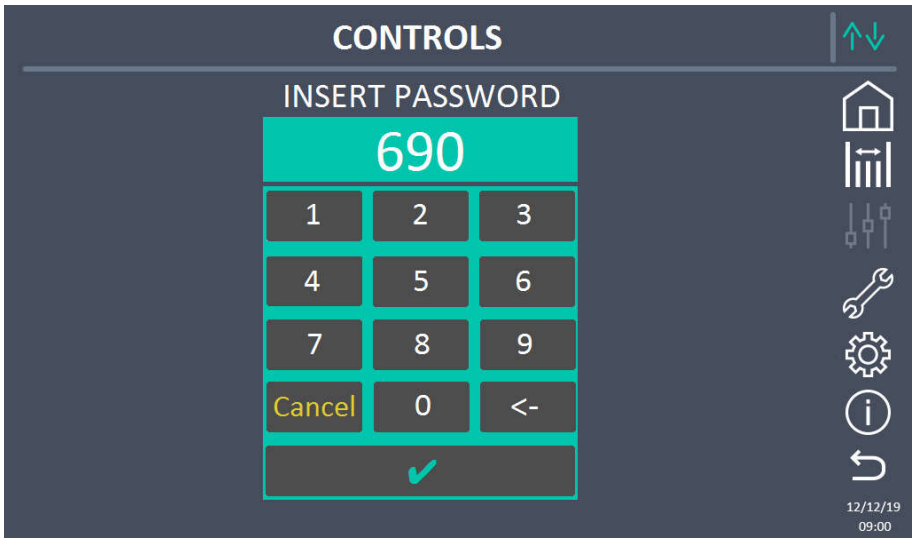
Start-up of a *Power Module* bypassed by the system is possible following the touch screen instructions, according to the following procedure.

1) From the main screen (flow diagram), press the ***CONTROL*** button.



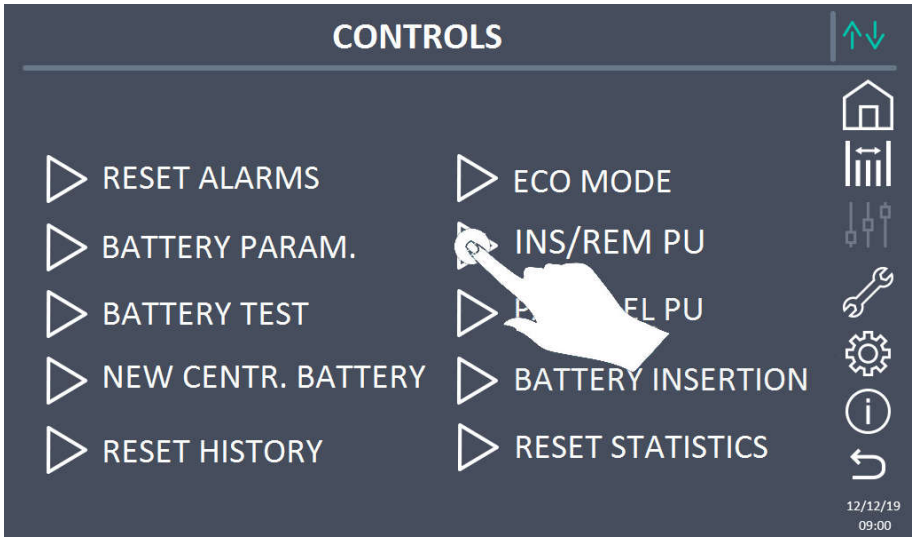
Picture 51 – Starting up and insertion of a POWER UNIT on the system

2) Enter the password to access the ***CONTROL*** menu.



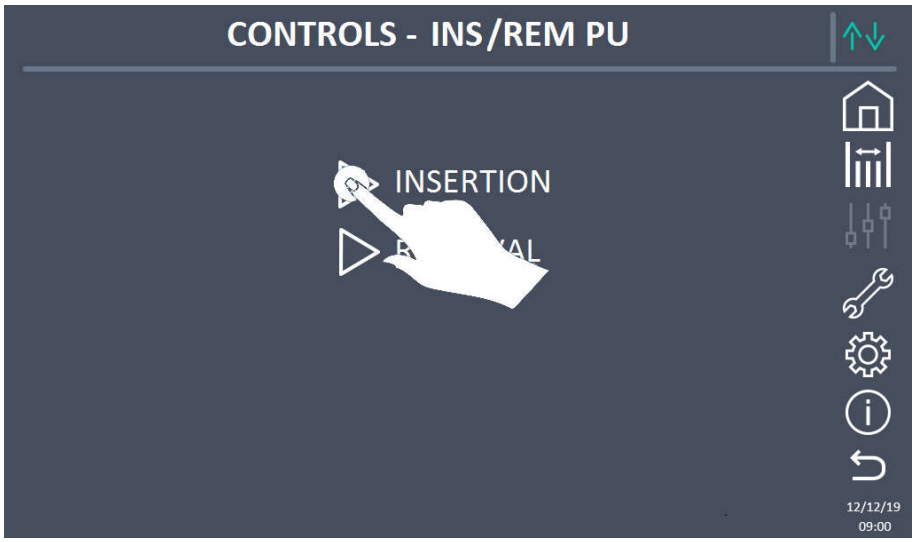
Picture 52 – Entering the password

3) Select the **INS/REM PU** menu.



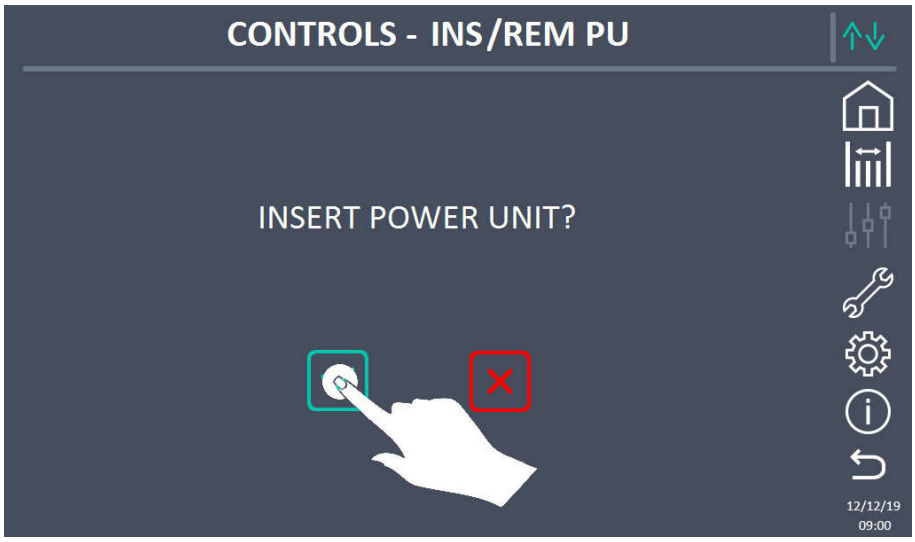
Picture 53 – Controls menu – Ins/Rem PU

4) Select the ***INSERTION*** menu.



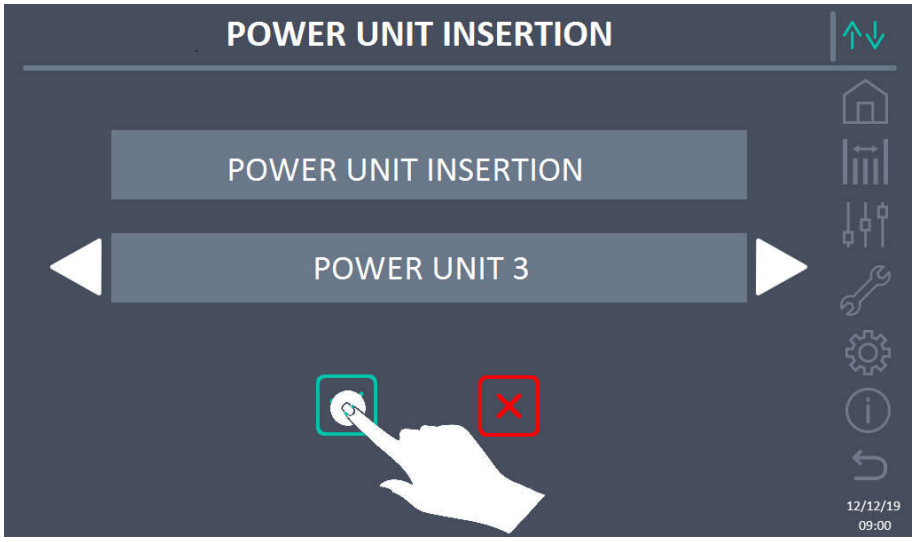
Picture 54 – Controls menu – Ins/Rem PU - Insertion

5) Confirm the choice by selecting the button with the green tick.



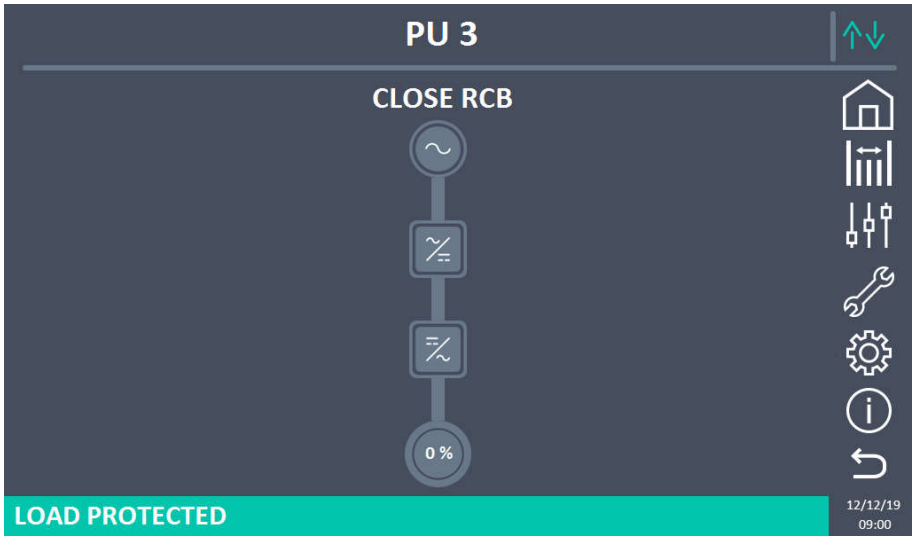
Picture 55 – Confirming PU insertion

6) Using the left and right arrow, select the POWER UNIT to insert and confirm using the button with the green tick.



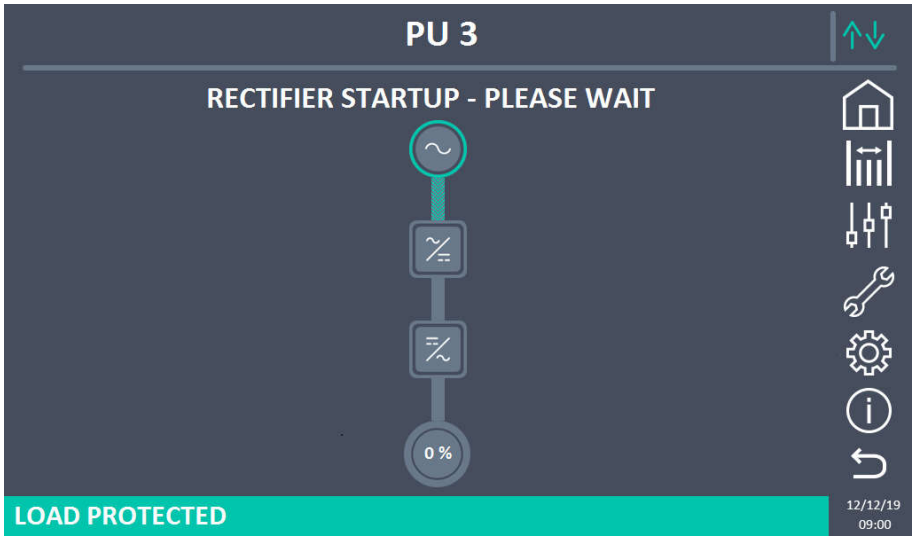
Picture 56 – Selecting the POWER UNIT to start-up and insert

7) If confirmed, you will be directly sent to the synoptic of the *POWER UNIT* to start up. Follow the instructions on the touch screen. Then, close the *RCBx* switch relating to the *POWER UNIT* to start up.



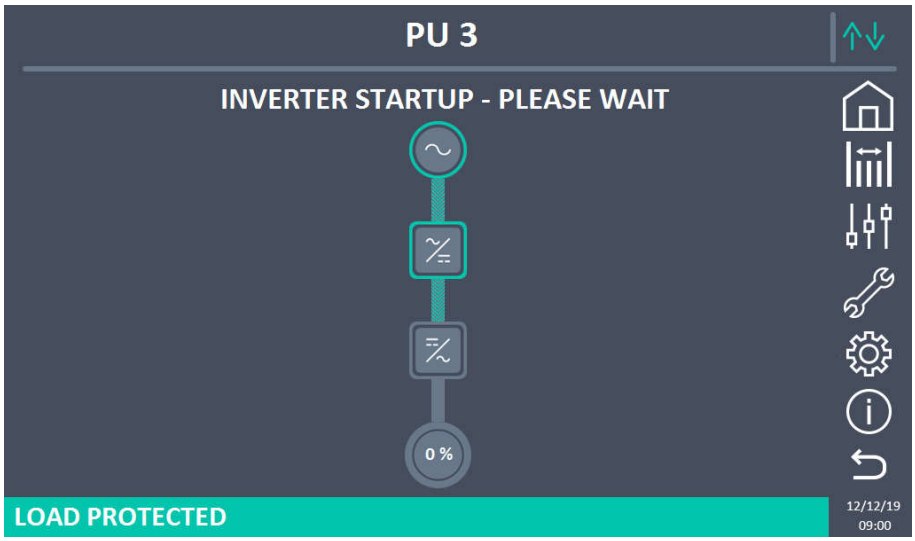
Picture 57 – RCBx switch closure of the POWER UNIT to start up and insert

8) Wait for the *Rectifier* of the *PU to start up.*



Picture 58 – Starting the Rectifier of the PU to insert

9) Wait for the *Inverter* of the *PU to start up.*

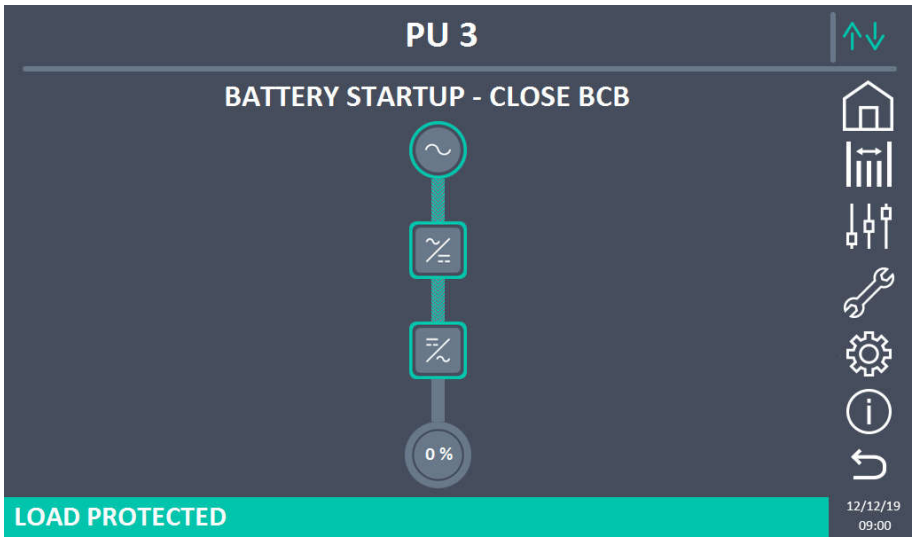


Picture 59 – Starting the Inverter of the PU to insert

Closure of the *BCBx* switch

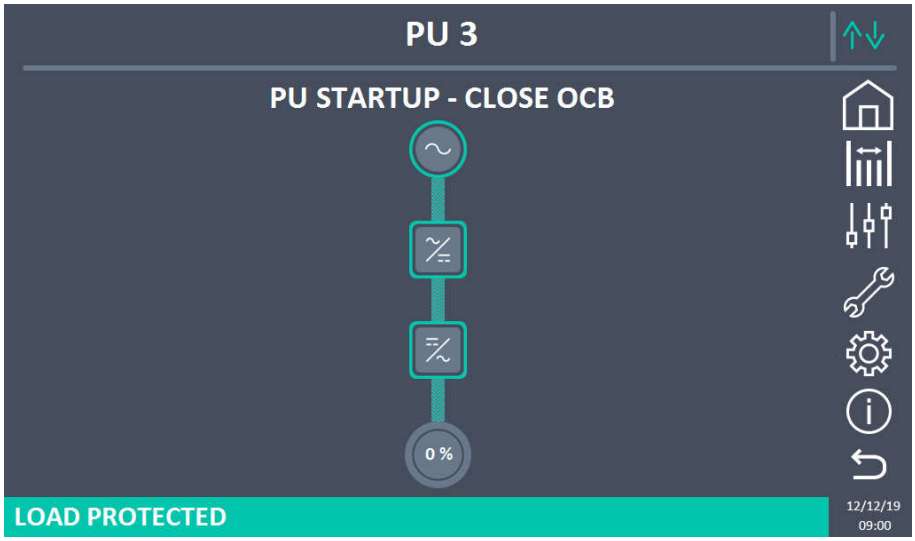
Closure of the *BCBx* switches placed on the distribution columns can only be carried out if the relevant light is on. If carried out before the request from the touch screen, it can cause serious damage to the equipment and/or the *Battery*.

10) Having terminated start-up of the *Rectifier*, the correctness is examined of the DC bus voltage and the green light switches on, beside the *BCBx* switches. Close the *BCBx* as requested.



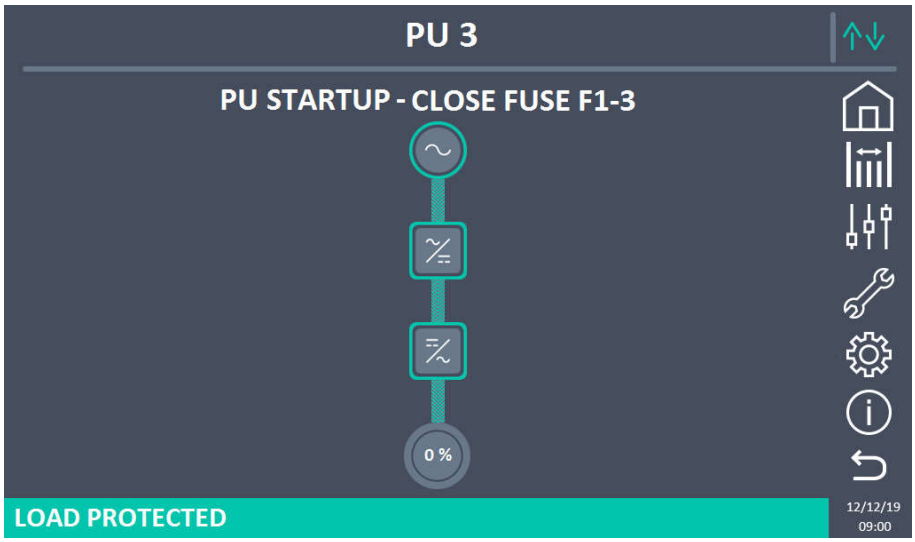
Picture 60 – Closure of the BCBx switch of the PU to insert

11) Close the *OCBx* switch of the *PU*.



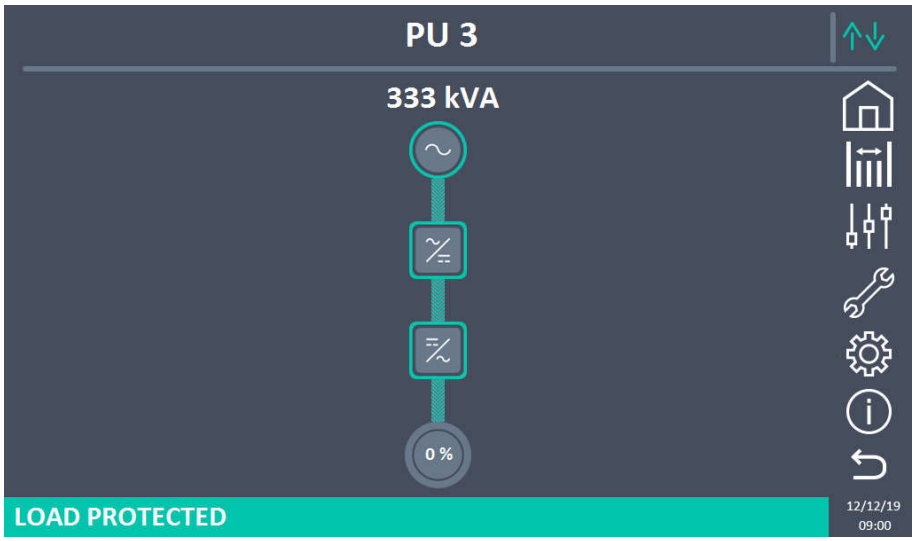
Picture 61 – Closure of the OCBx switch of the PU to insert

12) Close the *F1-x* fuse box.



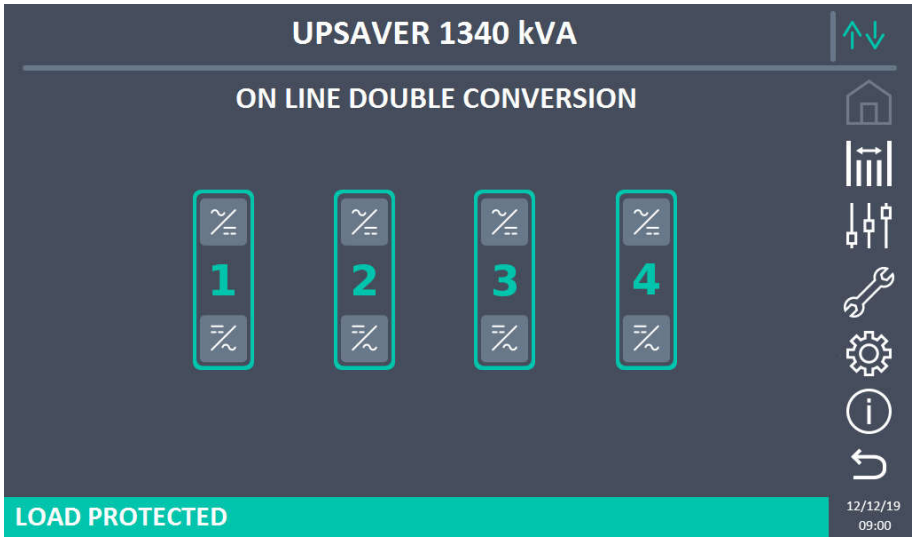
Picture 62 – Closure of the F1-x fuse box of the PU to insert

13) *PU* inserted and started correctly.



Picture 63 – PU running and inserted

14) Clicking on the ***HOME*** key and then on the ***SYSTEM DETAILS***, you return to the screen as seen below.



Picture 64 – UPSaver System flow diagram