



ИБП Jovyatlas Jovystar Compact S (30-50 кВА) - руководство по эксплуатации. Юниджет

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Operating manual

Wärtsilä

JOVYSTAR COMPACT S

30/40/50 kVA



BAX 5452



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Index	Date	Name	Alternation note
0	2015-11-11	D. Busboom	First edition
1	2016-01-28	D. Busboom	16/047
2	2016-11-02	D. Busboom	16/494
3	2016-11-30	D. Busboom	16/539
4	2017-01-10	D. Busboom	17/008
5	2017-01-24	D. Busboom	17/037
6	2017-06-26	D. Busboom	17/196

Contents

1	Introduction	5
1.1	General instructions	5
1.2	Overview of warning information	6
2	Description of the System	7
2.1	Functional description	8
2.1.1	<i>Rectifier</i>	8
2.1.2	<i>Inverter</i>	8
2.1.3	<i>Battery</i>	8
2.1.4	<i>Static bypass</i>	8
2.1.5	<i>Internal, manual bypass</i>	8
2.2	Operating states	9
2.2.1	<i>Normal operation</i>	9
2.2.2	<i>Inverter fault</i>	10
2.2.3	<i>Rectifier fault</i>	10
2.2.4	<i>Mains failure</i>	11
2.2.5	<i>Manual bypass</i>	11
3	Installation	12
3.1	Handling of the UPS	12
3.2	Positioning and Installation	13
3.2.1	<i>Base Plan, Static Load and Weights</i>	13
3.2.2	<i>Overall Dimensions, Clearances and Ventilation</i>	14
3.2.3	<i>Environmental Installation Conditions</i>	16
3.3	Electrical connections, cross sections, fuses	17
3.3.1	<i>Fuses and cross sections for cable connections to the UPS</i>	17
3.3.2	<i>Connections to the UPS</i>	18
3.3.3	<i>UPS-Options (Optional equipment)</i>	19
3.3.4	<i>Mounting and connecting the battery</i>	20
4	Operation	23
4.1	Front Panel	23
4.1.1	<i>Function Buttons</i>	24
4.1.2	<i>Mimic Panel / LED</i>	25
4.1.3	<i>LED-Bar</i>	26
4.2	Menu structure	27
4.2.1	<i>Measures</i>	28
4.2.2	<i>Alarms</i>	30
4.2.3	<i>Special</i>	31
4.2.4	<i>Info</i>	34
4.3	Alarm messages and status reports in the display	37
4.3.1	<i>Description of status reports</i>	37
4.3.2	<i>Description of alarm messages</i>	38
5	Commissioning and decommissioning procedures	44
5.1	Commissioning	44

5.1.1	<i>Problems during commissioning</i>	45
5.2	Decommissioning	45
5.3	Commissioning from the internal, manual bypass	46
5.4	Decommissioning in the internal manual bypass	46
6	Servicing	47
6.1	Maintenance	47
6.1.1	<i>Visual inspection</i>	47
6.1.2	<i>Functional test</i>	47
6.1.3	<i>Battery inspection</i>	47
6.2	Repairs	48
6.2.1	<i>Spare parts list</i>	48
7	Dismantling and cleaning up	48
8	Appendix	49
8.1	Technical data	49
8.2	Other technical documents	50

1 Introduction

Congratulations on purchasing a UPS unit from our **JOVYSTAR** series. The static UPS you have chosen incorporates the latest state of technology in power electronics and digital signal processing. It provides an ideal solution to the problems of supplying power to electronic data processing systems.

Our **JOVYSTAR** UPS systems are true online systems that protect your consumers. The production of this equipment is subject to stringent quality assurance. As a result, the UPS offers the perfect solution to your power supply needs.

The reliability of this product is our top priority and the result of more than 70 years of experience in secure power supply technology.

1.1 General instructions

Please read these instructions carefully

This operating manual includes safety requirements, instructions for installation as well as working instructions to help you guarantee the maximum performance and operating readiness the UPS offers. The manufacturer accepts no liability for damage to persons or equipment caused by disregarding instructions given in this manual.

Please store these instructions in a safe place

They contain important rules for the safe use of this UPS and information for contacting the manufacturer's service department in the event of any questions or problems concerning the UPS and its correct operation.

Storing or recycling packaging material

The packaging material for the UPS has been designed with great care to protect it against damage during transportation. This material is also useful should you ever need to return the UPS for inspection. Damage that arises during transportation is not covered by the warranty terms.

Validity

This operating manual reflects the technical status of the UPS at the time of printing. Its contents are not part of any contract but are for information purposes only.

Wärtsilä JOVYATLAS EUROATLAS GmbH reserves the right to make substantive and technical changes relative to the content of this Operating Manual without prior notification. **Wärtsilä JOVYATLAS EUROATLAS** GmbH cannot be held liable for any errors or inaccuracies in this operating manual, in view of the fact that there is no obligation to provide regular updates to it.

Limited warranty

Our goods and services are subject to the general terms of delivery for products of the electronics industry as well as our general sales conditions. We reserve the right to make changes to this operating manual at any time – in particular the technical data, operating instructions, dimensions and weights stipulated in it. We ask that any claims in respect of delivered goods be submitted within eight days of receipt of goods, enclosing the relevant packing note. Claims made at a later time cannot be considered.

Wärtsilä JOVYATLAS EUROATLAS GmbH will cancel without notice all obligations entered into by **Wärtsilä JOVYATLAS EUROATLAS** GmbH and its agents, such as warranties and service agreements, if replacement parts other than original **Wärtsilä JOVYATLAS EUROATLAS** GmbH parts or other than parts purchased from **Wärtsilä JOVYATLAS EUROATLAS** GmbH are used for servicing and repair.

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1.2 Overview of warning information

Proper operation and maintenance as well as adherence to the safety requirements are required to protect personnel and to ensure continuous readiness for use. All personnel installing/dismantling, commissioning, operating and maintaining this equipment must be familiar with and observe these safety regulations. Only trained and qualified personnel may carry out the described work and they must use the proper, intact tools, equipment, test equipment and materials.

Important instructions are indicated by the terms "**CAUTION**", "**ATTENTION**" and "**NOTE**" and by indented text passages.



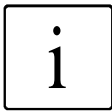
CAUTION:

This symbol identifies all working and operational procedures requiring absolute compliance to avoid any danger to personnel.



ATTENTION:

This symbol identifies all working and operational procedures requiring absolute compliance to prevent any damage or disruption to the uninterruptible power supply (UPS) or any of its components.



NOTE:

This symbol identifies technical requirements and additional information requiring the operator's attention.

2 Description of the System

Ensuring a reliable power supply is one of many major issues when using electronic data processing and process control systems. The main causes of many interruptions to power supply are:

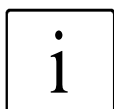
- Spikes produced by switching devices on the mains distribution
- High frequency superposition caused by welding machines, fluorescent lights, photocopiers and more
- Voltage variations due to fast load variations in big inductive consumers (lifts, transformers, machinery, etc.)
- Voltage failures due to disturbances in the mains supply
- Frequency variations caused by the use of separate power supply units

The range of disturbances extends from data corruption to memory leaks and from hardware failure to production stoppages. Therefore, the quality of the power supply is key to the reliability of electronic data processing equipment. The perfect solution for a secure, uninterrupted power supply for critical consumers is thus the UPS (Uninterruptible Power Supply). The UPS:

- Generates a constant supply voltage and frequency
- Reduces mains disturbances and feedback
- Guarantees an uninterruptible power supply to connected consumers for a specified period during a mains failure

In comparison with conventional power sources such as the mains power supply or generators*, the cutting edge technology featured in UPS systems in the **JOVYSTAR** series brings the following outstanding advantages:

- Minimum mains feedback caused by active IGBT rectifiers
- Three sources of intelligence through two DSPs (Digital Signal Processor) and µC (microprocessor)
- Extended communication interfaces
 - RS232/USB serial interfaces for reading UPS data (standard)
 - SNMP adapter for remote monitoring, data exchange via a LAN connection (option)
 - MODBUS adapter for remote monitoring, data transfer using MODBUS protocol via RS485 interface (option)
 - Parallel slot for parallel redundancy systems, UPS systems communicate data with one another via CAN bus protocol (option)
 - Relay card with alarm messages for industrial remote monitoring via floating contacts (option)



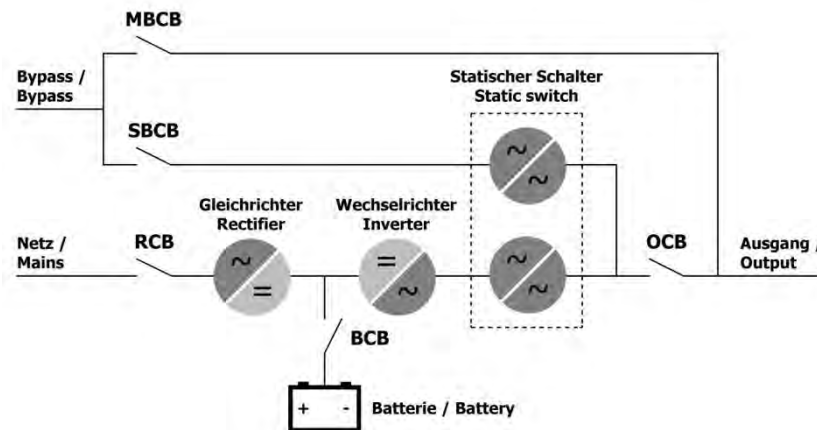
***NOTE:**

Operation of a UPS or other electronic consumers using a generator assumes that before installing the complete system the planner has established whether the generator can be used in conjunction with power electronics.

Some generators are designed such that operation with power electronics consumers is not possible due to the additional loading with harmonics, power factor and commutation notches. In some cases faults may occur such as voltage unbalance, a tendency to oscillate and the shutting down of the generator. It may help to ask the generator manufacturer about this and, if necessary change the regulator on the generator or incorporate damper windings in the generator from the outset.

2.1 Functional description

The block diagram shows the functional design of a JOVYSTAR UPS. It comprises the component groups "rectifier", "battery", "inverter", "static switch". The "RCB", "SBCB", "MBCB", "BCB" and "OCB" switches are used to start and shut down the UPS as well as to switch over to the bypass. Additionally, for maintenance purposes the battery can be disconnected from the UPS.



Block diagram of a JOVYSTAR UPS

Key to the block diagram

- Mains/Bypass → UPS supply
- RCB → Rectifier Circuit Breaker
- SBCB → Static Bypass Circuit Breaker
- MBCB → Manual Bypass Circuit Breaker
- BCB → Battery Circuit Breaker
- OCB → Output Circuit Breaker
- Output → Output for the connection of consumers

2.1.1 Rectifier

The rectifier converts the three-phase mains voltage into a regulated DC voltage to supply the inverter and charge the batteries. The rectifier comprises the control electronics for charging the battery and IGBT components for adjusting the power factor.

2.1.2 Inverter

The inverter converts the DC voltage from the rectifier or the battery into a stabilised AC voltage regulated by pulse width modulation. Due to the fast regulation, the UPS generates an excellent sine-wave voltage with extremely low distortion that even permits loads with high crest factors. The inverter output is also designed to be short-circuit proof (electronic short-circuit protection).

2.1.3 Battery

The battery works in standby parallel operation, which means that the inverter, charger and battery are permanently connected in parallel. To obtain the maximum lifetime of the battery it is protected by floating operation according to DIN 41773.

2.1.4 Static bypass

Static bypass switches the load without interruption between the inverter and bypass mains input. It comprises a thyristor bridge for the inverter and another for the bypass. For online operation the inverter output is switched to the UPS output. In the event of an overload at the output or failure of the inverter, the UPS output continues to be powered without interruption via the bypass.

2.1.5 Internal, manual bypass

Manual bypass is used to bypass parts of the UPS. In the event of maintenance or repair, the load is supplied directly from the mains.

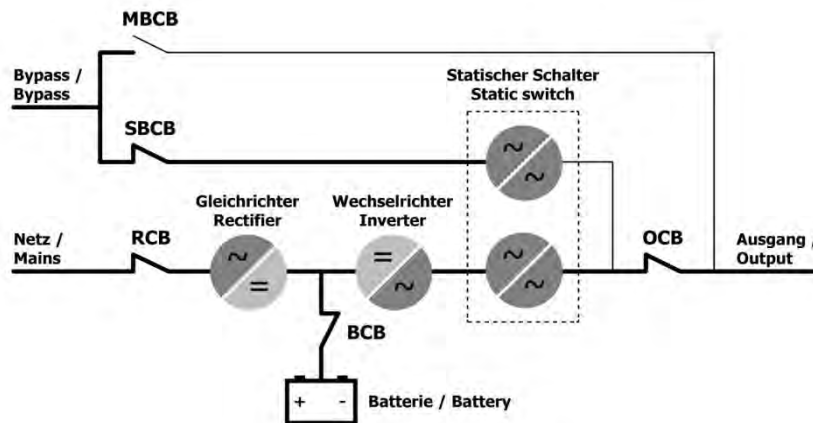
2.2 Operating states

2.2.1 Normal operation

Normal operation is divided into two further operating modes. For sensitive loads, online operation via the inverter provides a stable AC voltage. For loads that are less susceptible to mains fluctuations, eco mode offers a better efficiency rating.

Online operation

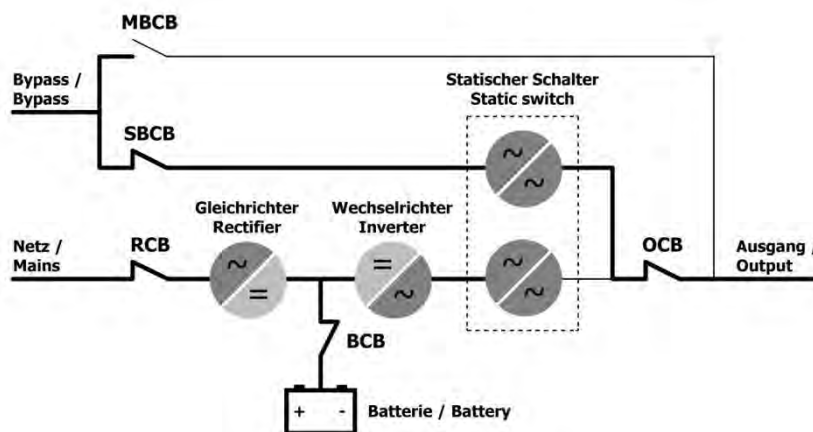
- The mains feeds the rectifier.
- The rectifier provides the DC voltage for the inverter and charges the batteries.
- The inverter supplies the load at the output with the necessary energy via the static switch.
- If there is any threat of a deep battery discharge, the system automatically switches to the static bypass without interruption.



Online operation: load supplied via the inverter

Offline operation:

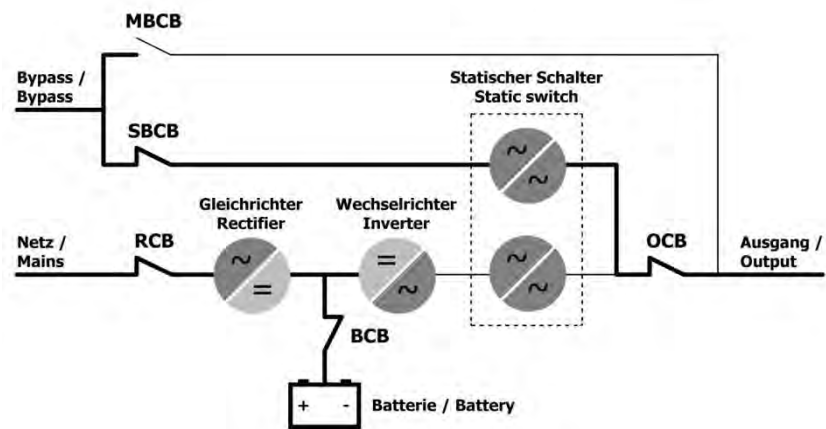
- The mains feeds the rectifier.
- The rectifier provides the DC voltage for the inverter and charges the batteries.
- The bypass supplies the load at the output with the necessary energy via the static switch.
- In the event of a mains failure the system automatically switches to the inverter without interruption.



Offline operation: load supplied via the static bypass

2.2.2 Inverter fault

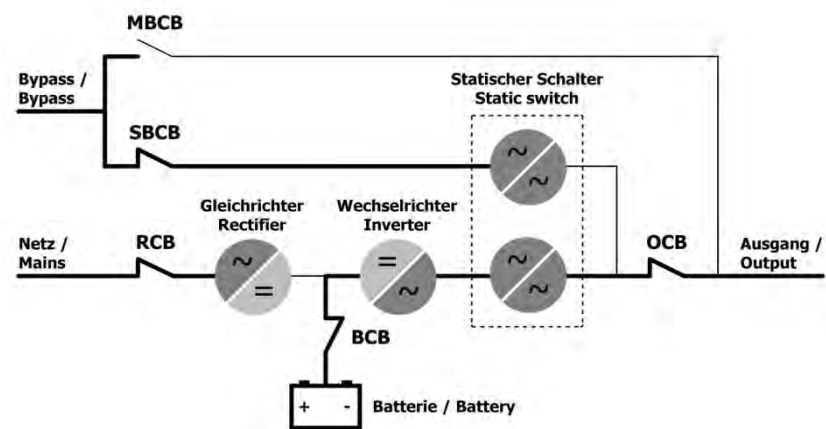
- The mains feeds the rectifier.
- The rectifier provides the DC voltage for the inverter and charges the batteries.
- The load at the output is transferred to the bypass without interruption via the static switch.



Inverter fault: load supplied via the bypass

2.2.3 Rectifier fault

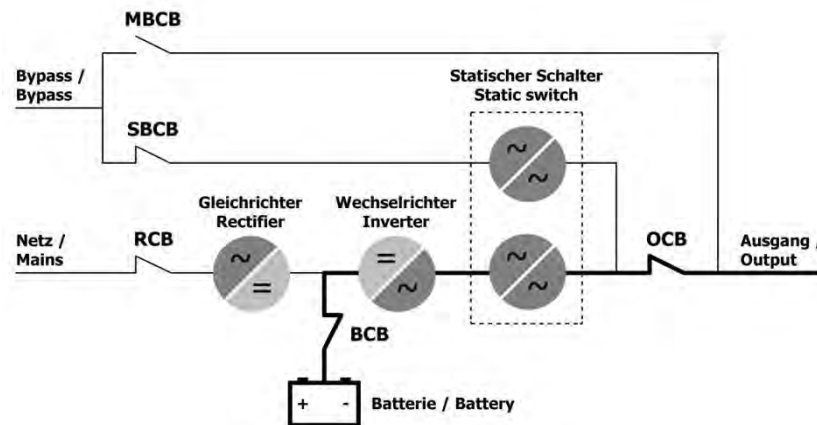
- The mains feeds the rectifier.
- The battery provides the DC voltage for the inverter (for the duration of the stored energy time).
- The inverter supplies the load at the output with the necessary energy via the static switch.
- If there is any threat of a deep battery discharge, the system automatically switches to the static bypass without interruption.



Rectifier fault: load supplied via the inverter according to the stored energy time of the batteries

2.2.4 Mains failure

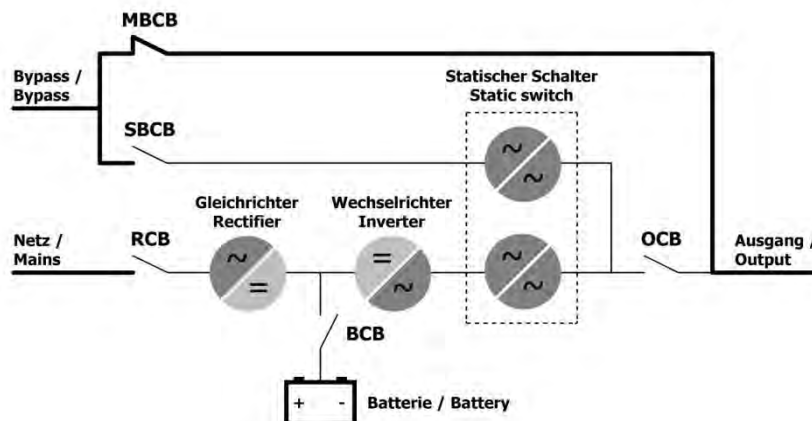
- The battery provides the DC voltage for the inverter (for the duration of the stored energy time).
- The inverter supplies the load at the output with the necessary energy via the static switch.
- If there is any threat of a deep battery discharge, the system automatically shuts down completely and the load is no longer supplied with power.



Mains failure: load supplied via the inverter according to the stored energy time of the batteries

2.2.5 Manual bypass

- The load is supplied by the mains via the manual bypass.
- Any necessary maintenance or repairs to the UPS can be carried out safely.



Manual bypass load supplied via the manual bypass

3 Installation

Remove the packaging immediately after receiving the UPS and check the system for transport damages. The transport company must be informed immediately after receipt of the UPS in the event of any damage caused during transportation. If the UPS is not installed immediately it must be stored in an upright position as indicated on the packaging and kept in a dry, well ventilated room. If the UPS is not stored in the original packaging, it must be protected from dust and moisture.

3.1 Handling of the UPS

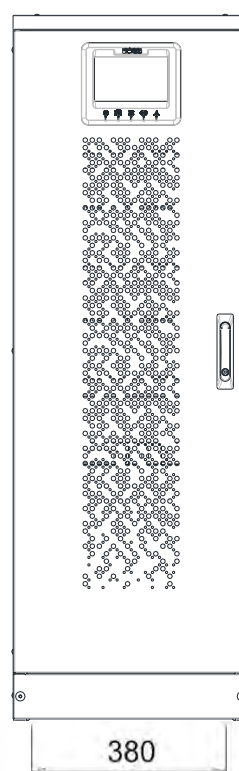
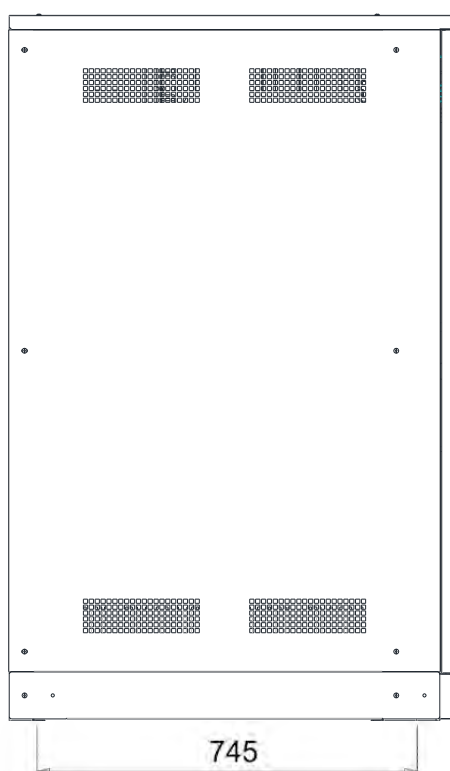
The UPS is packed on a pallet. It is handled from the transport vehicle to the installation (or storage) place via a fork lift.



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, in order to avoid risks of turnover, it's recommended to move the system on the wood pallet on which the UPS is fixed. Before the positioning in the final location, remove the UPS from the pallet. To handle the UPS remove the lower front, rear and side panels and insert the forks of a fork lift. The UPS can be handled both from the front and from the side according to the available spaces, as shown by the following picture.



3.2 Positioning and Installation

The UPS 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.

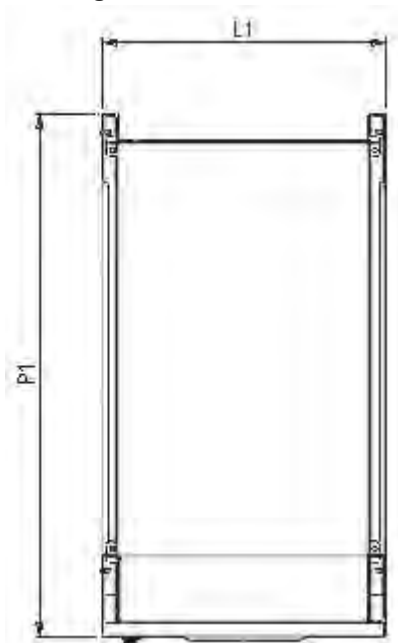


Special environmental conditions

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 Base Plan, Static Load and Weights

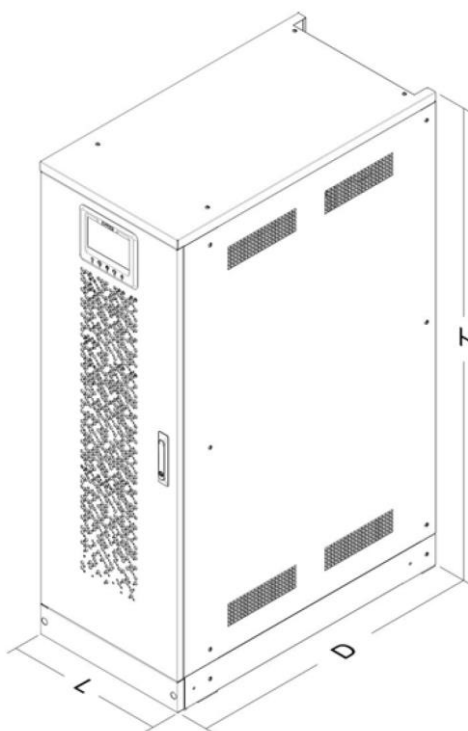


Power (kVA)	30	40	50
L1 – mm	502		
P1 – mm	943		

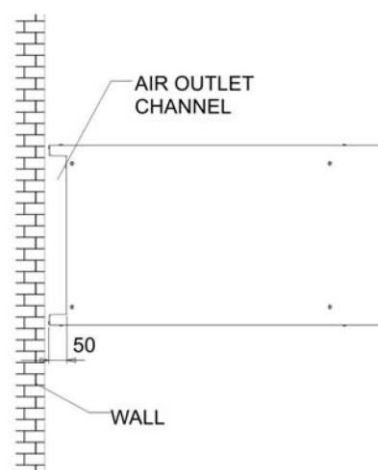
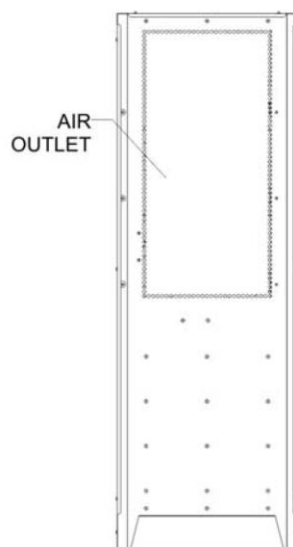
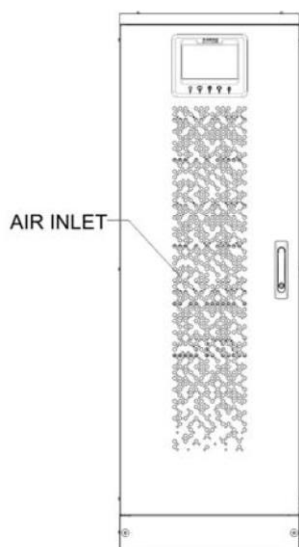
The supporting base of the UPS must be designed to carry the UPS weight and to ensure its steady and safe support. Its carrying capacity must be adequate to the static loads indicated in the table below.

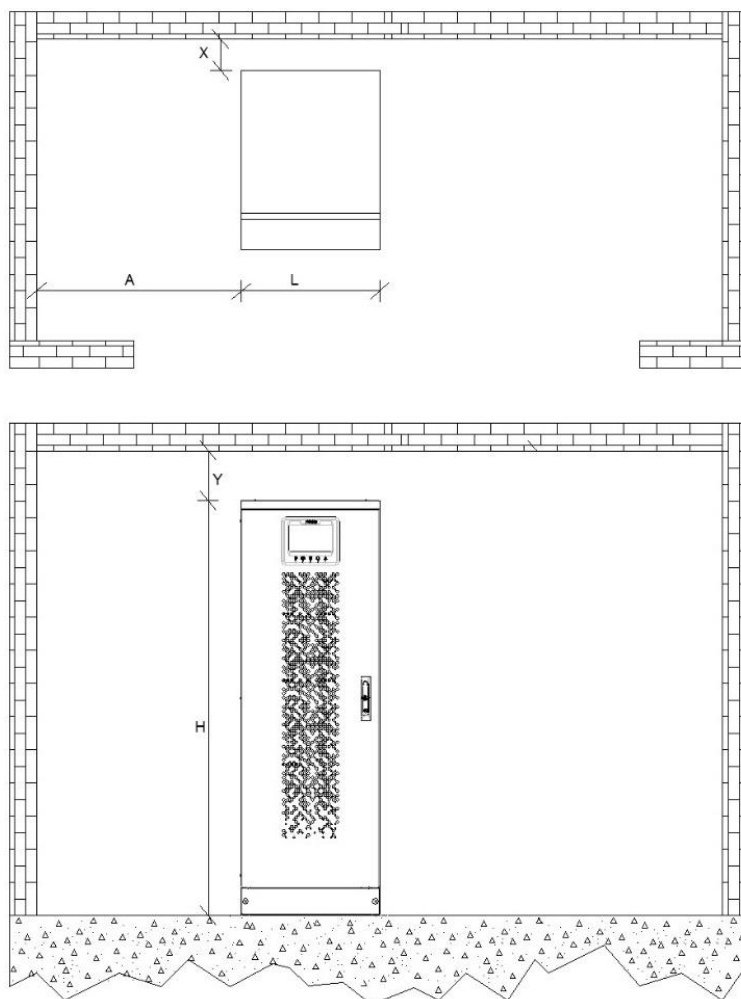
Power (kVA)	30	40	50
Weight w/o batteries (kg)	140	150	190
Static load w/o batteries (kg/m ²)	500	510	550
Weight with batteries (kg)	310	335	425
Static load with batteries (kg/m ²)	1110	1135	1225

3.2.2 Overall Dimensions, Clearances and Ventilation



Leistung (kVA)	30	40	50
L – mm	505		
D – mm	940		
H – mm	1505		





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.

Power (kVA)	30	40	50
L – mm		505	
H – mm		1505	
X (min.) - mm		0	
Y (min.) – mm		500	
A (min.) – mm		500*	

*Only required at installed battery inside the UPS (Battery exchange)!

The table below shows the air volume required for an optimal ventilation and cooling of the UPS.

Power (kVA)	30	40	50
Air volume (m3/h)	900	900	1100

3.2.3 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

The UPS 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 Electrical connections, cross sections, fuses

The electrical connection of the UPS unit is the task of the electrician providing the electrical installation services. This task is not carried out 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 all cases we recommend carrying out the installation and the electrical connections to the UPS in accordance with local regulations and standards. Take particular care during electrical installation to ensure a clockwise rotating phase sequence. In the event that strong electromagnetic fields are emitted, we recommend the use of shielded cables between the UPS and the load.

In accordance with EN 62040-1, mains backfeed protection has to be provided for the UPS, preventing a current flow from the output of the UPS back into the mains at a single fault of the system. Therefore it is necessary to install a separator in the power supply for the bypass, which the bypass current path separates automatically in case of a failure of the bypass mains.



ATTENTION:

Even when the mains voltage is switched off there is a dangerously high battery voltage inside the device. All installations and connections may therefore only be carried out by qualified electricians. Before commencing work, electricians must read this manual carefully to familiarize themselves with the special features of this UPS unit. The UPS output still carries voltage even in the event of a mains failure. For this reason, the installer must clearly label the outlets and sockets on the UPS unit in accordance with EN 62040!



ATTENTION:

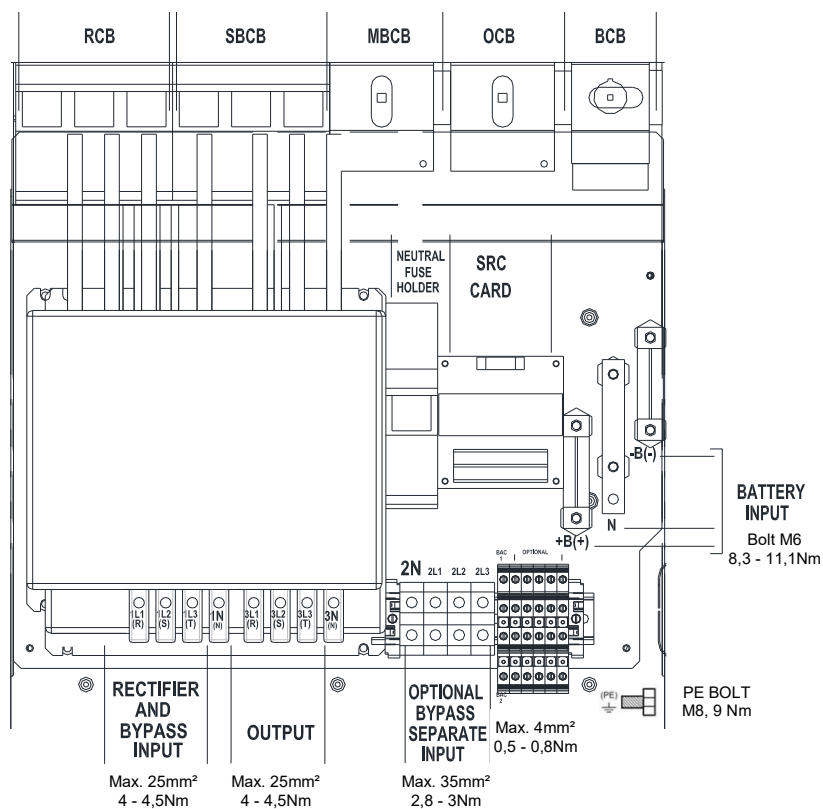
The input line between the mains and the UPS unit must be protected against short circuits! The use of FI safety switches before the UPS unit is not recommended.

3.3.1 Fuses and cross sections for cable connections to the UPS

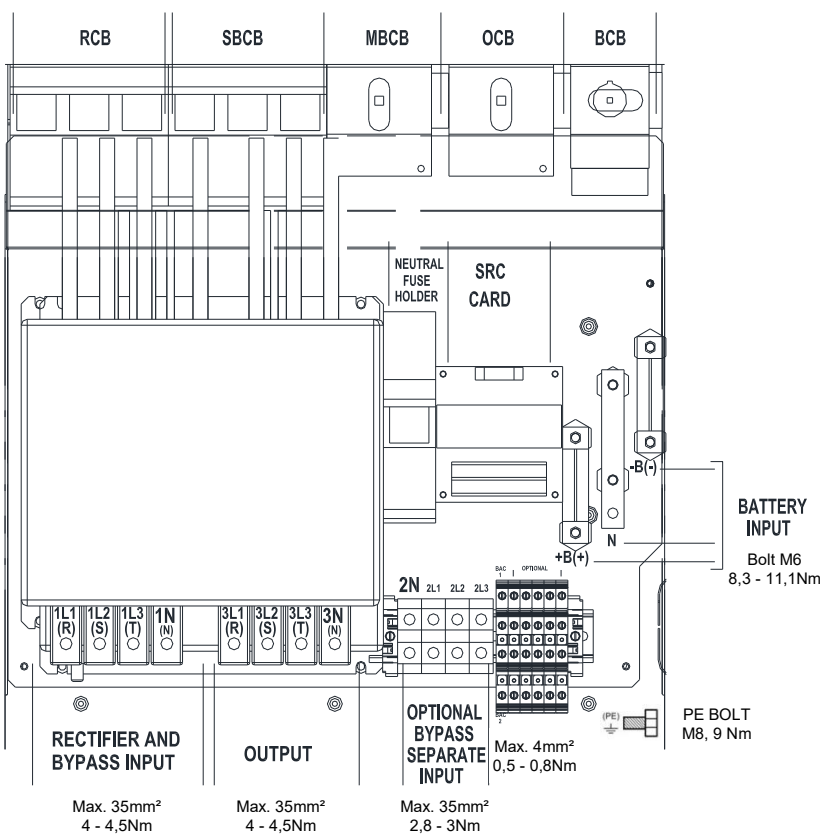
Should larger cable cross-sections be required for the installation than the maximum cross-section of the UPS terminals, a socket or a terminal box can be installed near the UPS. From there to the UPS, a cable laying with a smaller cross-section can be possible (better laying conditions such as installation type, cable length, ...).

Details der elektrischen Anschlüsse			
Leistung (kVA)	30	40	50
Input fuses [A]			
Rectifier	63	80	100
Bypass	63	80	100

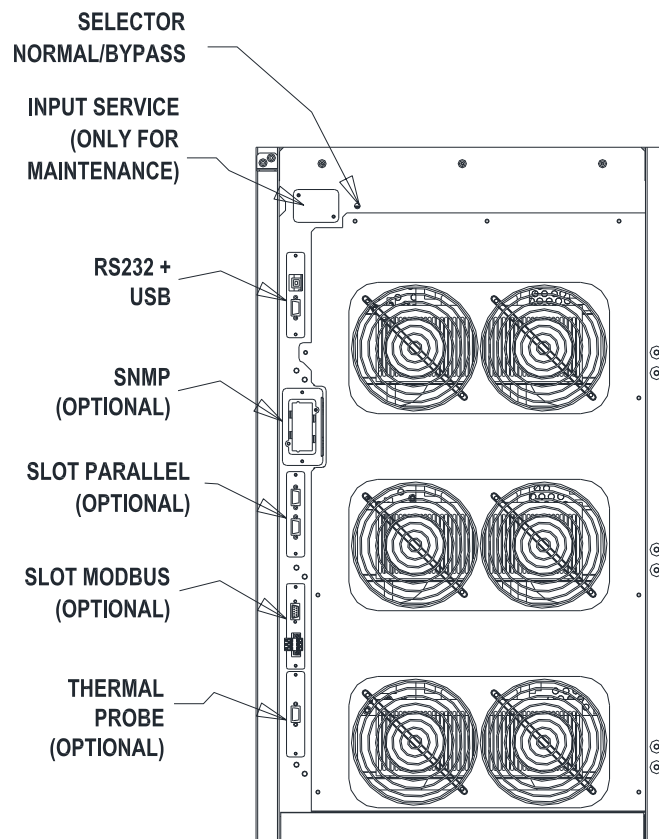
3.3.2 Connections to the UPS



30/40kVA



50kVA



3.3.3 UPS-Options (Optional equipment)

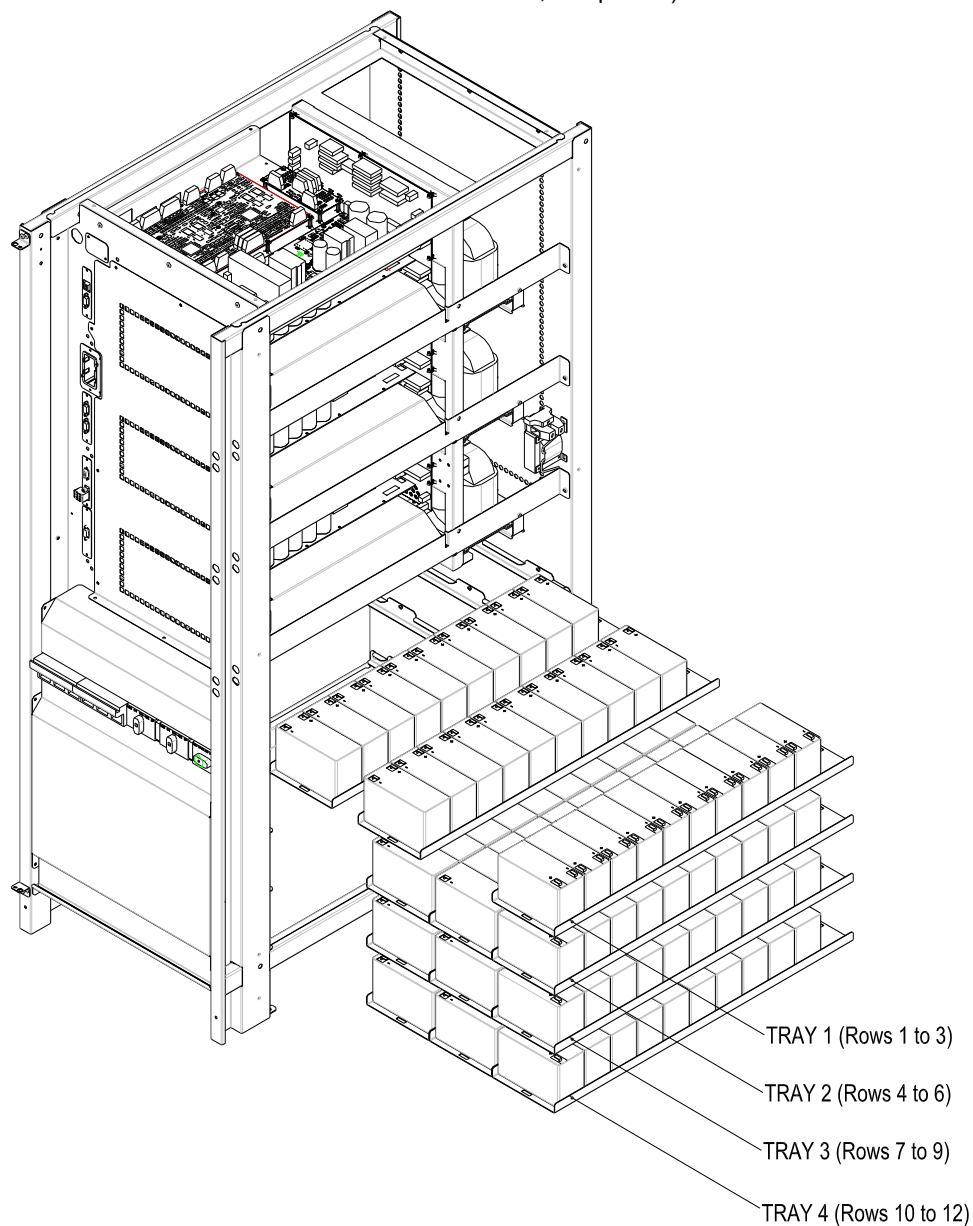
Following UPS-Options are described in the operating manual BAX 4834:

- Relay card
- SNMP adapter
- PROFIBUS
- MODBUS
- Battery symmetry supervision
- Parallel redundant systems

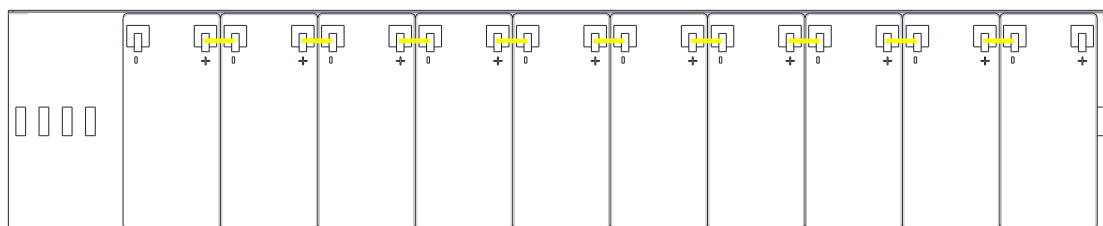
3.3.4 Mounting and connecting the battery

3.3.4.1 Battery 7/9/11Ah 12V installation

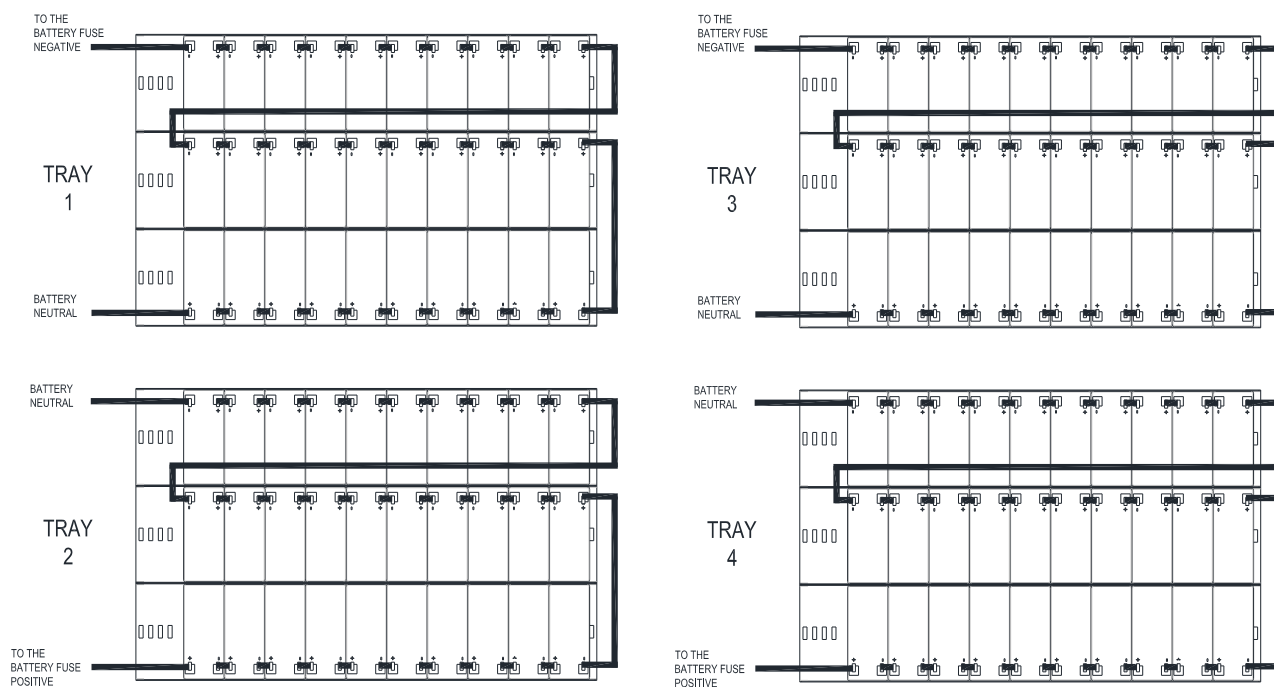
1) Remove the 4 screws to open the left/right lateral cover and access the battery trays (total trays are 4 and each contain three rows of 10 batteries, see picture).



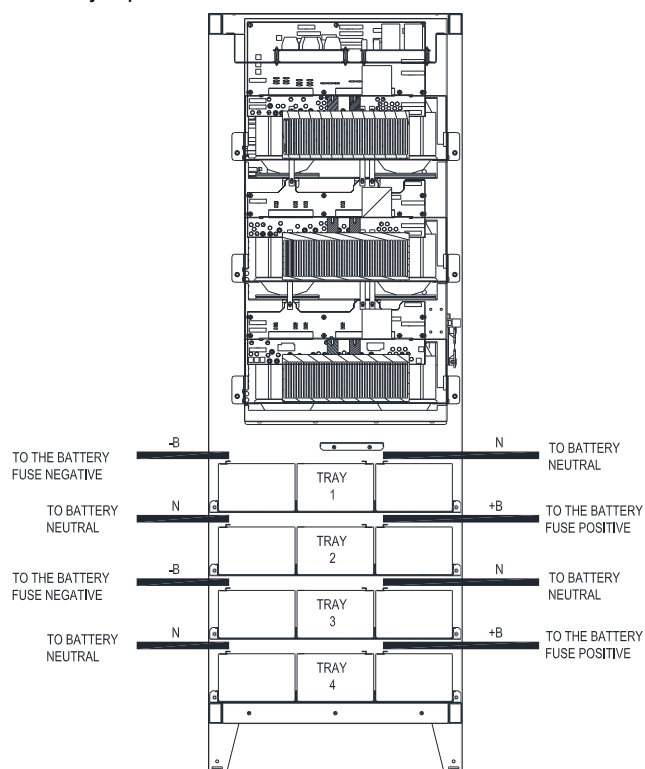
Trays 7/9/11Ah 12V battery lateral view



2) Install the batteries received in a separate packages and install it in accordance with the picture 11 and picture 12.



7/9/11Ah 12V battery connection tray top view



7/9/11Ah 12V battery connection tray front view

3) After the connection re-insert the battery trays on the internal of UPS.

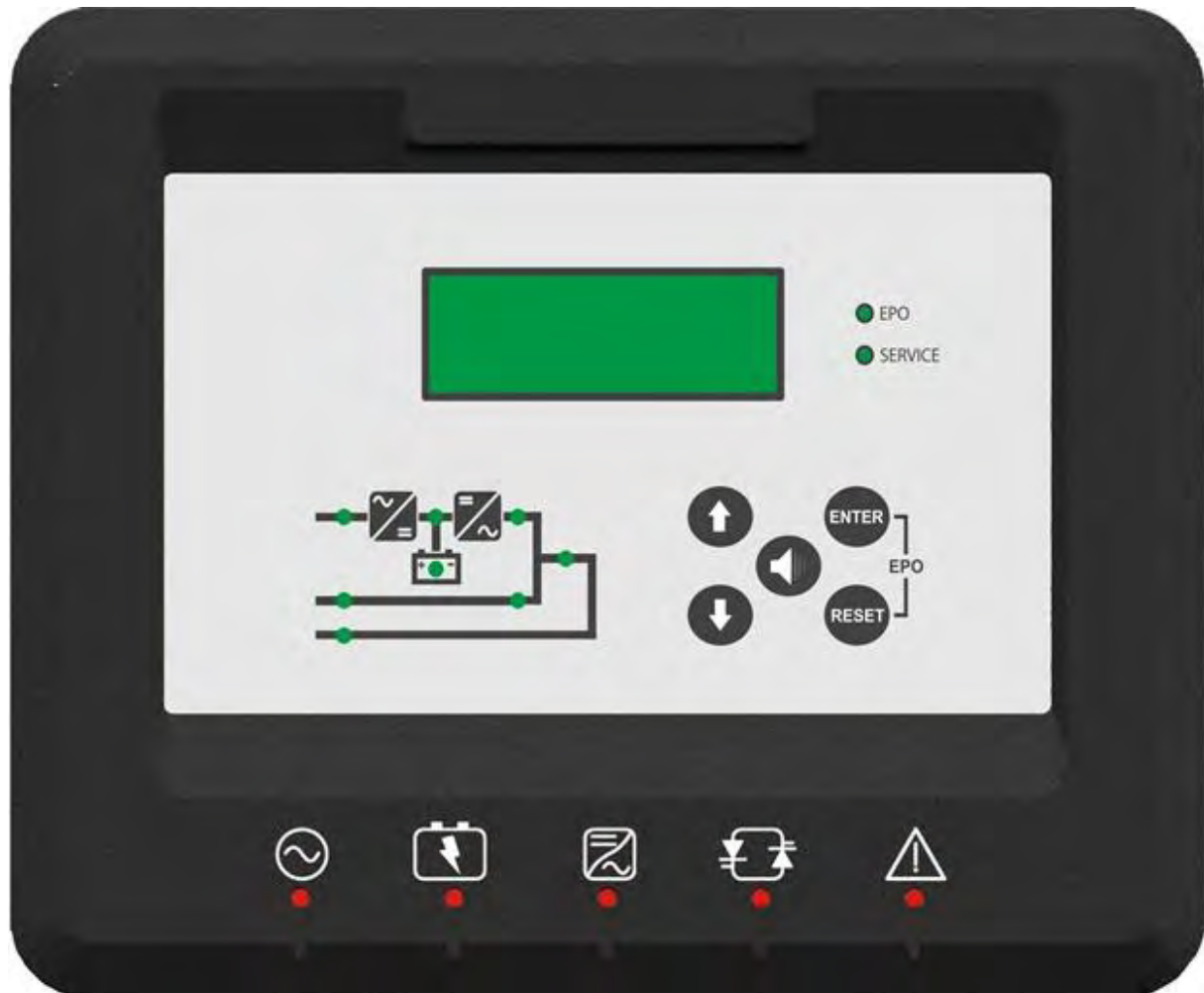
4) Put back and fix the left/right cover with the four screws.

4 Operation

4.1 Front Panel

The front panel of the UPS, consisting of four rows alphanumeric display plus 5 function keys, allows the complete monitoring of the UPS status.






The mimic flow helps to understand the operating status of the UPS.



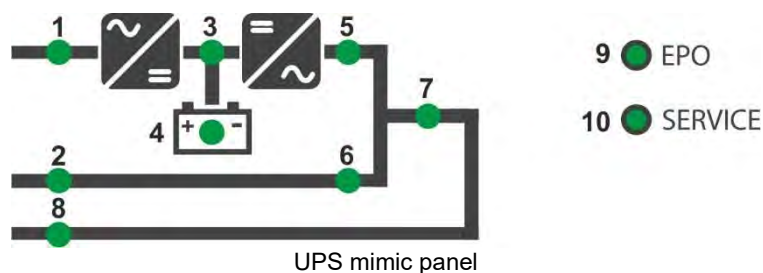
UPS front panel

4.1.1 Function Buttons

The front panel of the UPS is provided with 5 buttons whose functions are indicated in the following table:

Button	Assigned functions
	<ul style="list-style-type: none">➤ Scrolls up the menus➤ Increases the values by one unit➤ Selects a value
	<ul style="list-style-type: none">➤ Scrolls down the menus➤ Decreases the values by one unit➤ Selects a value
	<ul style="list-style-type: none">➤ Selects a menu➤ Confirms changes
	<ul style="list-style-type: none">➤ Silences the buzzer (activated due to an alarm or a failure)
	<ul style="list-style-type: none">➤ Returns to the previous menu

4.1.2 Mimic Panel / LED



LED 1		GREEN	AC line on rectifier input within tolerance
		GREEN	AC mains failure / Wrong phase rotation
LED 2		GREEN	AC bypass line within tolerance
		GREEN	Wrong phase rotation
		OFF	AC bypass line out of tolerance / failure
LED 3		GREEN	Rectifier off or faulty
		RED	DC voltage out of tolerance
		GREEN	Rectifier on and DC voltage within tolerance
LED 4		GREEN	Circuit breaker BCB closed and battery charging
		GREEN	Battery discharging or under TEST
		ORANGE	Circuit breaker BCB open
		RED	Battery fault (following a battery test)
		OFF	Battery not available
LED 5		GREEN	Inverter voltage within tolerance and static switch closed
		GREEN	Inverter overload or short-circuit
		OFF	Inverter off or voltage out of tolerance
LED 6		ORANGE	Re-transfer blocked
		ORANGE	Static bypass switch closed
		OFF	Static bypass switch open
LED 7		GREEN	Output circuit breaker OCB closed
		OFF	Output circuit breaker OCB open
LED 8		ORANGE	Manual bypass switch MBCB closed
		OFF	Manual bypass switch MBCB open
LED 9		RED	Emergency power off (EPO) activated
		OFF	Normal operation
LED 10		ORANGE	Maintenance request (slow blinking)
		ORANGE	Critical alarm (fast blinking)
		OFF	Normal operation

4.1.3 LED-Bar



11



12



13



14



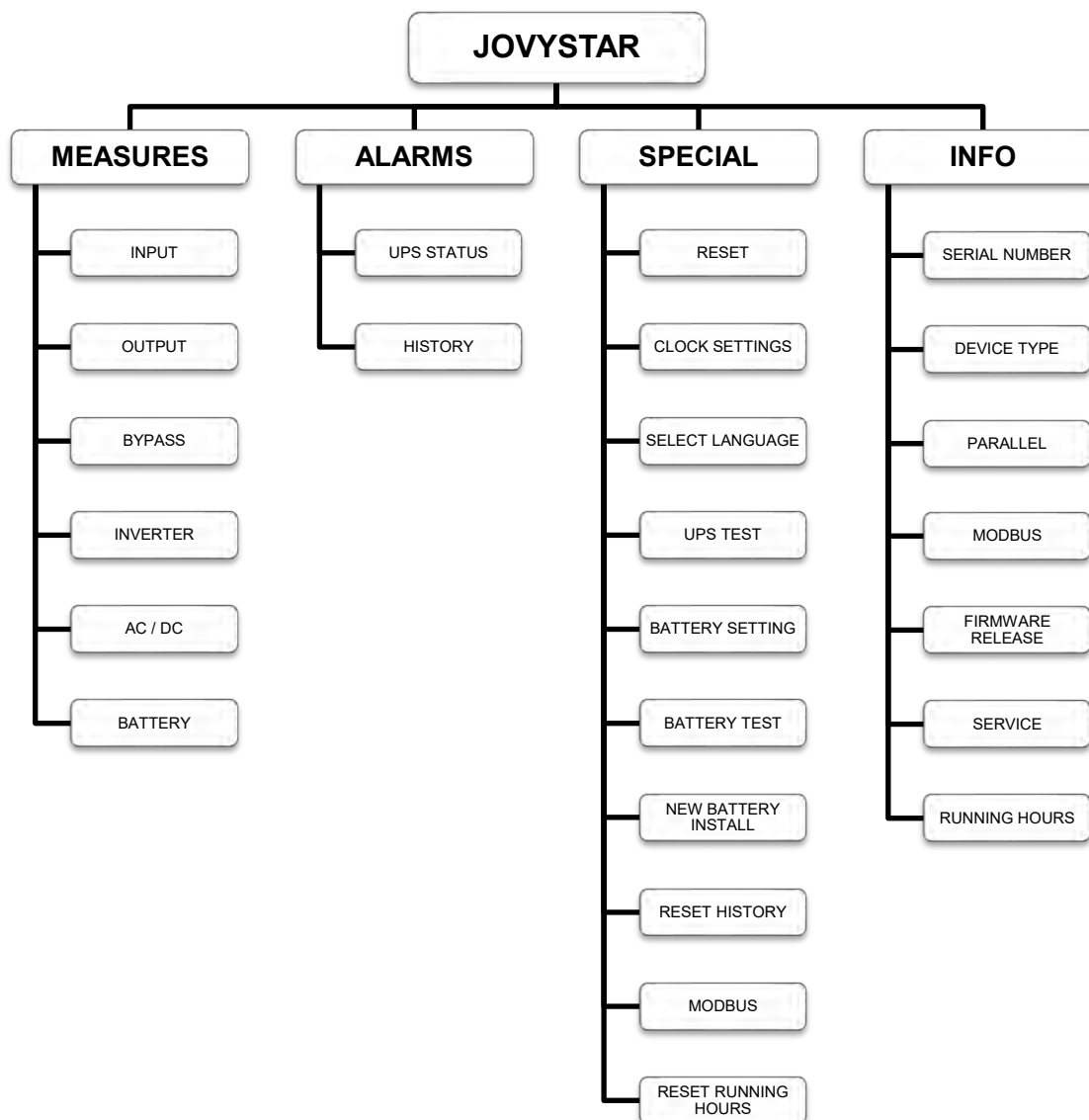
15

LED bar

LED 11		GREEN	AC line on rectifier input within tolerance
		GREEN	Wrong phase rotation (fast blinking)
		GREEN	Unbalanced AC voltage (slow blinking)
		OFF	AC mains failure
LED 12		GREEN	Circuit breaker BCB closed and battery charging
		ORANGE	Battery discharging or under TEST (fast blinking)
		ORANGE	Circuit breaker BCB open (slow blinking)
		RED	End of battery autonomy / Battery fault
LED 13		GREEN	Inverter voltage within tolerance and static switch closed
		ORANGE	Inverter overload or short-circuit
		RED	Inverter critical alarm
		OFF	Inverter off
LED 14		GREEN	AC bypass line within tolerance
		RED	Wrong phase rotation (fast blinking)
		RED	AC bypass line out of tolerance / failure
LED 15		GREEN	Programmed maintenance required (slow blinking)
		GREEN	Critical alarm (fast blinking)

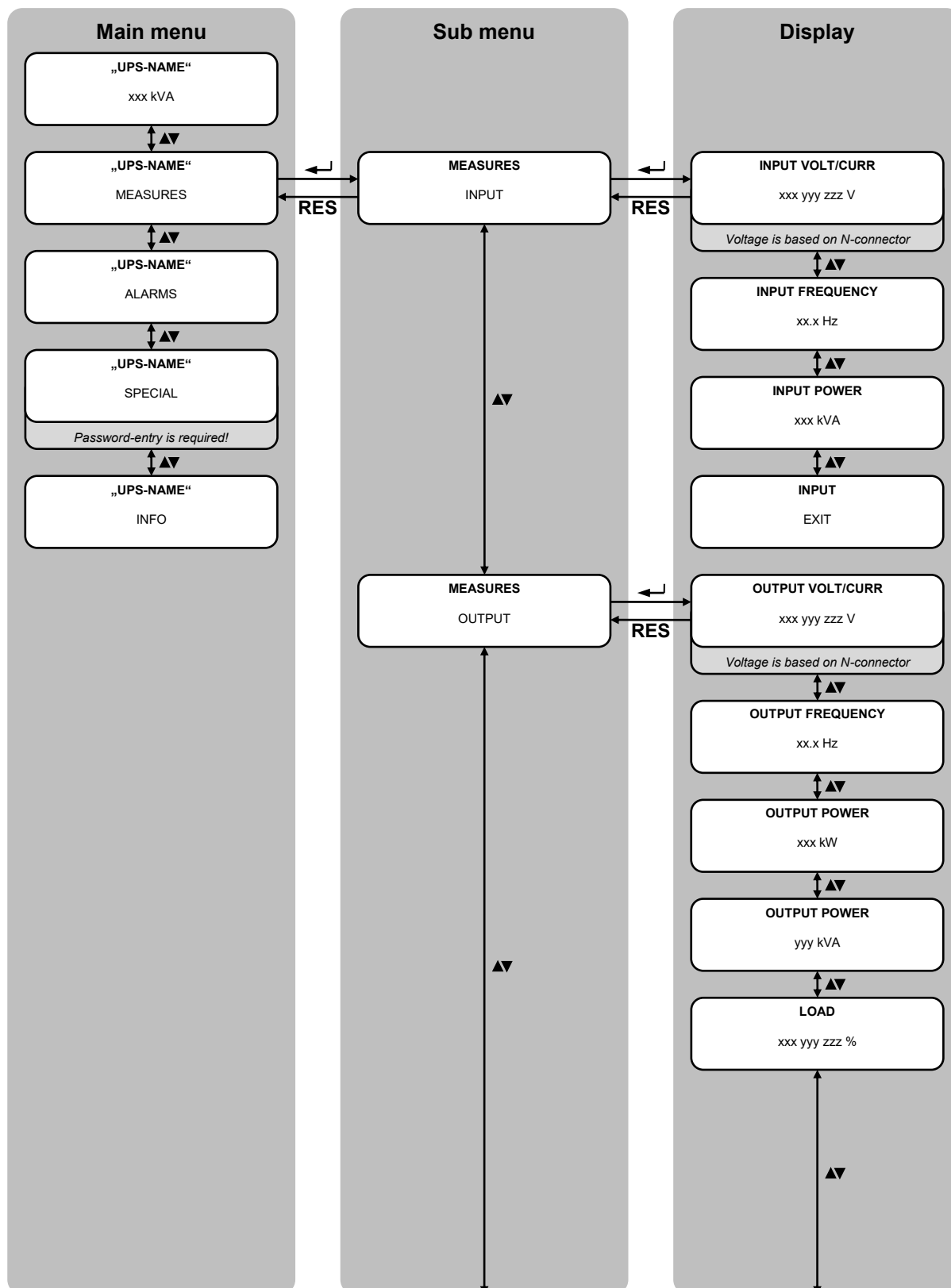
4.2 Menu structure

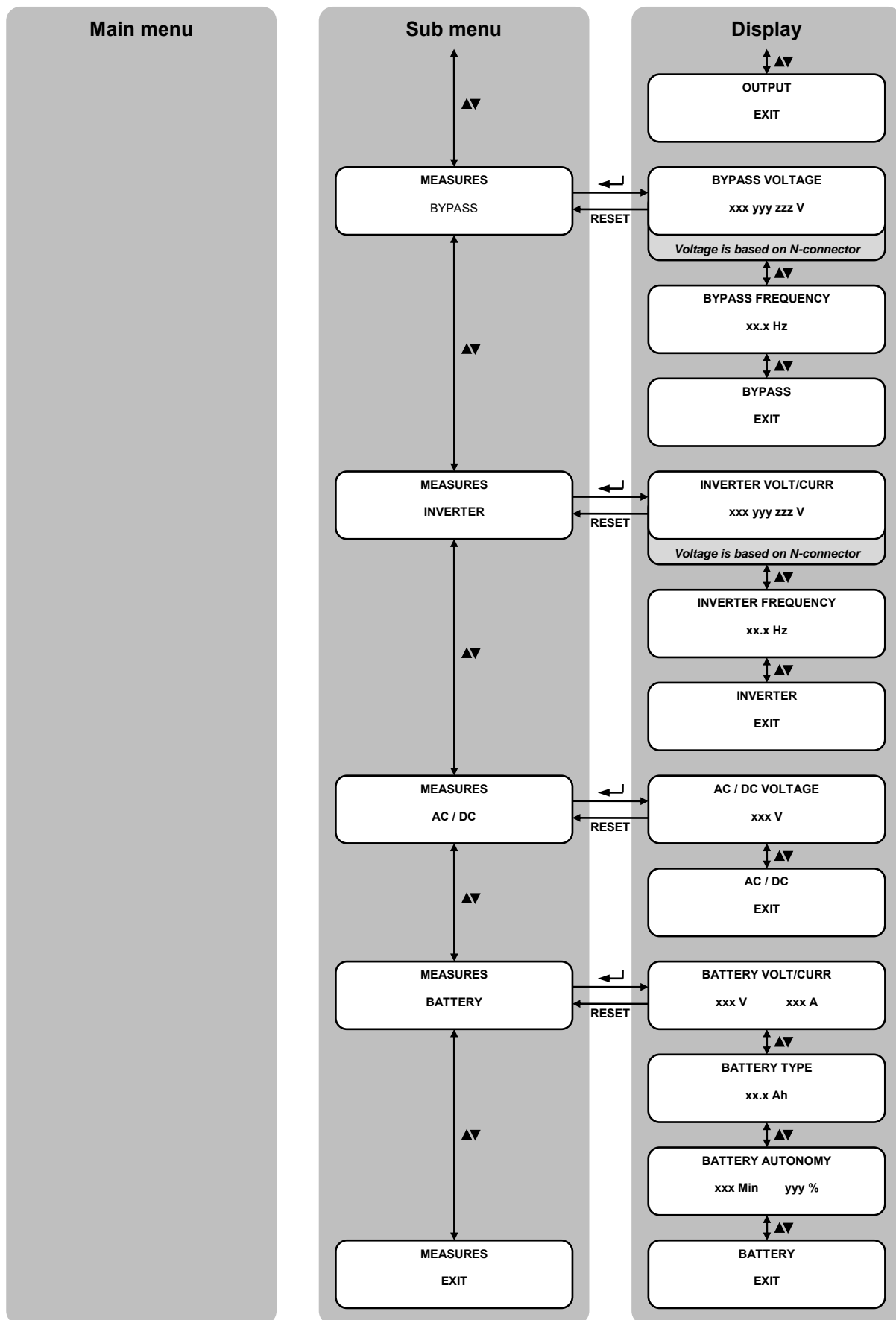
The following figure shows the complete structure in a clear format. The main menu is divided into four areas: "Measures", "Alarms", "Special" and "Info". This means the required information/reports and measures can be displayed quickly and various settings made. Details of the options available are given in the sections below.



4.2.1 Measures

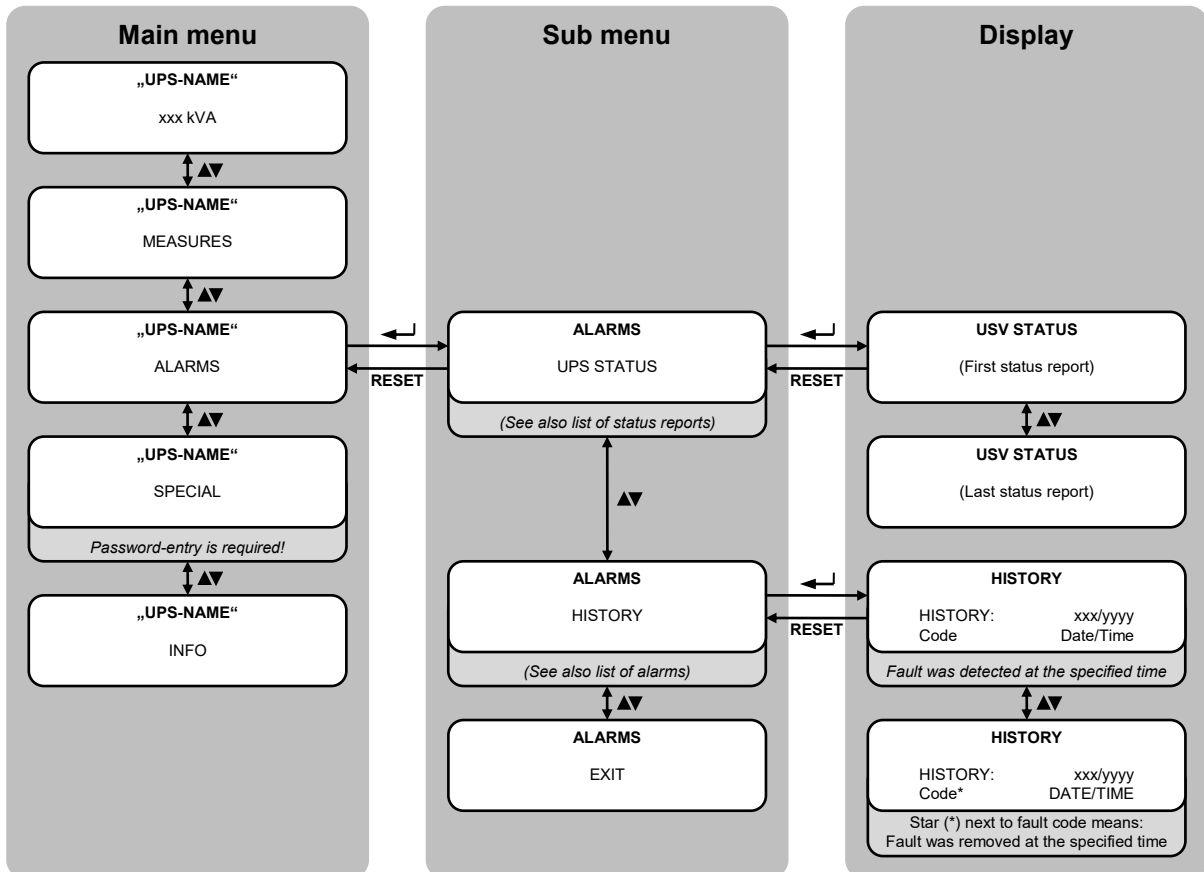
The measured data of the UPS are saved in the main menu under "Measures". It can be displayed the input, output and bypass values, as well as data about the assemblies rectifier, inverter and battery.





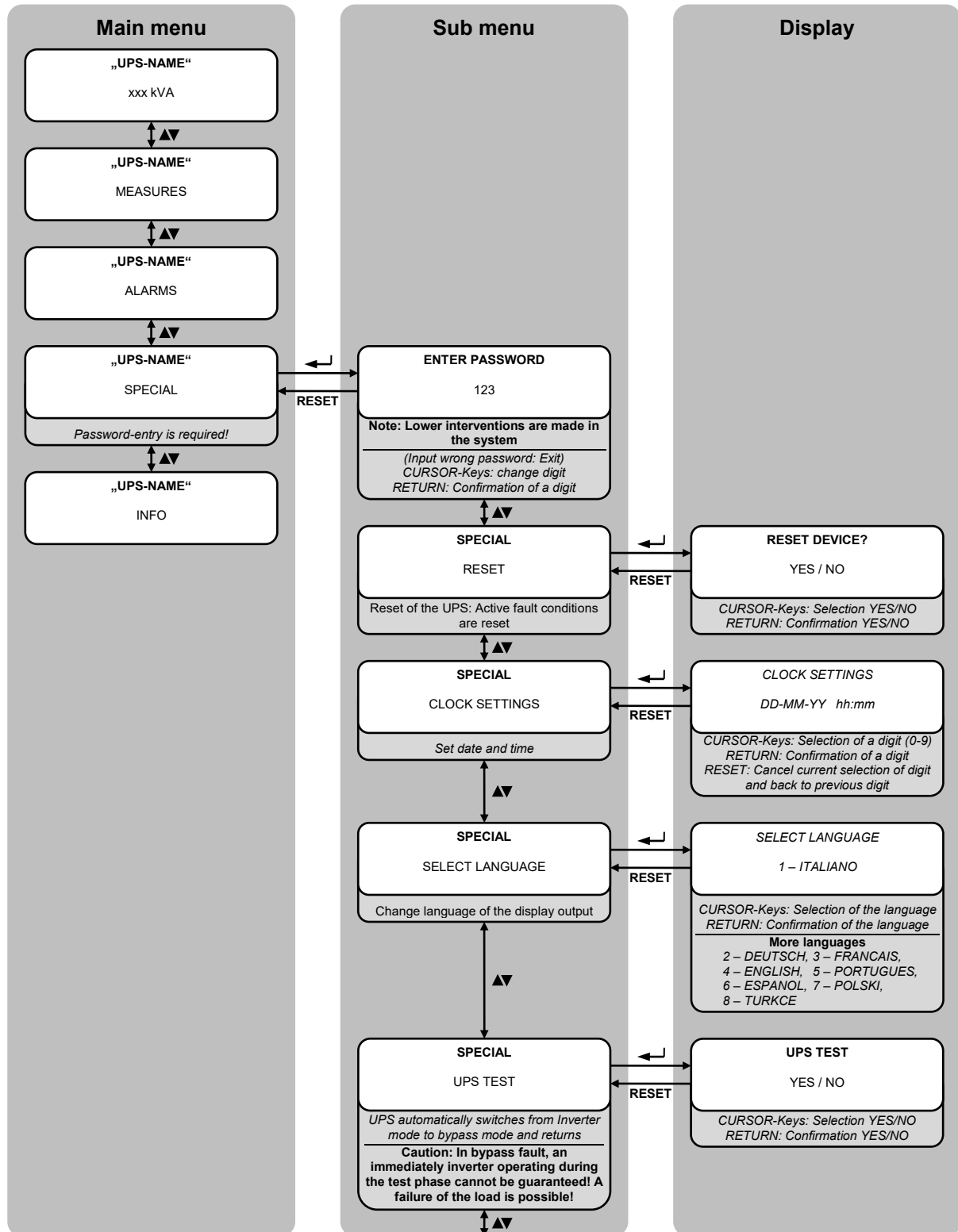
4.2.2 Alarms

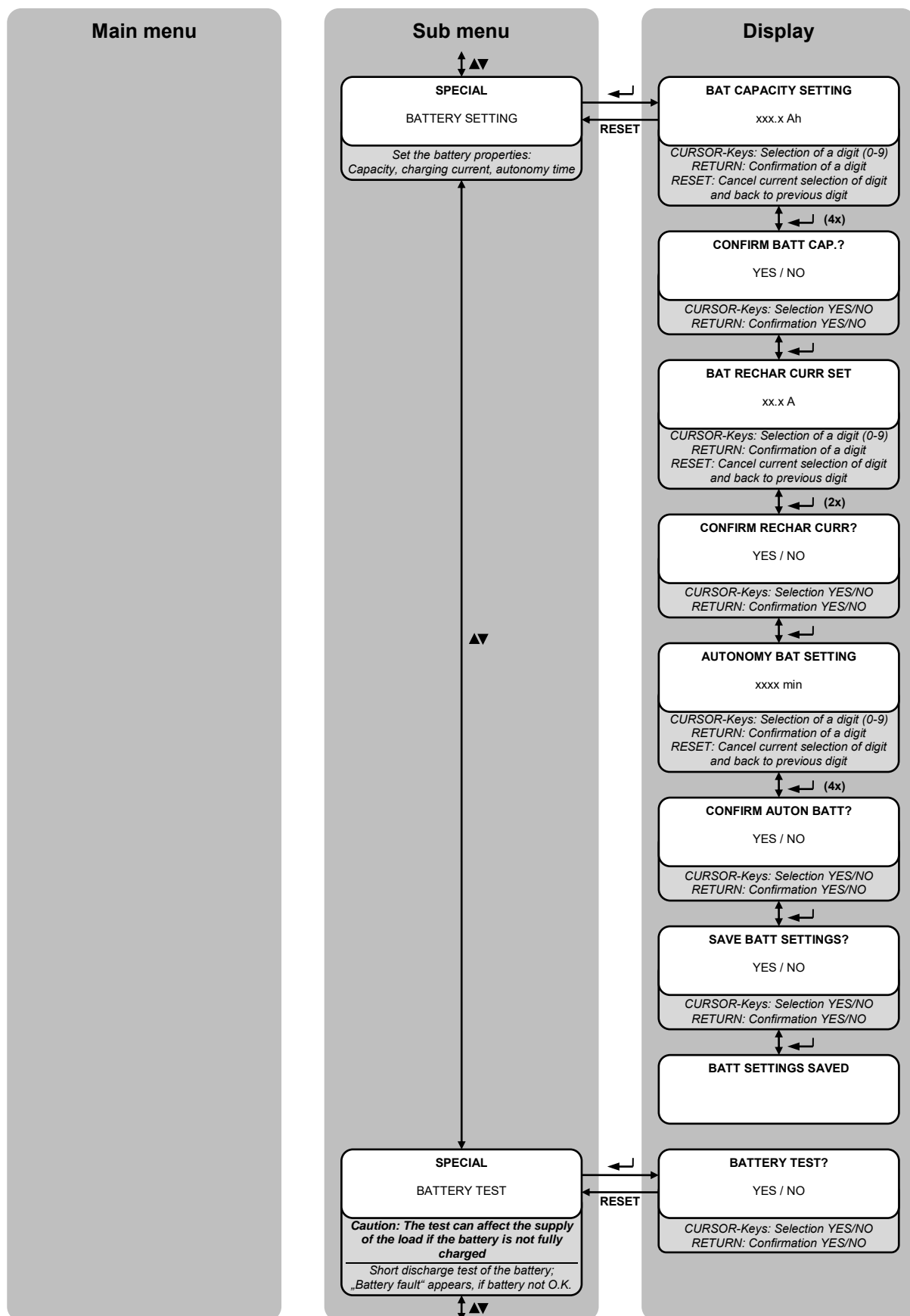
The menu "Alarms" displays the status of the UPS and the alarms. All active alarms and status reports will be displayed in the sub menu „UPS Status“. If a fault occurs, the status menu automatically appears and presents the relevant report on the display. In addition, an acoustic signal will sound, which can be disabled by pressing the buzzer button. Occurred and removed faults are saved and can be displayed in the sub menu „History“ at any time.

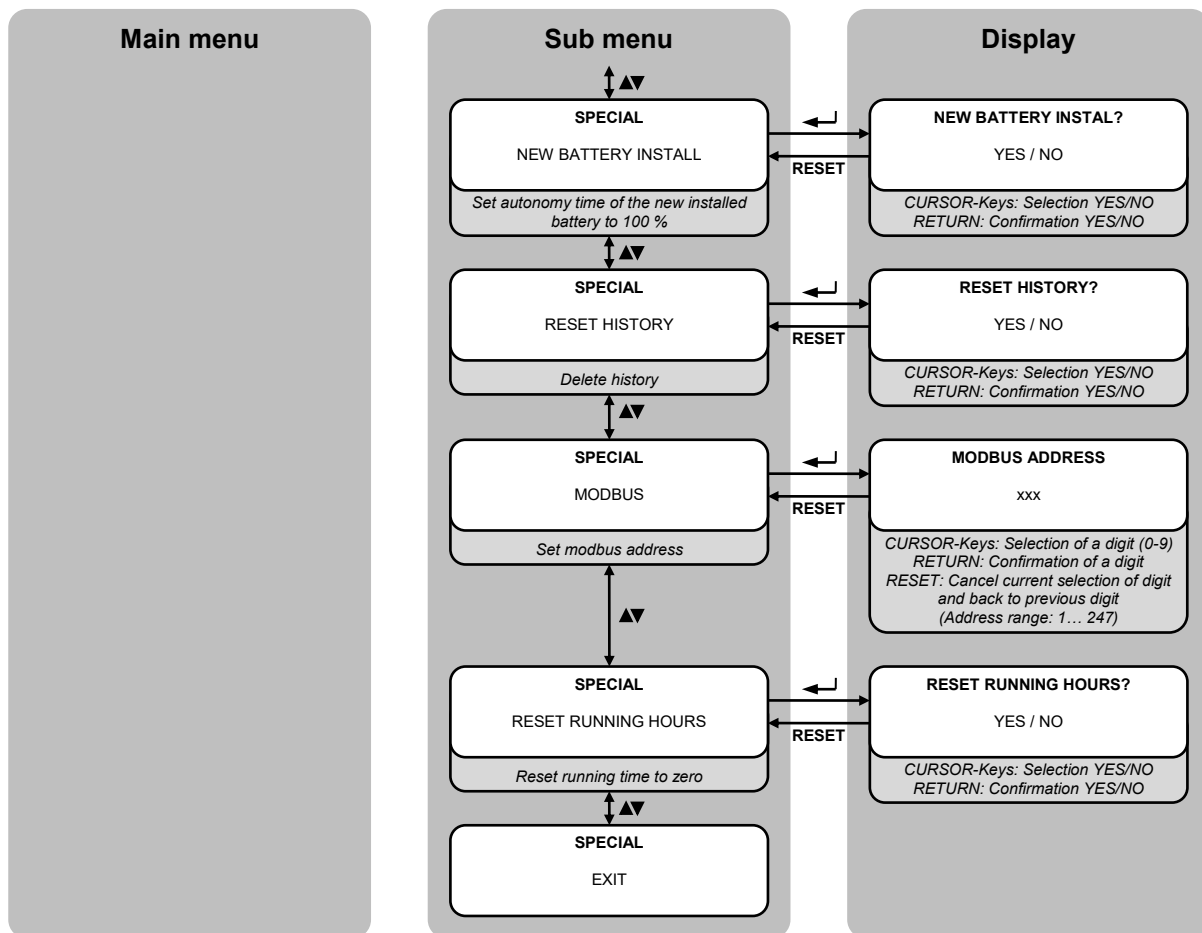


4.2.3 Special

Different settings to the UPS can be made in the „Special“-menu. For that a password entry is necessary, to prevent a change of the system data by unauthorized persons. Then the following settings can be made: Reset of the UPS, set Date/Time, select language, perform an UPS test, enter battery data, perform a battery test, install new battery, delete history, set modbus address and reset running time.

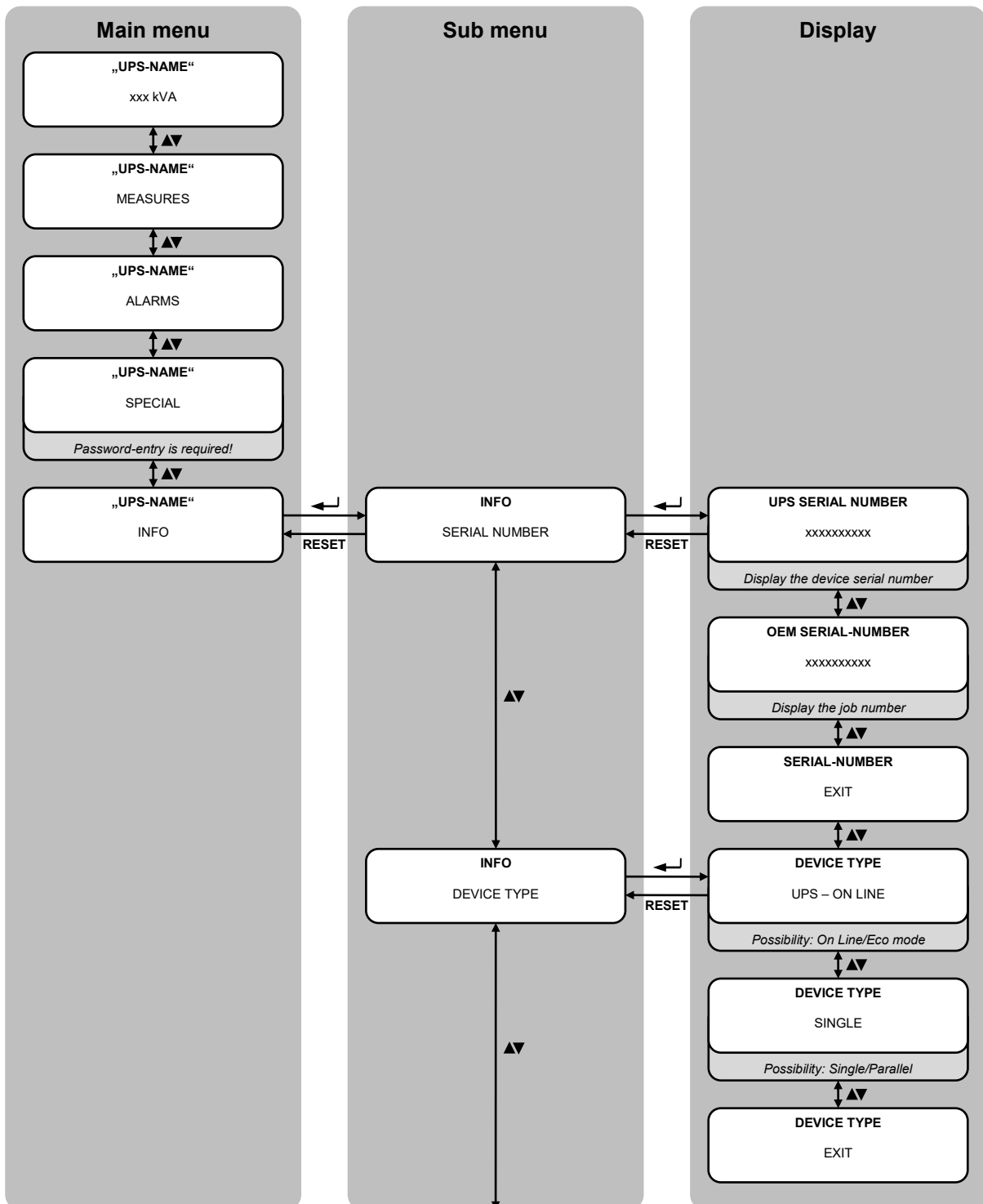


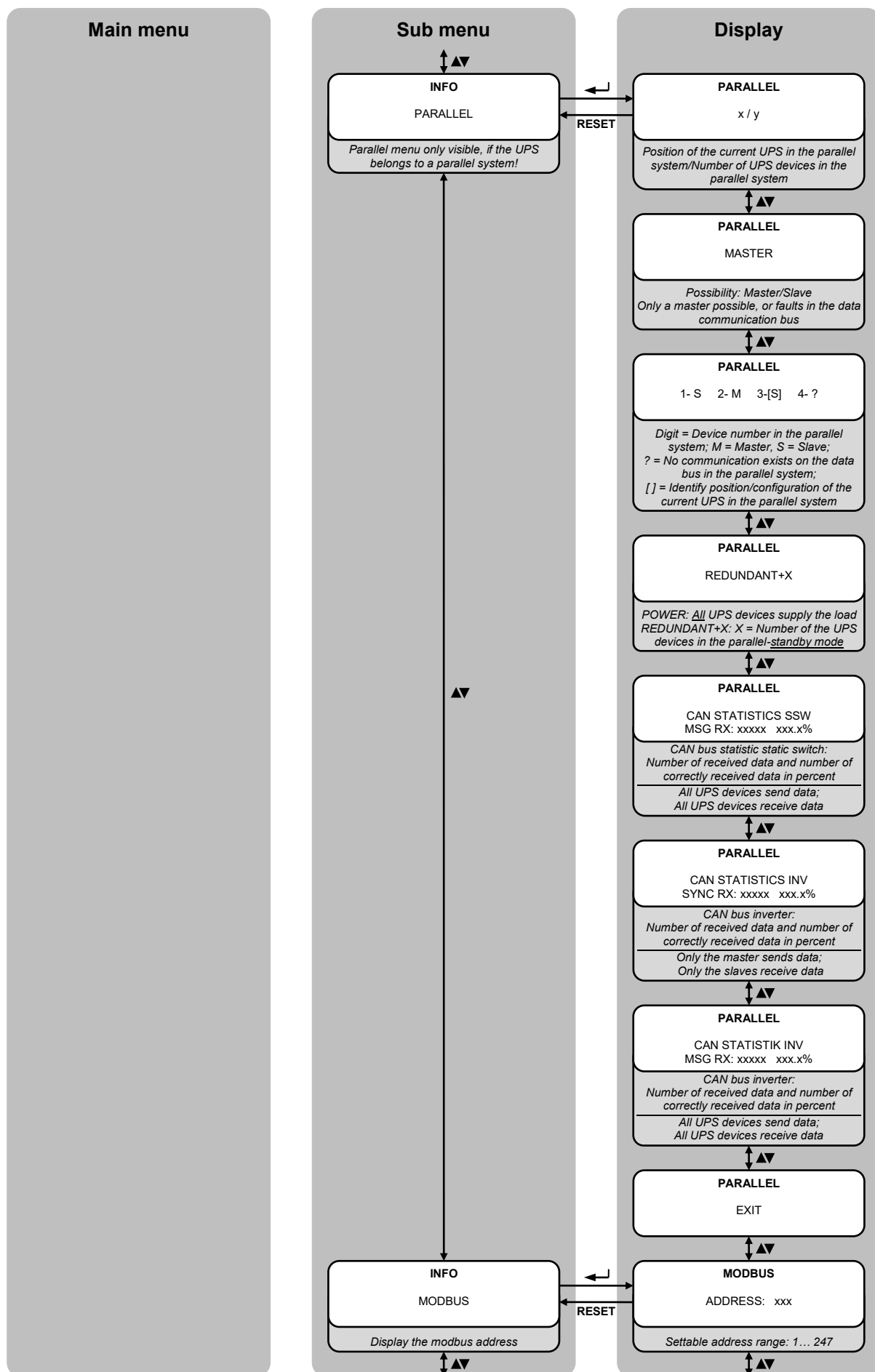


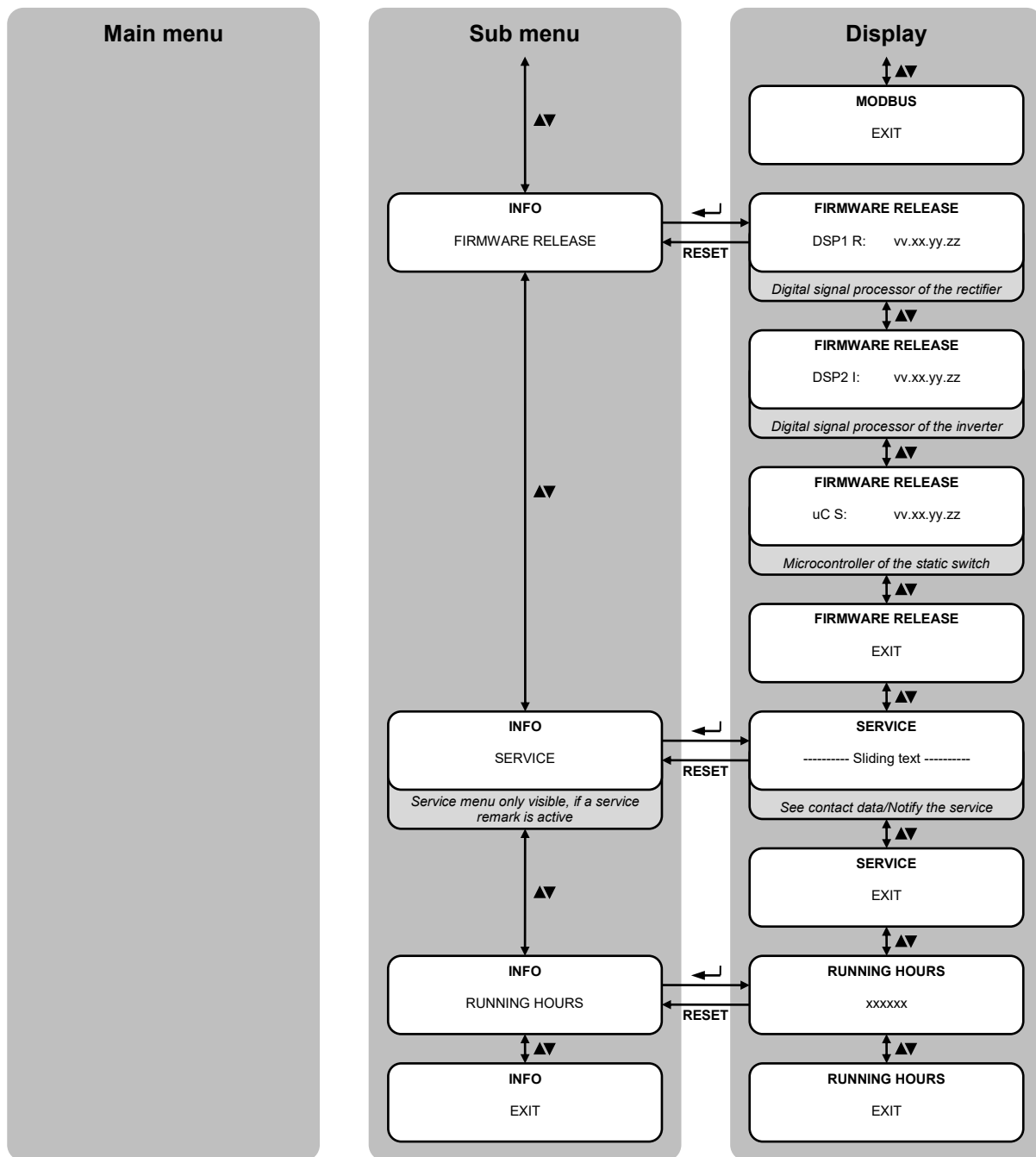


4.2.4 Info

The menu „Info“ include all relevant information of the UPS as the serial numbers (Device and job number), the device type (Online-/Eco mode and single or parallel system), the device data at a parallel system (Only active, if available), the modbus address, the versions of the installed firmware, the service remark (Only active, if available) and the running time.







4.3 Alarm messages and status reports in the display

The status reports describe the operating condition of individual components, whereas alarm messages indicate special states or faults described in detail below. The descriptions of alarm messages additionally show possible causes and recommend initial actions that may be taken to resolve the problem.

4.3.1 Description of status reports

Status	S1	RECTIFIER OK
Description	The rectifier section is working properly	
Operating condition	The rectifier supplies the inverter and keeps the battery charged	
Status	S2	BATTERY OK
Description	The battery is connected to the UPS	
Operating condition	The battery is kept charged by the rectifier and is ready to feed the inverter	
Status	S3	INVERTER OK
Description	The inverter voltage and frequency are within the allowed range	
Operating condition	The inverter is ready to feed the load	
Status	S4	INVERTER FEEDS LOAD (Only in Online-mode)
Description	The inverter feeds the load	
Operating condition	The load is fed via the static inverter switch	
Status	S5	INVERTER BYPASS SYNCHRONIZATION
Description	The inverter is synchronized with the bypass	
Operating condition	The synchronization between the inverter and the bypass is locked, and the static switch can change over from one source to the other.	
Status	S6	BYPASS OK
Description	The bypass voltage and frequency are within the allowed range	
Operating condition	The bypass line is ready for changeover in case of inverter failure	
Status	S7	BYPASS FEEDS LOAD (Only in ECO-mode)
Description	Load fed by the bypass line	
Operating condition	The load is fed by the bypass via the static switch, waiting for the inverter to restart	
Status	S8	BOOST CHARGE
Description	The battery is in BOOST charge	
Operating condition	The rectifier is charging the battery with a higher voltage. The return to FLOATING charge mode is automatic.	
Status	S9	MASTER INVERTER SYNCHRONIZATION
Description	The inverter is synchronized with the MASTER UPS	
Operating condition	This status is only present on the SLAVE UPS units, and shows that the inverter is synchronized with the signal sent by the MASTER UPS	

4.3.2 Description of alarm messages

Alarm	A1	MAINS FAILURE
Description	The voltage or frequency of the input line is 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 PHASE ROTATION NOT CORRECT
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	RECTIFIER OFF
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. Possible fault in the rectifier control circuit.	
Solutions	1. Check the parameters of the AC line voltage. 2. Restart the device. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A4	RECTIFIER FAILURE
Description	The rectifier has been disconnected due to an internal fault.	
Possible causes	Possible fault in the rectifier control circuit.	
Solutions	1. Check which alarms are present and carry out the indicated procedures. 2. Restart the device. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A5	WRONG DC VOLTAGE
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 procedures. 4. Restart the device. 5. If the alarm persists, contact our Technical Support Service.	
Alarm	A6	BATTERY IN TEST
Description	The rectifier voltage is reduced to start a short controlled discharge of the battery.	
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 possible battery faults.	
Alarm	A7	BCB OPEN
Description	The battery isolator is open.	
Possible causes	Battery isolator open.	
Solutions	1. Check the status of the battery isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. Check the connection between the auxiliary contact of the isolator and the auxiliary terminals of the UPS (if provided). 4. If the alarm persists, contact our Technical Support Service.	
Alarm	A8	BATTERY DISCHARGING
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 procedures. 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.	
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. 2. Reset the system. 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.	
Solutions	1. Check the loads connected to the UPS output. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A12	SHORT-CIRCUIT TIMEOUT STOP
Description	Inverter shutdown due to an extended short-circuit during a power failure, or due to an over current on the inverter bridge input.	
Possible causes	Short-circuit on the loads during a power failure. Inverter bridge fault. Temporary current peak.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A13	INVERTER OUT OF TOLERANCE
Description	The inverter voltage or frequency is 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 procedures. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A14	BYPASS PHASE ROTATION NOT CORRECT
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 FAILURE
Description	The voltage or frequency of the bypass line is out of tolerance.	
Possible causes	Bypass line 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	A16	BYPASS FEEDS LOAD (Only in Online-mode)
Description	The load is fed by the bypass line.	
Possible causes	Temporary changeover due to inverter failure.	
Solutions	1. Verify the inverter status and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A17	RE-TRANSFER 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 system. 2. Check the in-rush currents of the loads. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A18	MBCB CLOSED
Description	The manual bypass isolator is closed.	
Possible causes	Manual bypass isolator closed.	
Solutions	1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A19	OCB OPEN
Description	The output isolator is open.	
Possible causes	Output isolator open.	
Solutions	1. Check the status of the output isolator. 2. Check the functionality of the auxiliary contact of the isolator. 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. The inverter is shut down for 30 minutes and then restarted.	
Possible causes	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 system. 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 (Electronic Power Off)
Description	The system is blocked due to the activation of the electronic power off button.	
Possible causes	Activation of the (local or remote) electronic power off button.	
Solutions	1. Release the electronic power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A24	HIGH INVERTER / DC FUSE TEMPERATURE
Description	High temperature of the heat sink on the inverter bridge or tripping of the DC fuses which protect the inverter bridge.	
Possible causes	Fault of the heat sink cooling fans. The room temperature or cooling air temperature is too high. Tripping of the DC protection fuses.	
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. Check the status of the DC fuses on the inverter bridge input. 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	Various.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A26	COMMUNICATION LOSS
Description	Internal error.	
Possible causes	Microcontroller communication problems.	
Solutions	1. If the alarm persists, contact our Technical Support Service.	
Alarm	A27	EEPROM ERROR
Description	The controller has detected an error in the parameters stored in E²PROM.	
Possible causes	Wrong parameters entered during programming.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A28	CRITICAL FAULT
Description	An alarm has been activated which causes the shutdown of part of the UPS (rectifier, inverter, static switch).	
Possible causes	System 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	A29	SCHEDULED 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. It is necessary to carry out maintenance work.	
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 procedures.	
Alarm	A31	BUS MCB CLOSED
Description	The manual bypass isolator is closed.	
Possible causes	Manual bypass isolator closed.	
Solutions	1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A32	BUS EPO (Electronic Power Off)
Description	The system is blocked due to the activation of the electronic power off button.	
Possible causes	Activation of the (local or remote) electronic power off button.	
Solutions	1. Release the electronic power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A33	ASYMMETRIC LOAD
Description	The positive and negative voltages measured on the DC capacitors towards the middle point are different.	
Possible causes	Possible failure on the measuring circuit. Possible fault of DC capacitors.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A34	SERVICE REQUIRED
Description	A UPS check is necessary.	
Possible causes	Possible UPS fault.	
Solutions	1. If the alarm persists, contact our Technical Support Service.	
Alarm	A35	BATTERY IN 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, to terminals XD1/XD2. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A36	FAST SHUTDOWN
Description	Inverter shutdown due to the operation of the protection sensor as a result of sudden DC voltage variations.	
Possible causes	Battery fault.	
Solutions	1. Check the battery. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A38	INVERTER FEEDS LOAD (Only in ECO-mode)
Description	The load is fed by the inverter. This alarm is active for UPS systems in „ECO“ mode, where the preferential supply is from the bypass line.	
Possible causes	Temporary changeover due to bypass line failure.	
Solutions	1. Verify the status of the bypass line and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A39	INVERTER LOOP ERROR
Description	The control is not able to regulate the inverter voltage precisely.	
Possible causes	Regulation system failure.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A40	SSI FAULT
Description	The system has detected a failure in the static inverter switch.	
Possible causes	Possible problems on the loads. Static switch fault.	
Solutions	1. Check the absorption of the loads and the presence of DC components, if any, on AC current. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A41	RECTIFIER VOLTAGE LOOP ERROR
Description	The control is not able to regulate the rectifier output voltage precisely.	
Possible causes	Regulation system failure.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A43	RECTIFIER CURRENT LOOP ERROR
Description	The control is not able to regulate the rectifier output current precisely.	
Possible causes	Regulation system failure.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A44	DESATURATION
Description	The inverter is blocked due to the operation of the desaturation sensor of the IGBT drivers.	
Possible causes	Inverter bridge fault.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A45	HIGH SSW TEMPERATURE
Description	High temperature of the static switch heat sink.	
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	This alarm is only active on parallel systems. Continuity is not ensured in the event of a fault on one of the UPS units.	
Possible causes	The total load is higher than the maximum expected value. Possible failure on the measuring circuit.	
Solutions	1. Check the load fed by the system. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A47	WRONG TRANSMISSION OF EEPROM PARAMETERS
Description	Internal error.	
Possible causes	Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A48	FAILED RECEPTION OF EEPROM PARAMETERS
Description	Internal error.	
Possible causes	Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A49	TEST MODE DISCREPANCY
Description	Internal error.	
Possible causes	Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A50	STATIC SWITCH BLOCKED
Description	The static switch is blocked. The load is no longer supplied.	
Possible causes	Loads failure. Possible UPS fault.	
Solutions	1. Check the loads for possible failures. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.	
Alarm	A51	BATTERY TEMPERATURE OUT OF TOLERANCE
Description	The battery temperature is out of tolerance. This alarm is only active when the temperature probe is installed and enabled on the battery.	
Possible causes	Anomalous temperature in the battery cabinet. Possible failure on the measuring circuit.	
Solutions	1. Check the temperature on the batteries and remove the cause of the alarm, if any. 2. If the alarm persists, contact our Technical Support Service.	
Alarm	A52	DC COMP ERROR
Description	Internal error.	
Possible causes	Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A53	FIRMWARE CONFIGURATION ERROR
Description	The controller has detected an incompatibility in the control software.	
Possible causes	The software update was not performed properly.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A54	PARALLEL CAN COMMUNICATION ERROR
Description	Internal error.	
Possible causes	Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	
Alarm	A55	PARALLEL CABLE DISCONNECTED
Description	Parallel cable doesn't communicate.	
Possible causes	Parallel cable disconnected or damaged.	
Solutions	1. Check the connection of all cable. 2. Contact our Technical Support Service.	
Alarm	A56	MAINS BALANCE
Description	Rectifier stop at unbalanced mains	
Possible causes	The voltages of the three phases are deviate from each other about 7 %.	
Solutions	1. Check the input voltages/- cable from the mains. 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. Possible internal fault.	
Solutions	1. Make sure the position of the control devices (isolators, selectors) is as specified in the procedures (see „Installation and start-up“ section). 2. If the alarm persists, contact our Technical Support Service.	

5 Commissioning and decommissioning procedures

The procedures explain what to do when starting up, shutting down and switching between normal operation/bypass operation of the UPS. The sequence of actions must be adhered to exactly. Not adhering to the sequence may lead to serious faults and/or destruction of the UPS. In the event of queries, please contact our Technical Support Service (see contact details).

5.1 Commissioning

Certain important points should be checked in advance in order to prevent faults during commissioning:

- All wiring and connections have been connected properly
- The battery is connected with the poles correctly positioned and the battery voltage is in order
- The voltages and phase rotation of the mains connections are correct
- The "EPO" (Emergency Power Off) switch on the control panel, if installed, has not been pressed

No.	Panel display	Action	UPS status
1	---	Close RCB	All LEDs go on. Start of the control logic and activation of the panel.
2	BOOT LOADING		All LEDs go off.
3	EEPROM READING		All LEDs go off. EEPROM data are read.
4	PLEASE WAIT		
5	UPS START UP PLEASE WAIT		UPS startup. LED #1 lights if input voltage is correct.
6	RECTIFIER START UP PLEASE WAIT		The rectifier starts and increases the intermediate circuit voltage. LED #3 lights green if the intermediate circuit voltage is correct.
7	INVERTER START PLEASE WAIT		The inverter starts and increases the output voltage. LED #5 lights green, static switch inverter is closed
8	BYPASS START UP CLOSE SBCB	Close SBCB	
9	BYPASS START UP PLEASE WAIT		The control logic checks the bypass parameters. LED #2 lights green if the bypass voltage is correct.
10	BATTERIE START UP CLOSE BCB	Close BCB	Attention: <u>Optional</u> „Battery symmetry supervision“ is to reset additionally through the reset push button switch.
11	BATTERIE START UP PLEASE WAIT		The control logic checks if the BCB is closed. LED #4 lights green if the battery is correct.
12	UPS START UP CLOSE OCB	Close OCB	
13	START UP END PLEASE WAIT		The control logic checks the output parameters. LED #7 lights green if the output parameters are correct.
14	UPS NAME xxx kVA		After termination of the startup procedure appears the standard display.

5.1.1 Problems during commissioning

This paragraph contains essential information should an alarm occur during the start-up procedure. If the problem cannot be solved using this information, please contact our Technical Support Service.

1. *No information in the display after closing the RCB*
 - Check the phase sequence from the mains
 - Check whether the input voltage and frequency are within tolerances
 - Check rectifier fuses F1-F2-F3
2. *If the UPS stops the start sequence after step number 1 and one or more alarms occur*
 - Check displayed alarms and rectify the cause
 - Restart the UPS by closing the RCB
3. *If the UPS does not start again after step number 2 and the alarm displays A15 – Bypass failure*
 - Check whether the SBCB is closed
 - Check the fuses of the static bypass switch integrated in the UPS
 - Check the phase sequence of the bypass mains
 - Check whether the bypass voltage and frequency are within tolerances
4. *If the UPS does not start again after step number 3 and the alarm displays A7 – BCB open*
 - Check the BCB and the battery fuses
 - Inspect the connections between the auxiliary contact of the BCB and terminals Bac1-Bac2 of the UPS

5.2 Decommissioning

Decommissioning the UPS leads directly to an interruption in the power supply to the consumer. The following steps should therefore only be carried out if necessary/wished.

No.	Action	Panel display	UPS Status
1	Open OCB	A30 COMMON-ALARM	The supply of the load is interrupted. LED #7 goes off.
2	Open BCB	A30 COMMON-ALARM	The battery is disconnected from the rectifier. LED #4 flashes red.
3	Open SBCB	A30 COMMON-ALARM	The static Bypass is disconnected. LED #2 goes off.
4	Open RCB	A30 COMMON-ALARM	Rectifier and inverter switched off. All LEDs go off.
5		---	End of switch off procedure.

5.3 Commissioning from the internal, manual bypass

This switchover procedure starts the UPS from the internal manual bypass. Before doing so, the following two preconditions must be checked.

- The bypass switch is in the bypass position
- The MCB is closed.

No.	Panel display	Action	UPS Status
1	---	<i>Close RCB</i>	All LEDs go on. Start of the control logic and activation of the panel.
2	EEPROM READING		All LEDs go off. EEPROM data are read.
3	USV START UP PLEASE WAIT		All LEDs go off. LED #1 lights green, LED #8 lights orange.
4	RECTIFIER START UP PLEASE WAIT		The rectifier starts and increases the intermediate circuit voltage. LED #3 lights green if the intermediate circuit voltage is correct.
5	START UP FROM MCB CLOSE SBCB	<i>Close SBCB</i>	
6	BYPASS START UP PLEASE WAIT		LED #2 lights green. The control logic checks the bypass parameters. LED #6 lights green, static switch bypass is closed.
7	START UP FROM MCB CLOSE BCB	<i>Close BCB</i>	LED #4 lights green. Attention: Optional „Battery symmetry supervision“ is to reset additionally through the reset push button switch.
8	START UP FROM MCB CLOSE OCB	<i>Close OCB</i>	LED #7 lights green. Die Last is supplied through the static- and manual bypass.
9	START UP FROM MCB OPEN MCB	<i>Open MCB</i>	LED #8 goes off. The load is supplied through the manual bypass only.
10	INVERTER START PLEASE WAIT		The inverter starts and increases the output voltage. The control logic checks the synchronization with the bypass.
11	START UP FROM MCB MOVE BYP-SWITCH	<i>Bypass switch to „Normal“</i>	LED #5 lights green. LED #6 goes off. The inverter supplies the load.
12	START UP END PLEASE WAIT		The control logic checks the output parameters. LED #7 lights green if the output parameters are correct.
13	UPS NAME xxx kVA		The UPS is in normal mode again.

5.4 Decommissioning in the internal manual bypass

Once the procedure has been carried out successfully the consumer is switched to the internal manual bypass without interruption.



Attention: The input voltage from the mains is still live at the input terminals of the UPS. To ensure that the UPS is completely voltage free, the input voltage must additionally be disconnected from the UPS.

No.	Action	Panel display	UPS Status
1	<i>Bypass switch to position „Bypass“</i>	A30 COMMON-ALARM	Static switch inverter opens, static switch bypass closes. LED #5 goes off, LED #6 lights orange.
2	<i>Close MCB</i>	A30 COMMON -ALARM	LED #8 lights orange. The load is supplied through the manual- and static bypass.
3	<i>Open OCB</i>	A30 COMMON -ALARM	LED #7 goes off. The load is supplied through the manual bypass only.
4	<i>Open BCB</i>	A30 COMMON -ALARM	LED #4 flashes red. The battery is disconnected from the rectifier.
5	<i>Open SBCB</i>	A30 COMMON -ALARM	LED #2 goes off. The static bypass is opened.
6	<i>Open RCB</i>	A30 COMMON -ALARM	LED #1 and LED #3 go off. Rectifier and inverter are switched off.
7		---	The display goes off, the UPS is disconnected.

6 Servicing

6.1 Maintenance

To maintain constant availability and operational reliability, we recommend that you carry out regular visual and functional tests on the UPS as well as inspecting the battery charge status. A log should be kept for verification.



CAUTION:

Maintenance work must sometimes be performed when the UPS is connected to the power supply. Always observe the safety regulations and secure the work area!

6.1.1 Visual inspection

During visual inspections, check for:

- Unusual noises or odours
- Mechanical damage or foreign bodies in the unit
- Conductive dirt or dust deposits inside the unit
- Accumulations of dust that affect heat dissipation
- Fault messages shown in the display.

The intervals between visual inspections depend first and foremost on the conditions in the location where the devices are installed.

6.1.2 Functional test

The functional testing of the UPS should be performed every six months and involves the following tasks:

- Activate the manual bypass
- Disconnect the UPS and check the following functions when restarting the system:
 - Displays (fault messages)
 - Correct start of the rectifier and inverter
 - Function of the static switch
 - Check the output voltages of the rectifier and inverter as well as of the static switch

6.1.3 Battery inspection

If the UPS is out of operation for a prolonged period, maintenance-free batteries must be recharged at three-monthly intervals. Please observe the battery manufacturer's instructions!



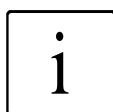
CAUTION:

Acid vapours emitted in the battery compartment can cause burns upon contact with body parts and when inhaled. The applicable protective measures must be complied with in accordance with the safety regulations of VDE 0510, Part 2.

The following items must be measured and logged every three months:

- Battery voltage between B+/N and B-/N
- If possible, the voltage of the block batteries, otherwise of the battery racks

The voltage of all block batteries must be measured and logged on an annual basis. The firmness of all screw connections must be checked annually. All checks must be performed in accordance with DIN IEC 60896-21. Special checks, such as those in accordance with DIN VDE 0108, must also be observed. Additional testing by means of automatic testing equipment is not permitted except with the written approval of the battery manufacturer.



NOTE:

If the battery voltage is not within the stated range and/or the battery cannot be charged successfully, please inform our Technical Support Service and if necessary have the battery replaced by our specialists.

6.2 Repairs

Despite the use of predominantly wear-free components, we recommend that you should store spare parts that are relevant to the operation of the UPS unit. This will assist the permanent operational readiness of your UPS. When ordering spare parts, please quote the designation (code) and order/device number.

6.2.1 Spare parts list

The spare parts list will be submitted.

7 Dismantling and cleaning up

After the decommissioning and dismantling of the UPS system from the connected power supply, the UPS and batteries must be cleaned up in accordance with the statutory provisions. We take free of charge our UPS unit and batteries from the operator and recycle them appropriately.

8 Appendix

The following pages contain technical documents, including drawings and technical specifications for the UPS unit.

8.1 Technical data

JOVYSTAR COMPACT S			
Online UPS-Type	30 kVA	40 kVA	50 kVA
Output			
Output apparent power (cos φ = 0,9)	30 kVA	40 kVA	50 kVA
Output active power (cos φ = 1)	27 kW	36 kW	45 kW
Rated output voltage	3 x 380/220 V / 3 x 400/230 V / 3 x 415/240 V		
- Tolerance static, symmetric load	±1 %		
- Tolerance static, asymmetric load	±2 %		
- Tolerance dynamic load (20 % → 100 % → 20 %)	±5 %		
- Correction time after load step	< 20 ms		
Rated output frequency	50/60 Hz		
- Tolerance at free running quartz oscillator	±0,001 Hz		
- Tolerance at inverter-synchronization with mains	±2 Hz		
Rated output current (cos φ = 0,9)	44 A	58 A	73 A
Rated output current (cos φ = 1,0)	39 A	52 A	65 A
THDU (according to IEC EN 62040-3)			
- Linear load	< 1 %		
- Non linear load	< 5 %		
Input rectifier			
Input voltage	3 x 400/230 V +15 % -20 %		
Input frequency	50/60 Hz ±10 %		
Input current (at 100 % load, without battery charging)	42 A	56 A	70 A
Input current (at 100 % load, max. battery current)	54 A	66 A	88 A
Input power factor (at 100 % load)	> 0,99		
Input current THD (at 100 % load)	< 3 %		
Input Bypass			
Input voltage	3 x 380/220 V / 3 x 400/230 V / 3 x 415/240 V ±10 %		
Input frequency	50/60 Hz ±5 %		
Battery			
Number of battery cells	2 x 180		
Compensation charging voltage	2 x 409 V (2,27 V/Z)		
Cut-off voltage	2 x 310 V (1,72 V/Z)		
Max. battery charging current (at 100 % load)	10 A	8 A	15
Battery charging characteristic	IU (DIN 41773)		
Overload capability/Output short circuit characteristic			
Overload capability inverter	< 125 % for 10 min 125 % to 150 % for 30 s > 150 % for 100 ms		
Overload capability static bypass	150 % continuously 1000 % for 1 cycle		
Short circuit characteristic (Bypass is available)	Immediate transfer to the bypass		
Short circuit characteristic (Bypass is not available)			
1. Current limitation to 500 ms	78 A	104 A	130 A
2. Current limitation from 500 ms to 5 s	66 A	87 A	109,5 A
Design			
Dimensions (W x H x D)	505 x 1505 x 940 mm		
Weight (without battery)	140 kg	150 kg	190 kg
Weight (with battery)	500 kg	510 kg	550 kg
Paint	RAL 9005		
Noise level	< 52 dB		< 57 dB
International protection	IP 20		
Conformity according IEC 62040			
EMV-class	C3		
UPS classification	VFI SS 111		
Other data			
Efficiency normal mode (at 100 % load)	> 93 %		
Efficiency battery mode (at 100 % load)	> 96 %		
Efficiency eco-mode (Offline-mode)	> 98 %		
Max. crest factor without power reduction	3 : 1		
Heat dissipation (at 100 % load and rated input voltage)	2 kW	2,7 kW	3,4 kW
Requirements to the installation position			
Max. installation altitude without power reduction	< 1000 m		
Power reduction for installation altitude according to IEC EN 62040-3	0,5 % every 100 m above 1000 m up to 2000 m		
Required air cooling volume	900 m³/h	900 m³/h	1100 m³/h
UPS operating ambient temperature	0 to +40 °C		
UPS storage temperature	-10 to +70 °C		
Battery ambient -/storage temperature (recommended battery ambient temperature, see also battery operating instruction)	0 to +25 °C +20 °C		
Relative humidity (non condensing)	< 95 %		

8.2 Other technical documents

We provide you through our website on the product page of the UPS the following documents available to download:

- Battery data sheets
- Battery operating instructions
- Material safety data sheet
- CE – Compliance Declaration

Download at:

http://www.jovyatlas.com/ja/Waertsilae-JOVYSTAR-COMPACT_120-93-2

<http://www.jovyatlas.com/Batteries>

Operating Manual

Wärtsilä

JOVYSTAR COMPACT M

60kVA – 160kVA



BAX 5480



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Index	Date	Name	Remarks
0	2015-12-12	Chr. Fechteler	
1	2016-05-24	D. Busboom	16/285
2	2016-12-01	D. Busboom	16/540
3	2017-01-10	D. Busboom	17/008
4	2017-01-24	D. Busboom	17/037
5	2017-08-24	D. Busboom	17/274
6	2017-10-16	D. Busboom	17/364

Table of Contents

1	Conventions Used	5
2	Documentation Notes	6
3	Contact	6
4	Factory Warranty	7
5	Limitation of Liability	9
6	Scope	9
7	Safety Rules and Warnings	10
7.1	Use of the UPS	10
7.2	Special Safety Warnings	10
7.3	Environmental Protection	16
8	Installation	16
8.1	Receipt of the UPS	16
8.2	Handling of the UPS	17
8.3	Positioning and Installation	18
8.4	Positioning and Connection of the Batteries	22
9	Electrical connection	23
9.1	Connection of the Power Cables	24
9.2	Backfeed Protection Device	25
9.3	Terminal Boards	26
9.4	Battery	27
9.5	Connection of the Auxiliary Cables	33
9.6	Serial interfaces and external connections	34
9.7	Relay Card Connection (Optional)	36
9.8	UPS-Options (Optional equipment)	37
10	Startup and Shutdown	38
10.1	Preliminary checks	38
10.2	Start-Up Procedure	39
10.3	Basic Troubleshooting	41
10.4	Switching to Manual Bypass	42
10.5	Restart from Manual Bypass	43
11	General UPS Description	44
11.1	Typology	44
11.2	System Description	44
11.3	Operating Status	46
11.4	Control and Operation Devices	50
12	Front Panel	52
12.1	Function Buttons	53
12.2	Mimic Panel / LED	54
12.3	LED-Bar	55
13	Handling the Operating Panel	56
13.1	Main Menus	56
13.2	Measures Display	57
13.3	Basic Diagnostics	59
14	Settings and Advanced Operations	63
14.1	Setting Date and Time	65
14.2	Display language setting	65
14.3	New Battery Installation	65
14.4	Battery Configuration	65
14.5	Setting Modbus Parameters	67
14.6	UPS Test	67
14.7	Battery Test	68
14.8	System Reset	68
14.9	Reset Alarm history	69
15	System Information	70
15.1	Parallel Operation Information	71

15.2	Service Information.....	73
16	Faults and Alarms.....	74
16.1	Operating Status Definition.....	75
16.2	Troubleshooting.....	76
17	Technical Data.....	84
18	Service and Download.....	85

Thank you for choosing a Wärtsilä JOVYATLAS 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 Contact

For any information about the UPS systems manufactured by JOVYATLAS, please contact:

Wärtsilä JOVYATLAS EUROATLAS GmbH
Fennenweg 4
26844 Jemgum, Germany
Tel. +49 – 4958 9394 - 0
Fax +49 – 4958 9394 - 10
service.jovyatlas.de@wartsila.com

<http://www.jovyatlas.de>

For help with technical problems or for information concerning device use and maintenance, please contact the technical help service by phoning the above-indicated telephone number, specifying the following data:

- Type of device and its nominal power
- Serial number
- Error code, if applicable.

4 Factory Warranty

The factory warranty provided by Wärtsilä JOVYATLAS EUROATLAS GmbH is subject to the terms indicated below.

Validity

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

Duration

- a) The factory warranty provided by Wärtsilä JOVYATLAS EUROATLAS GmbH 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

- a) The execution of one or more repairs within the warranty time will not alter the original expiry of the warranty.
- b) 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 Wärtsilä JOVYATLAS EUROATLAS GmbH 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.

Modes required

- a) In the event of a fault covered by the warranty, the customer shall notify Wärtsilä JOVYATLAS EUROATLAS GmbH 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, Wärtsilä JOVYATLAS EUROATLAS GmbH must be notified of the time necessary to obtain the documentation required, if any.
- d) In case of customer's non-compliance, Wärtsilä JOVYATLAS EUROATLAS GmbH reserves the right to refuse warranty service. Wärtsilä JOVYATLAS EUROATLAS GmbH 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 Wärtsilä JOVYATLAS EUROATLAS GmbH
 - Tampering, alterations or repair attempts made without the specific written approval by Wärtsilä JOVYATLAS EUROATLAS GmbH
 - Damage caused by work done by personnel not authorized by Wärtsilä JOVYATLAS EUROATLAS GmbH
 - 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 Wärtsilä JOVYATLAS EUROATLAS GmbH 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.

5 Limitation of Liability

All the information contained in the present documentation is the exclusive property of Wärtsilä JOVYATLAS EUROATLAS GmbH. Written consent by Wärtsilä JOVYATLAS EUROATLAS GmbH 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.
- JOVYATLAS 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 JOVYATLAS.
- JOVYATLAS will not be held responsible for the consequences arising from the use of non-original spare parts.
- JOVYATLAS 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.
- JOVYATLAS assumes responsibility for the information given in the original version of the manual in German language.

6 Scope

The instructions contained in the operating manual are applicable to the UPS systems listed below.

JOVYATLAS JOVYSTAR COMPACT m 60kVA - 160kVA



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.

7 Safety Rules and Warnings

7.1 Use of the UPS

Congratulations on choosing a product from JOVYATLAS for the safety of your equipment. To obtain the best performance from your JOVYSTAR COMPACT m 60 - 160 kVA UPS 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.



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.

7.2 Special Safety Warnings

7.2.1 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.

7.2.2 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.

7.2.3 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.

7.2.4 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.

7.2.5 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"

7.2.6 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.

7.2.7 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.

7.2.8 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.**

7.3 Environmental Protection

7.3.1 Recycling of packing materials

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

7.3.2 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.

8 Installation

8.1 Receipt of the UPS

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.

8.1.1 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.**

8.2 Handling of the UPS

The UPS is packed on a pallet. It is handled from the transport vehicle to the installation (or storage) place via a fork lift.

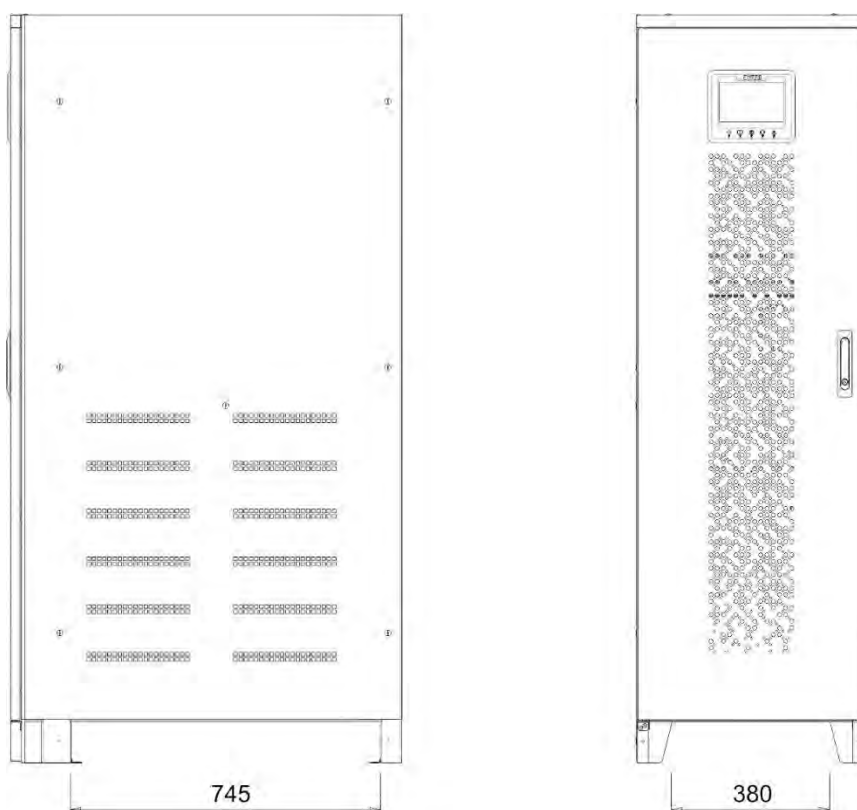


The device has a heavy weight

- **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, in order to avoid risks of turnover, it's recommended to move the system on the wood pallet on which the UPS is fixed. Before the positioning in the final location, remove the UPS from the pallet.

To handle the UPS remove the lower front, rear and side panels and insert the forks of a fork lift. The UPS can be handled both from the front and from the side according to the available spaces, as shown by the following picture.



Picture 2 – Handling of the UPS

8.3 Positioning and Installation

The UPS 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.

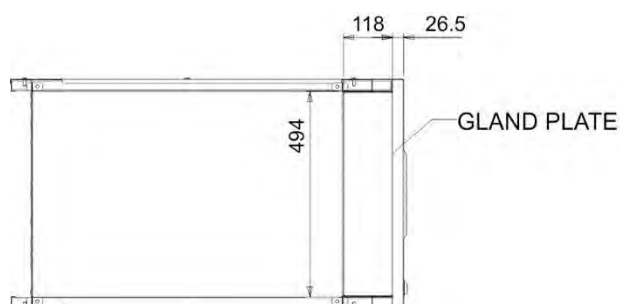


Special environmental conditions

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.

8.3.1 Base Plan, Static Load and Weights



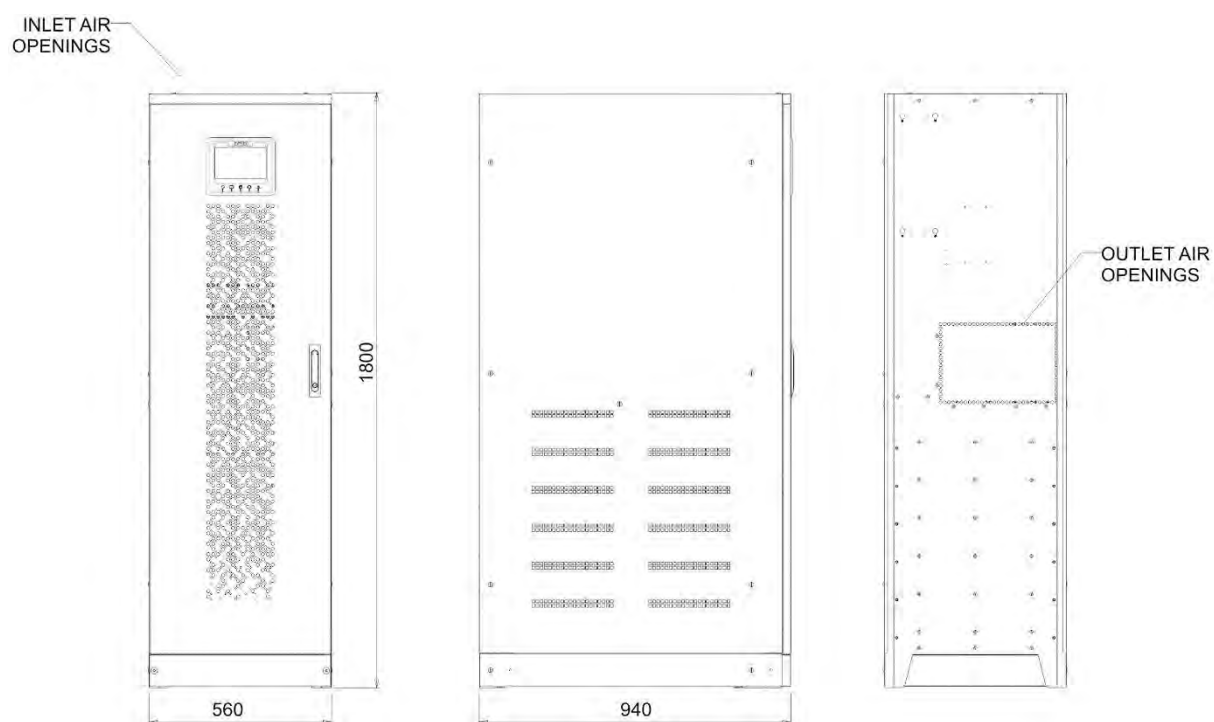
Picture 3 – Base plan

The supporting base of the UPS must be designed to carry the UPS weight and to ensure its steady and safe support.

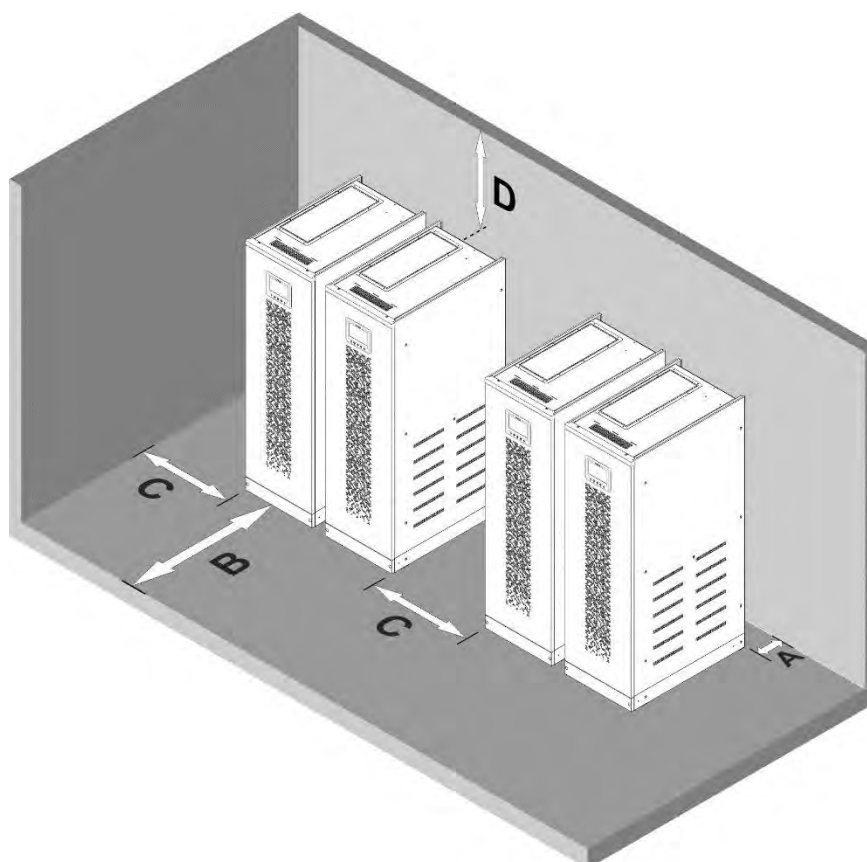
Its carrying capacity must be adequate to the static loads indicated in the table below.

Power (kVA)	60	80	100	125	160
Weight w/o batteries (kg)	250	300	320	360	380
Static load w/o batteries (kg/m ²)	490	590	630	710	750
Weight with batteries (kg)	800	850	-	-	-
Static load with batteries (kg/m ²)	1570	1670	-	-	-

8.3.2 Overall Dimensions, Clearances and Ventilation



Picture 4 – Overall dimensions



Picture 5 – 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.

- UPS with internal batteries

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

- UPS with external battery cabinet

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

The table below shows the air volume required for an optimal ventilation and cooling of the UPS.

Power (kVA)	60	80	100	125	160
Air volume (m ³ /h)	1000	1200	1200	1500	1500

8.3.3 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

The UPS 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.

8.4 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 EN62040-1-2 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 EN62040-1-2 annex N). 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 m³ 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 X10-9/10.

9 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 UPS 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 I_{sc}) that is needed to determine the breaking power of automatic circuit breakers, and to the minimum current (min I_{sc}) 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 are placed on the front of the UPS. 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 inadvisable. 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.

9.1 Connection of the Power Cables

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

- DC supply from the battery (if the battery is external);
- AC supply from the rectifier and bypass supply mains;
- AC output to the loads.



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.

Should larger cable cross-sections be required for the installation than the maximum cross-section of the UPS terminals, a socket or a terminal box can be installed near the UPS. From there to the UPS, a cable laying with a smaller cross-section can be possible (better laying conditions such as installation type, cable length, ...).

Details of the electrical connections					
Power (kVA)	60	80	100	125	160
Input fuses [A]					
Rectifier	125	160	200	250	315
Bypass	125	160	200	250	315
Power connections					
Type	Screw terminals				
Conductor max. cross section [mm ²]	35	70		95	
Max. number of conductors	1				
Tightening torque [Nm]	4 ÷ 4,5	7 ÷ 8		15 ÷ 20	
PE	Bolt M10 (19 Nm)				

Rated current (at full load and battery recharging)					
Power (kVA)	60	80	100	125	160
Rectifier input [A] ⁽¹⁾	109	140	170	214	267
Bypass input / Output [A] ^{(1) (2)}	87	115	144	180	231
Battery [A]	100	133	166	208	266

⁽¹⁾ Values referred to 400Vac rated voltage

⁽²⁾ For the overload values refer to the Technical Specification

9.2 Backfeed Protection Device

The UPS is provided (as option) with voltage-free contacts, which can be used to operate the shunt trip coil (undervoltage release type) of the external sectioning device; the external device is not part of the UPS supply and is provided and installed at customer care.

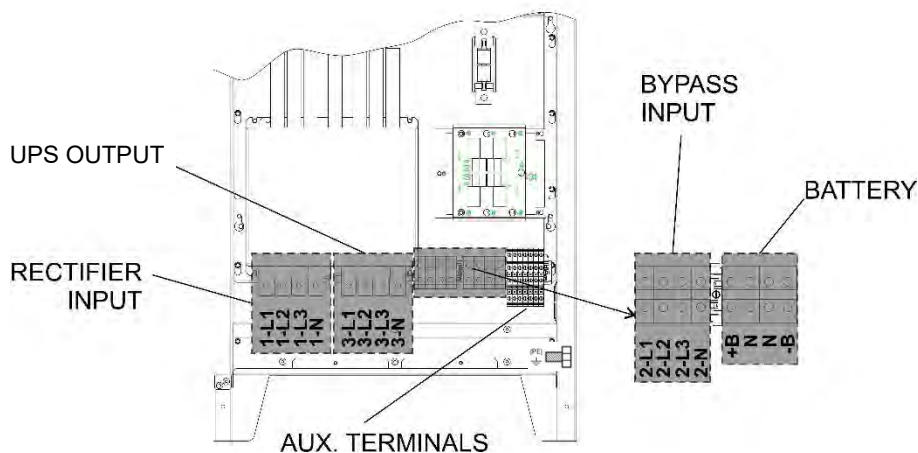
The following table shows the main electrical characteristics of the external sectioning device.

Backfeed protection device					
Power (kVA)	60	80	100	125	160
Maximum operating voltage (Vac)	690				
Minimum rated current (A)	125	160	200	250	315
Category	AC-1				

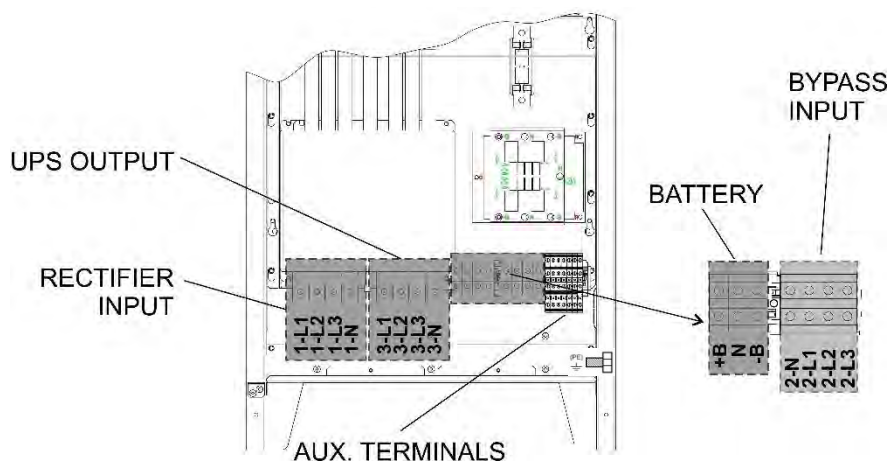
A backfeed contactor can also be installed inside the UPS as an option.

9.3 Terminal Boards

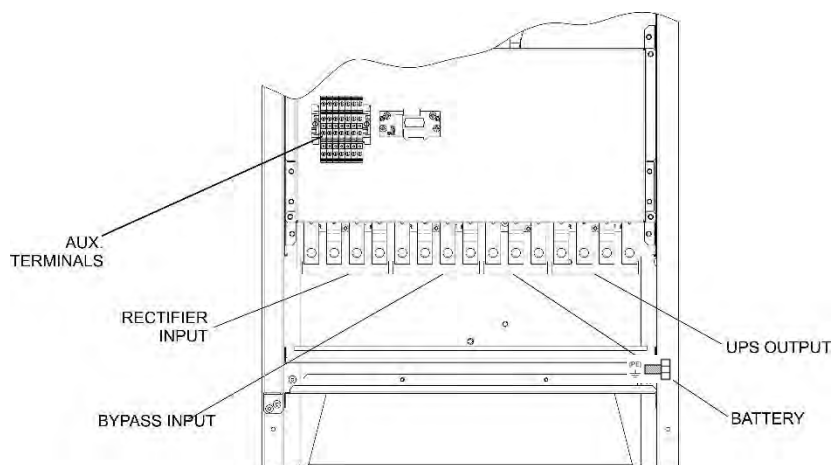
The UPS is provided with terminal boards for the connection of power cables and of auxiliary connections.



Picture 6 – Terminal board 60 – 80kVA



Picture 7a – Terminal board 100 kVA



Picture 7b – Terminal board 125 - 160 kVA

9.4 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 4.5.

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 N).

The batteries can be internal or 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.



Internal batteries

The UPS can have internal batteries.

- Servicing of batteries should be performed by qualified personnel only.
- Replace the batteries with the same number of block and capacity.
- Replace only with original type.
- CAUTION: do not dispose of batteries in fire. The battery may explode.
- CAUTION: do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- CAUTION: do not dump the exhausted batteries in the environment.

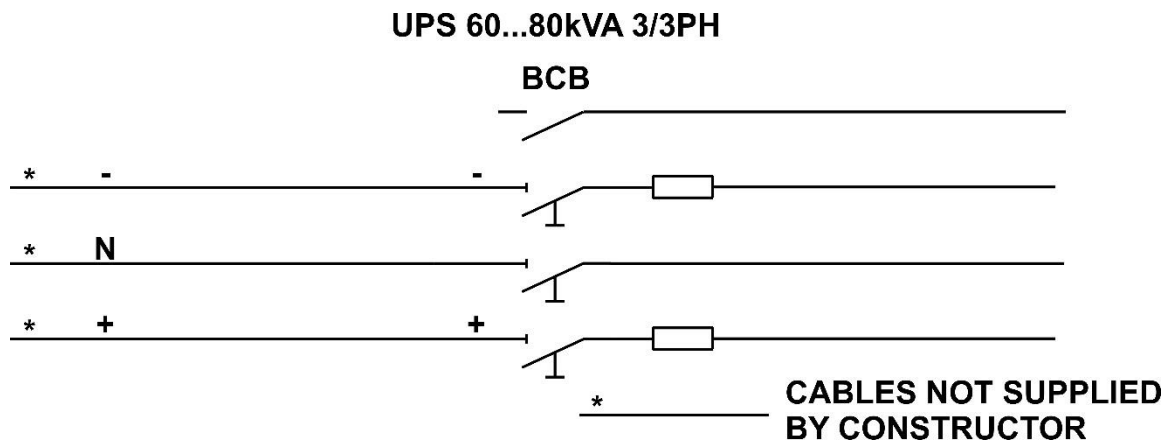
9.4.1 Battery connection and positioning



Battery voltage

After the battery installation, before closing BCB, check the battery voltage on the BCB circuit breaker.

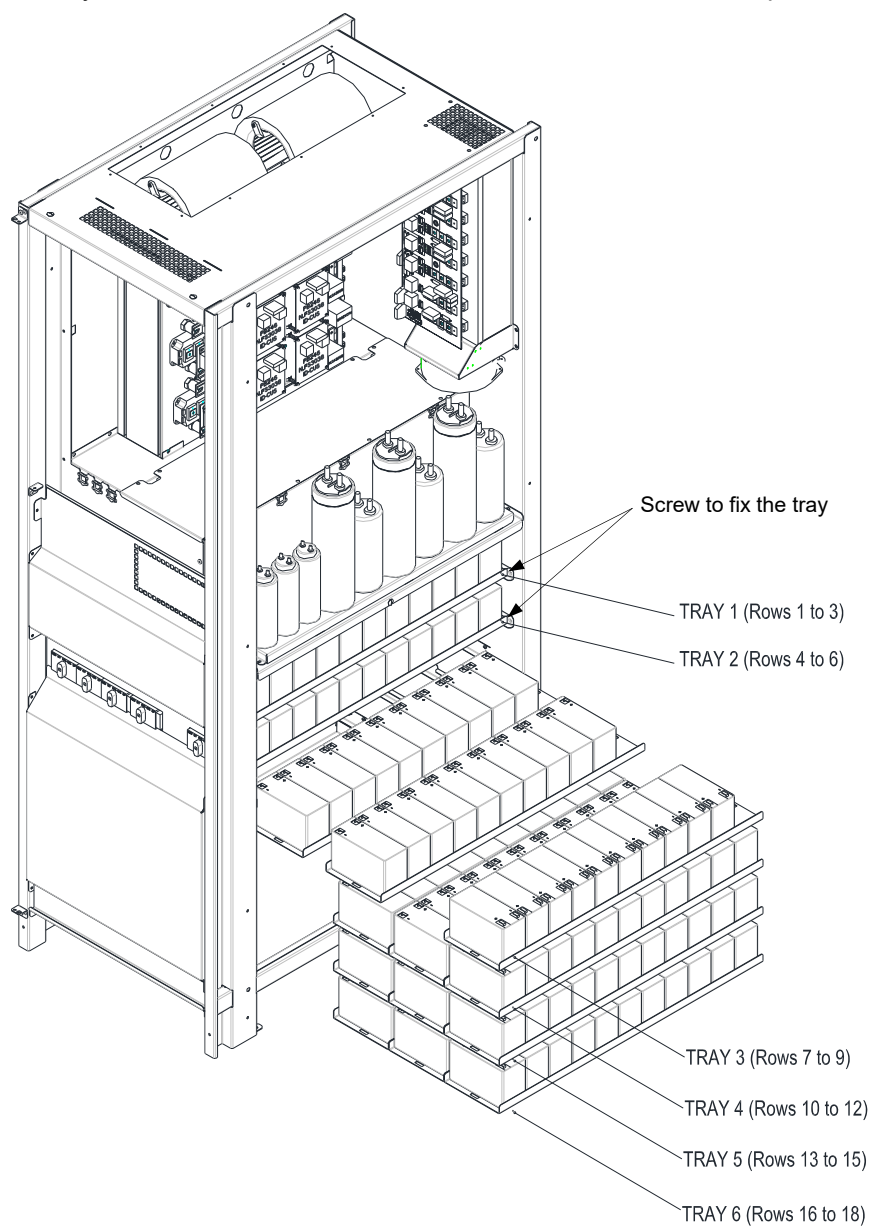
In case of not directly supplied cabling, please connect the cables to the battery breaker (BCB) as shown in the below picture.



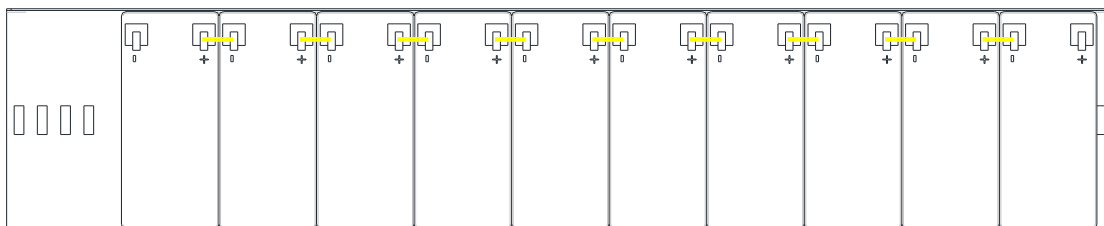
Picture 8 – Cabling of BCB fuse holder

9.4.1.1 Battery 7/9/11Ah 12V installation – 60-80 kVA

1) Remove the six screws to open the left/right lateral cover and access the battery trays (total trays are 6 and each contain three rows of 10 batteries, see picture 9 & 10).

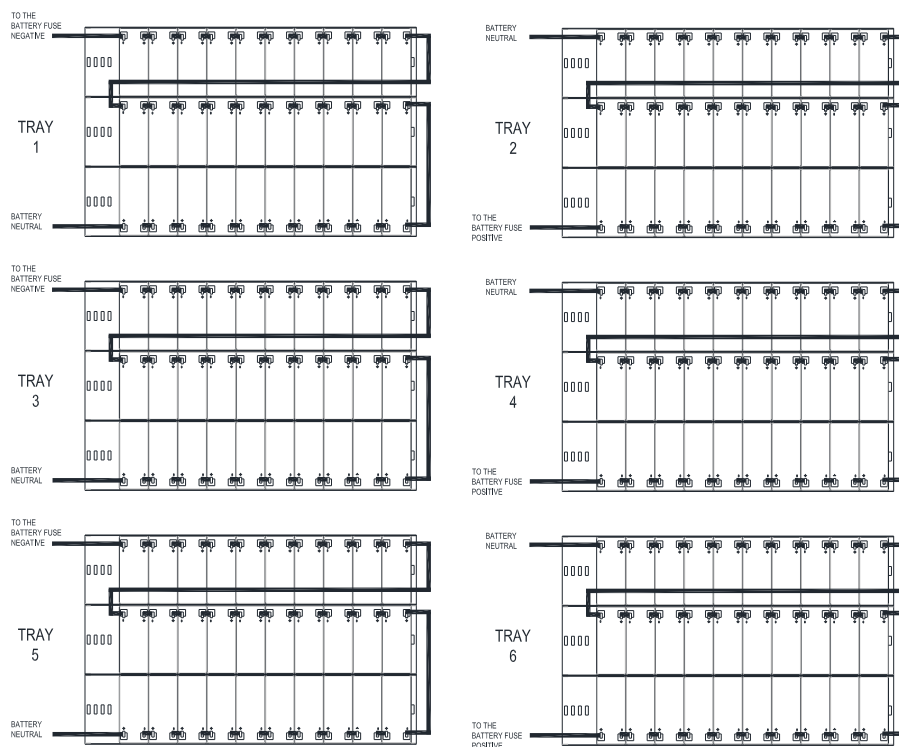


Picture 9 - Trays 7/9/11Ah 12V battery lateral view

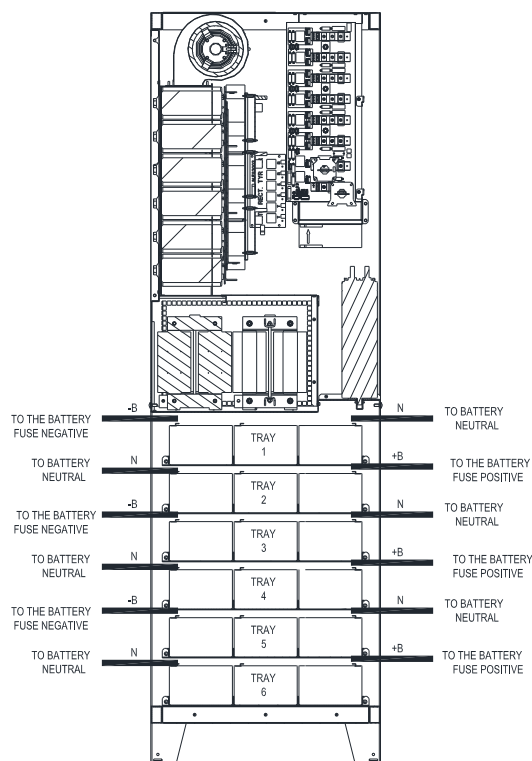


Picture 10 – One raw 7/9/11Ah 12V battery top view

2) Install the batteries received in a separate packages and install it in accordance with the picture 11 and picture 12.



Picture 11- 7/9/11Ah 12V battery connection tray top view



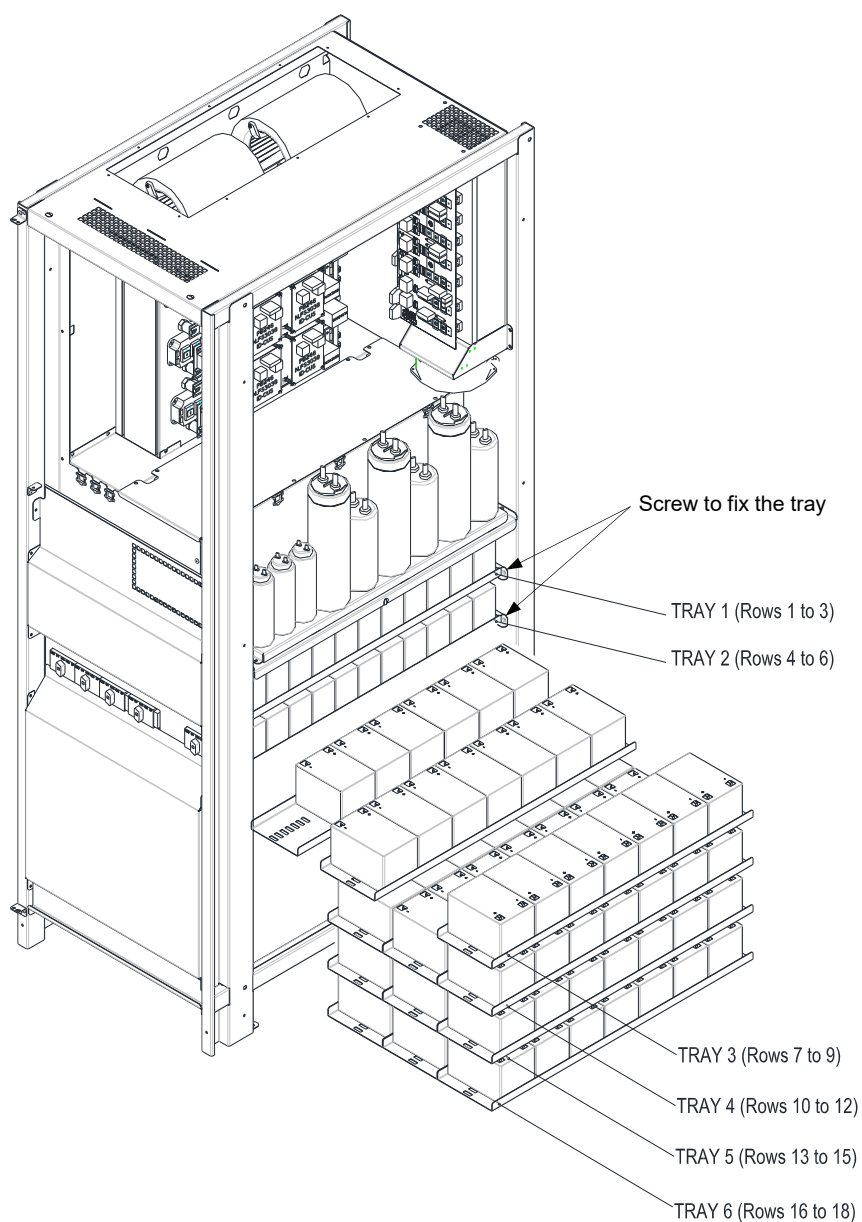
Picture 12- 7/9/11Ah 12V battery connection tray front view

3) After the connection re-insert the battery trays on the internal of UPS.

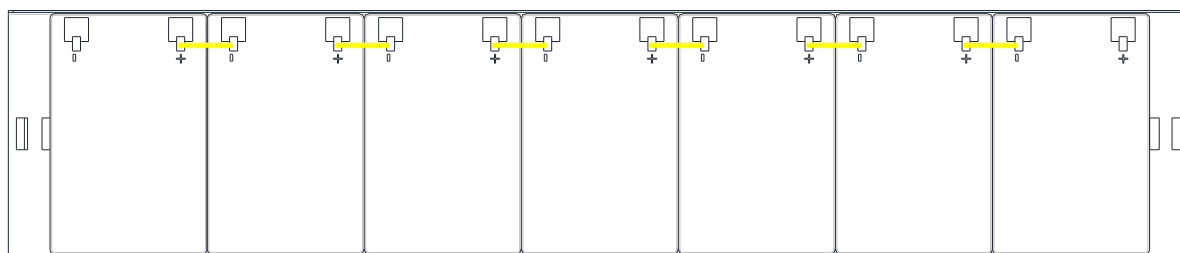
4) Put back and fix the left/right cover with the four screws.

9.4.1.2 Battery 12/14Ah 12V battery installation – 60-80 kVA

1) Remove the six screws to open the left/right lateral cover and access the battery trays
(total trays are 6 and each contain two rows of 7 batteries and one rows of 6 batteries, see picture 13 & 14).

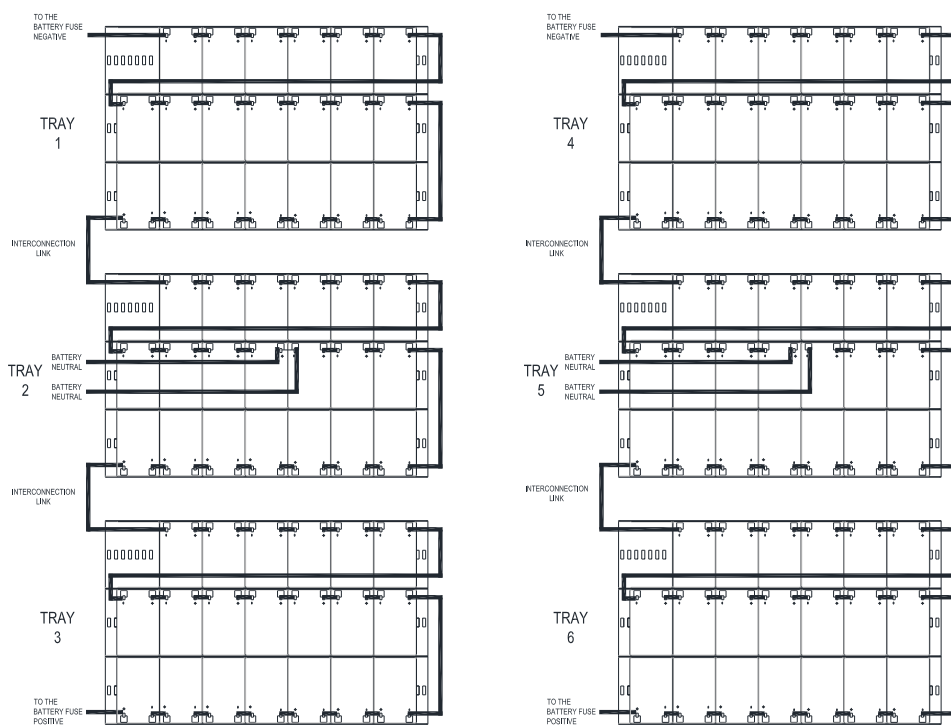


Picture 13 - Trays 12/14Ah 12V battery lateral view

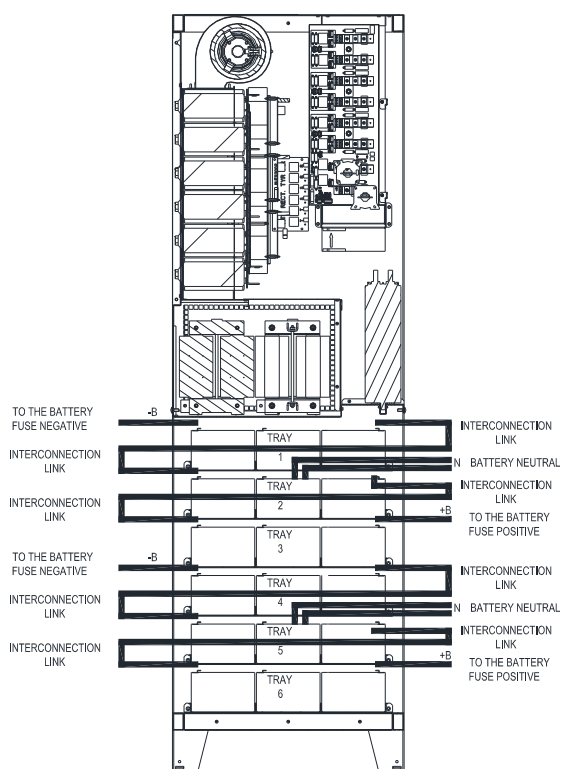


Picture 14 – One row 12/14Ah 12V battery top view

2) Install the batteries received in a separate packages and install it in accordance with the picture 15 and picture 16.



Picture 15- 12/14Ah 12V battery connection tray top view



Picture 16-12/14Ah 12V battery connection tray front view

- 3) After the connection re-insert the battery trays on the internal of UPS.
- 4) Put back and fix the left/right cover with the four screws.

9.5 Connection of the Auxiliary Cables

The UPS systems can be connected to external controls/components specifically designed to improve the safety and reliability of the device.

External manual bypass (MBCB);

External Normal/Bypass selector switch;

External output switch (OCB);

Remote emergency power off button (EPO);

Auxiliary battery contact (BCB).

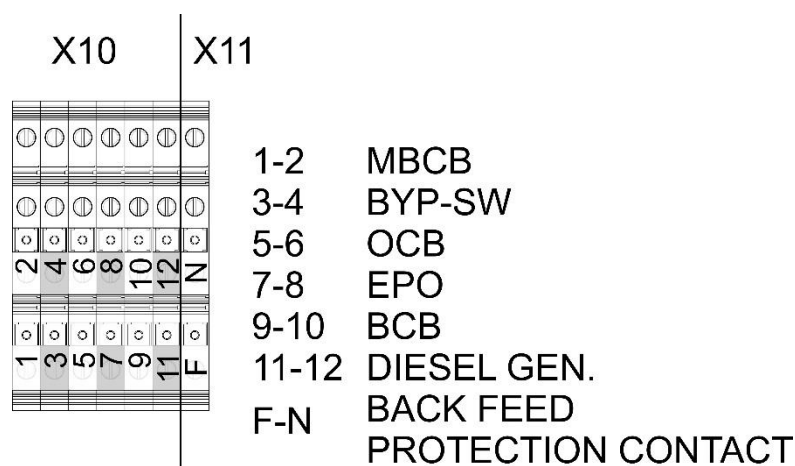
Diesel generator

The auxiliary cables are connected to a dedicated terminal board. Wires up to 4 mm² can be connected to the terminals.



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 17 – Auxiliary terminals 60÷160 kVA

9.5.1 External manual bypass

Auxiliary contact of the external Manual Bypass Switch (if provided) on terminals X10-1/2.

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.

9.5.2 Normal/Bypass selector

Auxiliary contact of the external NORMAL/BYPASS selector on terminals X10-3/4.

When the contact is closed the UPS will transfer the load from inverter to bypass.

9.5.3 UPS output switch

Auxiliary contact of the external UPS output switch (if provided) on terminals X10-5/6.

This auxiliary contact is necessary to indicate the position of the isolator (open-closed)..

In case the external switch is not provided short-circuit the terminals 5-6.

9.5.4 Remote emergency power off (EPO)

Auxiliary EPO contact on terminals X10-7/8.

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.

In case the external EPO command is not provided short-circuit the terminals 7-8.

9.5.5 Battery auxiliary contact

Battery auxiliary contact on terminals X10-9/10.

This auxiliary contact is necessary to indicate the position of the isolator (open-closed).

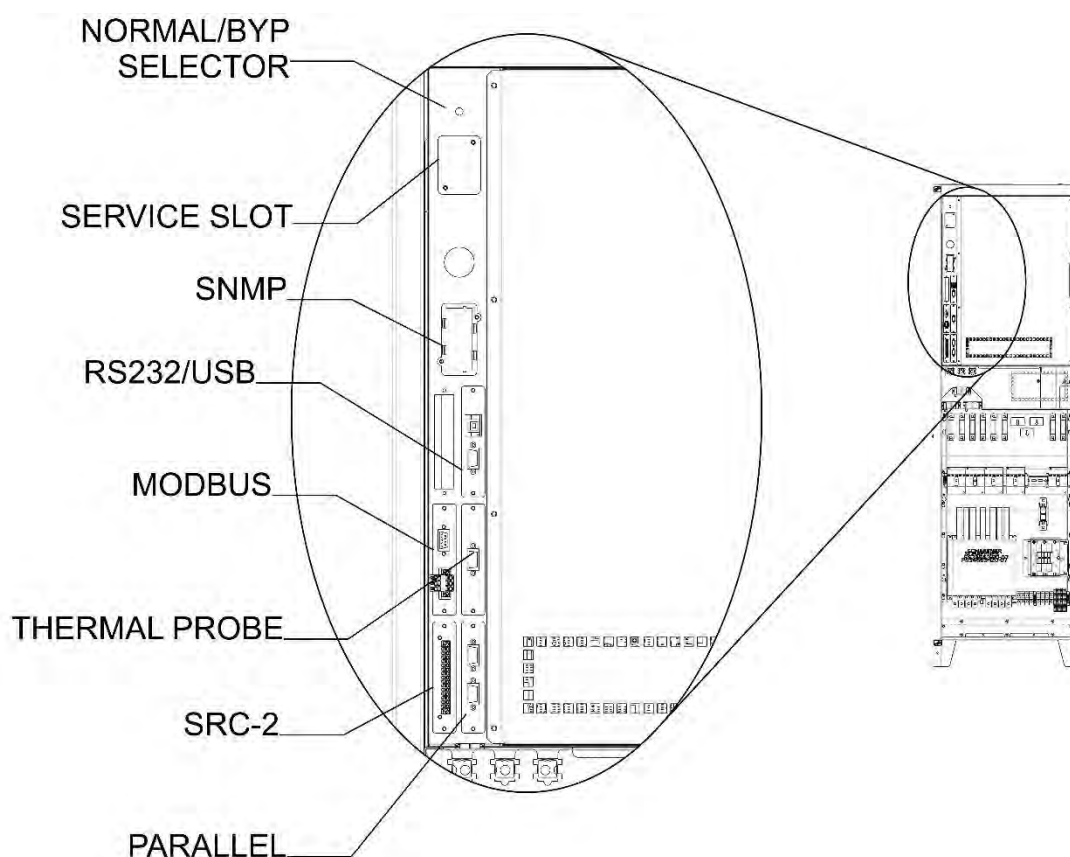
9.5.6 Diesel Generator auxiliary contact

Auxiliary contact from the Diesel Generator on terminals X10-11/12.

A normally open contact must be used; the contact must close when the diesel generator is operating. The microprocessor will acquire the status of the contact and, upon the rectifier start-up, it will enable the "Diesel Mode" operation, that is the operation at reduced DC voltage in order to reduce the power drawn from the AC line.

9.6 Serial interfaces and external connections

The UPS is provided with serial interfaces and external connection facilities for the communication of the operating status and parameters.

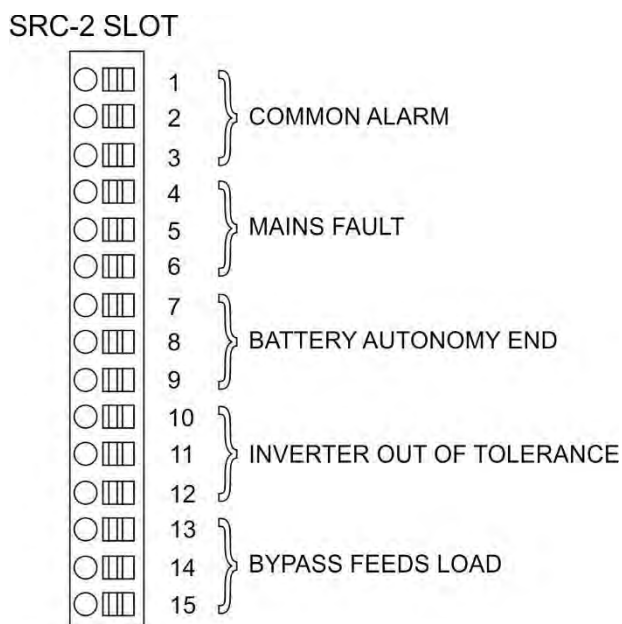


Picture 18 – Position of the serial interfaces

- RS232/USB: it is used for connection to the proprietary programming and control software.
- SRC-2 (OPTIONAL): relay card, used for the remote signalizations of status and alarms.
- PARALLEL (OPTIONAL): it is used for communication between paralleled UPS units.
- MODBUS (OPTIONAL): it is used for the transmission of data to the outside via MODBUS RTU protocol (RS485).
- THERMAL PROBE (OPTION): it is used to acquire the temperature of the battery cabinet/room in order to adjust the charging voltage automatically.
- SNMP (OPTIONAL): it is used for the external transmission of data via LAN.
- NORMAL/BYPASS SELECTOR

9.7 Relay Card Connection (Optional)

The UPS, in its full configuration, is provided with a relay card for repeating alarms and operating statuses remotely. The electric connection is carried out directly on the terminals located on the front of the interfaces slot SRC-2.



Picture 19 – Relay card terminals

Relay	Alarms/ Status	Status	M1		LED	
			Pins	Status in normal operation	Name	Status in normal operation
RL 1	Alarm = A30 COMMON ALARM	Not energized if alarm is present	2 - 3	Closed	DL 1	ON
			1 - 2	Open		
RL 2	Alarm = A1 MAINS FAULT	Not energized if alarm is present	5 - 6	Closed	DL 2	ON
			4 - 5	Open		
RL 3	Alarm = A9 BATTERY AUT END	Not energized if alarm is present	8 - 9	Closed	DL 3	ON
			7 - 8	Open		
RL 4	Alarm = A13 INV OUT OF TOL	Not energized if alarm is present	11 - 12	Closed	DL 4	ON
			10 - 11	Open		
RL 5	NORMAL MODE Alarm = A16 BYPASS -> LOAD	Not energized if alarm is present	13 - 14	Closed	DL 5	ON
			14 - 15	Open		
RL 5	ECO MODE Status = S7 BYPASS -> LOAD	Energized if status is present	14 - 15	Closed		
			13 - 14	Open		

Relay output characteristics:

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

9.8 UPS-Options (Optional equipment)

Following UPS-Options are described in the operating manual BAX 4834:

- SNMP adapter
- PROFIBUS
- MODBUS
- Battery symmetry supervision
- Parallel redundant systems

10 Startup and Shutdown



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.



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.



External isolators

All the procedures that follow make reference to the external isolator BCB and are only valid if such device is installed (externally) and its auxiliary contacts properly wired to the UPS terminals.

10.1 Preliminary checks

Before starting up the unit, make sure that:

- all installation and electric connection works have been performed professionally;
- all power and control cables have been properly and tightly connected to the relevant terminal boards;
- the ground cable is properly connected;
- the battery polarity is correct and the voltage is within the operating values;
- the phase rotation of the line is correct and the voltage is within tolerance with the operating values.
- the emergency power off “EPO” push-button, if installed, is not pressed (if not, press it back to the rest position).

10.2 Start-Up Procedure



EPO push-button and phase rotation

Before switching the UPS on, make sure that:

- 1) the emergency power off “EPO” push-button, if installed, is not pressed. If not, press it back to the rest position;
- 2) the input and output phase rotation is correct.



Circuit breaker BCB

Do not close the battery breaker BCB before it's required by the front panel. Serious damages to the UPS internal parts and/or to the battery may occur.



Wiring of the auxiliary contacts

Carry out a proper electrical installation by wiring the auxiliary contacts of the external manual bypass, output and battery isolators to the dedicated terminals on board the UPS. This will allow the control logic to acquire the status of the switches and guide the operator during the start-up and manual bypass procedures.

No.	LCD	Action	Checks
1	Blank	CLOSE RCB	After operating switch RCB the pre-charging phase of the capacitive bank will start. The control logic will be started and the front panel is activated.
2	BOOT LOADER		"BOOT" phase where the UPS firmware can be updated following the appropriate procedure. All the LED's on the front panel are on.
3	EEPROM READING		Reading of the configuration parameters stored in the EEPROM. All the LED's on the front panel are off.
4	EEPROM PARAM. SENDING		Sending of the configuration parameters stored in the EEPROM. All the LED's on the front panel are off.
5	PLEASE WAIT		
6	UPS START UP PLEASE WAIT		UPS start-up. LED #1 is on - input voltage present.
7	RECTIFIER START UP PLEASE WAIT		The IGBT rectifier bridge starts to modulate; VDC voltage reaches the nominal value. LED #3 is lit green: DC voltage present.
8	INVERTER START UP PLEASE WAIT		The modulation of the inverter bridge is started. The AC output voltage reaches the nominal value. After a few seconds the static inverter switch is closed. LED #5 is lit green: static switch SSI closed.
9	BYPASS START UP CLOSE SBCB	CLOSE SBCB	
10	BYPASS START UP PLEASE WAIT		The control logic checks that all the bypass parameters (voltage, phase rotation, frequency) are correct. LED #2 is lit green: bypass voltage present
11	BATTERY START UP CLOSE BCB	CLOSE BCB	
12	BATTERY START UP PLEASE WAIT		The control logic checks the closing of the circuit breaker to go to the following step. Led #4 lit green.
13	UPS START UP END CLOSE OCB	CLOSE OCB	
14	START UP END PLEASE WAIT		The control logic checks that all the output parameters (voltage, current, frequency) are correct. LED #7 is lit green: output voltage present.
End	UPS NAME NOMINAL POWER		The default screen is displayed after a short time with the UPS name and the nominal power.

10.3 Basic Troubleshooting

This paragraph provides the basic information if any problems occur during the start-up procedure. In case the problem cannot be solved, contact the service department.

- 1) After closing RCB the LCD display is still blank
 - Check the phase rotation of supply voltage.
 - Make sure the input voltage and frequency are within tolerance.
 - Check the rectifier protection fuses F1-F2-F3; they are inside the unit.
- 2) After step #1 the UPS stops the starting sequence and shows one or more alarm messages
 - Check the alarms indicated on the display and remove their causes.
 - Close RCB and try to restart the UPS.
- 3) After step #2 the unit shows the alarm A15 – Byp fault
 - Make sure the switch SBCB is closed.
 - Check the protection fuses of the static bypass switch; they are inside the unit.
 - Check the phase rotation of the bypass voltage.
 - Make sure voltage and frequency are within tolerance.
- 4) After step #3 the unit shows the alarm A7 – BCB open
 - Make sure you have closed the battery circuit breaker; the circuit breaker or the fuse holder is external to the UPS system.
 - Check the battery fuses.
 - Check the interconnection between the auxiliary contact of the battery circuit breaker (in the external cabinet) and the terminals X10-9/10.

Shutdown Procedure

No.	Action	LCD	Checks
1	Open OCB	A30 GENERAL ALARM	The supply to the load is interrupted. LED #7 off.
2	Open BCB	A30 GENERAL ALARM	The battery is disconnected from the rectifier. Led #4 red flashing.
3	Open SBCB	A30 GENERAL ALARM	The bypass supply is disconnected. LED #2 off.
4	Open RCB	A30 GENERAL ALARM	Rectifier and inverter shutdown.
5	BLANK	End of shutdown procedure.	

10.4 Switching to Manual Bypass

The load is transferred to Manual Bypass with no interruption of supply to the loads. In this configuration, the system can be restarted via the return procedure from load on manual bypass, without the need to de-energize the loads.



Manual bypass

To perform the switching procedure correctly, make sure no alarms are present on the system. During Manual Bypass the load is supplied directly by the input mains, therefore continuous supply cannot be guaranteed to the loads.

No.	Action	LCD	Checks
1	Move the bypass selector SW to BYPASS	A30 GENERAL ALARM	The load is transferred to the bypass line. LED #5 off, LED #6 lit orange.
2	Close MBCB	A30 GENERAL ALARM	The inverter is switched off. The load is supplied by the input mains through the manual bypass switch. The static bypass switch is still closed. Led #8 lit orange.
3	Open BCB	A30 GENERAL ALARM	The battery is disconnected from the DC bus bar. Led #4 red flashing.
4	Open RCB	A30 GENERAL ALARM	The supply input is opened; the rectifier shuts down. LED #1 off.
5	Open OCB	A30 GENERAL ALARM	The load remains fed by the manual bypass switch. LED #8 off.
6	Open SBCB	A30 GENERAL ALARM	The bypass line is disconnected. The display goes out.
7		BLANK	The load is supplied directly by the mains through the manual bypass switch. The UPS is isolated.

10.5 Restart from Manual Bypass

Before restarting the UPS from manual by-pass, make sure the "Bypass_SW" selector is in BYPASS position and the MCB isolator is closed.

No.	LCD	ACTION	Checks
1	BLANK	Close RCB	
2	BOOT LOADING		"BOOT" phase where the UPS firmware can be updated following the appropriate procedure. All the LED's on the front panel are on.
3	EEPROM READING		Reading of the configuration parameters stored in the EEPROM. All the LED's on the front panel are off.
4	UPS START UP WAIT PLEASE		The rectifier is supplied and the DC voltage reaches the nominal value. All the LED's on the front panel are on. The microprocessor checks that all the start-up conditions are good for restart. Led #1 lit green. Led #8 lit orange.
5	RECTIFIER START UP WAIT PLEASE		The IGBT rectifier bridge starts to modulate; VDC voltage reaches the nominal value. LED #3 is lit green: DC voltage present.
6	START UP FROM MCB CLOSE SBCB	Close SBCB	
7	BYPASS START UP WAIT PLEASE		The microprocessor checks that all the bypass parameters (voltage, phase rotation, frequency) are within tolerance. Led #2 lit green. The static bypass switch is closed. LED #6 lit orange.
8	START UP FROM MCB CLOSE BCB	Close BCB	Closing of the battery circuit breaker. Led #4 lit green.
9	START UP FROM MCB CLOSE OCB	Close OCB	The load is fed by the static bypass switch. Circuit breaker MCB is still closed. Led #7 lit green.
10	START UP FROM MCB OPEN MCB	Open MCB	The load is fed by the static bypass switch and the inverter can be started. LED #8 off.
11	INVERTER START WAIT PLEASE		The modulation of the inverter bridge is started. The AC voltage reaches the nominal value. The microprocessor checks the synchronization with the bypass line.
12	START UP FROM MCB MOVE BYP - SWITCH		Move the selector "NORMAL-BYPASS" to NORMAL The load is transferred to the inverter. Led #5 lit green.
13	START UP END WAIT PLEASE		The microprocessor checks that all the output parameters (voltage, current, frequency) are within the tolerance limits.
14	UPS MODEL OUTPUT VOLTAGE		

11 General UPS Description

11.1 Typology

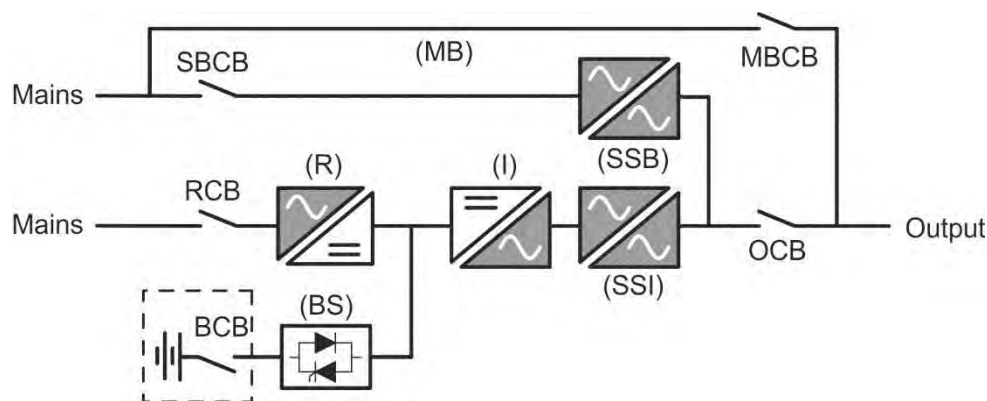
The UPS described in this manual is on-line, double conversion; the inverter included in the UPS always supplies energy to the load, whether mains is available or not (according to the battery autonomy time).

This configuration guarantees the best service to the User, as it supplies clean power uninterruptedly, ensuring voltage and frequency stabilization at nominal value. Thanks to the double conversion, it makes the load completely immune from micro-interruptions and from excessive mains variations, and prevents damage to critical loads (Computer - Instrumentation - Scientific equipment etc.).



Output voltage present

The line connected to the UPS output is energized even during mains failure, therefore in compliance with the prescriptions of IEC EN62040-1-2, the installer will have to identify the line or the plugs supplied by the UPS making the User aware of this fact.



Picture 20 – Block diagram

The UPS uses IGBT technology with a high switching frequency in order to allow a low distortion of the current re-injected into the supply line, as well as high quality and stability of output voltage. The components used assure high reliability, very high efficiency and maintenance easiness.

11.2 System Description

11.2.1 Rectifier

It converts the three-phase voltage of the AC mains into continuous DC voltage.

It uses a three-phase fully-controlled IGBT bridge with a low harmonic absorption.

The control electronics uses a 32 bit μ P of latest generation that allows to reduce the distortion of the current absorbed by mains (THDi) to less than 3%. This ensures that the rectifier does not distort the supply mains, with regard to the other loads. It also avoids cable overheating due to the harmonics circulation.

The rectifier is so sized as to supply the inverter at full load and the battery at the maximum charging current.

11.2.2 Inverter

It converts the direct voltage coming from the rectifier or from the DC battery into alternating AC voltage stabilized in amplitude and frequency.

The inverter uses IGBT technology with a high switching frequency of approximately 8 kHz.

The control electronics uses a 32 Bit μ P of latest generation that, thanks to its processing capability, generates an excellent output sine-wave.

Moreover, the fully digital control of the output sine-wave allows to achieve high performances, among which a very low voltage distortion even in presence of high-distorting loads.

11.2.3 Battery and battery charger

The battery is installed outside the UPS. It is generally housed in an external battery cabinet.

The battery charger logic is completely integrated in the rectifier's control electronics.

The battery is charged, according to the DIN 41773 Standard, every time it has been partially or completely discharged. When its full capacity is restored, it is disconnected from the DC bus by means of a static switch, in order to save energy, reduce the stress due to the AC ripple thus increasing the lifetime. This operating mode is called Green Conversion.

It is however periodically charged but the prevailing state is of complete rest.

11.2.4 Static bypass

The Static Bypass allows to transfer the load between Inverter and Emergency Mains, and vice-versa, in a very short time, and uses SCR's as power commutation elements.

11.2.5 Manual bypass

The Manual Bypass is used to cut off the UPS completely, supplying the load directly from the input mains in case of maintenance or serious failure.



Follow the procedures contained in the manual

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.



External manual bypass

In the UPS system the manual bypass isolator is optional and installed outside the unit.

11.3 Operating Status

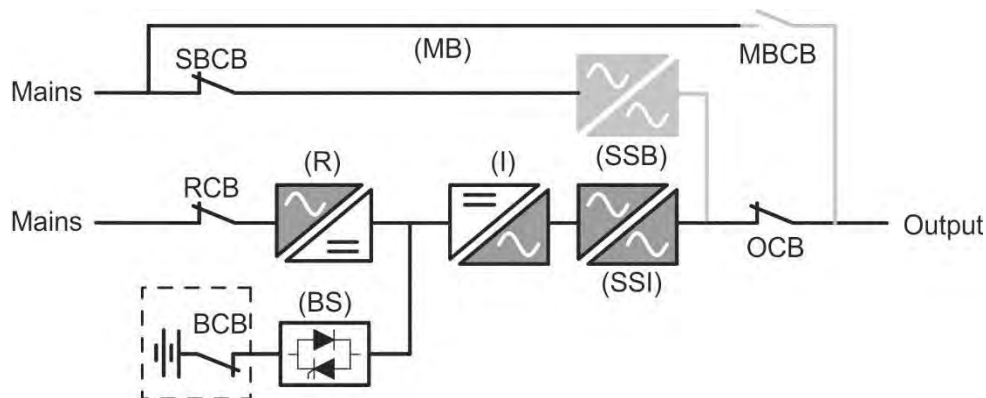
The UPS has five different operating modes, as described below:

- Normal operation
- Green Conversion
- Bypass operation
- Battery operation
- Manual bypass

11.3.1 Normal operation

During normal operation all the circuit breakers/isolators are closed, except for MBCB (maintenance bypass).

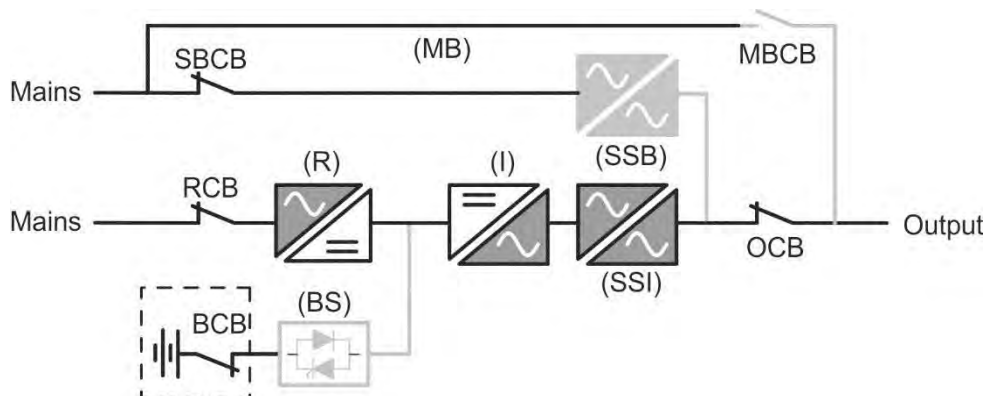
The rectifier is supplied by the AC three-phase input voltage which, on its turn, feeds the inverter and compensates mains voltage as well as load variations, keeping the DC voltage constant. At the same time, it provides to charge the battery. The inverter converts the DC voltage into an AC sine-wave with stabilized voltage and frequency, and also supplies the load via its static switch SSI.



Picture 21 – Normal operation

11.3.2 Green Conversion

During the operation in Green Conversion mode the battery is disconnected from the DC bus by means of a static switch (see picture) and the rectifier works at reduced DC voltage; a control algorithm provides to periodically re-connect the battery for recharge purposes (intermittent charging).



Picture 22 – Green Conversion

When the Green Conversion algorithm is active the rectifier operates at reduced DC voltage and supplies the inverter alone, since the battery is disconnected from the DC bus.

The battery charge is controlled by a specific algorithm. In case no mains outage events have occurred, and so no battery discharges have occurred too, the control logic provides to start a charging cycle once every 25 days. The battery-charger restores the capacity lost due to the self-discharge and remains in floating charge for additional 12 hours. As this time has elapsed the battery static switch is opened and the battery is disconnected from the DC bus.

In case a discharge event occurs, the control logic provides to calculate the capacity which has been lost during the discharge; as the mains is restored a charging cycle is started, which is extended for an additional time that depends on the percentage of lost capacity, referred to the rated value.

- Lost capacity < 10% ➔ Additional charge for 12 hours
- Lost capacity between 10% and 20% ➔ Additional charge for 48 hours
- Lost capacity > 20% ➔ Additional charge for 96 hours

Such values comply with the recommendations of the main battery manufacturers.

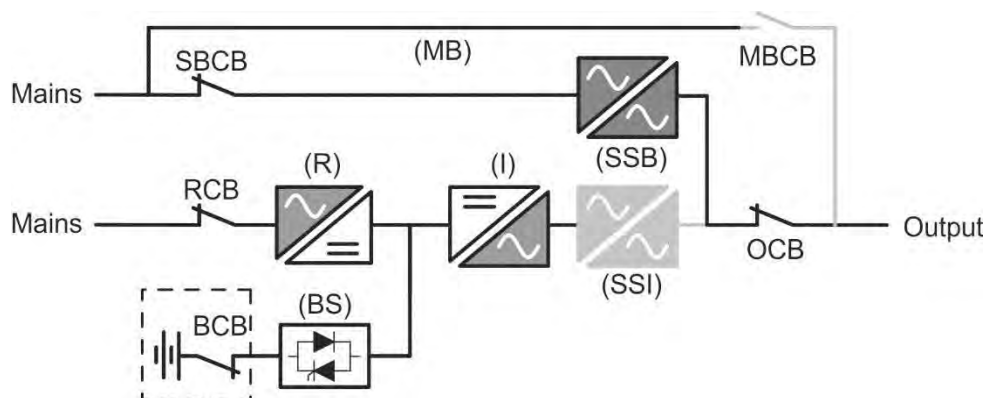


Set the right battery capacity

The UPS front panel allows the setting of the battery parameters, including the rated capacity. Considering the importance that such value assumes for the correct execution of the charge control algorithm, it is highly recommended to verify the correctness of the programmed value.

11.3.3 Bypass operation

The load can be switched to bypass either automatically or manually. The manual changeover is due to the BYPASS SWITCH which forces the load to bypass. In case of failure of the bypass line, the load is switched back to inverter without interruption.



Picture 23 – Load supplied by bypass

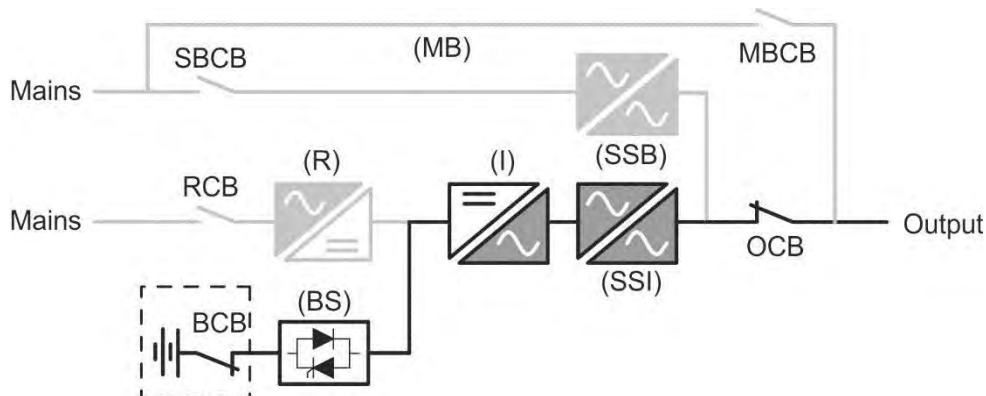
11.3.4 Battery operation

In case of power failure or rectifier fault, the battery feeds the inverter without interruption. The battery voltage drops based on the amplitude of the discharging current. The voltage drop has no effect on the output voltage, which is kept constant by changing the PWM modulation. An alarm is activated when the battery is near the minimum discharge value.

In case the supply is restored before the battery is completely discharged, the system will be switched back to normal operation automatically. In the opposite case, the inverter shuts down and the load is switched to the bypass line (bypass operation). If the bypass line is not available or is out of tolerance, the loads supply is interrupted as soon as the battery reaches the discharge limit threshold (black-out). As soon as the supply is restored, the rectifier will recharge the battery. In the standard configuration, the loads are supplied again via static switch SSB when mains is available again. The inverter is restarted when the battery has partially restored its capacity.

The system restart from the black-out condition can be customized based on the requirements of the plant, in three different modes:

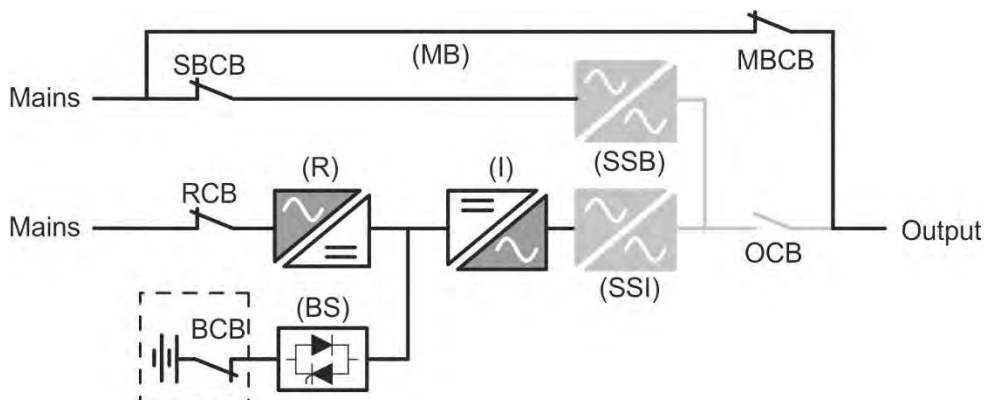
- Bypass → loads are supplied as soon as the bypass line is available (factory configuration).
- Inverter → loads are supplied by the inverter (even if the bypass line is available) when the battery voltage has reached a programmed threshold, after the rectifier restart.
- Man. Inverter → the output supply is NOT restored automatically. The system requires a confirmation to restart which can only be done manually by the user via the front panel.



Picture 24 – Battery operation

11.3.5 Manual bypass

The manual bypass operation is necessary whenever the UPS functionality is tested, or during maintenance or repair work.



Picture 25 – Manual bypass for functional checks



Follow the procedures contained in the manual

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.

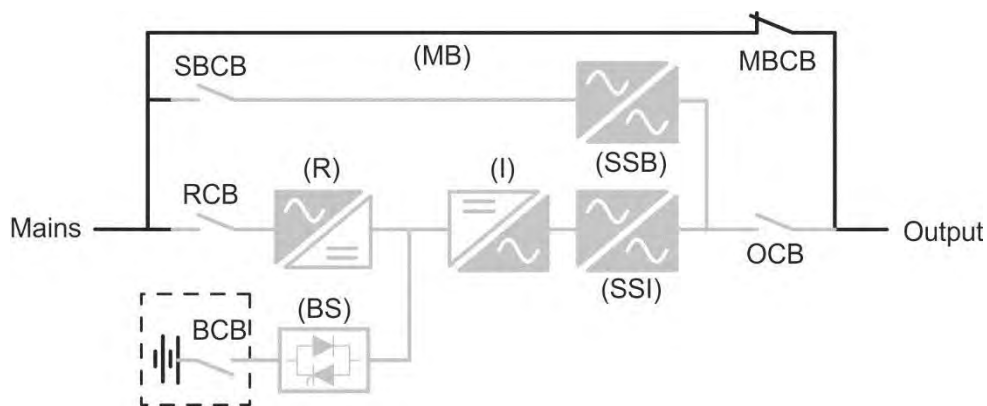


Wiring of the auxiliary contacts

Carry out a proper electrical installation by wiring the auxiliary contacts of the manual bypass and output isolators to the dedicated terminals on board the UPS. This will allow the control logic to acquire the status of the switches and guide the operator during the start-up and manual bypass procedures.

For further information refer to the section "Installation and start-up".

During the manual bypass due to repair or maintenance, the UPS is completely shut down and the load is directly supplied by the bypass line.



Picture 26 – Manual bypass for repair or maintenance works

11.4 Control and Operation Devices

The control and operation devices of the UPS are indicated below:

- Isolator on rectifier input (RCB)
- Isolator on bypass input (SBCB)
- Isolator on UPS output (OCB)
- Manual bypass isolator (MBCB)
- Battery Isolator / Circuit breaker (BCB) - External, inside the battery cabinet
- Emergency power off button (EPO)
- Normal/Bypass selector
- LCD control panel



Check the personnel training

The use of the operation and control devices of the UPS is intended for authorized personnel only. We recommend to check the training of the personnel responsible for the use and maintenance of the system.

11.4.1 Isolators

The isolators provided on the UPS are used to isolate the power components of the device from the AC supply line, from the storage battery and from the load.



Voltage present on terminals

The isolators do not isolate the UPS completely, since AC voltage is still present on the UPS input terminals. Before carrying out any maintenance on the unit:

- Isolate the device completely by operating the external circuit breakers;
- Wait at least 5 minutes in order to allow the capacitors to discharge.

11.4.2 Emergency Power Off Command (EPO)

The emergency power off command is used to disconnect the UPS output immediately, interrupting the loads supply. It also shuts down the inverter.



Operate the command only in case of real emergency

The components of the system are subject to a high stress when the emergency power off command is operated under load presence.

Use the emergency power off button only in case of real emergency.



Supply reset

Reset the output supply only when the causes which led to the emergency shutdown have been eliminated and you are sure that there is no hazard to persons and things.

11.4.3 Normal/Bypass Selector

The Normal/Bypass selector is installed externally, on the rear of UPS. It is generally used during the manual bypass procedure, when it is necessary to isolate the UPS for maintenance or repair.



Follow the procedures contained in the manual

The Normal/Bypass selector shall only be operated in accordance with the procedures specified in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.

11.4.4 LCD control panel

The control panel of the UPS is used in order to:

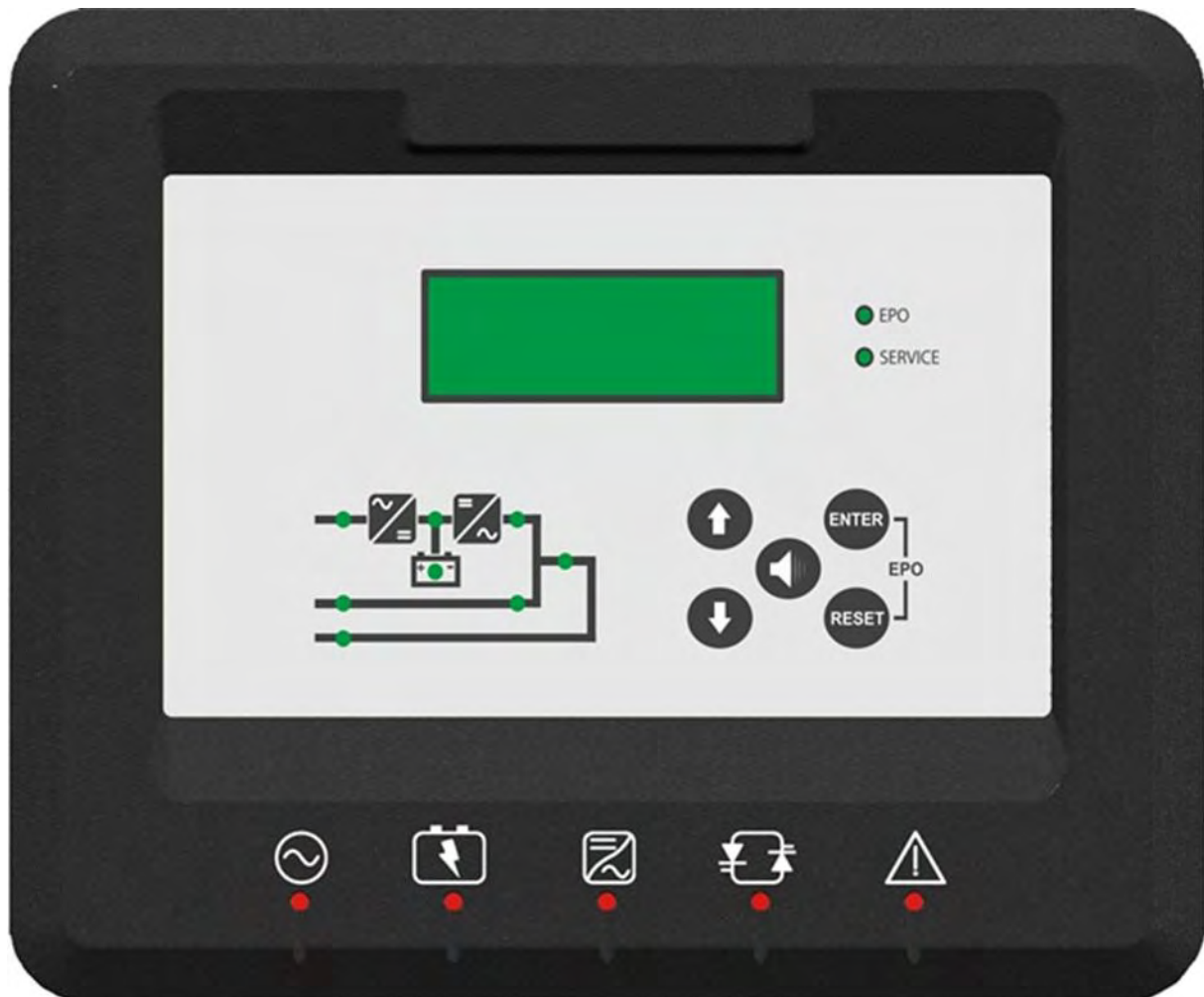
- Check the operating parameters of the device
- Check the alarms present
- Access the event log
- Display the information on the device
- Modify the operating parameters

The menu which allows to change the parameters is password-protected in order to prevent access to unauthorized personnel.

12 Front Panel

The front panel of the UPS, consisting of four rows alphanumeric display plus 5 function keys, allows the complete monitoring of the UPS status.






The mimic flow helps to understand the operating status of the UPS.



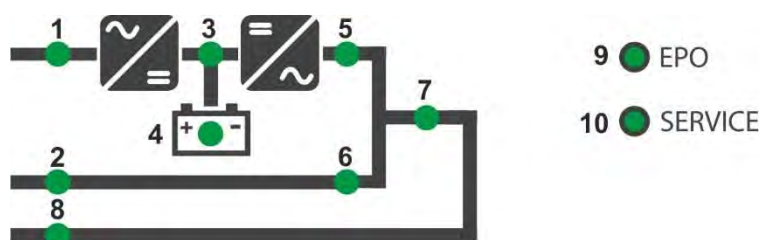
Picture 27 – UPS front panel

12.1 Function Buttons

The front panel of the UPS is provided with 5 buttons whose functions are indicated in the following table:

Button	Assigned functions
	<ul style="list-style-type: none">➤ Scrolls up the menus➤ Increases the values by one unit➤ Selects a value
	<ul style="list-style-type: none">➤ Scrolls down the menus➤ Decreases the values by one unit➤ Selects a value
	<ul style="list-style-type: none">➤ Selects a menu➤ Confirms changes
	<ul style="list-style-type: none">➤ Silences the buzzer (activated due to an alarm or a failure)
	<ul style="list-style-type: none">➤ Returns to the previous menu

12.2 Mimic Panel / LED



Picture 28 – UPS mimic panel

LED 1		GREEN	AC line on rectifier input within tolerance
		GREEN	AC mains failure / Wrong phase rotation
LED 2		GREEN	AC bypass line within tolerance
		GREEN	Wrong phase rotation
		OFF	AC bypass line out of tolerance / failure
LED 3		GREEN	Rectifier off or faulty
		RED	DC voltage out of tolerance
		GREEN	Rectifier on and DC voltage within tolerance
LED 4		GREEN	Circuit breaker BCB closed and battery charging
		GREEN	Battery discharging or under TEST
		ORANGE	Circuit breaker BCB open
		RED	Battery fault (following a battery test)
		OFF	Battery not available
LED 5		GREEN	Inverter voltage within tolerance and static switch closed
		GREEN	Inverter overload or short-circuit
		OFF	Inverter off or voltage out of tolerance
LED 6		ORANGE	Re-transfer blocked
		ORANGE	Static bypass switch closed
		OFF	Static bypass switch open
LED 7		GREEN	Output circuit breaker OCB closed
		OFF	Output circuit breaker OCB open
LED 8		ORANGE	Manual bypass switch MCB closed
		OFF	Manual bypass switch MCB open
LED 9		RED	Emergency power off (EPO) activated
		OFF	Normal operation
LED 10		ORANGE	Maintenance request (slow blinking)
		ORANGE	Critical alarm (fast blinking)
		OFF	Normal operation

12.3 LED-Bar



Picture 29 – LED bar

LED 11		GREEN	AC line on rectifier input within tolerance
		GREEN	Wrong phase rotation (fast blinking)
		GREEN	Unbalanced AC voltage (slow blinking)
		OFF	AC mains failure
LED 12		GREEN	Circuit breaker BCB closed and battery charging
		ORANGE	Battery discharging or under TEST (fast blinking)
		ORANGE	Circuit breaker BCB open (slow blinking)
		RED	End of battery autonomy / Battery fault
LED 13		GREEN	Inverter voltage within tolerance and static switch closed
		ORANGE	Inverter overload or short-circuit
		RED	Inverter critical alarm
		OFF	Inverter off
LED 14		GREEN	AC bypass line within tolerance
		RED	Wrong phase rotation (fast blinking)
		RED	AC bypass line out of tolerance / failure
LED 15		GREEN	Programmed maintenance required (slow blinking)
		GREEN	Critical alarm (fast blinking)

13 Handling the Operating Panel

13.1 Main Menus

UPS NAME
xxx kVA

Main screen (nominal power of the UPS)

UPS NAME
MEASURES

UPS measures regarding basic parameters
(voltage, current, etc.)

UPS NAME
ALARMS

UPS operating status, possible alarms present and
alarms history

UPS NAME
SPECIAL

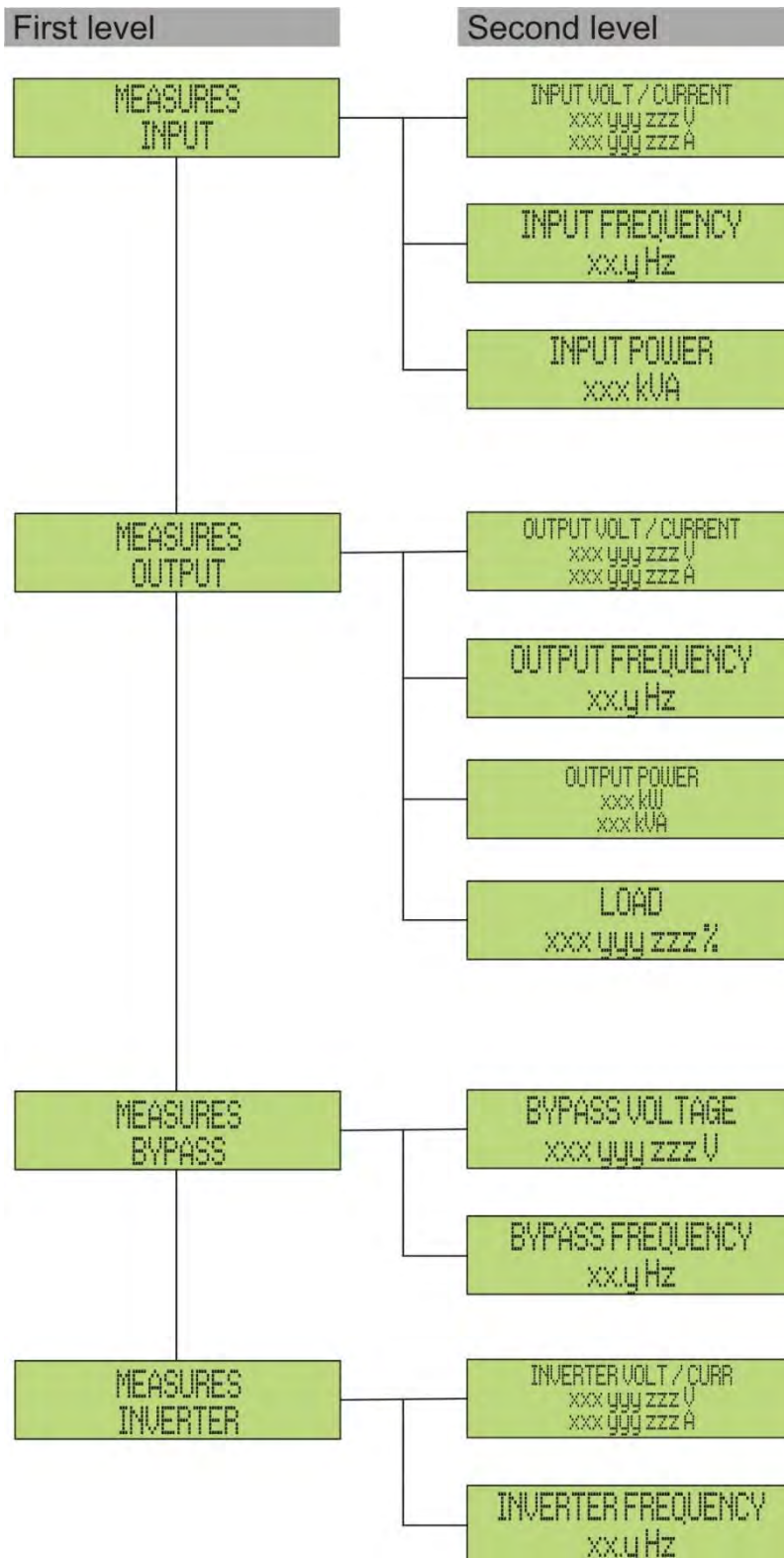
Setting of parameters and special functions

UPS NAME
INFO

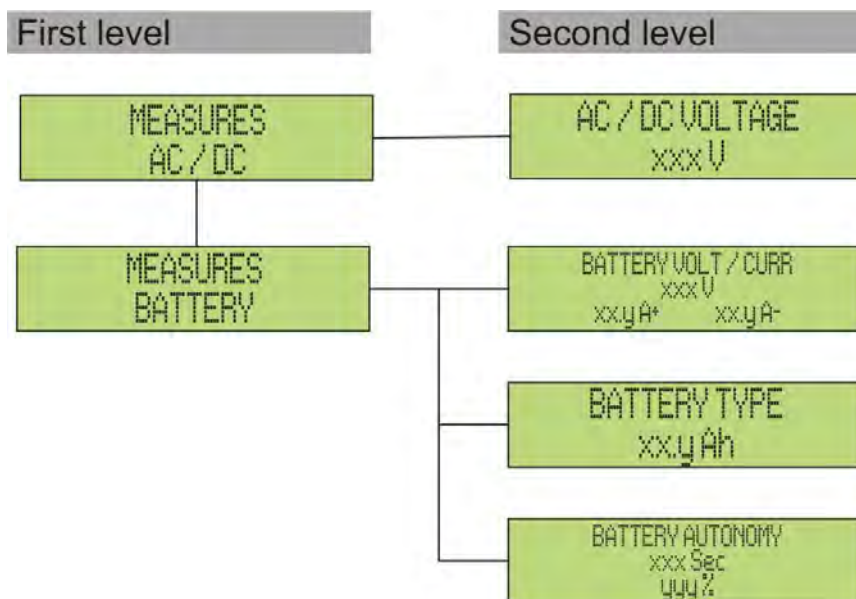
General information regarding the UPS

13.2 Measures Display

The Measures-menu is structured as follows:



Picture 30 – Structure of MEASURES menu (1 of 2)



Picture 31 – Structure of MEASURES menu (2 of 2)

Sub-menu	Displayed data	Accuracy
INPUT	Rectifier input voltage ^{(1) (2)}	1 V
	Rectifier input current ⁽³⁾	1 A
	Frequency	0.1 Hz
	Input power	1 kVA
OUTPUT	Voltage ^{(1) (2)}	1 V
	Current ⁽³⁾	1 A
	Frequency	0.1 Hz
	Active power	1 kW
	Apparent power	1 kVA
	Load percentage	1 %
BYPASS	Voltage ^{(1) (2)}	1 V
	Frequency	0.1 Hz
INVERTER	Voltage ^{(1) (2)}	1 V
	Frequency	0.1 Hz
AC/DC	Rectifier output voltage	1 V
BATTERY	Voltage and current	1 V / 1 A
	Nominal capacity	1 Ah
	Residual autonomy	1 min / 1 %

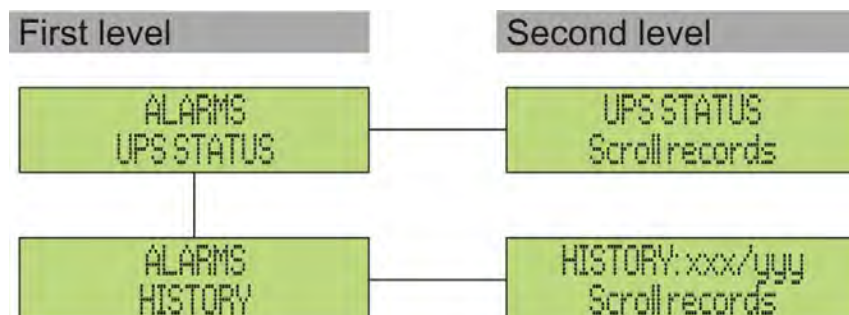
⁽¹⁾ The voltage measures are always referred to the phase-to-neutral value

⁽²⁾ The three voltages are displayed in one screen as “xxx yyy zzz V”

⁽³⁾ The three line currents are displayed in one screen as “xxx yyy zzz A”


13.3 Basic Diagnostics

The ALARMS menu allows to display the current operating status of the device and to access the event log, based on the following structure.



Picture 32 – Structure of ALARMS menu


Sub-menu	Displayed data
UPS STATUS	Alarms present and operating statuses
HISTORY	Event log

The LCD panel displays the ALARMS menu automatically whenever an alarm occurs. The audible indicator, if enabled, is activated to show the occurred failure. The audible alarm is silenced pressing the key  (BUZZER).

UPS STATUS
alarm/status no. 1

Display of the first alarm present (if no alarm is present, the operating status is displayed)

UPS STATUS
Last alarm/status

Press the key  to browse the menu and to go to the next alarm/status (in alphabetical order)

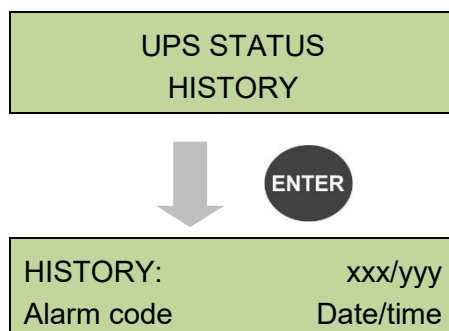


Automatic erasure of alarms

Should an alarm occur and then the conditions that originated it no longer exist, the alarm will be automatically cancelled and the system restarted.

13.3.1 Display of alarms history

All the events are recorded in the alarms history.




The first event shown is the latest one in order of time; a new event makes all the other events automatically shift one position, clearing the oldest event.

The quantity of stored events is displayed on the first line (xxx/yyy), which contains the data currently displayed (position in the list) and the total number of stored data (maximum number equal to 500) respectively. An asterisk indicates the automatic reset of the alarm.

HISTORY:	001/015
A3 *	26-10-10 20:05

Latest event stored (in order of time)


- E.g.: automatic reset of alarm "A3 – BOOSTER STOPPED"



HISTORY:	002/015
A3	26-10-10 19:45

Immediately prior event

- E.g.: alarm "A3 – BOOSTER STOPPED"



HISTORY:	015/015
A18	15-10-10 12:49

First event stored (in order of time)

13.3.2 Alarms and operating status

ALARMS

A 1	MAINS FAULT	A28	CRITICAL FAULT
A 2	INPUT WRONG SEQ	A29	MAINTENANCE REQ
A 3	BOOSTER STOPPED	A30	COMMON ALARM
A 4	BOOSTER FAULT	A31	MBCB BUS CLOSED
A 5	DC VOLTAGE FAULT	A32	EPO BUS CLOSED
A 6	BATTERY IN TEST	A33	ASYMMETRIC LOAD
A 7	BCB OPEN	A34	SERVICE REQUIRED
A 8	BATTERY DISCHARGE	A35	DIESEL MODE
A 9	BATTERY AUT END	A36	DC FASTSHUTDOWN
A10	BATTERY FAULT	A38	INV --> LOAD
A11	SHORT CIRCUIT	A39	INV ERROR LOOP
A12	STOP TIMEOUT SC	A40	SSI FAULT
A13	INV OUT OF TOL	A41	RECT ERROR LOOP
A14	BYPASS WR SEQ	A43	CURR ERROR LOOP
A15	BYPASS FAULT	A45	HIGH TEMP SSW
A16	BYPASS --> LOAD	A46	PAR LOST REDUND
A17	RETRANSFER BLOCK	A47	SEND PARAM ERROR
A18	MBCB CLOSED	A48	RCV PARAM ERROR
A19	OCB OPEN	A49	TEST MODE ERROR
A20	OVERLOAD	A50	SSW BLOCKED
A21	THERMAL IMAGE	A51	BATT TEMPERATURE
A22	BYPASS SWITCH	A52	INVERTER BLOCK
A23	EPO PRESSED	A53	FIRMWARE ERROR
A24	HIGH TEMPERATURE	A54	CAN ERROR
A25	INVERTER OFF	A55	PAR CABLE DISC
A26	COMMUNIC ERROR	A56	MAINS UNBALANCE
A27	EEPROM ERROR	A63	START SEQ BLOCK

Status

S 1	BOOSTER OK	S12	BATT STANDBY
S 2	BATTERY OK	S13	BATT CHARGING
S 3	INVERTER OK	S14	BATT FLOATING
S 4	INVERTER --> LOAD		
S 5	INV BYPASS SYNC		
S 6	BYPASS OK		
S 7	BYPASS --> LOAD		
S 9	INV MASTER SYNC		



Display and recording mode of alarms

- The statuses are always displayed in ascending order when the **ALARMS – STATUSES** menu is entered.
- The alarms are shown when they are present and must be silenced with the buzzer.
- The alarms remain displayed whilst they are present and they are automatically stored in the event log with date and time.

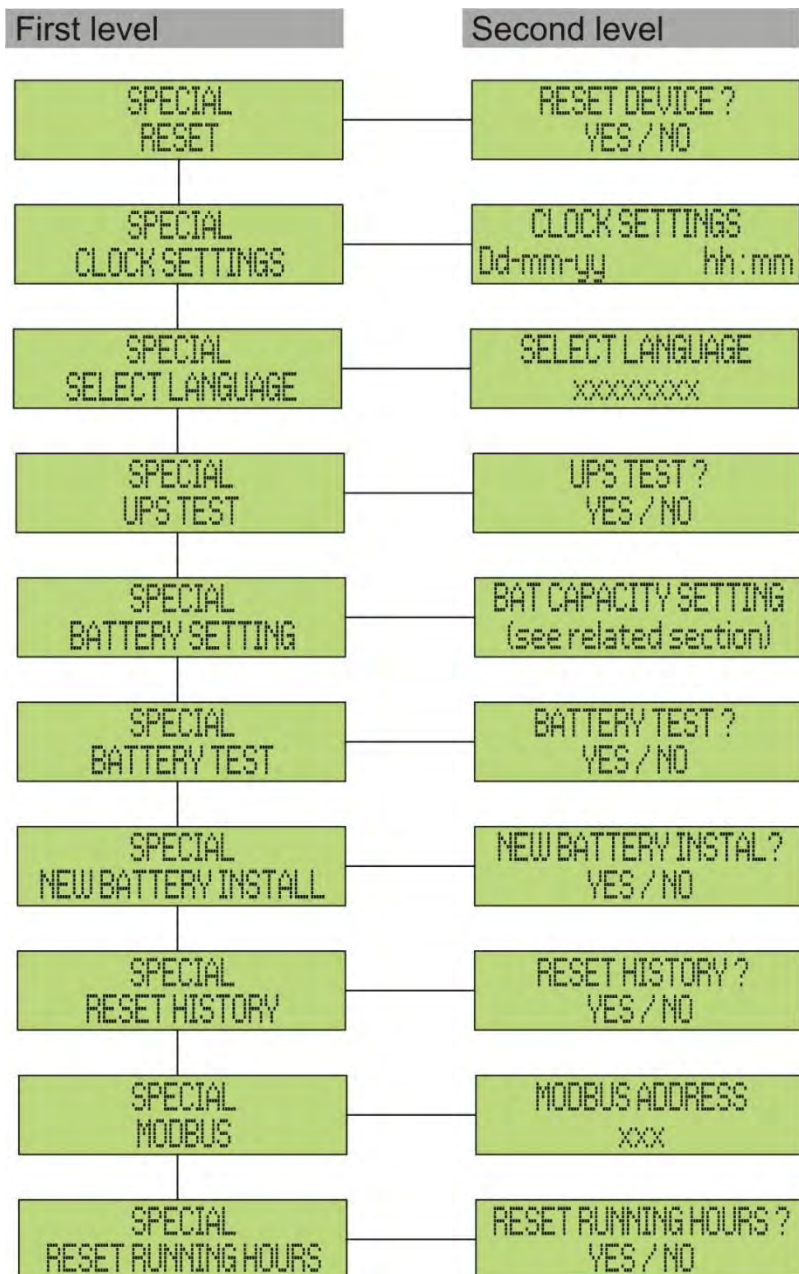


Description of alarms and statuses

For a more detailed description of the alarms and statuses, see the “Faults and alarms” section of the present manual.

14 Settings and Advanced Operations

Some operating parameters of the UPS can be set via the SPECIAL menu, which is structured as follows:



Picture 33 – Structure of SPECIAL menu

Sub-menu	Programmable data
RESET	Reset of failure conditions
CLOCK SETTINGS	System date and time
SELECT LANGUAGE	Display language setting
UPS TEST	Performs a commutation test
BATTERY SETTING	Battery parameter setting
BATTERY TEST	Performs a battery test
NEW BATTERY INSTALL	Sets autonomy to 100%
RESET HISTORY	Event log reset
MODBUS	MODBUS address of device
RESET RUNNING HOURS	Reset the hour counter related to the UPS running time



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.**

14.1 Setting Date and Time

Date and time may be set via the CLOCK menu.

CLOCK SETTINGS	
DD-MM-YY	hh : mm

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing ↵ (ENTER).



Setting the current date and time correctly

The correct setting of the date and time is essential for the recording of the event log.

14.2 Display language setting

The table below shows the languages which can be set for the display.

Parameter	Default	Possible Settings
LANGUAGE	ITALIAN	ITALIAN GERMAN FRENCH ENGLISH PORTUGUESE SPANISH POLISH TURKISH

The parameters are changed via the arrow buttons (▲ / ▼) to increase the digits, and the ↵ button is used to confirm the entry.

14.3 New Battery Installation

The NEW BATTERY INSTALLATION menu is used in case battery circuit breaker BCB is not closed, when requested, in the start-up phase. In this case the system will start considering the battery completely discharged and activating the alarm "A10 – BATTERY FAULT".

To set the battery autonomy to 100% it is necessary to access the menu and press the ↵ button to confirm.


14.4 Battery Configuration

In case the UPS has been tested without knowing the characteristic data of the storage battery, the BATTERY CONFIGURATION menu allows to set such data. In particular, the following data can be set:

- Battery capacity in Ampere-hours (Ah)
- Recharging current in Amperes (A)
- Nominal autonomy in minutes

Access the menu by pressing the  button (ENTER).

BAT CAPACITY SETTING
0120

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing  (ENTER).




CONFIRM BATT CAP.?
YES

Confirmation screen of the parameter set



BAT RECHAR CURR SET
18

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing  (ENTER).




CONFIRM RECHAR CURR?
YES

Confirmation screen of the parameter set



AUTONOMY BAT SETTING
0020

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing  (ENTER).



CONFIRM AUTON BATT?
YES

Confirmation screen of the parameter set



SAVE BATT SETTINGS?
YES

Confirmation screen for the configuration



BATT SETTINGS SAVED
PRESS "ENTER"



Setting all the parameters

To save all the parameters it is necessary to reach the end of the guided procedure until the last screen previously shown.

If the procedure is interrupted earlier, none of the parameters previously set will be saved.

14.5 Setting Modbus Parameters

The parameters regarding the communication via RS485 interface can be set in the MODBUS menu.

MODBUS ADDRESS 202

The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing ↵ (ENTER).

MODBUS ADDRESS: Default = 1 Range = 1 247

14.6 UPS Test

The UPS TEST menu allows to carry out a switching test of the inverter. The inverter is switched off and the load is transferred to the bypass supply. The inverter supply is automatically restored after a few seconds.

UPS TEST? NO

The value on the second line is ready to be changed



UPS TEST? YES

The parameter is changed. The change is confirmed by pressing ↵ (ENTER)



SPECIAL UPS TEST

The system performs a test and returns to the previous screen

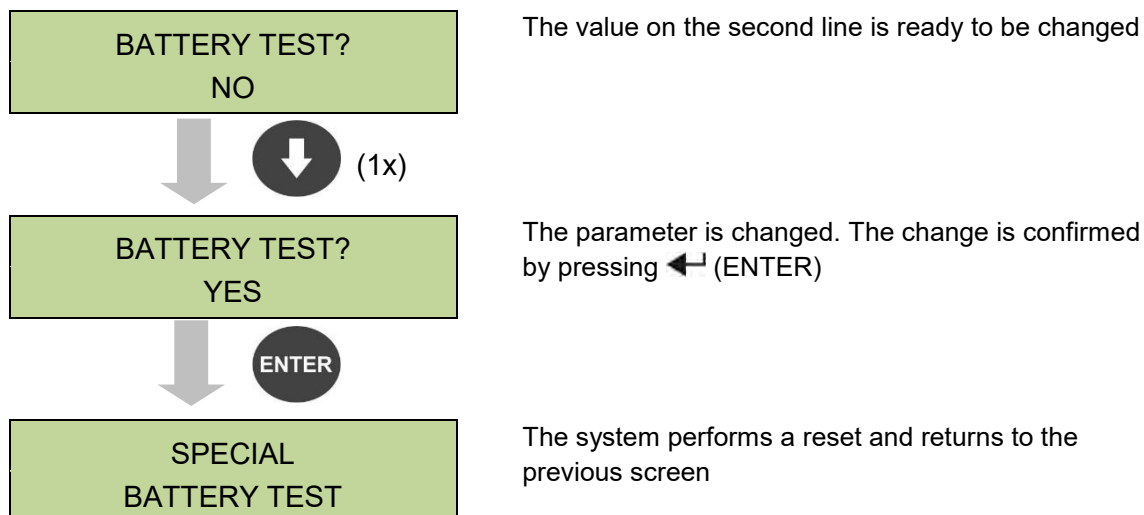


Possible loss of supply

In case of power failure while the test is being performed, the immediate operation of the inverter is not guaranteed.

14.7 Battery Test

The BATTERY TEST menu allows to carry out a short discharge test of the battery. In case the battery is not efficient, the alarm “A10 – Battery fault” is generated at the end of the test.



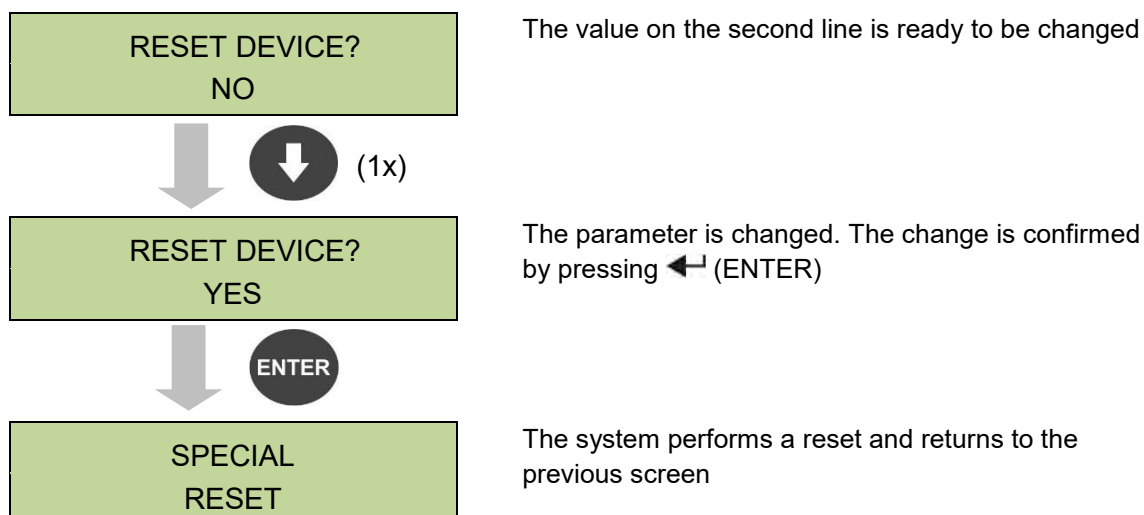
Possible loss of supply

This test can affect the continuity of supply to the loads if the battery is not fully charged.

14.8 System Reset

The UPS is equipped with internal protections which block the system or some of its sections. The alarm can be cleared and normal operation can be resumed via the RESET menu. In case the failure persists, the UPS will return to the previous failure condition.

In some cases the RESET is necessary to simply reset a failure signal, then the UPS will resume operation.



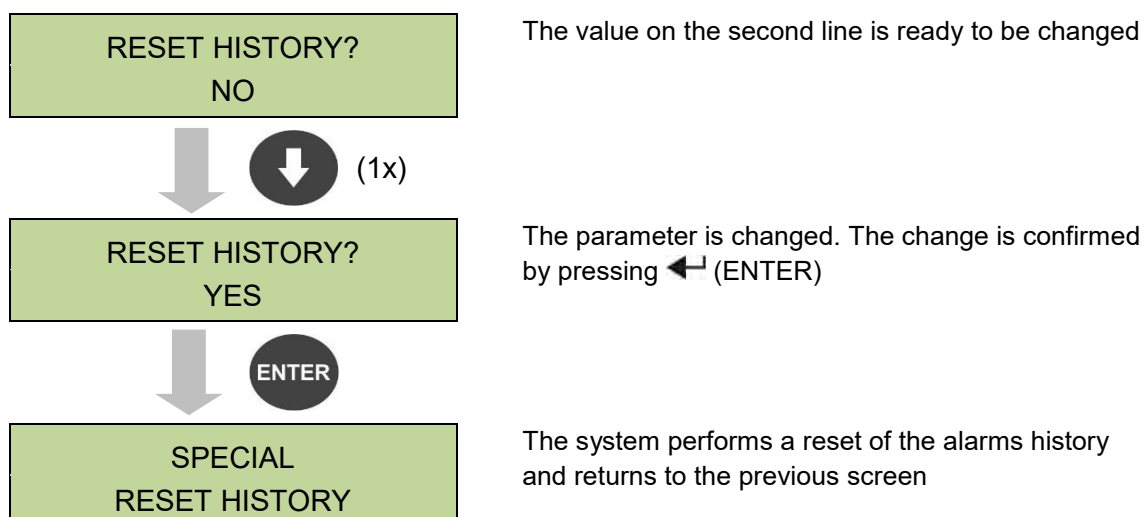
The failure conditions which impose a manual reset are:

- Static switch re-transfer block (alarm A17)
- Inverter shutdown due to the operation of the IGBT desaturation sensor (alarm A44)
- Inverter shutdown due to short-circuit timeout (alarm 12)
- Inverter shutdown due to thermal image protection (alarm 21)
- Inverter shutdown due to the operation of the quick disconnect sensor (alarm A36)
- Inverter shutdown due to voltage control loop error (alarm A39)
- Booster shutdown due to voltage control loop error (alarm A41)
- Booster shutdown due to current control loop error (alarm A43)
- Static switch blocked (alarm A50)
- Booster shutdown due to the operation of the load symmetry sensor (alarm A33)
- Activation of the battery fault alarm (alarm A10)
- Scheduled maintenance request (alarm A29).

For a description of the UPS status in each of the failure conditions listed above, please refer to the "Faults and alarms" section.

14.9 Reset Alarm history

Access the RESET HISTORY menu.

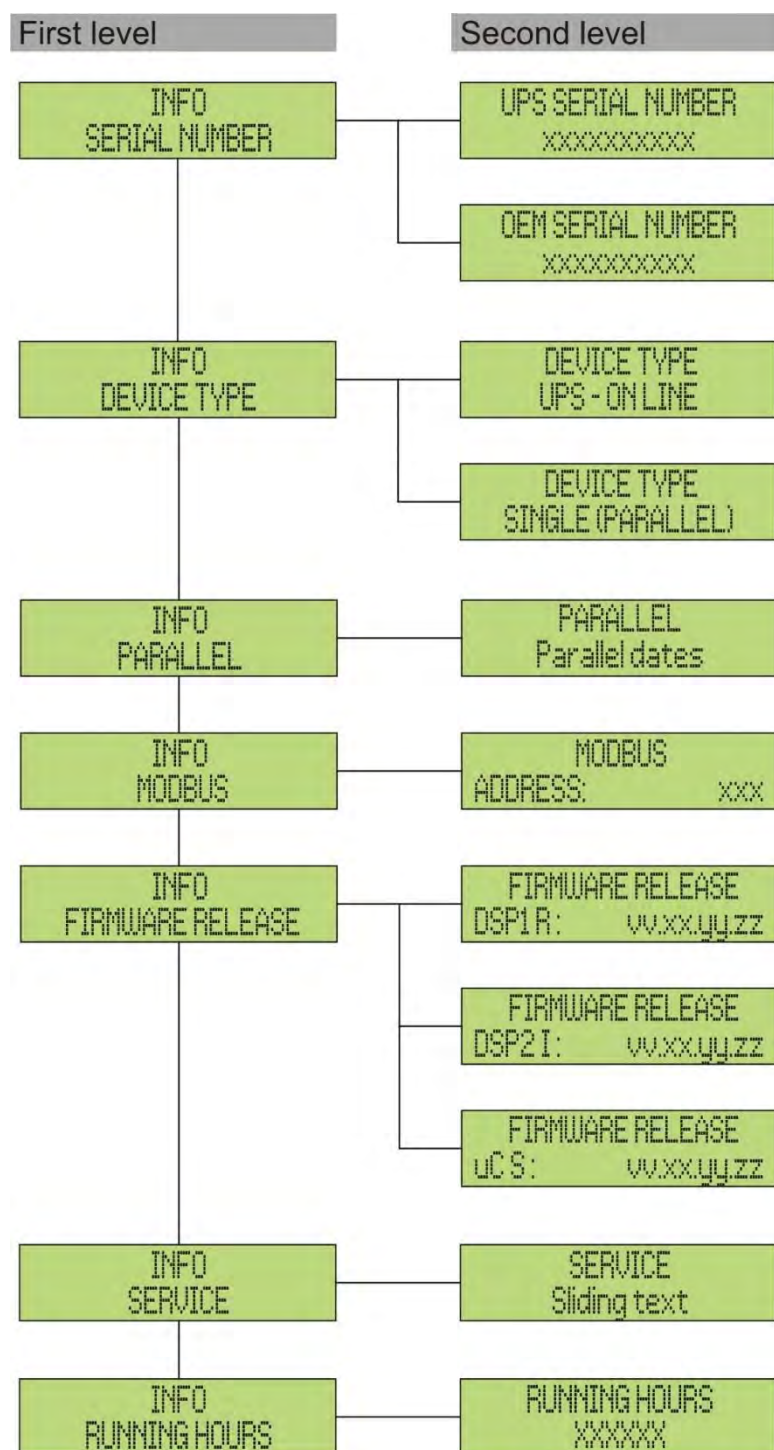


Loss of data

The alarms history contains very important data to monitor the device behaviour over time. We recommend to save the data before deleting it.

15 System Information

The INFO menu provides general information regarding the UPS based on the structure indicated below.



Picture 34 – Structure of INFO menu

All data shown in the various sections are set by the factory via a special interface software and cannot be altered, except by personnel authorized by the manufacturer.

The only adjustable parameters are the MODBUS settings (see SPECIAL menu).

Sub-menu	Displayed data
SERIAL NUMBER	Device serial number given by the manufacturer and by an OEM distributor, if any
DEVICE TYPE	The device type can be: ON LINE - UPS FREQUENCY CONVERTER ECO MODE - UPS SINGLE UPS PARALLEL
PARALLEL ⁽¹⁾	Data regarding the parallel configuration
MODBUS	MODBUS address of device
FIRMWARE RELEASE	Firmware versions installed on the system
SERVICE	Scrolling text string with information regarding technical service
RUNNING HOURS	Dates related to hours number of UPS running time

⁽¹⁾ the menu is only active if the UPS belongs to a Parallel or Load Sync system

15.1 Parallel Operation Information

The PARALLEL menu is only active if the UPS belongs to a parallel or load-sync system.

15.1.1 UPS Position

PARALLEL 2 / 6

The first number on the second line identifies the position of that specific UPS within the parallel system. The second number represents the total number of UPS units.

15.1.2 Master / Slave Priority

PARALLEL MASTER

The string on the second line may have two values, "MASTER" or "SLAVE". Only one MASTER UPS can be present in the system; if not there will be a conflict on the data communication bus.

15.1.3 Communication Bus Monitoring

PARALLEL			
1-[M]	2- S	3- S	4- S

The second line of this menu gives a general indication regarding the communication between the UPS units composing the system.

- The numbers represent the single UPS 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 UPS unit.
- A question mark next to a number indicates that that UPS unit is not communicating on the data bus.

Let us assume to have the following situation:

- system composed of 4 UPS units;
- UPS2 is currently the MASTER UPS;
- we are checking the data communication on UPS3;
- UPS4 is not communicating.

The menu will be as shown below.

PARALLEL			
1- S	2- M	3- [S]	4- ?

In case there are more than four paralleled devices, the menu will be as follows.

PARALLEL			
1- S	2- M	3- [S]

The dots indicate the presence of a further menu which shows the status of the other UPS units in the system.

15.1.4 Parallel Type

PARALLEL	
REDUNDANT+x	

The string on the second line may have two values, "POWER" or "REDUNDANT+x".

- POWER means that the parallel system is so set as to require the presence of all the UPS 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 UPS units, "REDUNDANT+2" means that only one of the UPS units is sufficient to feed the load.

15.1.5 Message Statistics

The statistics section regarding the messages exchanged on the communication buses consists of three different menus.

CAN STATISTICS SSW	
MSG RX: 32564	100.0%

Number of messages received and percentage of reception accuracy regarding the status of the static switches. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

CAN STATISTICS INV	
SYNC RX: 15849	100.0%

Number of messages received and percentage of reception accuracy regarding the synchronism signals. The messages are sent by the MASTER UPS, therefore the number will only increase on the SLAVE UPS units.

CAN STATISTICS INV	
MSG RX: 9277	99.9%

Number of messages received and percentage of reception accuracy regarding the status of the system. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

15.2 Service Information

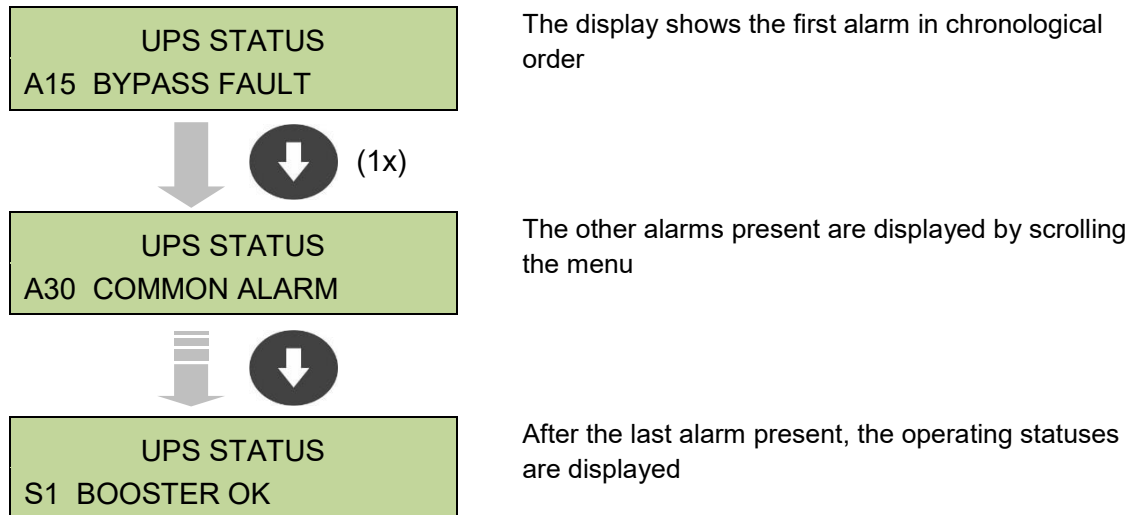
The SERVICE menu provides important information regarding the technical service on the UPS. The information is displayed via a text string of max. 60 characters which scrolls on the second display line.

However, please also see the addresses and contact numbers indicated in the present manual.

16 Faults and Alarms

As indicated in the previous chapters, the system is provided with basic diagnostics which allow immediate visualization of the operating conditions.

The LCD panel displays the alarms screen immediately, and an audible indicator is activated (if enabled). Each screen displays the alphanumeric alarm code and a short description of the alarm.



Injury hazard due to electric shock!

Before carrying out any operation on the UPS, make sure that all the safety precautions are adhered to:

- Any work on the unit must be carried out by qualified personnel;
- Internal components can only be accessed after disconnecting the device from supply sources;
- Always use protective devices designed for each type of activity;
- The instructions contained in the manuals must be strictly followed;
- In case of doubt or impossibility of solving the problem, please contact JOVYATLAS immediately.

16.1 Operating Status Definition

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

Status	S2	BATTERY OK
Description	The battery is connected to the UPS.	
Operating condition	The battery is kept charged by the rectifier and is ready to feed the inverter.	

Status	S3	INVERTER OK
Description	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	S5	INV BYPASS SYNC
Description	The inverter is synchronized with the bypass.	
Operating condition	The synchronization between the inverter and the bypass is locked, and the static switch can change over from one source to the other.	

Status	S6	BYPASS OK
Description	The bypass voltage and frequency are within the allowed range.	
Operating condition	The bypass line is ready for changeover in case of inverter failure.	

Status	S7	BYPASS --> LOAD
Description	Load fed by the bypass line.	
Operating condition	The load is fed by the bypass via the static switch, waiting for the inverter to restart.	

Status	S9	INV MASTER SYNC
Description	The inverter is synchronized with the MASTER UPS.	
Operating condition	This status is only present on the SLAVE UPS units, and shows that the inverter is synchronized with the signal sent by the MASTER UPS.	

Status	S12	BATT STANDBY
Description	The battery is in standby mode.	
Operating condition	The battery static switch is open and the battery is disconnected from the DC bus.	

Status	S13	BATT CHARGING
Description	The battery is charging.	
Operating condition	The battery is connected to the DC bus and absorbing charging current.	

Status	S14	BATT FLOATING
Description	The battery cyclic charge is activated.	
Operating condition	The battery static switch is closed and the battery is connected to the DC bus for the cyclic charge (no discharge has occurred over the last 25 days).	

16.2 Troubleshooting

Alarm	A1	MAINS FAULT
Description	The voltage or frequency of the input line are out of tolerance.	
Possible causes	<ul style="list-style-type: none"> ➤ Mains instability or failure. ➤ Wrong phase rotation. 	
Solutions	<ol style="list-style-type: none"> 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 SEQ
Description	The phase rotation on the rectifier input line is wrong.	
Possible causes	<ul style="list-style-type: none"> ➤ Wrong connection of power cables. 	
Solutions	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ➤ Instability of the AC line voltage or frequency. ➤ Possible fault in the rectifier control circuit. 	
Solutions	<ol style="list-style-type: none"> 1. Check the parameters of the AC line voltage. 2. Restart the device. 3. 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	<ul style="list-style-type: none"> ➤ Possible fault in the rectifier control circuit. 	
Solutions	<ol style="list-style-type: none"> 1. Check which alarms are present and carry out the indicated procedures. 2. Restart the device. 3. 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	<ul style="list-style-type: none"> ➤ The battery has reached the discharge voltage due to a power failure. ➤ Measuring circuit failure. 	
Solutions	<ol style="list-style-type: none"> 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 procedures. 4. Restart the device. 5. If the alarm persists, contact our Technical Support Service. 	

Alarm	A6	BATTERY IN TEST
Description	The rectifier voltage is reduced to start a short controlled discharge of the battery.	
Possible causes	<ul style="list-style-type: none"> ➤ A battery test has been started automatically (if set), or manually by the user. 	
Solutions	<ol style="list-style-type: none"> 1. Wait for the test to end, and check possible battery faults. 	

Alarm	A7	BCB OPEN
Description	The battery isolator is open.	
Possible causes	<ul style="list-style-type: none"> ➤ Battery isolator open. 	
Solutions	<ol style="list-style-type: none"> 1. Check the status of the battery isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. Check the connection between the auxiliary contact of the isolator and the auxiliary terminals of the UPS (if provided). 4. If the alarm persists, contact our Technical Support Service. 	

Alarm	A8	BATTERY DISCHARGE
Description	The battery is discharging.	
Possible causes	<ul style="list-style-type: none"> ➤ The battery is discharging due to a mains failure. ➤ Rectifier failure. 	
Solutions	<ol style="list-style-type: none"> 1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service. 	

Alarm	A9	BATTERY AUT END
Description	The battery has reached the pre-alarm discharge level.	
Possible causes	<ul style="list-style-type: none"> ➤ The battery is discharging due to a mains failure. ➤ Rectifier failure. 	
Solutions	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ➤ Battery fault. 	
Solutions	<ol style="list-style-type: none"> 1. Check the battery. 2. Reset the system. 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	<ul style="list-style-type: none"> ➤ Load problem. ➤ Measuring circuit failure. 	
Solutions	<ol style="list-style-type: none"> 1. Check the loads connected to the UPS output. 2. If the alarm persists, contact our Technical Support Service. 	

Alarm	A12 STOP TIMEOUT SC
Description	Inverter shutdown due to an extended short-circuit during a power failure, or due to an overcurrent on the inverter bridge input.
Possible causes	<ul style="list-style-type: none"> ➤ Short-circuit on the loads during a power failure. ➤ Inverter bridge fault. ➤ Temporary current peak.
Solutions	<ol style="list-style-type: none"> 1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A13 INV OUT OF TOL
Description	The inverter voltage or frequency are out of tolerance.
Possible causes	<ul style="list-style-type: none"> ➤ Inverter shutdown due to an alarm. ➤ Inverter failure.
Solutions	<ol style="list-style-type: none"> 1. Check which alarms are present and carry out the indicated procedures. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A14 BYPASS WR SEQ
Description	The phase rotation of the bypass line is wrong.
Possible causes	<ul style="list-style-type: none"> ➤ Wrong connection of power cables.
Solutions	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ➤ Bypass line instability or failure. ➤ Wrong phase rotation.
Solutions	<ol style="list-style-type: none"> 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	A16 BYPASS --> LOAD
Description	The load is fed by the bypass line.
Possible causes	<ul style="list-style-type: none"> ➤ Temporary changeover due to inverter failure.
Solutions	<ol style="list-style-type: none"> 1. Verify the inverter status and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A17 RETRANSFER BLOCK
Description	The load is blocked on the bypass line.
Possible causes	<ul style="list-style-type: none"> ➤ Very frequent changeovers due to load in-rush currents. ➤ Static switch problems.
Solutions	<ol style="list-style-type: none"> 1. Reset the system. 2. Check the in-rush currents of the loads. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A18 MBCB CLOSED
Description	The manual bypass isolator is closed.
Possible causes	<ul style="list-style-type: none"> ➤ Manual bypass isolator closed.
Solutions	<ol style="list-style-type: none"> 1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A19	OCB OPEN
Description	The output isolator is open.	
Possible causes	➤ Output isolator open.	
Solutions	1. Check the status of the output isolator. 2. Check the functionality of the auxiliary contact of the isolator. 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. The inverter is shut down for 30 minutes and then restarted.	
Possible causes	➤ 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 system. 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 (local or remote) emergency power off button.	
Solutions	1. Release the emergency power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A24	HIGH TEMPERATURE
Description	High temperature of the heat sink on the inverter bridge or tripping of the DC fuses which protect the inverter bridge.	
Possible causes	➤ Fault of the heat sink cooling fans. ➤ The room temperature or cooling air temperature is too high. ➤ Tripping of the DC protection fuses.	
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. Check the status of the DC fuses on the inverter bridge input. 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	➤ Various.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A26	COMMUNIC ERROR
Description	Internal error.	
Possible causes	➤ Microcontroller communication problems.	
Solutions	1. If the alarm persists, contact our Technical Support Service.	

Alarm	A27	EEPROM ERROR
Description	The controller has detected an error in the parameters stored in EEPROM.	
Possible causes	➤ Wrong parameters entered during programming.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A28	CRITICAL FAULT
Description	An alarm has been activated which causes the shutdown of part of the UPS (rectifier, inverter, static switch).	
Possible causes	➤ System 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	A29	MAINTENANCE REQ
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 which alarms are present and carry out the indicated procedures.	

Alarm	A31	MBCB BUS CLOSED
Description	The manual bypass isolator is closed.	
Possible causes	➤ Manual bypass isolator closed.	
Solutions	1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A32 EPO BUS CLOSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	➤ Activation of the (local or remote) emergency power off button.
Solutions	1. Release the emergency power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.

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.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A34 SERVICE REQUIRED
Description	A UPS check is necessary.
Possible causes	➤ 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, to terminals XD1/XD2. 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 sudden DC voltage variations.
Possible causes	➤ Battery fault.
Solutions	1. Check the battery. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A38 INV --> LOAD
Description	The load is fed by the inverter. This alarm is active for UPS systems in "ECO" mode, where the preferential supply is from the bypass line.
Possible causes	➤ Temporary changeover due to bypass line failure.
Solutions	1. Verify the status of the bypass line and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A39 INV ERROR LOOP
Description	The control is not able to regulate the inverter voltage precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A40 SSI FAULT
Description	The system has detected a failure in the static inverter switch.
Possible causes	<ul style="list-style-type: none"> ➤ Possible problems on the loads. ➤ Static switch fault.
Solutions	<ol style="list-style-type: none"> 1. Check the absorption of the loads and the presence of DC components, if any, on AC current. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A41 RECT ERROR LOOP
Description	The control is not able to regulate the rectifier output voltage precisely.
Possible causes	<ul style="list-style-type: none"> ➤ Regulation system failure.
Solutions	<ol style="list-style-type: none"> 1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A43 CURR ERROR LOOP
Description	The control is not able to regulate the rectifier output current precisely.
Possible causes	<ul style="list-style-type: none"> ➤ Regulation system failure.
Solutions	<ol style="list-style-type: none"> 1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A45 HIGH TEMPERATURE SSW
Description	High temperature of the heat sink on the static switch.
Possible causes	<ul style="list-style-type: none"> ➤ Fault of the heat sink cooling fans. ➤ The room temperature or cooling air temperature is too high.
Solutions	<ol style="list-style-type: none"> 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 PAR LOST REDUND
Description	This alarm is only active on PARALLEL systems. Continuity is not ensured in the event of a fault on one of the UPS units.
Possible causes	<ul style="list-style-type: none"> ➤ The total load is higher than the maximum expected value. ➤ Possible failure on the measuring circuit.
Solutions	<ol style="list-style-type: none"> 1. Check the load fed by the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A47 SEND PARAM ERROR
Description	Internal error.
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems.
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service.

Alarm	A48 RCV PARAM ERROR
Description	Internal error.
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems.
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service.

Alarm	A49	TEST MODE ERROR
Description	Internal error.	
Possible causes	➤ Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A50	SSW BLOCKED
Description	The static switch is blocked. The load is no longer supplied.	
Possible causes	➤ Loads failure. ➤ Possible UPS fault.	
Solutions	1. Check the loads for possible failures. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A51	BATT TEMPERATURE
Description	The battery temperature is out of tolerance. This alarm is only active when the temperature probe is installed and enabled on the battery.	
Possible causes	➤ Anomalous temperature in the battery cabinet. ➤ Possible failure on the measuring circuit.	
Solutions	1. Check the temperature on the batteries and remove the cause of the alarm, if any. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A53	FIRMWARE ERROR
Description	The controller has detected an incompatibility in the control software.	
Possible causes	➤ The software update was not performed properly.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A54	CAN ERROR
Description	Internal error.	
Possible causes	➤ Microcontroller communication problems.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A55	PAR CABLE DISC
Description	Parallel cable doesn't communicate.	
Possible causes	➤ Parallel cable disconnected or damaged.	
Solutions	1. Check the connection of cable 2. Contact our Technical Support Service.	

Alarm	A56	MAINS UNBALANCE
Description	The rectifier input voltage is unbalanced.	
Possible causes	➤ Problems on the LV or MV distribution network ➤ Defect of the measuring circuit	
Solutions	1. Check the input voltage 2. Contact our Technical Support Service.	

Alarm	A63	START SEQ BLOCK
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. ➤ Possible internal fault.	
Solutions	1. Make sure the position of the control devices (isolators, selectors) is as specified in the procedures (see "Installation and start-up" section). 2. If the alarm persists, contact our Technical Support Service.	

17 Technical Data

JOVYSTAR COMPACT m					
Online UPS-Type	60 kVA	80 kVA	100 kVA	125 kVA	160 kVA
Output					
Output apparent power (cos φ = 1)	60 kVA	80 kVA	100 kVA	125 kVA	160 kVA
Output active power (cos φ = 1)	60 kW	80 kW	100 kW	125 kW	160 kW
Rated output voltage	3 x 380/220 V / 3 x 400/230 V / 3 x 415/240 V				
- Tolerance static, symmetric load	±1 %				
- Tolerance static, asymmetric load	±2 %				
- Tolerance dynamic load (20 % → 100 % → 20 %)	±5 %				
- Correction time after load step	< 20 ms				
Rated output frequency	50/60 Hz				
- Tolerance at free running quartz oscillator	±0,001 Hz				
- Tolerance at inverter-synchronization with mains	±2 Hz				
Rated output current	87 A	115 A	144 A	180 A	231 A
THDU (according to IEC EN 62040-3)					
- Linear load	< 1 %				
- Non linear load	< 5 %				
Input Rectifier					
Input voltage	3 x 400/230 V +15 % -20 %				
Input frequency	50/60 Hz ±10 %				
Input current (at 100 % load, without battery charging)	91 A	122 A	152 A	190 A	243 A
Input current (at 100 % load, max. battery current)	109 A	140 A	170 A	214 A	267 A
Input power factor (at 100 % load)	> 0,99				
Input current THD (at 100 % load)	< 3 %				
Input Bypass					
Input voltage	3 x 380/220 V / 3 x 400/230 V / 3 x 415/240 V ±10 %				
Input frequency	50/60 Hz ±10 %				
Battery					
Number of battery cells	360 - 372				
Compensation charging voltage	817 V (2,27 V/Z) @ 360cells				
Cut-off voltage	620 V (1,72 V/Z) @ 360cells				
Max. battery charging current (at 100 % load)	15 A	15 A	15 A	20 A	20 A
Max. battery charging current with activated DCM (Dynamic charging mode, only at partial load)	50 A		50 A		
Battery charging characteristic	IU (DIN 41773)				
Overload capability/Output short circuit characteristic					
Overload capability inverter	> 100 % to 125 % for 10 min (1) > 125 % to 150 % for 30 s > 150 % to 199 % for 100 ms				
Overload capability static bypass	150 % continuously 1000 % for 1 cycle				
Short circuit characteristic (Bypass is available)	Immediate transfer to the bypass				
Short circuit characteristic (Bypass is not available) Current limitation to 100 ms	265 A	300 A	400 A	490 A	640 A
Short Circuit Current after 100ms up to 5seconds	130 A	172 A	216 A	270 A	346 A
Selectivity	½ cycle (fuse gG 20% In)				
Design					
Dimensions (W x H x D)	560 x 1800 x 940 mm				
Weight (without battery)	250 kg	300 kg	320 kg	360 kg	380 kg
Paint	RAL 9005				
Noise level	< 60 dB				
protection degree	IP 20				
Conformity according IEC 62040					
Reference Standards	EN 62040 – 1, EN 62040 – 2, EN 62040 - 3				
UPS classification	VFI SS 111				
Other data					
Efficiency normal mode (at 100 % load) (AC to AC)	> 95 %				
Efficiency battery mode (at 100 % load) (DC to AC)	> 97 %				
Efficiency eco-mode (Offline-mode)	> 98 %				
Max. crest factor without power reduction	3 : 1				
Heat dissipation (at 100 % load and rated input voltage)	3.2 kW	4.2 kW	5.3 kW	6.6 kW	8.4 kW
Requirements to the installation position					
Max. installation altitude without power reduction	< 1000 m				
Power reduction for installation altitude according to IEC EN 62040-3	1 % every 100 m above 1000 m up to 2000 m				
Required air cooling volume	1000 m³/h	1000 m³/h	1200 m³/h	1200 m³/h	1500 m³/h
UPS operating ambient temperature	0 to +40 °C				
UPS storage temperature	-10 to +70 °C				
Battery ambient -/storage temperature (recommended battery ambient temperature, see also battery operating instruction)	0 to +25 °C +20 °C				
Relative humidity (non condensinal)	< 95 %				

(1) For 160kVA Overload capability 10' >100%...110%, 5' >110...125%

18 Service and Download

Following documents are available at our website:

- Battery data sheets
- Battery operating instructions
- Material safety data sheet
- CE – Compliance Declaration

<http://www.jovyatlas.com/ja/Waertsilae-JOVYSTAR-COMPACT,120-93-2>

<http://www.jovyatlas.com/Batteries>

S E R V I C E – H O T L I N E !

Telefon: 04958 - 9394 - 30 Telefax: 04958 - 9394 - 10

E-Mail: service.jovyatlas.de@wartsila.com Internet: <http://www.jovyatlas.de>

Operating Manual

Wärtsilä

JOVYSTAR COMPACT L

200kVA



BAX 5624



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Index	Date	Name	Remarks
0	2016-11-23	D. Busboom	
1	2017-01-10	D. Busboom	17/008
2	2017-01-24	D. Busboom	17/037

Table of Contents

1	Conventions Used	4
2	Documentation Notes	5
3	Contact	5
4	Factory Warranty	6
5	Limitation of Liability	8
6	Scope	8
7	Safety Rules and Warnings	9
7.1	Use of the UPS	9
7.2	Special Safety Warnings	9
7.3	Environmental Protection	15
8	Installation	15
8.1	Receipt of the UPS	15
8.2	Handling of the UPS	16
8.3	Positioning and Installation	17
8.4	Positioning and Connection of the Batteries	21
9	Electrical connection	22
9.1	Connection of the Power Cables	23
9.2	Backfeed Protection Device	25
9.3	Terminal Boards	25
9.4	Battery	26
9.5	Connection of the Auxiliary Cables	27
9.6	Serial interfaces and external connections	28
9.7	Relay Card Connection (Optional)	30
10	Startup and Shutdown	31
10.1	Preliminary checks	31
10.2	Start-Up Procedure	32
10.3	Shut-down procedure	36
10.4	SWITCHING PROCEDURE TO MANUAL BYPASS	36
10.5	Restart from Manual bypass	37
11	General UPS Description	41
11.1	Typology	41
11.2	System Description	41
11.3	Operating Status	43
11.4	Control and Operation Devices	47
12	CONTROL panel	49
12.1	ICONS	49
13	<i>Touch screen</i> – Managing the UPS	51
13.1	Displaying the measures	51
13.2	Basic diagnostics	53
13.3	Settings and advanced operations	58
13.4	System information	67
14	Faults and Alarms	71
14.1	Operating Status Definition	72
14.2	Troubleshooting	73
15	Technical Data	81
16	Service and Download	82

Thank you for choosing a Wärtsilä JOVYATLAS 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 Contact

For any information about the UPS systems manufactured by JOVYATLAS, please contact:

Wärtsilä JOVYATLAS EUROATLAS GmbH
Fennenweg 4
26844 Jemgum, Germany
Tel. +49 – 4958 9394 - 0
Fax +49 – 4958 9394 - 10
service.jovyatlas.de@wartsila.com

<http://www.jovyatlas.de>

For help with technical problems or for information concerning device use and maintenance, please contact the technical help service by phoning the above-indicated telephone number, specifying the following data:

- Type of device and its nominal power
- Serial number
- Error code, if applicable.

4 Factory Warranty

The factory warranty provided by Wärtsilä JOVYATLAS EUROATLAS GmbH is subject to the terms indicated below.

Validity

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

Duration

- a) The factory warranty provided by Wärtsilä JOVYATLAS EUROATLAS GmbH 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

- a) The execution of one or more repairs within the warranty time will not alter the original expiry of the warranty.
- b) 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 Wärtsilä JOVYATLAS EUROATLAS GmbH 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.

Modes required

- a) In the event of a fault covered by the warranty, the customer shall notify Wärtsilä JOVYATLAS EUROATLAS GmbH 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, Wärtsilä JOVYATLAS EUROATLAS GmbH must be notified of the time necessary to obtain the documentation required, if any.

- d) In case of customer's non-compliance, Wärtsilä JOVYATLAS EUROATLAS GmbH reserves the right to refuse warranty service. Wärtsilä JOVYATLAS EUROATLAS GmbH 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 Wärtsilä JOVYATLAS EUROATLAS GmbH
 - Tampering, alterations or repair attempts made without the specific written approval by Wärtsilä JOVYATLAS EUROATLAS GmbH
 - Damage caused by work done by personnel not authorized by Wärtsilä JOVYATLAS EUROATLAS GmbH
 - 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 Wärtsilä JOVYATLAS EUROATLAS GmbH 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.

5 Limitation of Liability

All the information contained in the present documentation is the exclusive property of Wärtsilä JOVYATLAS EUROATLAS GmbH. Written consent by Wärtsilä JOVYATLAS EUROATLAS GmbH 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.
- JOVYATLAS 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 JOVYATLAS.
- JOVYATLAS will not be held responsible for the consequences arising from the use of non-original spare parts.
- JOVYATLAS 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.
- JOVYATLAS assumes responsibility for the information given in the original version of the manual in German language.

6 Scope

The instructions contained in the operating manual are applicable to the UPS systems listed below.

Wärtsilä JOVYSTAR COMPACT L 200kVA



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.

7 Safety Rules and Warnings

7.1 Use of the UPS

Congratulations on choosing a product from JOVYATLAS for the safety of your equipment. To obtain the best performance from your JOVYSTAR COMPACT L 200 kVA UPS 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.



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.

7.2 Special Safety Warnings

7.2.1 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.

7.2.2 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.

7.2.3 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.

7.2.4 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.

7.2.5 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"

7.2.6 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.

7.2.7 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.

7.2.8 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.**

7.3 Environmental Protection

7.3.1 Recycling of packing materials

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

7.3.2 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.

8 Installation

8.1 Receipt of the UPS

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.

8.1.1 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.**

8.2 Handling of the UPS

The UPS is packed on a pallet. It is handled from the transport vehicle to the installation (or storage) place via a fork lift.

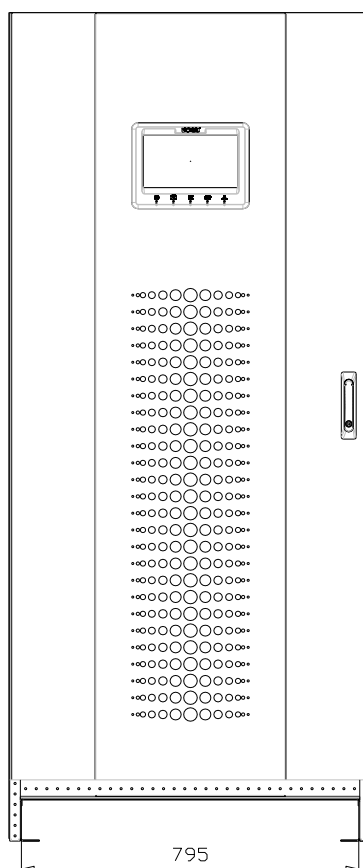


The device has a heavy weight

- **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, in order to avoid risks of turnover, it's recommended to move the system on the wood pallet on which the UPS is fixed. Before the positioning in the final location, remove the UPS from the pallet.

To handle the UPS remove the lower rear and front, insert the forks of a fork lift. The UPS can be handled from the front according to the available spaces, as shown by the following picture.



Picture 2 – Handling of the UPS

8.3 Positioning and Installation

The UPS 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.

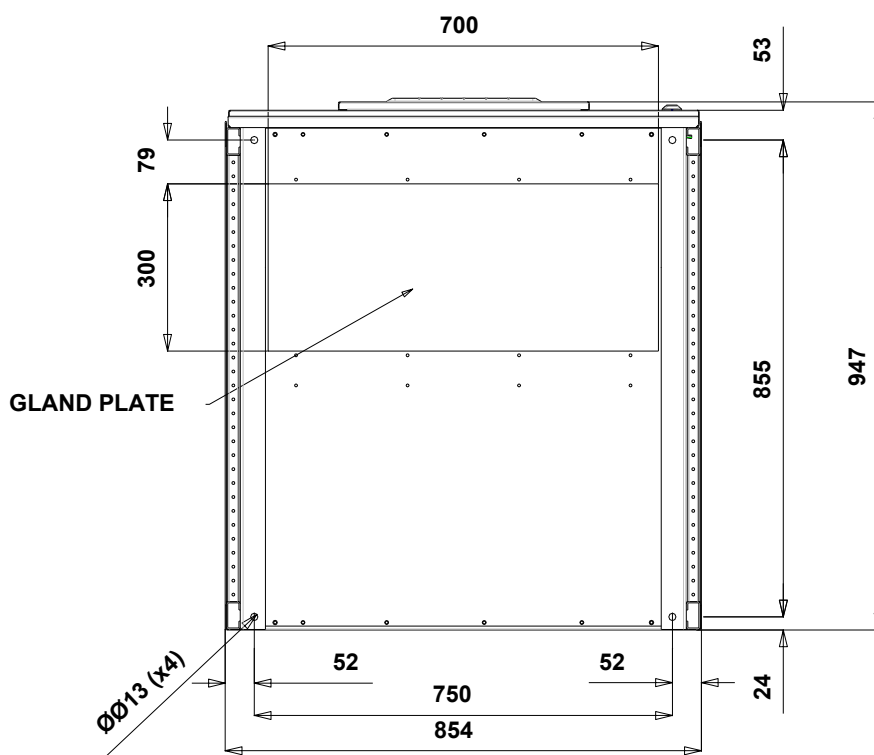


Special environmental conditions

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.

8.3.1 Base Plan, Static Load and Weights



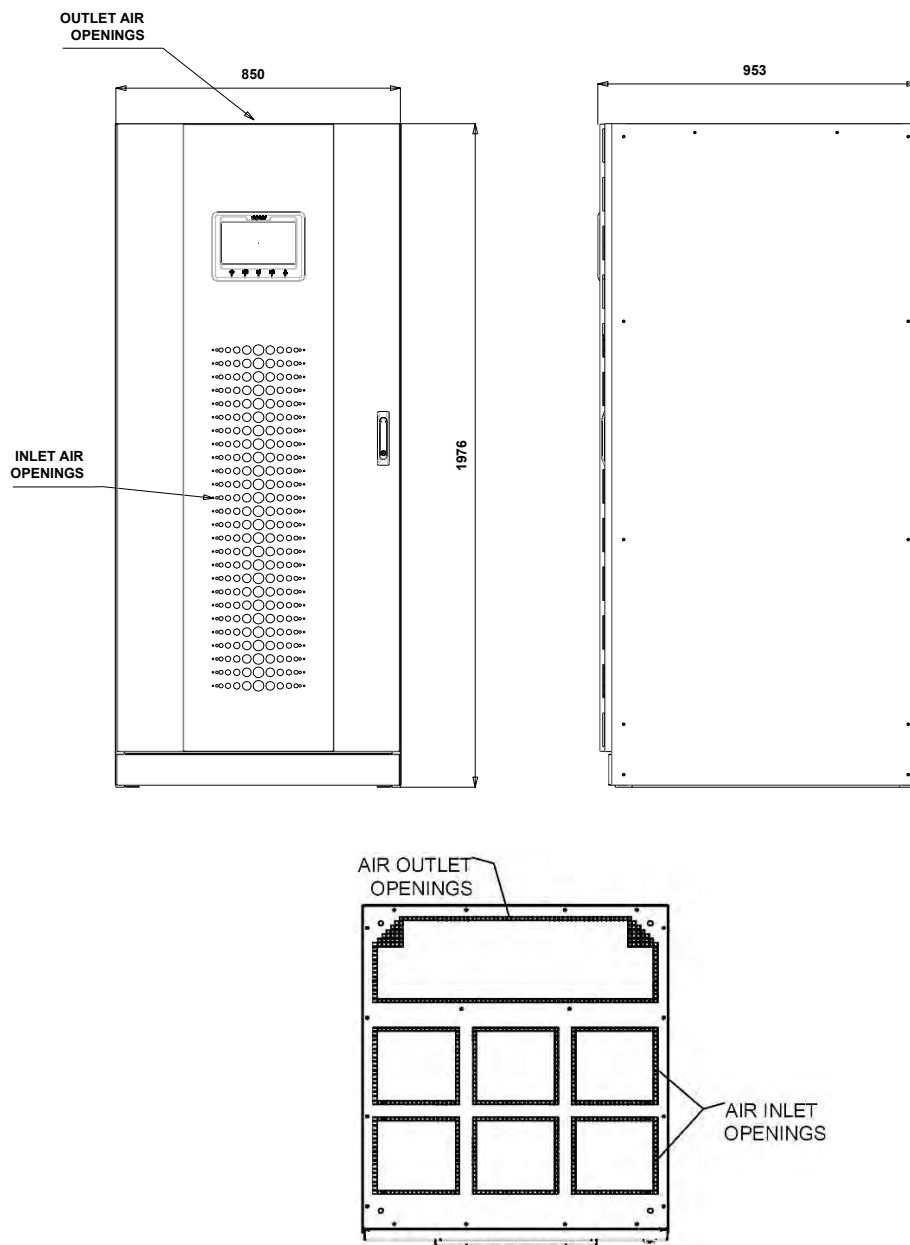
Picture 3 – Base plan

The supporting base of the UPS must be designed to carry the UPS weight and to ensure its steady and safe support.

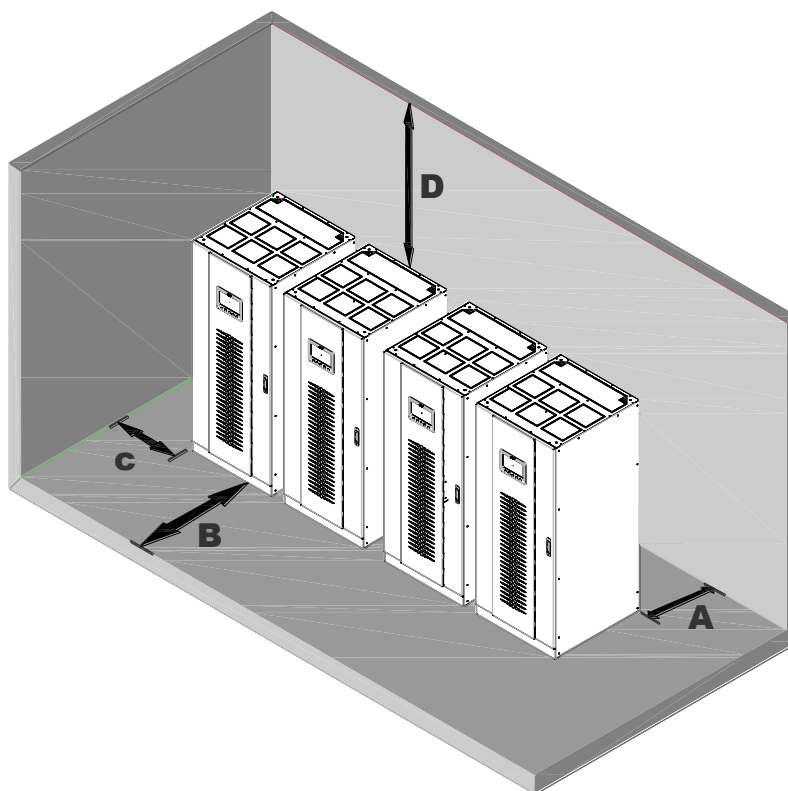
Its carrying capacity must be adequate to the static loads indicated in the table below.

Power (kVA)	200
Weight (kg)	720
Static load (kg/m²)	1120

8.3.2 Overall Dimensions, Clearances and Ventilation



Picture 4 – Overall dimensions



Picture 5 – 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.

- UPS with internal batteries

	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 UPS.

Power (kVA)	200
Air volume (m ³ /h)	1800

8.3.3 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

The UPS 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.

8.4 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 N). 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 m³ 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 X10-9/10.

9 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 UPS 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 I_{sc}) that is needed to determine the breaking power of automatic circuit breakers, and to the minimum current (min I_{sc}) 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 are placed on the front of the UPS. 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 inadvisable. 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.

9.1 Connection of the Power Cables

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

- DC supply from the battery (if the battery is external);
- AC supply from the rectifier and bypass supply mains;
- AC output to the loads.



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.

Details of the electrical connections	
Power (kVA)	200
Input fuses [A]	
Rectifier	400
Bypass	400
Power connections	
Type	Aluminium bars
Conductor max. cross section [mm ²]	185
Max. number of conductors	2
Fixing bolt dimensions	M12
Tightening torque [Nm]	4 ÷ 4,5
PE	Bolt M10 (19 Nm)

Rated current (at full load and battery recharging)	
Power (kVA)	200
Rectifier input [A] ⁽¹⁾	338
Bypass input / Output [A] ^{(1) (2)}	289
Battery [A]	330

⁽¹⁾ Values referred to 400Vac rated voltage

⁽²⁾ For the overload values refer to the Technical Specification

9.2 Backfeed Protection Device

The UPS is provided (as option) with voltage-free contacts, which can be used to operate the shunt trip coil (undervoltage release type) of the external sectioning device; the external device is not part of the UPS supply and is provided and installed at customer care.

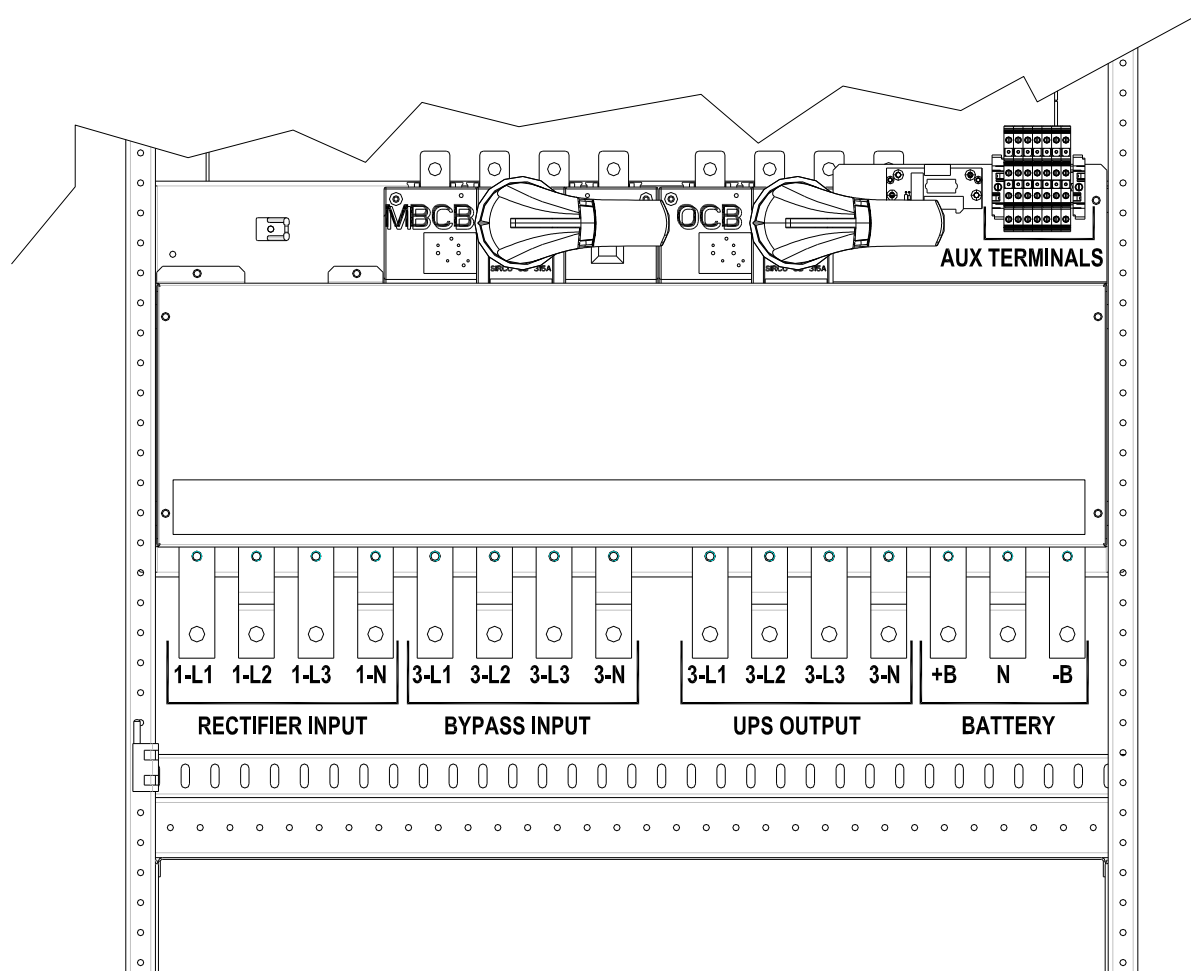
The following table shows the main electrical characteristics of the external sectioning device.

Backfeed protection device	
Power (kVA)	200
Maximum operating voltage (Vac)	690
Minimum rated current (A)	400
Category	AC-1

An isolator switch with integrated undervoltage release can be installed inside the UPS as an option.

9.3 Terminal Boards

The UPS is provided with terminal boards for the connection of power cables and of auxiliary connections.



Picture 6 – Terminal board UPS

9.4 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 4.5.

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 N).

The batteries can 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.

9.5 Connection of the Auxiliary Cables

The UPS systems can be connected to external controls/components specifically designed to improve the safety and reliability of the device.

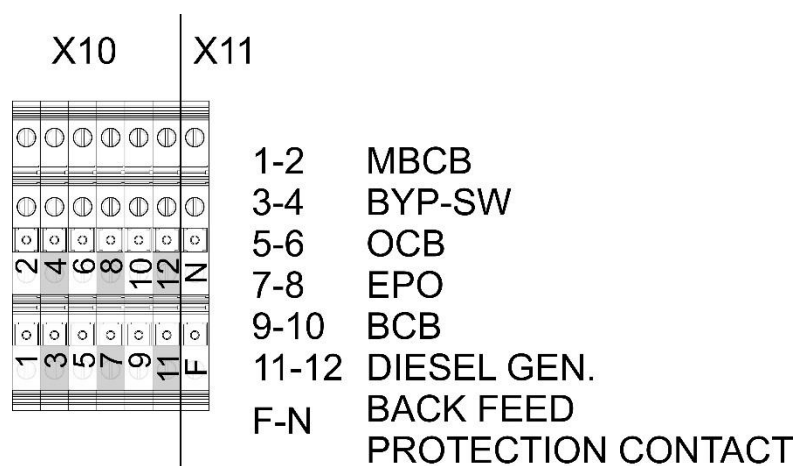
- External manual bypass (MBCB);
- External bypass switch (selector normal/bypass);
- External output switch (OCB);
- Remote emergency power off button (EPO);
- Auxiliary battery contact (BCB).
- Diesel generator

The auxiliary cables are connected to a dedicated terminal board. Wires up to 4 mm² can be connected to the terminals.



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 7 – Auxiliary terminals UPS

9.5.1 External manual bypass

Auxiliary contact of the external Manual Bypass Switch (if provided) on terminals X10-1/2.

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.

9.5.2 Bypass switch

Auxiliary contact of the external NORMAL/BYPASS selector on terminals X10-3/4.

When the contact is closed the UPS will transfer the load from inverter to bypass.

9.5.3 UPS output switch

Auxiliary contact of the external UPS output switch (if provided) on terminals X10-5/6.

This auxiliary contact is necessary to indicate the position of the isolator (open-closed)..

In case the external switch is not provided short-circuit the terminals 5-6.

9.5.4 Remote emergency power off (EPO)

Auxiliary EPO contact on terminals X10-7/8.

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.

In case the external EPO command is not provided short-circuit the terminals 7-8.

9.5.5 Battery auxiliary contact

Battery auxiliary contact on terminals X10-9/10.

This auxiliary contact is necessary to indicate the position of the isolator (open-closed).

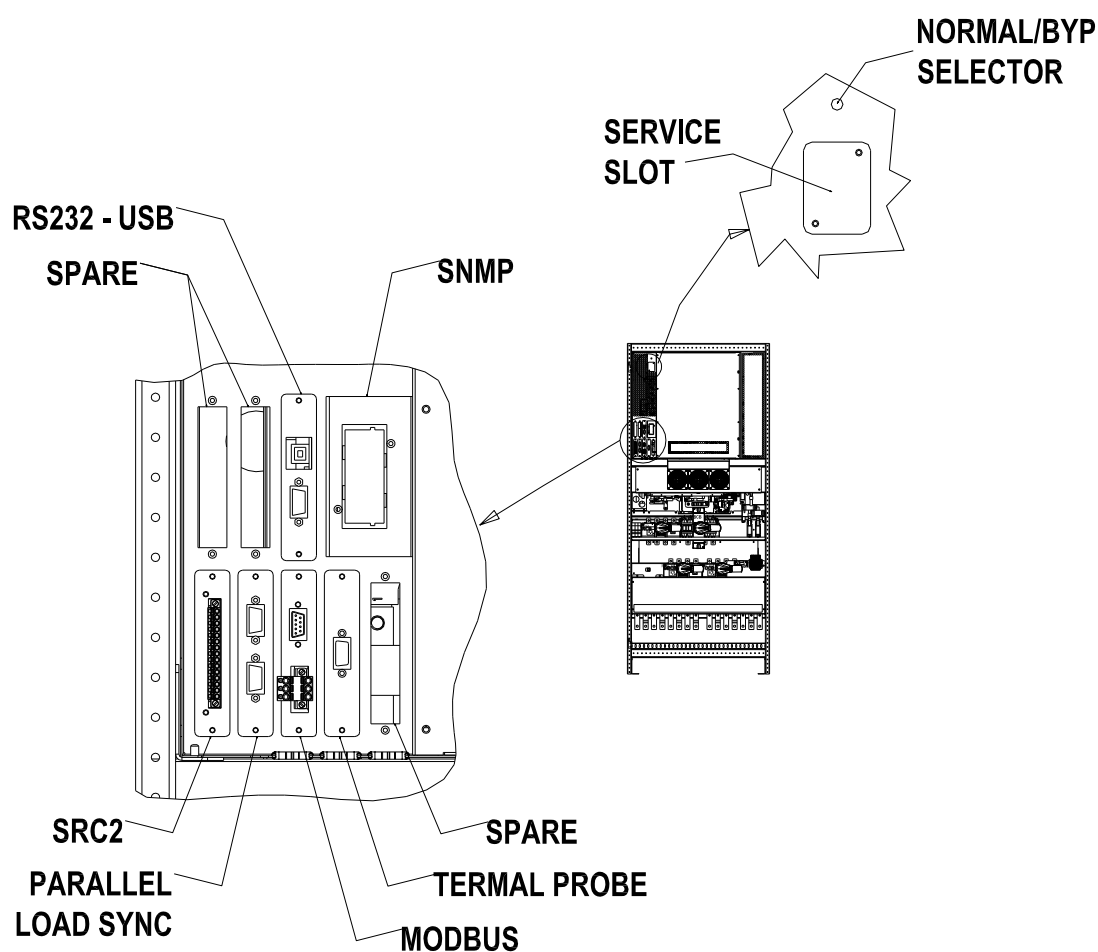
9.5.6 Diesel Generator auxiliary contact

Auxiliary contact from the Diesel Generator on terminals X10-11/12.

A normally open contact must be used; the contact must close when the diesel generator is operating. The microprocessor will acquire the status of the contact and, upon the rectifier start-up, it will enable the "Diesel Mode" operation, that is the operation at reduced DC voltage in order to reduce the power drawn from the AC line.

9.6 Serial interfaces and external connections

The UPS is provided with serial interfaces and external connection facilities for the communication of the operating status and parameters.

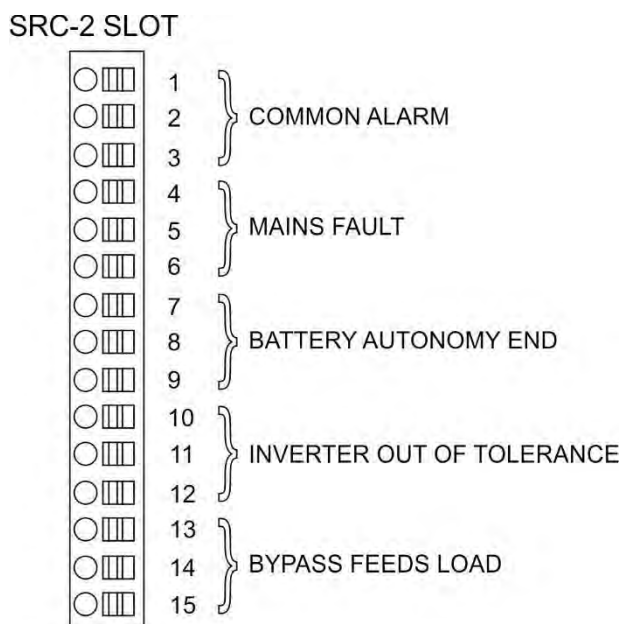


Picture 8 – Position of the serial interfaces

- RS232/USB: it is used for connection to the proprietary programming and control software.
- SRC-2 (OPTIONAL): relay card, used for the remote signalizations of status and alarms.
- PARALLEL (OPTIONAL): it is used for communication between paralleled UPS units.
- MODBUS (OPTIONAL): it is used for the transmission of data to the outside via MODBUS RTU protocol (RS485).
- THERMAL PROBE (OPTION): it is used to acquire the temperature of the battery cabinet/room in order to adjust the charging voltage automatically.
- SNMP (OPTIONAL): it is used for the external transmission of data via LAN.
- NORMAL/BYPASS SELECTOR

9.7 Relay Card Connection (Optional)

The UPS, in its full configuration, is provided with a relay card for repeating alarms and operating statuses remotely. The electric connection is carried out directly on the terminals located on the front of the interfaces slot SRC-2.



Picture 9 – Relay card terminals

Relay	Alarms/ Status	Status	M1		LED	
			Pins	Status in normal operation	Name	Status in normal operation
RL 1	Alarm = A30 COMMON ALARM	Not energized if alarm is present	2 - 3	Closed	DL 1	ON
			1 - 2	Open		
RL 2	Alarm = A1 MAINS FAULT	Not energized if alarm is present	5 - 6	Closed	DL 2	ON
			4 - 5	Open		
RL 3	Alarm = A9 BATTERY AUT END	Not energized if alarm is present	8 - 9	Closed	DL 3	ON
			7 - 8	Open		
RL 4	Alarm = A13 INV OUT OF TOL	Not energized if alarm is present	11 - 12	Closed	DL 4	ON
			10 - 11	Open		
RL 5	NORMAL MODE Alarm = A16 BYPASS -> LOAD	Not energized if alarm is present	13 - 14	Closed	DL 5	ON
			14 - 15	Open		
RL 5	ECO MODE Status = S7 BYPASS -> LOAD	Energized if status is present	14 - 15	Closed		
			13 - 14	Open		

Relay output characteristics:

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

10 Startup and Shutdown



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.



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.



External isolators

All the procedures that follow make reference to the external isolator BCB and are only valid if such device is installed (externally) and its auxiliary contacts properly wired to the UPS terminals.

10.1 Preliminary checks

Before starting up the unit, make sure that:

- all installation and electric connection works have been performed professionally;
- all power and control cables have been properly and tightly connected to the relevant terminal boards;
- the ground cable is properly connected;
- the battery polarity is correct and the voltage is within the operating values;
- the phase rotation of the line is correct and the voltage is within tolerance with the operating values.
- the emergency power off “EPO” push-button, if installed, is not pressed (if not, press it back to the rest position).

10.2 Start-Up Procedure



EPO push-button and phase rotation

Before switching the UPS on, make sure that:

- 1) the emergency power off “EPO” push-button, if installed, is not pressed. If not, press it back to the rest position;
- 2) the input and output phase rotation is correct.



Circuit breaker BCB

Do not close the battery breaker BCB before it's required by the front panel. Serious damages to the UPS internal parts and/or to the battery may occur.



Wiring of the auxiliary contacts

Carry out a proper electrical installation by wiring the auxiliary contacts of the external manual bypass, output and battery isolators to the dedicated terminals on board the UPS. This will allow the control logic to acquire the status of the switches and guide the operator during the start-up and manual bypass procedures.

The system start-up is completely guided; the indications available by the touch screen allows the complete comprehension of the various steps and helps the operator in performing the requested operations in the correct sequence.

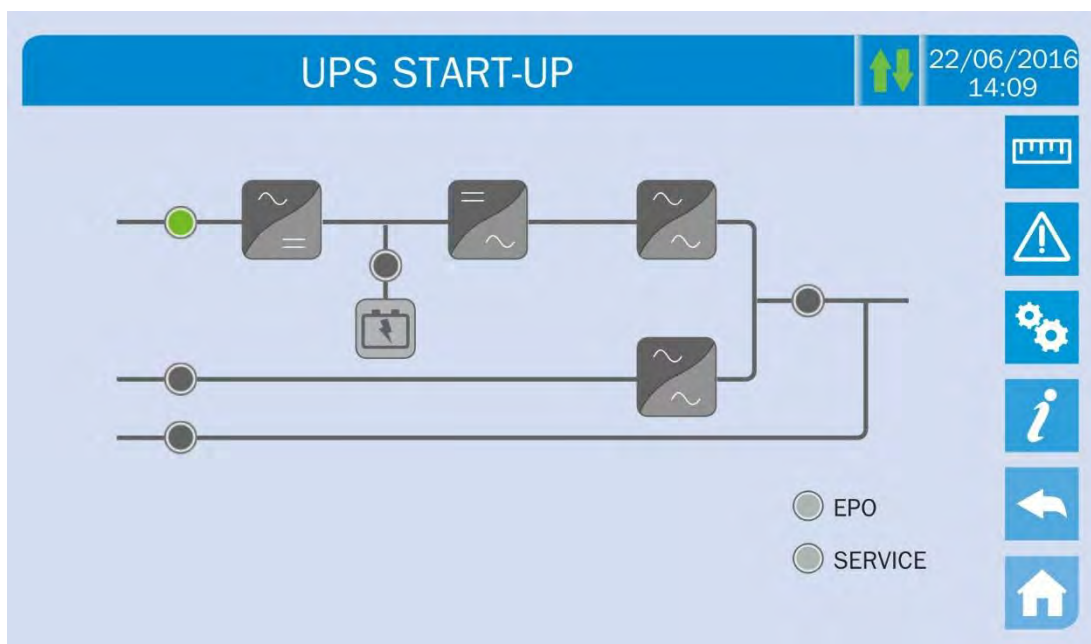
However, all the sectioning devices must be mandatorily manoeuvred under the supervision and control of engineers who are qualified to operate on electrical circuits.



Use qualified personnel only

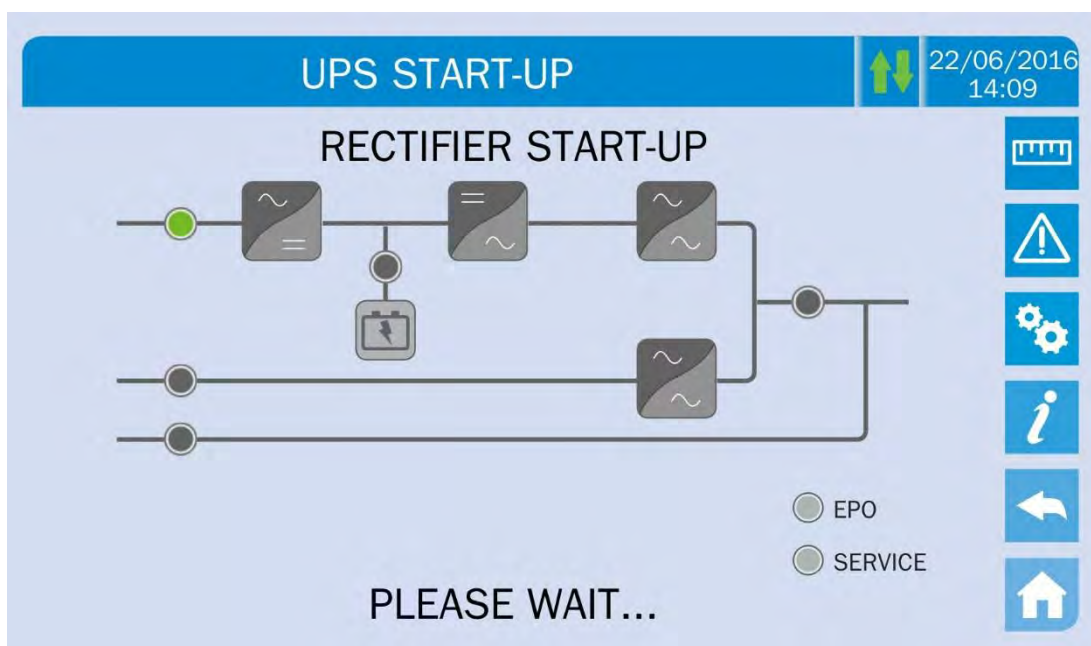
Any electrical manoeuvre must be carried out by qualified and trained personnel.

- 1) Close the rectifier input switch RCB. After some seconds the *touch screen* will start and will show the UPS mimic diagram.

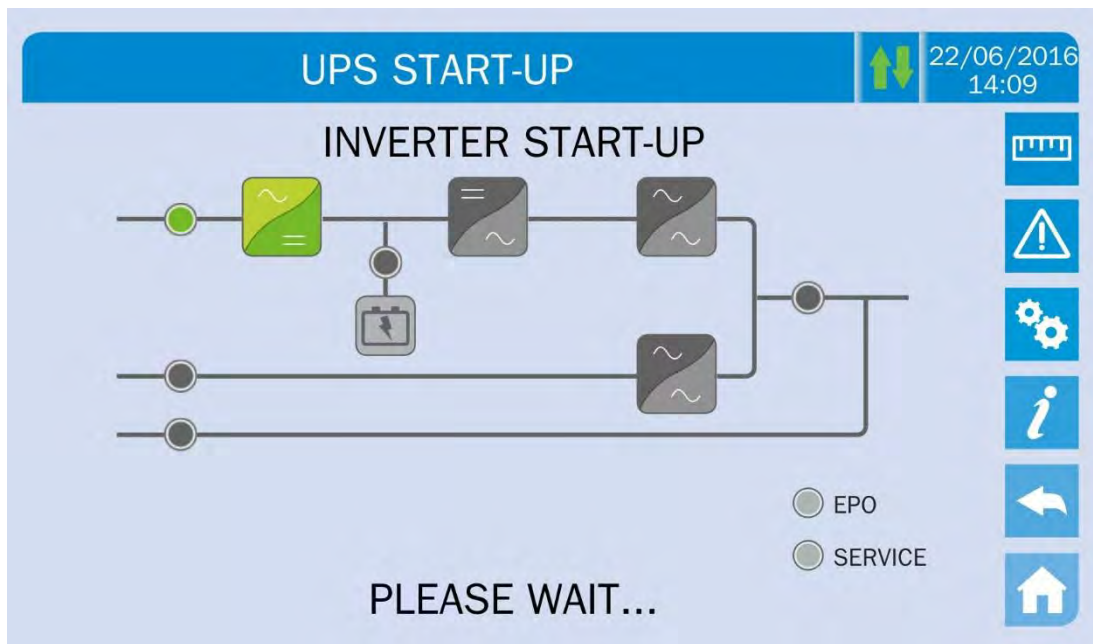


Picture 10 – UPS start-up page

- 2) After the software loading phase the control logic will acquire the system status and the operation of the RCB switch, and will show the operating sequences.

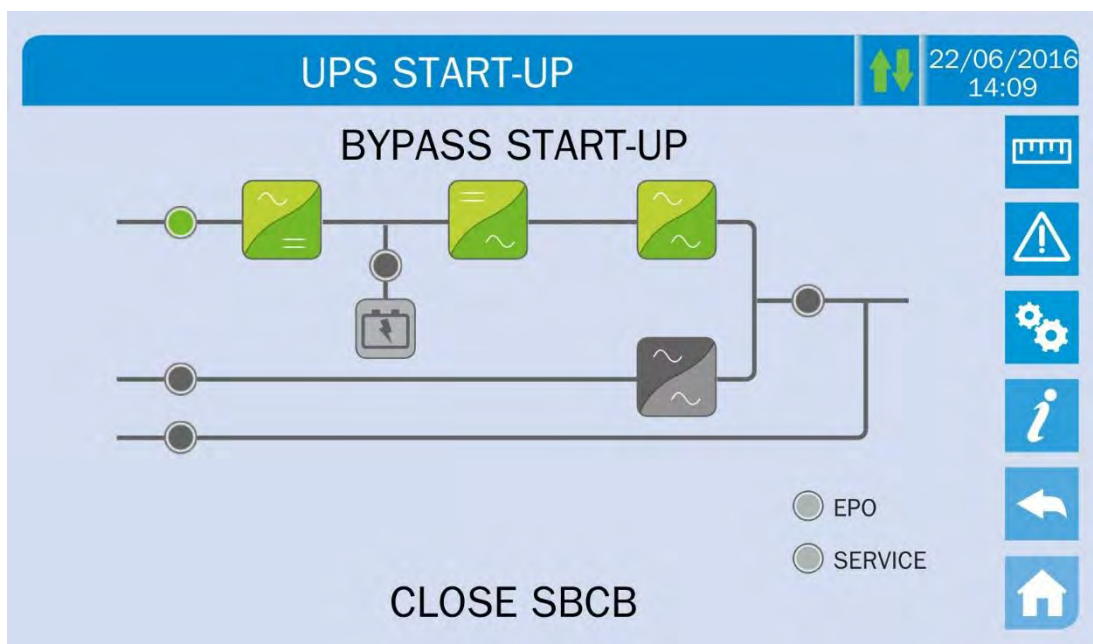


Picture 11 – Rectifier start-up



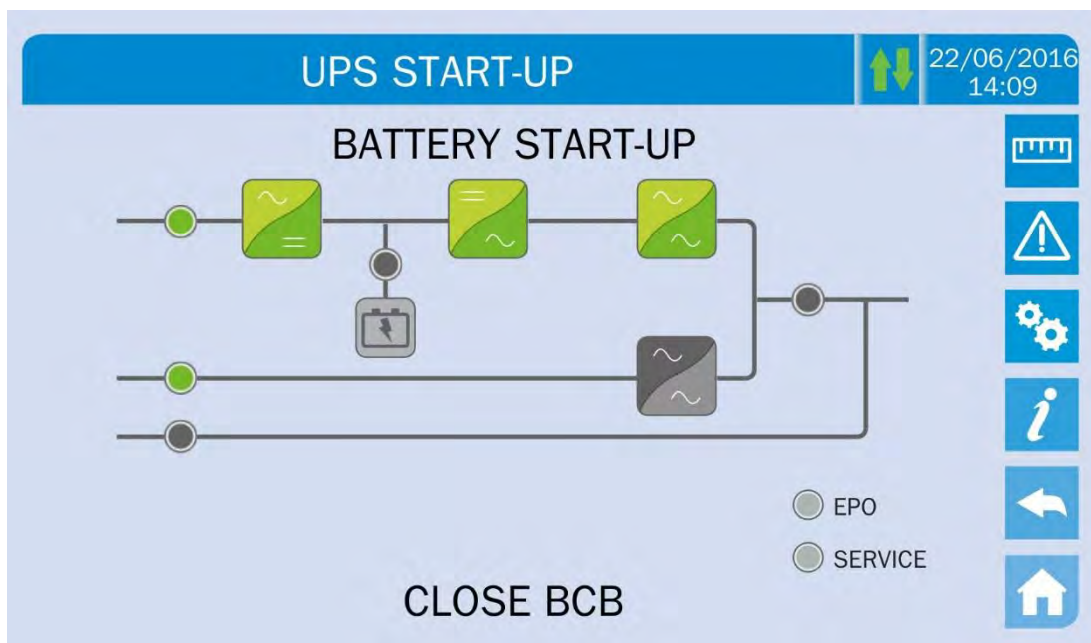
Picture 12 – Inverter start-up

- 3) As the inverter is correctly started-up, close the bypass switch SBCB when indicated by the display. The logic will check the correctness of the bypass phase sequence and RMS voltage value.



Picture 13 – Bypass start-up

- 4) Close the battery switch BCB when indicated by the display.



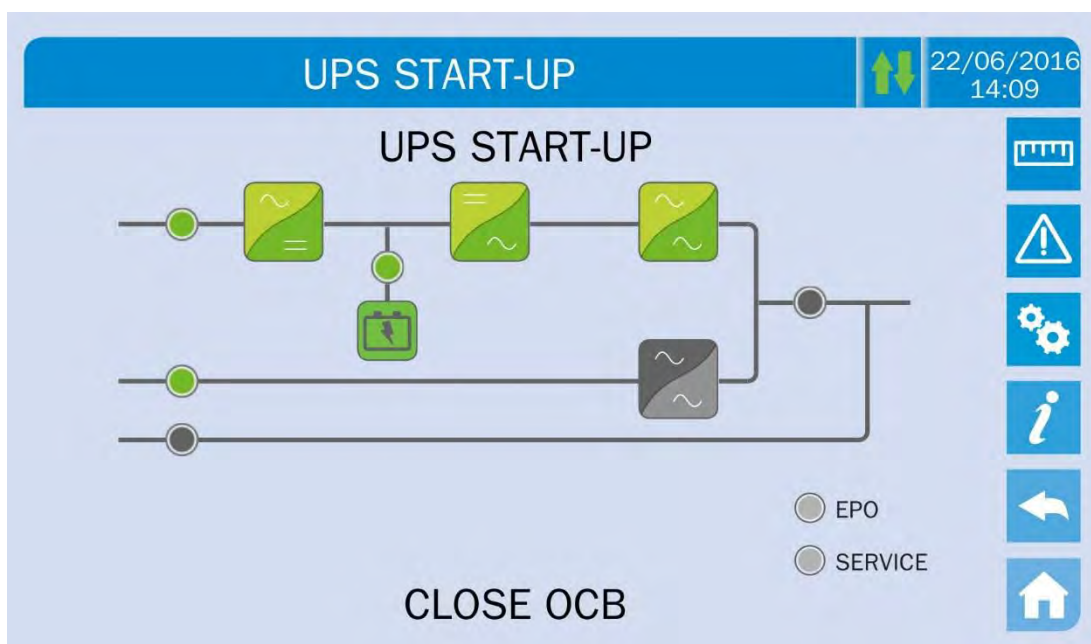
Picture 14 – Battery start-up



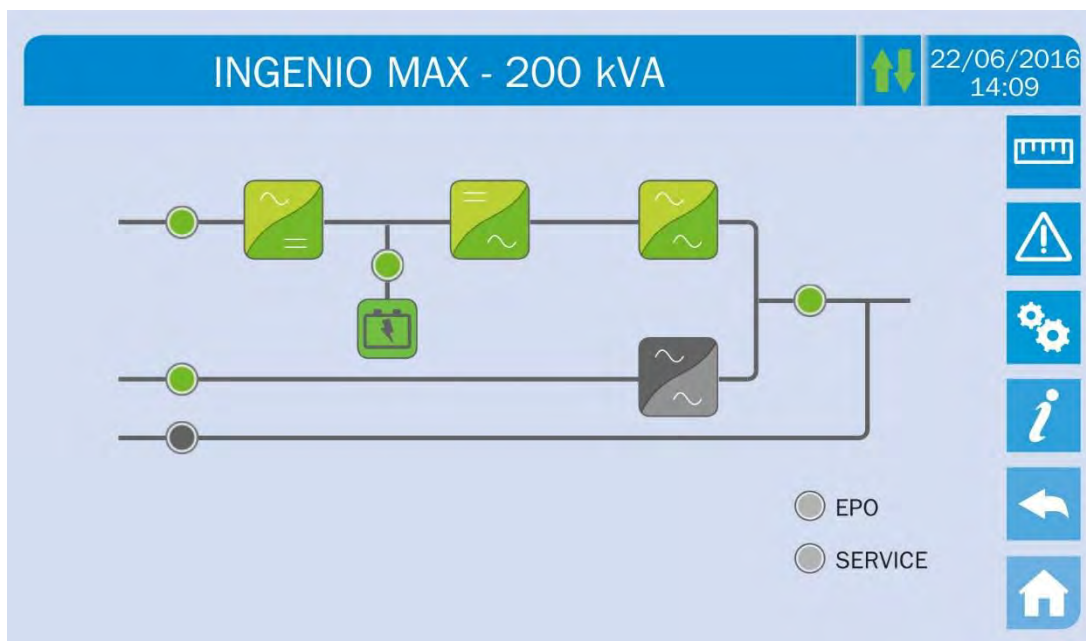
Operation on BCB switch

The switch BCB, located in the external battery cabinet, can only be closed if the DC voltage is in tolerance. Serious damages both to the battery and the equipment may occur if the breaker is closed before the front panel requires it.

- 5) Close the UPS output switch OCB to connect the UPS to the load bus. After this operation the start-up is completed and the display will show the final mimic diagram.



Picture 15 – Connecting the UPS to the load



Picture 16 – Start-up end

10.3 Shut-down procedure

- 1) Open the switch **OCB**.
- 2) Open the switch **BCB**.
- 3) Open the switch **SBCB**.
- 4) Open the switch **RCB**.

10.4 SWITCHING PROCEDURE TO MANUAL BYPASS

The load is transferred to Manual Bypass with no interruption of supply to the loads. In this configuration, the system can be restarted via the return procedure from load on manual bypass, without the need to de-energize the loads.



Manual bypass

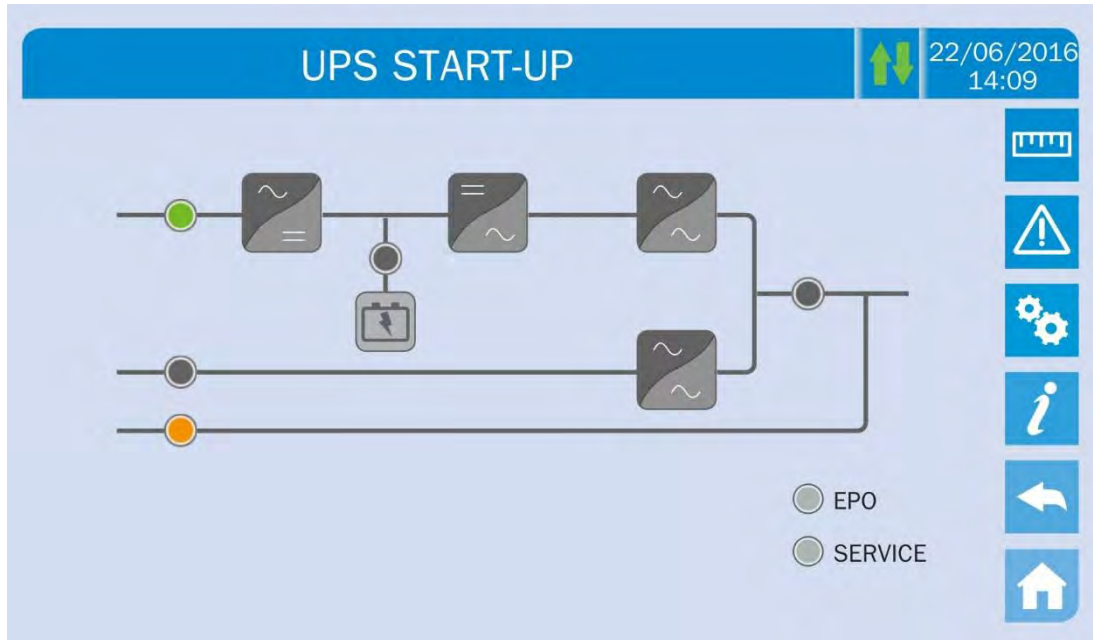
To perform the switching procedure correctly, make sure no alarms are present on the system. During Manual Bypass the load is supplied directly by the input mains, therefore continuous supply cannot be guaranteed to the loads.

- 1) Move the *Bypass_SW* selector to the **BYPASS** position.
- 2) Close the switch **MBCB**.
- 3) Open the switch **OCB**.
- 4) Open the switch **BCB**.
- 5) Open the switch **SBCB**.
- 6) Open the switch **RCB**.

10.5 Restart from Manual bypass

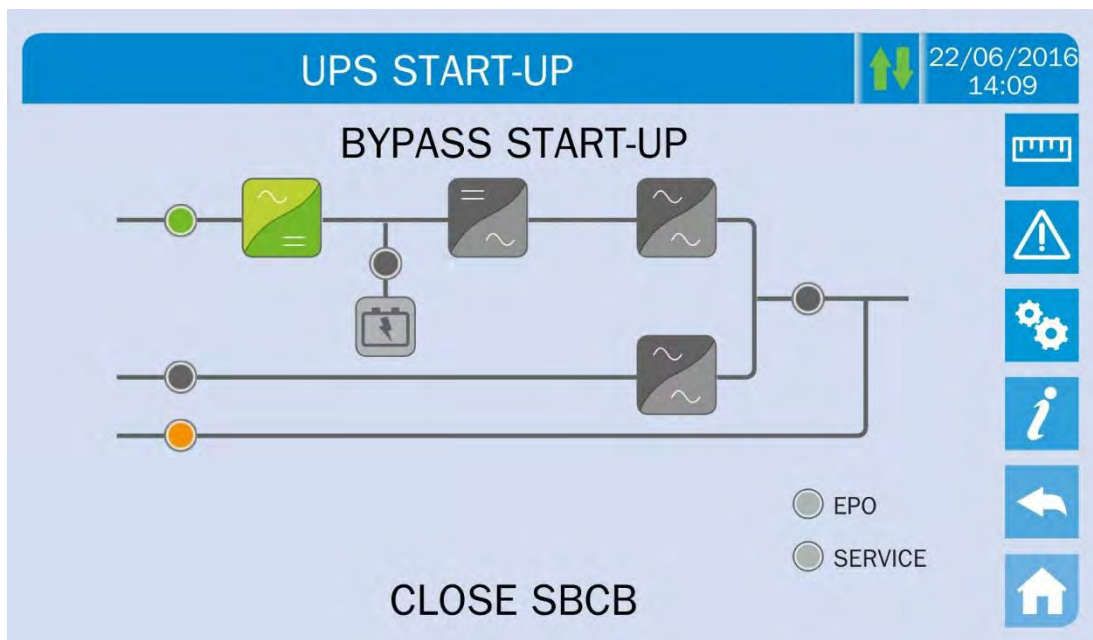
Before restarting the UPS from manual bypass, make sure the "Bypass_Sw" selector is in *BYPASS* position and the MCBB isolator is closed.

- 1) Close the rectifier input switch RCB. After some seconds the *touch screen* will start and will show the UPS mimic diagram.



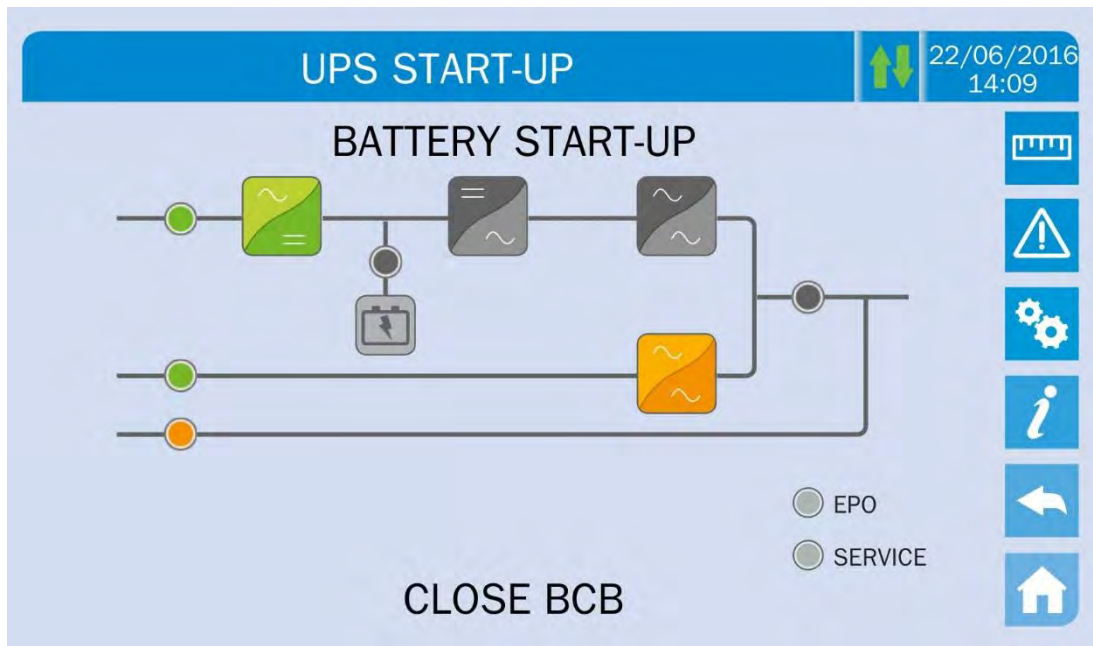
Picture 17 – Start-up from manual bypass

- 2) After the software loading phase the control logic will acquire the system status and the operation of the RCB switch, and will show the operating sequences. Close the switch SBCB as requested.



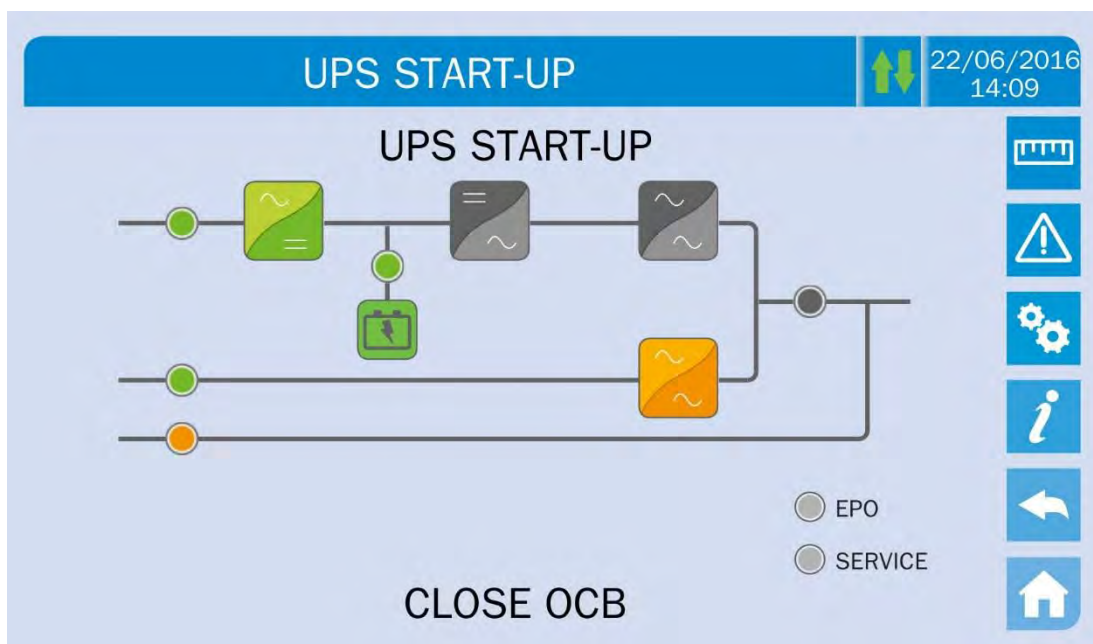
Picture 18 – Bypass start-up

- 3) Close the battery switch BCB when indicated by the display.

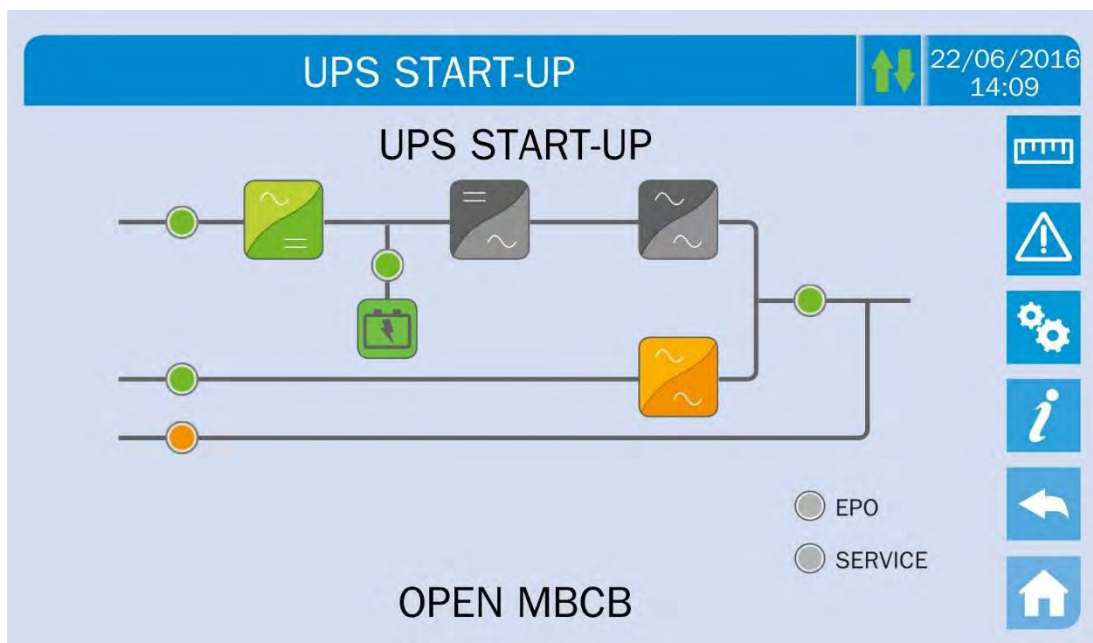


Picture 19 – Connecting the battery

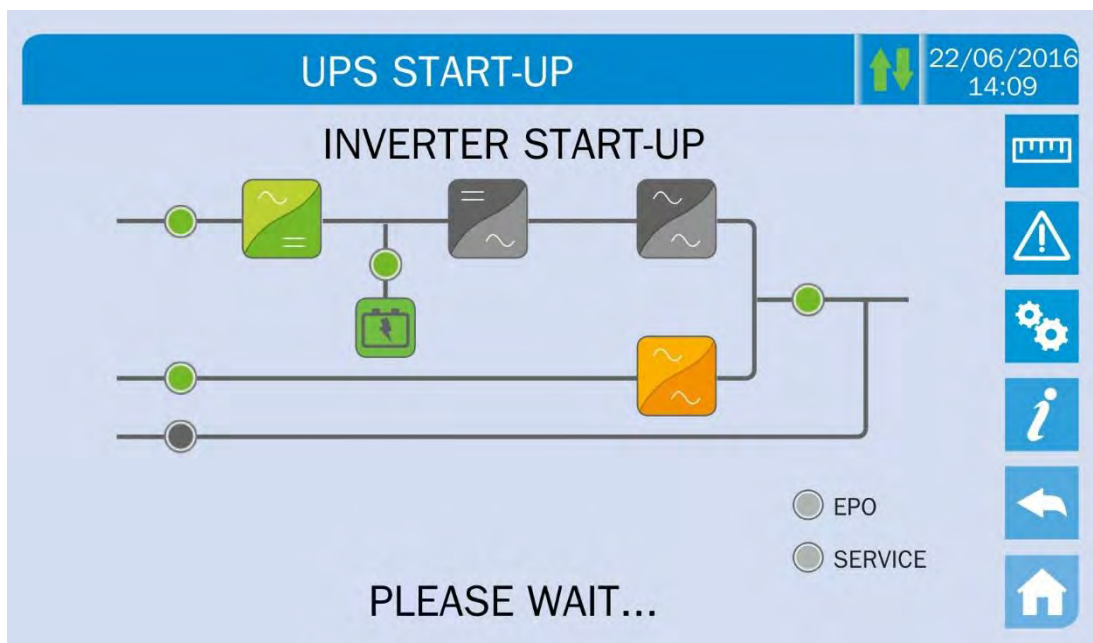
- 4) Close the output switch OCB when required and immediately after the display will require to open the manual bypass switch MBCB. The inverter will start.



Picture 20 – Closing the UPS output switch

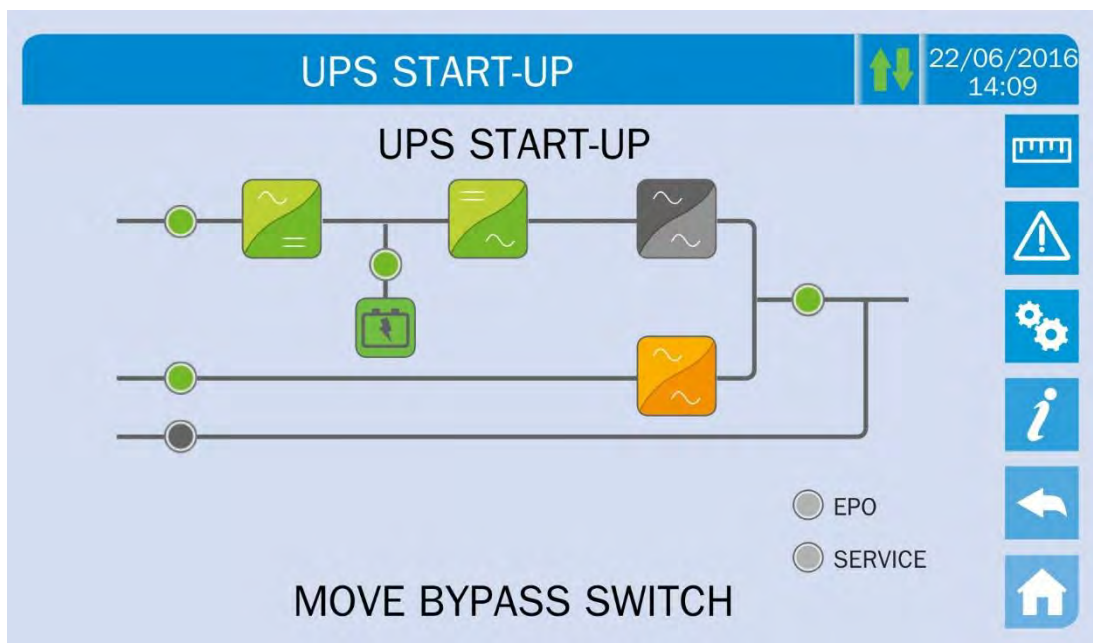


Picture 21 – Opening the manual bypass switch

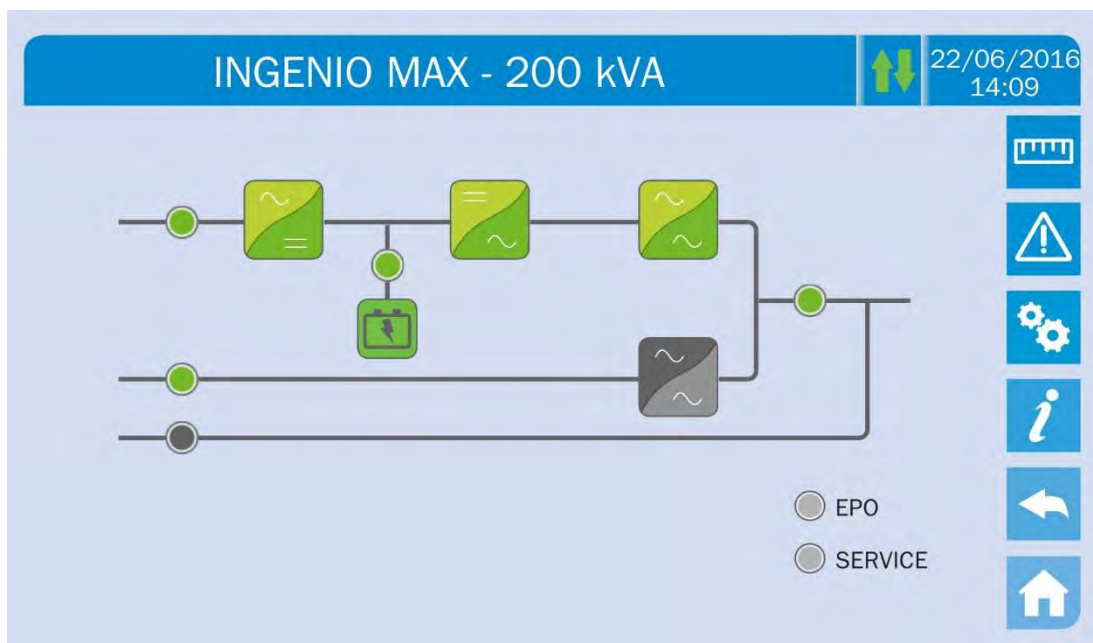


Picture 22 – Inverter start-up

- 5) As soon as the inverter is started it will be possible to transfer the load. Move the bypass switch as required by the display to complete the UPS start-up.



Picture 23 – Transferring the load



Picture 24 – Re-start from manual bypass completed

11 General UPS Description

11.1 Typology

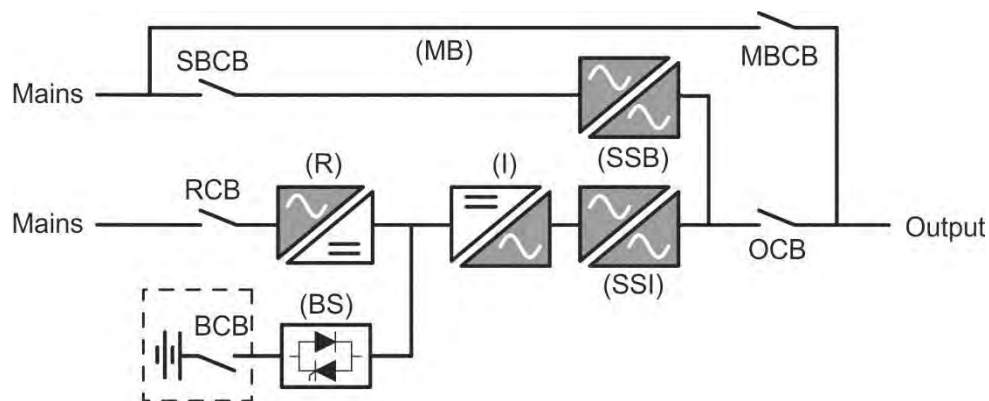
The UPS described in this manual is on-line, double conversion; the inverter included in the UPS always supplies energy to the load, whether mains is available or not (according to the battery autonomy time).

This configuration guarantees the best service to the User, as it supplies clean power uninterruptedly, ensuring voltage and frequency stabilization at nominal value. Thanks to the double conversion, it makes the load completely immune from micro-interruptions and from excessive mains variations, and prevents damage to critical loads (Computer - Instrumentation - Scientific equipment etc.).



Output voltage present

The line connected to the UPS output is energized even during mains failure, therefore in compliance with the prescriptions of IEC EN62040-1-2, the installer will have to identify the line or the plugs supplied by the UPS making the User aware of this fact.



Picture 25 – Block diagram

The UPS uses IGBT technology with a high switching frequency in order to allow a low distortion of the current re-injected into the supply line, as well as high quality and stability of output voltage. The components used assure high reliability, very high efficiency and maintenance easiness.

11.2 System Description

11.2.1 Rectifier

It converts the three-phase voltage of the AC mains into continuous DC voltage.

It uses a three-phase fully-controlled IGBT bridge with a low harmonic absorption.

The control electronics uses a 32 bit μP of latest generation that allows to reduce the distortion of the current absorbed by mains (THDi) to less than 3%. This ensures that the rectifier does not distort the supply mains, with regard to the other loads. It also avoids cable overheating due to the harmonics circulation.

The rectifier is so sized as to supply the inverter at full load and the battery at the maximum charging current.

11.2.2 Inverter

It converts the direct voltage coming from the rectifier or from the DC battery into alternating AC voltage stabilized in amplitude and frequency.

The inverter uses a 3-level power conversion bridge with IGBT technology in order to work with a high switching frequency of approximately 8 kHz. The control electronics uses a 32 Bit μ P of latest generation that, thanks to its processing capability, generates an excellent output sine-wave.

Moreover, the fully digital control of the output sine-wave allows to achieve high performances, among which a very low voltage distortion even in presence of high-distorting loads.

11.2.3 Battery and battery charger

The battery is installed outside the UPS. It is generally housed in an external battery cabinet.

The battery charger logic is completely integrated in the rectifier's control electronics.

The battery is charged, according to the DIN 41773 Standard, every time it has been partially or completely discharged. When its full capacity is restored, it is disconnected from the DC bus by means of a static switch, in order to save energy, reduce the stress due to the AC ripple thus increasing the lifetime. This operating mode is called Green Conversion.

It is however periodically charged but the prevailing state is of complete rest.

11.2.4 Static bypass

The Static Bypass allows to transfer the load between Inverter and Emergency Mains, and vice-versa, in a very short time, and uses SCR's as power commutation elements.

11.2.5 Manual bypass

The Manual Bypass is used to cut off the UPS completely, supplying the load directly from the input mains in case of maintenance or serious failure.



Follow the procedures contained in the manual

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.



External manual bypass

In the UPS system the manual bypass isolator is optional and installed outside the unit.

11.3 Operating Status

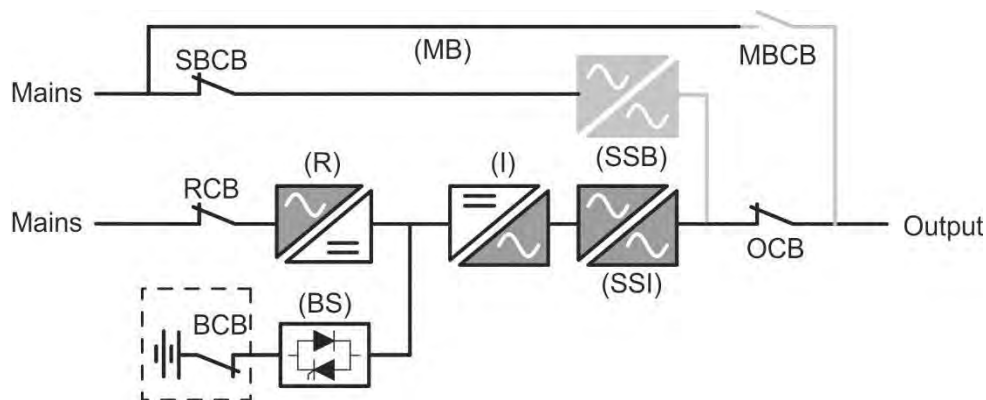
The UPS has five different operating modes, as described below:

- Normal operation
- Green Conversion
- Bypass operation
- Battery operation
- Manual bypass

11.3.1 Normal operation

During normal operation all the circuit breakers/isolators are closed, except for MCB (maintenance bypass).

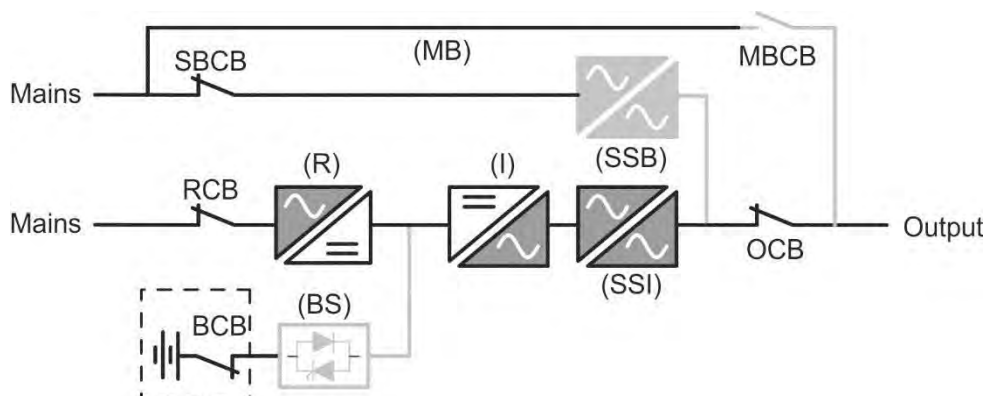
The rectifier is supplied by the AC three-phase input voltage which, on its turn, feeds the inverter and compensates mains voltage as well as load variations, keeping the DC voltage constant. At the same time, it provides to charge the battery. The inverter converts the DC voltage into an AC sine-wave with stabilized voltage and frequency, and also supplies the load via its static switch SSI.



Picture 26 – Normal operation

11.3.2 Green Conversion

During the operation in Green Conversion mode the battery is disconnected from the DC bus by means of a static switch (see picture) and the rectifier works at reduced DC voltage; a control algorithm provides to periodically re-connect the battery for recharge purposes (intermittent charging).



Picture 27 – Green Conversion

When the Green Conversion algorithm is active the rectifier operates at reduced DC voltage and supplies the inverter alone, since the battery is disconnected from the DC bus.

The battery charge is controlled by a specific algorithm. In case no mains outage events have occurred, and so no battery discharges have occurred too, the control logic provides to start a charging cycle once every 25 days. The battery-charger restores the capacity lost due to the self-discharge and remains in floating charge for additional 12 hours. As this time has elapsed the battery static switch is opened and the battery is disconnected from the DC bus.

In case a discharge event occurs, the control logic provides to calculate the capacity which has been lost during the discharge; as the mains is restored a charging cycle is started, which is extended for an additional time that depends on the percentage of lost capacity, referred to the rated value.

- Lost capacity < 10% ➔ Additional charge for 12 hours
- Lost capacity between 10% and 20% ➔ Additional charge for 48 hours
- Lost capacity > 20% ➔ Additional charge for 96 hours

Such values comply with the recommendations of the main battery manufacturers.

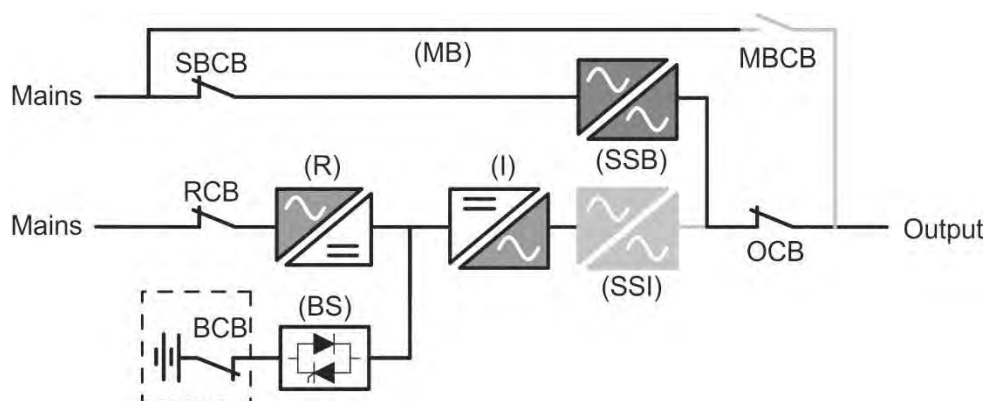


Set the right battery capacity

The UPS front panel allows the setting of the battery parameters, including the rated capacity. Considering the importance that such value assumes for the correct execution of the charge control algorithm, it is highly recommended to verify the correctness of the programmed value.

11.3.3 Bypass operation

The load can be switched to bypass either automatically or manually. The manual changeover is due to the BYPASS SWITCH which forces the load to bypass. In case of failure of the bypass line, the load is switched back to inverter without interruption.



Picture 28 – Load supplied by bypass

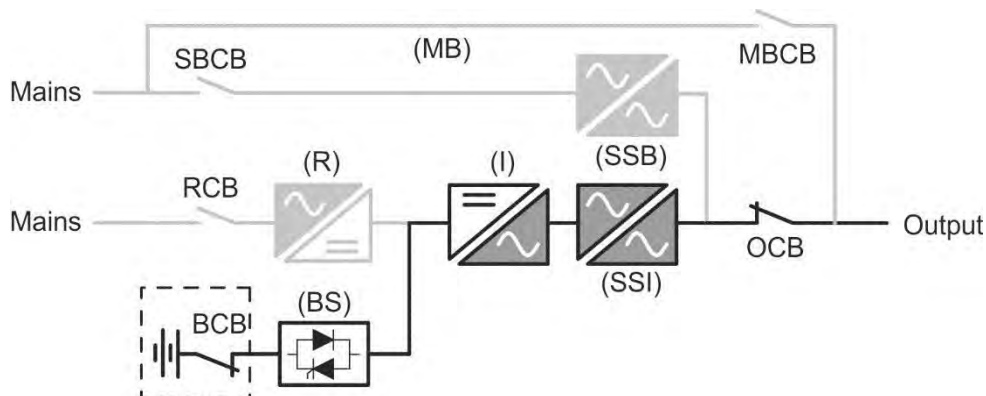
11.3.4 Battery operation

In case of power failure or rectifier fault, the battery feeds the inverter without interruption. The battery voltage drops based on the amplitude of the discharging current. The voltage drop has no effect on the output voltage, which is kept constant by changing the PWM modulation. An alarm is activated when the battery is near the minimum discharge value.

In case the supply is restored before the battery is completely discharged, the system will be switched back to normal operation automatically. In the opposite case, the inverter shuts down and the load is switched to the bypass line (bypass operation). If the bypass line is not available or is out of tolerance, the loads supply is interrupted as soon as the battery reaches the discharge limit threshold (black-out). As soon as the supply is restored, the rectifier will recharge the battery. In the standard configuration, the loads are supplied again via static switch SSB when mains is available again. The inverter is restarted when the battery has partially restored its capacity.

The system restart from the black-out condition can be customized based on the requirements of the plant, in three different modes:

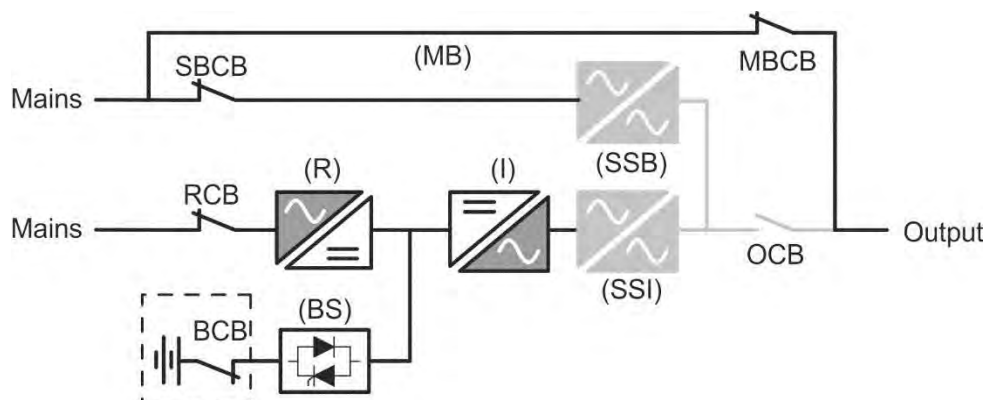
- Bypass → loads are supplied as soon as the bypass line is available (factory configuration).
- Inverter → loads are supplied by the inverter (even if the bypass line is available) when the battery voltage has reached a programmed threshold, after the rectifier restart.
- Man. Inverter → the output supply is NOT restored automatically. The system requires a confirmation to restart which can only be done manually by the user via the front panel.



Picture 29 – Battery operation

11.3.5 Manual bypass

The manual bypass operation is necessary whenever the UPS functionality is tested, or during maintenance or repair work.



Picture 30 – Manual bypass for functional checks



Follow the procedures contained in the manual

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.

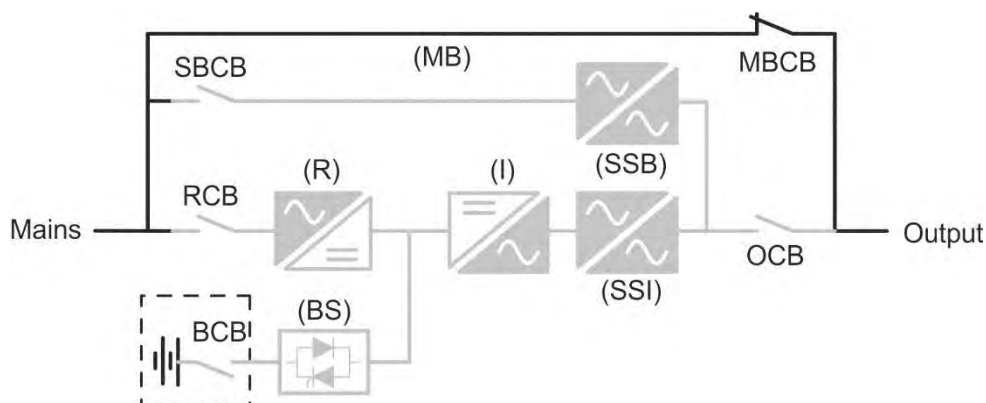


Wiring of the auxiliary contacts

Carry out a proper electrical installation by wiring the auxiliary contacts of the manual bypass and output isolators to the dedicated terminals on board the UPS. This will allow the control logic to acquire the status of the switches and guide the operator during the start-up and manual bypass procedures.

For further information refer to the section "Installation and start-up".

During the manual bypass due to repair or maintenance, the UPS is completely shut down and the load is directly supplied by the bypass line.



Picture 31 – Manual bypass for repair or maintenance works

11.4 Control and Operation Devices

The control and operation devices of the UPS are indicated below:

- Isolator on rectifier input (RCB)
- Isolator on bypass input (SBCB)
- Isolator on UPS output (OCB)
- Manual bypass isolator (MBCB)
- Battery Isolator / Circuit breaker (BCB) - External, inside the battery cabinet
- Emergency power off button (EPO)
- Normal/Bypass selector
- Touch screen control panel



Check the personnel training

The use of the operation and control devices of the UPS is intended for authorized personnel only. We recommend to check the training of the personnel responsible for the use and maintenance of the system.

11.4.1 Isolators

The isolators provided on the UPS are used to isolate the power components of the device from the AC supply line, from the storage battery and from the load.



Voltage present on terminals

The isolators do not isolate the UPS completely, since AC voltage is still present on the UPS input terminals. Before carrying out any maintenance on the unit:

- Isolate the device completely by operating the external circuit breakers;
- Wait at least 5 minutes in order to allow the capacitors to discharge.

11.4.2 Emergency Power Off Command (EPO)

The emergency power off command is used to disconnect the UPS output immediately, interrupting the loads supply. It also shuts down the inverter.



Operate the command only in case of real emergency

The components of the system are subject to a high stress when the emergency power off command is operated under load presence.

Use the emergency power off button only in case of real emergency.



Supply reset

Reset the output supply only when the causes which led to the emergency shutdown have been eliminated and you are sure that there is no hazard to persons and things.

11.4.3 Normal/Bypass Selector

The Normal/Bypass selector is installed externally, on the rear of UPS. It is generally used during the manual bypass procedure, when it is necessary to isolate the UPS for maintenance or repair.



Follow the procedures contained in the manual

The Normal/Bypass selector shall only be operated in accordance with the procedures specified in the installation and start-up section. The manufacturer cannot accept responsibility for damages arising from incorrect operation.

11.4.4 LCD control panel

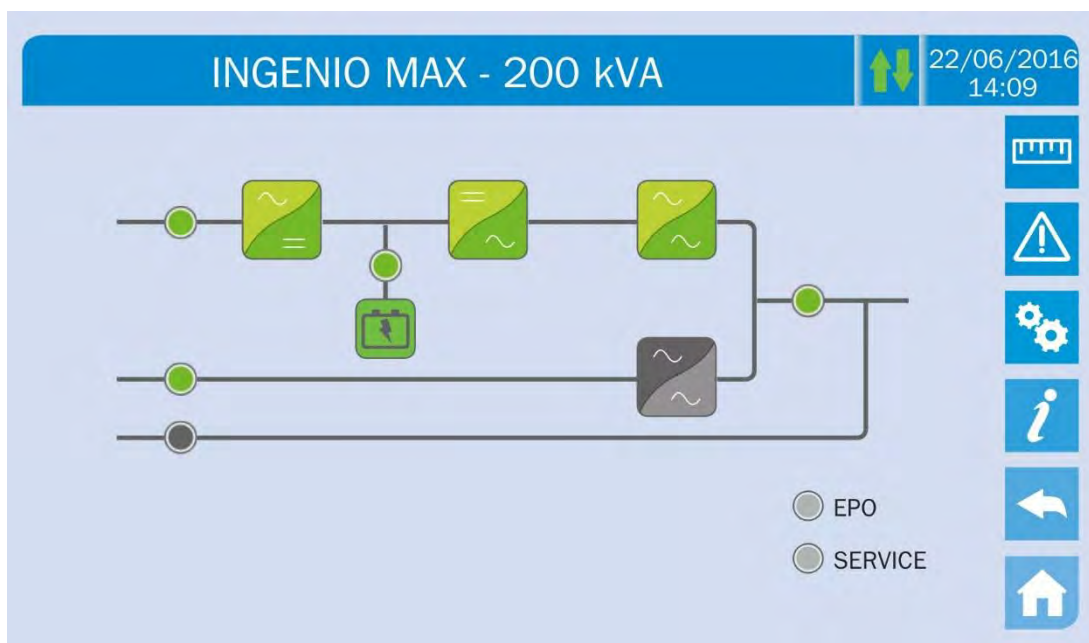
The control panel of the UPS is used in order to:

- Check the operating parameters of the device
- Check the alarms present
- Access the event log
- Display the information on the device
- Modify the operating parameters

The menu which allows to change the parameters is password-protected in order to prevent access to unauthorized personnel.

12 CONTROL panel

The UPS control panel is a 10.1" *touch screen* which dialogues with the I/O module control logic via serial protocol. The main page (**Home**) shows the system flow diagram, from which all the UPS operating variables can be displayed.



Picture 32 – UPS front panel, Home page

12.1 ICONS

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

Icon	Assigned functions	
	<i>Measures</i>	Enters the <i>Measures</i> section
	<i>Alarms</i>	Enters the <i>Alarms</i> section and resets the buzzer if activated
	<i>Settings</i>	Enters the <i>Settings</i> section
	<i>Info</i>	Enters the <i>Info</i> section
	<i>Back</i>	Goes back one page
	<i>Home</i>	Goes back to the <i>Home</i> page
	<i>Communication</i>	Controls the communication between the panel and the UPS electronics

12.1.1Icons colours

The icons can take on different colours on the basis of the UPS operating condition; in general the basic colours are:

- Light blue → It indicates that the section is related to the UPS.
- Grey → The keys turn grey (disabled) when the key specific section is entered.
- Red → The **Alarms** key will turn red in case an alarm occurs.

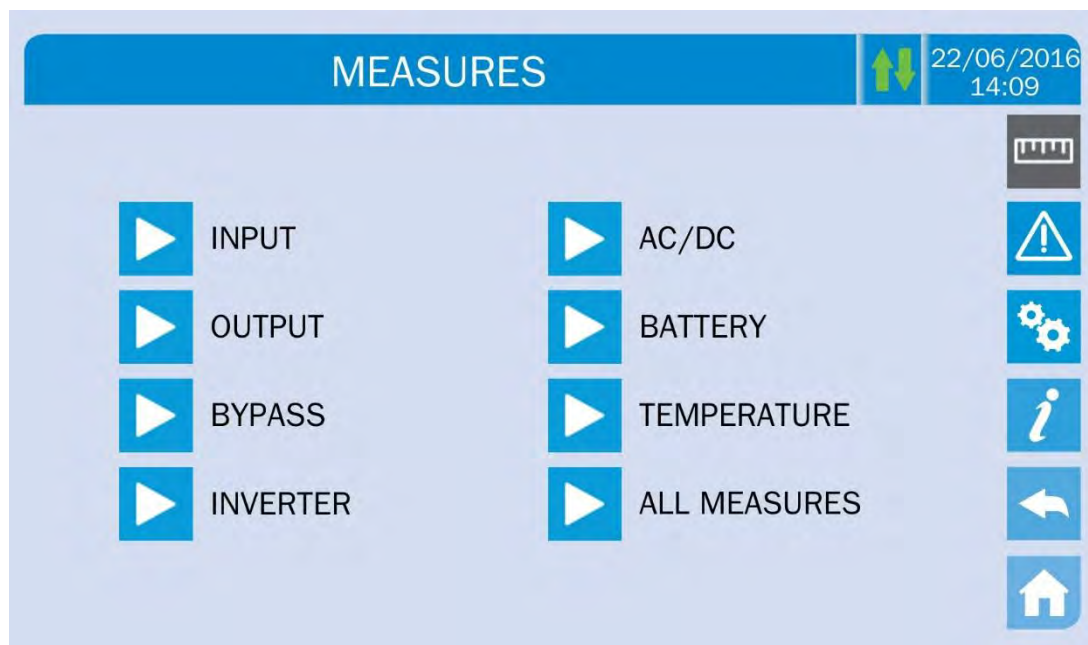
For what concern the *Communication* icon, it turns red in case of communication error between the *touch screen* and the UPS control logic.

13 Touch screen – Managing the UPS

The UPS operating parameters can be managed by entering the various sections of the control panel from the *Home* page directly.

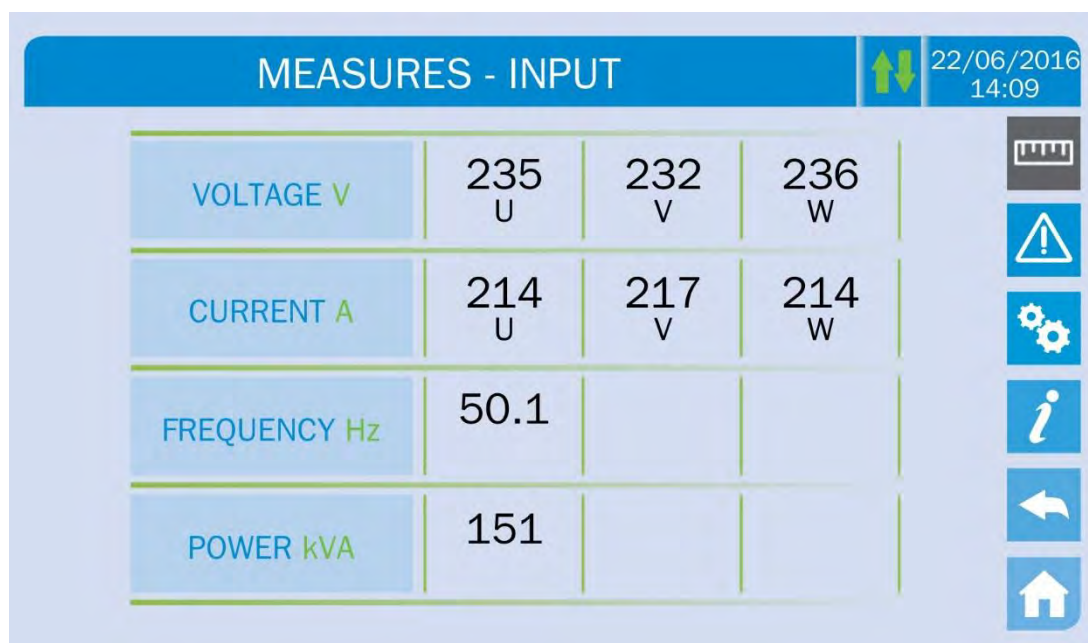
13.1 Displaying the measures

Press on the *Measures* icon to enter the main page.



Picture 33 – MEASURES section

The measures page of a specific section of the UPS is entered pressing one of the arrows. A typical *Measures* page is shown below.



Picture 34 – Input measures page

The list of all the available measures is given below.

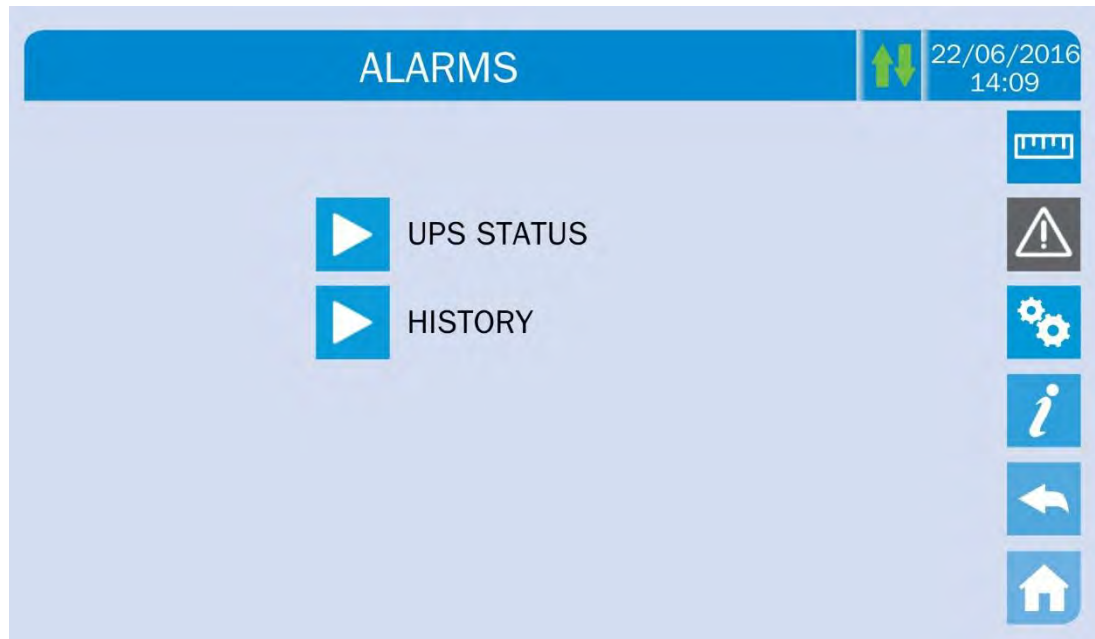
Sub-page	Displayed data	Accuracy
INPUT	Rectifier input voltage ⁽¹⁾	1 V
	Rectifier input current	1 A
	Frequency	0,1 Hz
	Input power	1 kVA
OUTPUT	Voltage ⁽¹⁾	1 V
	Current	1 A
	Load percentage	1 %
	Active power	1 kW
	Apparent power	1 kVA
	Frequency	0,1 Hz
BYPASS	Voltage ⁽¹⁾	1 V
	Frequency	0,1 Hz
INVERTER	Voltage ⁽¹⁾	1 V
	Frequency	0,1 Hz
AC / DC	Rectifier output voltage	1 V
BATTERY	Voltage and current	1 V / 1 A
	Rated capacity	1 Ah
	Residual autonomy	1 min / 1 %
TEMPERATURE ⁽²⁾	Battery	0,1° C
	UPS	0,1° C

⁽¹⁾ The voltage measures are always given referred to the phase-to-neutral value

⁽²⁾ The temperatures are displayed only if the relevant probe is installed

13.2 Basic diagnostics

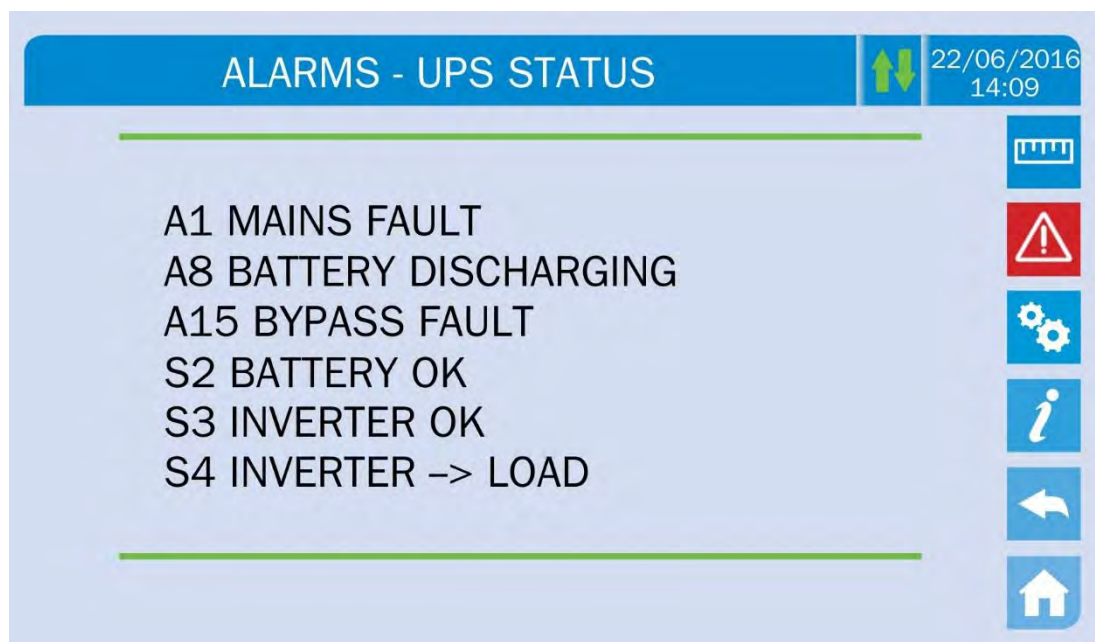
Pressing the *Alarms* icon will open the page where either the UPS operating status or the history log can be selected.



Picture 35 – ALARMS section

13.2.1 Displaying the operating status

Press *UPS status* to show the UPS operating status, which includes possible active alarms.








Picture 36 – ALARMS section

The current system status is shown; in case the list is longer than the page capacity (8 lines) it can be scrolled by sliding a finger on the screen.

13.2.2 Icons colours

The icons *Alarms* and *Home* take on different colours on the basis of both the UPS operating condition and the displayed page.

Icon	Colour	Meaning
	<i>Light blue</i> <i>Dark blue</i>	No active alarms
	Grey	No active alarms A page of the <i>Alarms</i> section is currently displayed
	Red	Active alarm; if the alarm is affecting one of the modules the relevant icon in the <i>Home</i> page will turn <i>Orange</i> or <i>Red</i>
	<i>Light blue</i>	No active alarms
	Red	Active alarms in the I/O module while a page of one of the power modules sections is currently displayed

The audible indicator, if enabled, is activated to show the occurred failure. The audible alarm is silenced by pressing the *Alarms* icon.



Automatic erasure of alarms

Should an alarm occur and then the conditions that originated it no longer exist, the alarm will be automatically cancelled and the system restarted.

13.2.3 Displaying the alarms history

ALARMS - HISTORY

22/06/2016

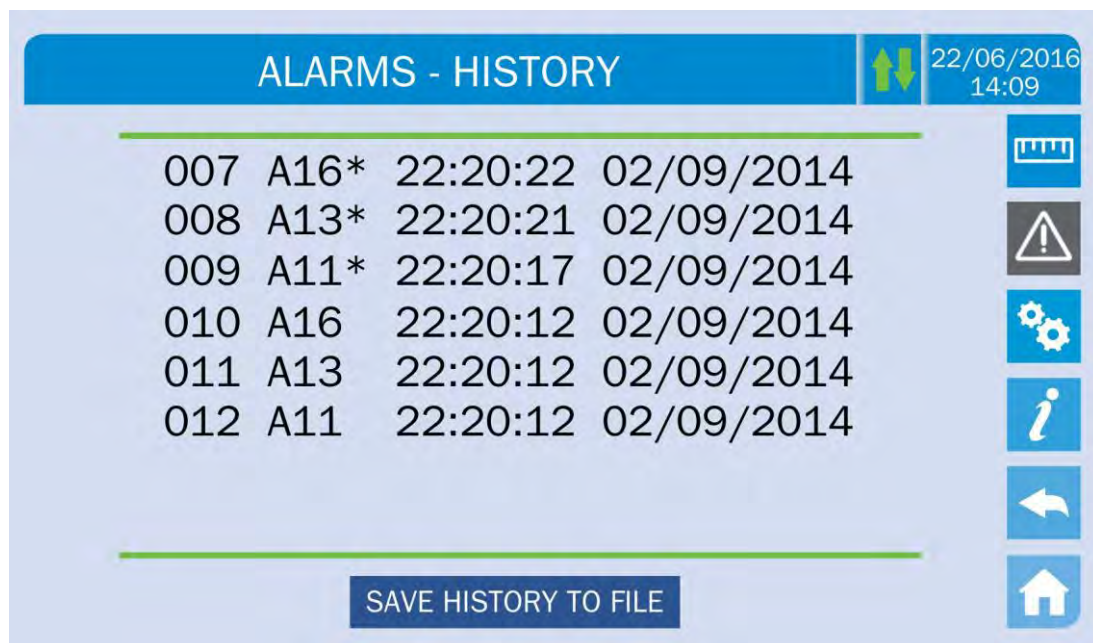
14:09

001	A8*	08:44:36	21/09/2014
002	A1*	08:44:21	21/09/2014
003	A15*	08:44:21	21/09/2014
004	A1	08:44:00	21/09/2014
005	A8	08:44:00	21/09/2014
006	A15	08:44:00	21/09/2014
007	A16*	22:20:22	02/09/2014

SAVE HISTORY TO FILE

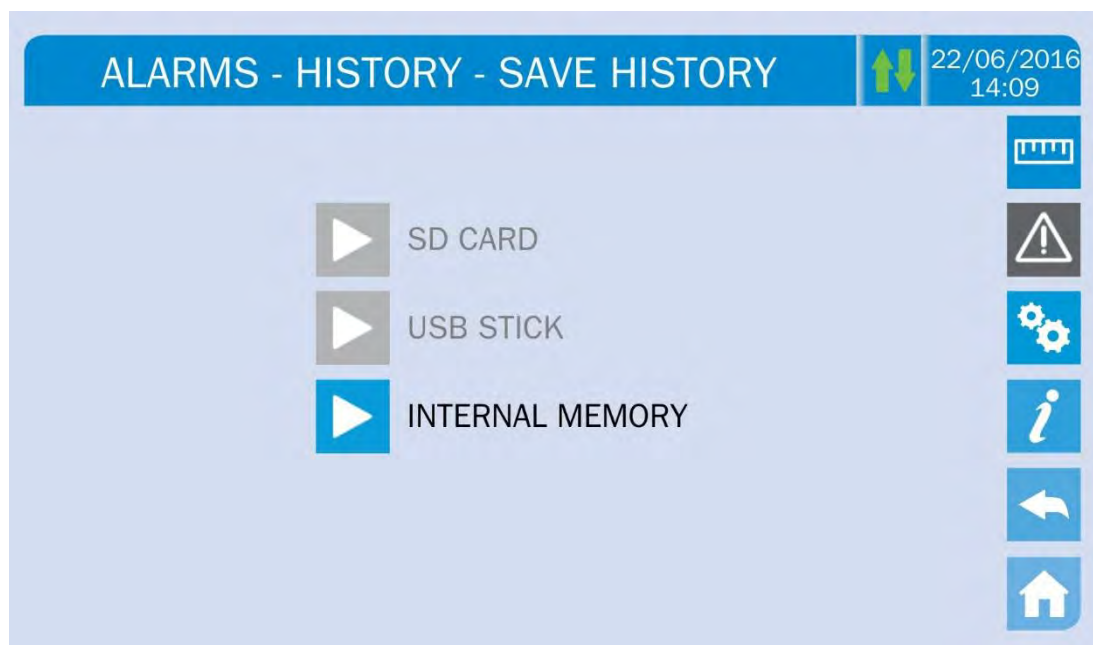
Picture 37 – History log, page 1

The first event shown is the latest one in order of time; a new event makes all the other events automatically shift one position, clearing the oldest event.
 Each line shows the number of the event (position within the list), the alarm code and date and time; an asterisk indicates the automatic reset of the alarm.
 The maximum number of events which can be shown is equal to 250.
 The events log can be scrolled by sliding a finger on the screen.



Picture 38 – History log, page 2

Pressing the key *Save history to file* will open the following page.



Picture 39 – Saving the history log

The *touch screen* automatically recognizes when an external memory support (USB stick or SD card) is inserted, and changes the colour of the relevant icon from grey (disabled) to blue (enabled).
 The text file that will be saved contains the same information available on the *History* pages, completed with the description of each event.

ALARMS

A1	MAINS FAULT	A29	MAINTENANCE REQ
A2	INPUT WRONG SEQ	A30	COMMON ALARM
A3	BOOSTER STOPPED	A31	MBCB BUS CLOSED
A4	BOOSTER FAULT	A32	EPO BUS CLOSED
A5	DC VOLTAGE FAULT	A33	ASYMMETRIC LOAD
A6	BATTERY IN TEST	A34	SERVICE REQUIRED
A7	BCB OPEN	A35	DIESEL MODE
A8	BATTERY DISCHARGE	A36	DC FASTSHUTDOWN
A9	BATTERY AUT END	A38	INV --> LOAD
A10	BATTERY FAULT	A39	INV ERROR LOOP
A11	SHORT CIRCUIT	A40	SSI FAULT
A12	STOP TIMEOUT SC	A41	RECT ERROR LOOP
A13	INV OUT OF TOL	A45	HIGH TEMP SSW
A14	BYPASS WR SEQ	A46	PAR LOST REDUND
A15	BYPASS FAULT	A47	SEND PARAM ERROR
A16	BYPASS --> LOAD	A48	RCV PARAM ERROR
A17	RETRANSFER BLOCK	A49	TEST MODE ERROR
A18	MBCB CLOSED	A50	SSW BLOCKED
A19	OCB OPEN	A51	BATT TEMPERATURE
A20	OVERLOAD	A52	INVERTER BLOCK
A21	THERMAL IMAGE	A53	FIRMWARE ERROR
A22	BYPASS SWITCH	A54	CAN ERROR
A23	EPO PRESSED	A55	PAR CABLE DISC
A24	HIGH TEMPERATURE	A56	MAINS UNBALANCE
A25	INVERTER OFF	A57	INPUT CURRENT UNBALANCE
A26	COMMUNIC ERROR	A58	INVERER CURRENT UNBALANCE
A27	EEPROM ERROR	A59	BACKFEED RELAY ON
A28	CRITICAL FAULT	A63	START SEQ BLOCK

STATUS

S1	BOOSTER OK	S12	BATT STANDBY
S2	BATTERY OK	S13	BATT CHARGING
S3	INVERTER OK	S14	BATT FLOATING
S4	INVERTER --> LOAD		
S5	INV BYPASS SYNC		
S6	BYPASS OK		
S7	BYPASS --> LOAD		
S9	INV MASTER SYNC		



Display and recording mode of alarms

- The statuses are always displayed in ascending order when the **ALARMS – STATUS** menu is entered.
- The alarms are shown when they are present and must be silenced with the buzzer.
- The alarms remain displayed whilst they are present and they are automatically stored in the event log with date and time.

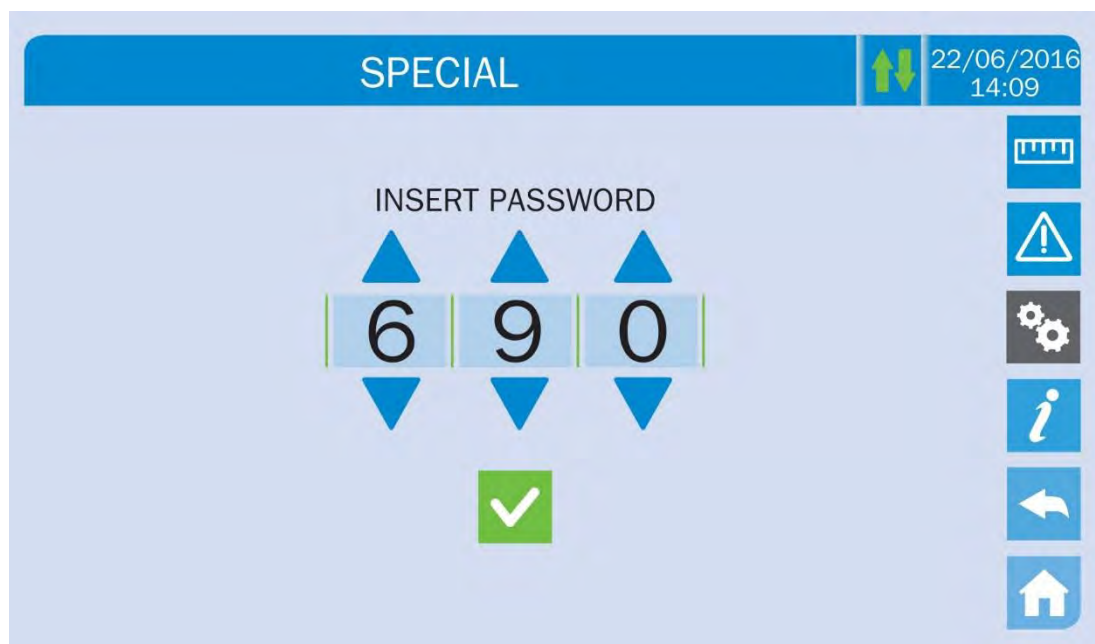


Description of alarms and statuses

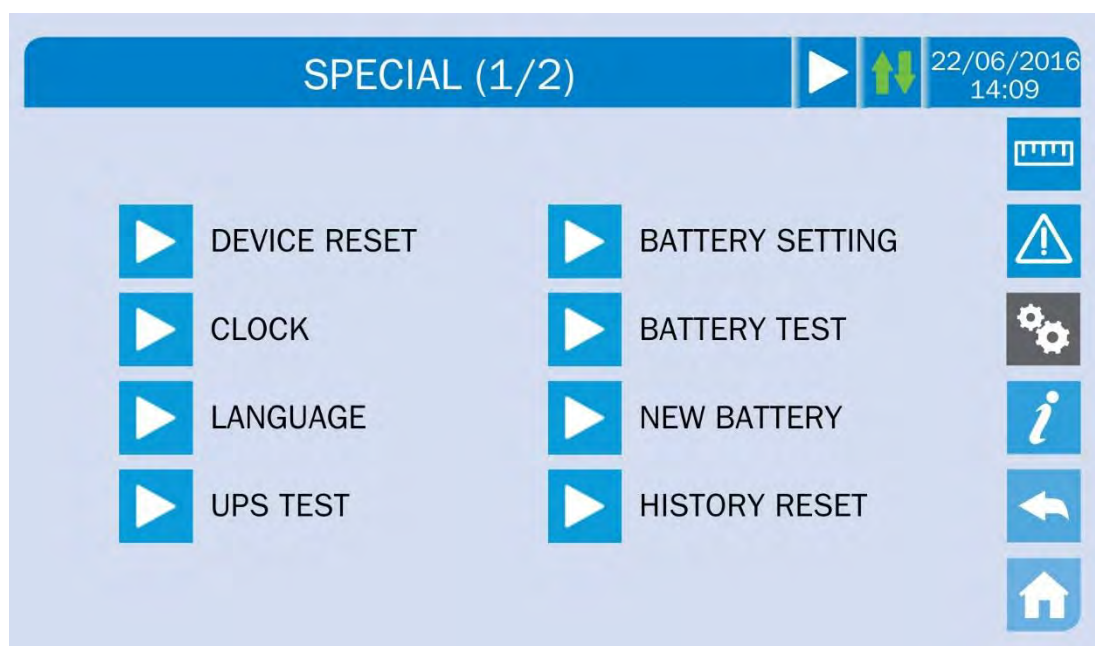
For a more detailed description of the alarms and statuses, see the “Faults and alarms” section of the present manual.

13.3 Settings and advanced operations

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

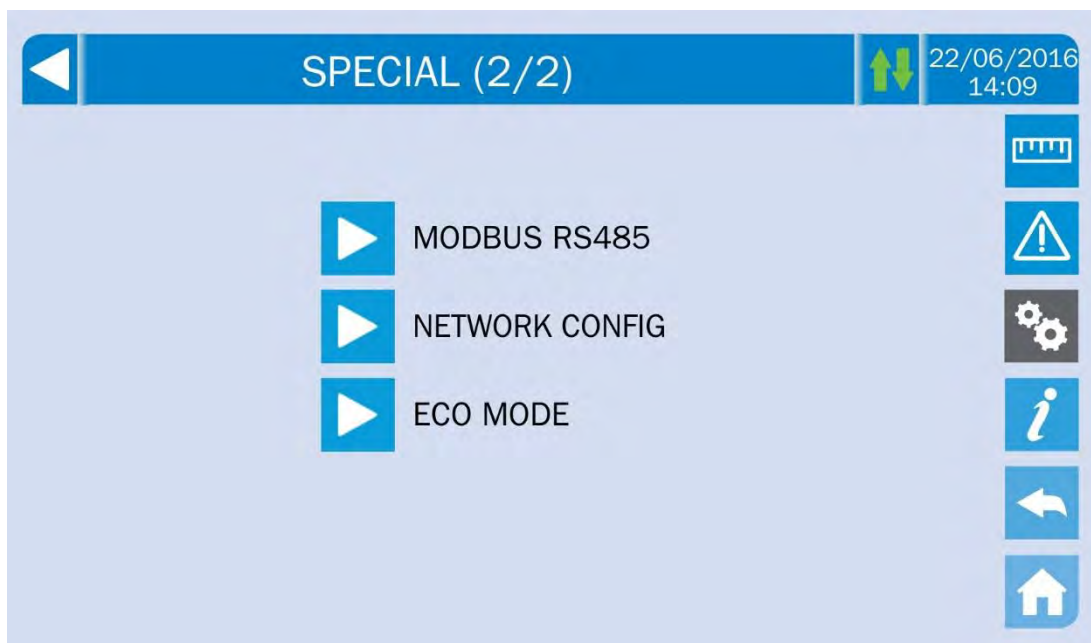


Picture 40 – Access password to the Settings section



Picture 41 – SETTINGS section, page 1

The arrow in the upper main bar indicates that the section contains further pages.



Picture 42 – SETTINGS section, page 2



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.

13.3.1 Resetting the device

The UPS is equipped with internal protections which block the system or some of its sections. The alarm can be cleared and normal operation can be resumed via the *DEVICE RESET* page. In case the failure persists, the UPS will return to the previous failure condition.

In some cases the RESET is necessary to simply reset a failure signal, then the UPS will resume operation. The failure conditions which impose a manual reset are:

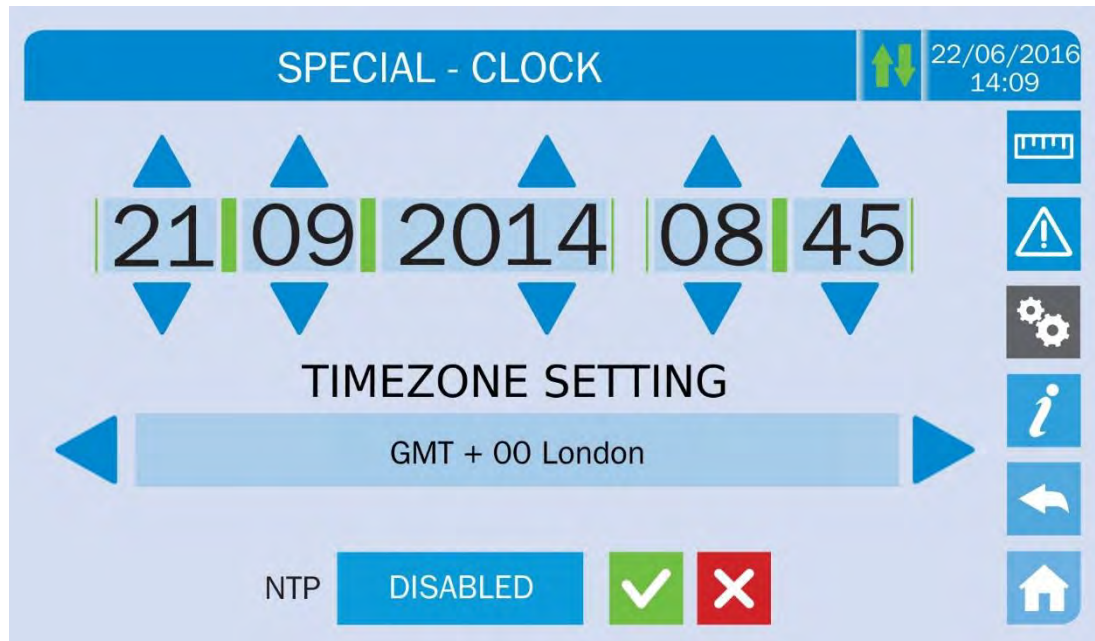
- Activation of the battery fault alarm (alarm A10)
- Static switch re-transfer block (alarm A17)
- Scheduled maintenance request (alarm A29)
- Booster shutdown due to the operation of the load symmetry sensor (alarm A33)
- Inverter shutdown due to voltage control loop error (alarm A39)
- Booster shutdown due to voltage control loop error (alarm A41)
- Booster shutdown due to current control loop error (alarm A43)
- Block due to the disconnection of one parallel cable (alarm A50)
- Block due to the disconnection of two parallel cables (alarm A55)
- System restart after a shutdown due to EPO activation

Several specific blocking conditions of the power modules can only be cleared by directly entering the *Settings* section of the modules (see relevant paragraph).

For a description of the UPS status in each of the failure conditions listed above, please refer to the "Faults and alarms" section.

13.3.2 Setting date and time

Date and time may be set via the *CLOCK* page.



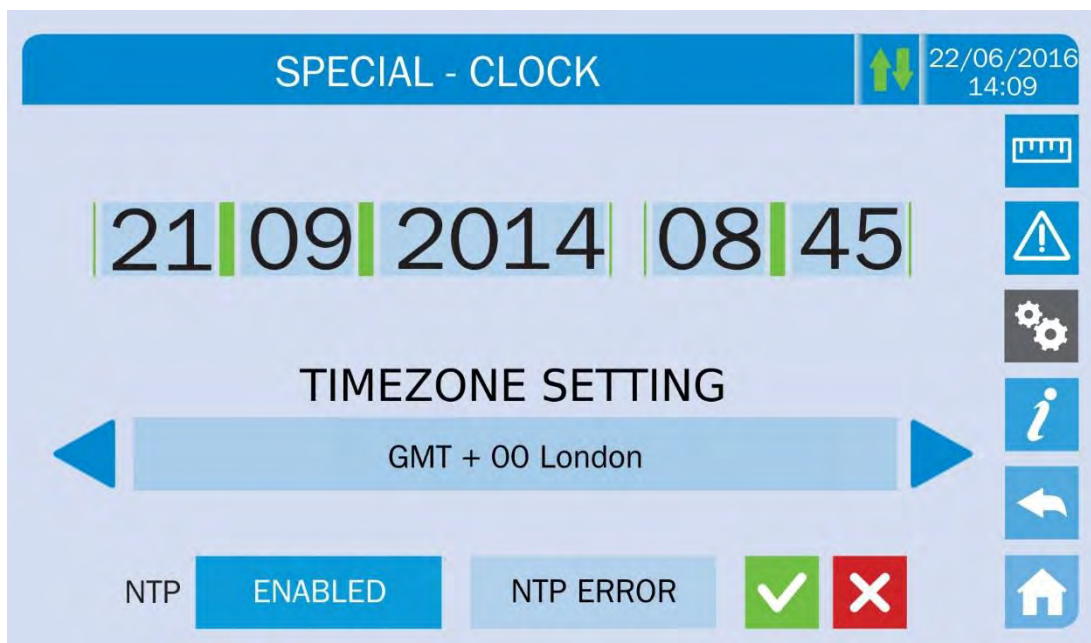
Picture 43 – Clock manual setting



Setting the current date and time correctly

The correct setting of the date and time is essential for the recording of the event log.

The system also allows the setting of a NTP server for the synchronization of date and time. Such configuration mode is enabled by pressing the label *Disabled*. As the NTP server is enabled the data can't be manually entered anymore.



Picture 44 – Clock automatic setting

The NTP server access parameters can be configured via the *Network configuration* pages in the *Settings* section. In case the server does not respond or the LAN connection is lacking, the message *NTP ERROR* will be displayed.

13.3.3 Setting the display language

The following picture shows the languages that can be set.



Picture 45 – Language setting

The language selection is made pressing one of the flags.

13.3.4 Resetting the history log

The history log can be reset by entering the *HISTORY RESET* section; the operation requires a further confirmation.



Loss of data

The alarms history contains very important data to monitor the device behaviour over time. We recommend to save the data before deleting it.

13.3.5 Setting the RS485 user interface parameters

The parameters regarding the communication via RS485 interface can be set in the *MODBUS RS485* section.

This section allows to set the ModBus address, the communication mode and the data transmission speed.

13.3.6 New battery

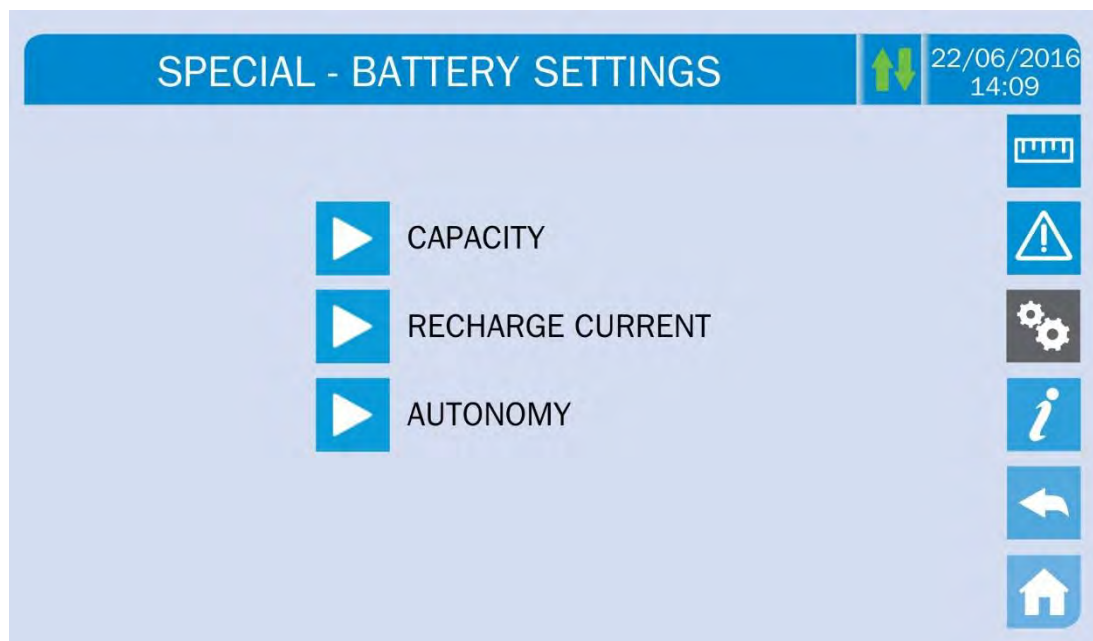
The page *NEW BATT* is used in case battery circuit breaker BCB is not closed, when requested, in the start-up phase. In this case the system will start considering the battery completely discharged and activating the alarm "A10 – BATTERY FAULT".

To set the battery autonomy to 100% it is necessary to access the section and confirm the operation in the confirmation page.

In case of distributed battery configuration such section is disabled and can be found in the *Settings* section of each power module.

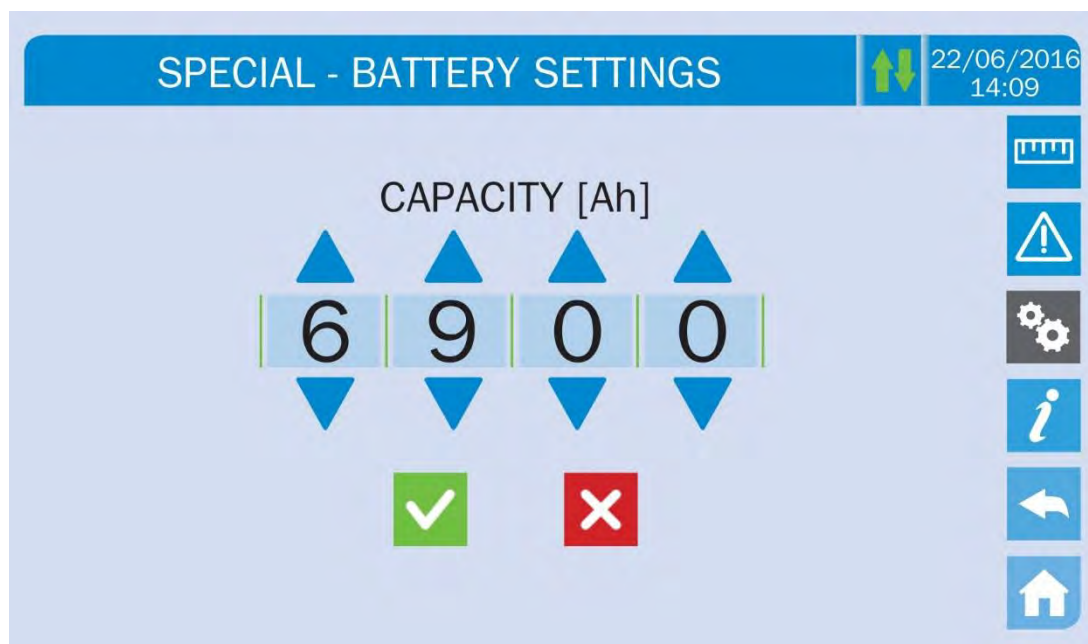
13.3.7 Setting the battery

In case the UPS has been tested without knowing the characteristic data of the storage battery, the *BATTERY SETTING* section allows to set such data. Each single settable parameter can be accessed via the following page.



Picture 46 –Battery parameters setting

The various parameters setting pages are similar to each other and requires the operator to enter and confirm the value; the setting page of the battery capacity is given below as a reference.



Picture 47 – Battery parameters setting

13.3.8 Battery test

The *BATTERY TEST* section allows to carry out a short discharge test of the battery. In case the battery is not efficient, the alarm “A10 – Battery fault” is generated at the end of the test.



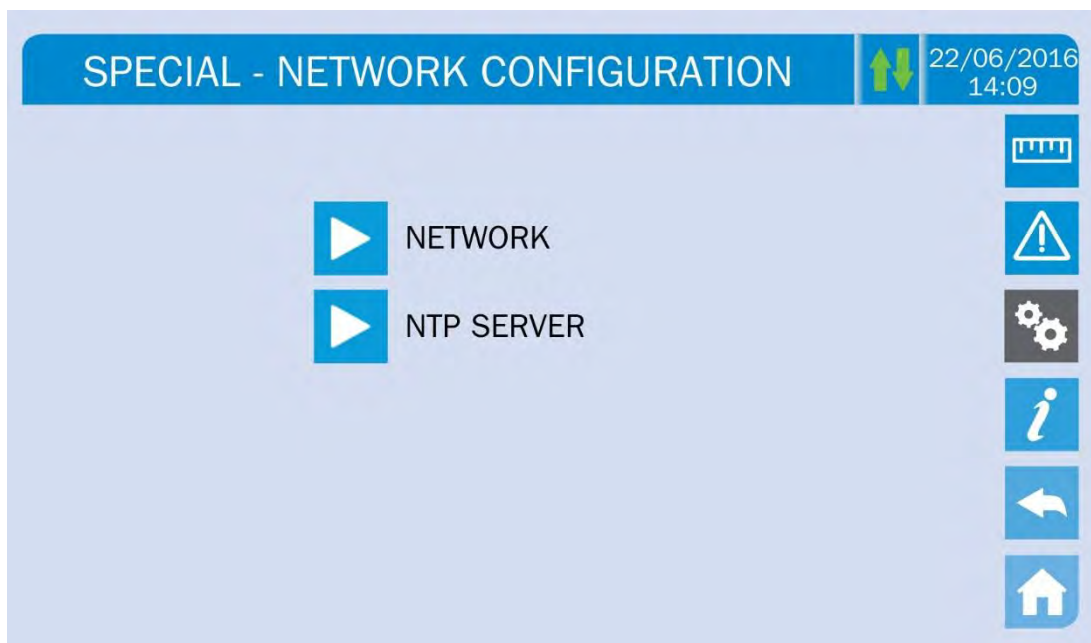
Possible loss of supply

This test can affect the continuity of supply to the loads if the battery is not fully charged.

13.3.9 Setting the display network parameters

The *NETWORK CONFIG* section allows to configure the parameters related to the LAN network and to the system time synchronization server.

All the parameters that can be set in this section are related to the communication ports (LAN and RS485) available on-board the *touch screen*.

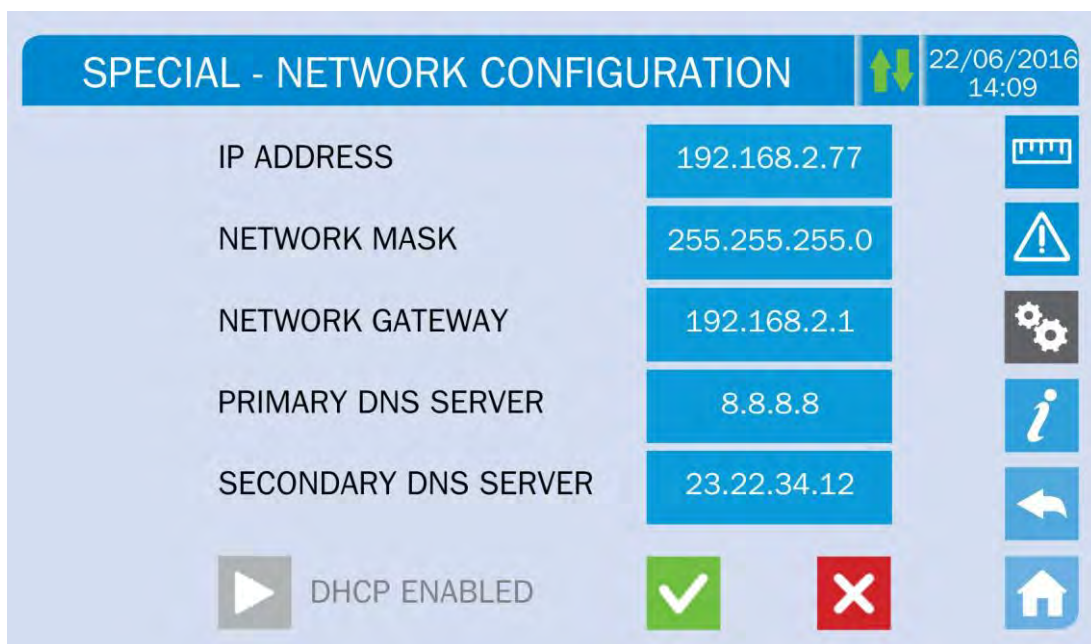


Picture 48 – Touch screen network parameters setting

13.3.9.1 Setting the LAN parameters

The LAN network parameters which can be set are the following:

- IP address
- Network mask
- Network gateway
- Primary DNS server
- Secondary DNS server
- DHCP Enabling / Disabling



Picture 49 – LAN parameters setting

13.3.9.2 Setting the NTP parameters

The NTP service parameters which can be set are the following:

- Primary NTP server address
- Primary NTP server address
- NTP Enabling / Disabling

The screenshot shows the 'SPECIAL - NETWORK CONFIGURATION' screen. At the top, there is a status bar with a double arrow icon, the date '22/06/2016', and the time '14:09'. Below this, the 'PRIMARY NTP SERVER' section has a blue input field containing '193.204.114.232'. The 'SECONDARY NTP SERVER' section also has a blue input field containing '193.204.114.232'. At the bottom, there is a play button icon followed by the text 'NTP ENABLED', a green checkmark icon, and a red 'X' icon. On the right side, there is a vertical toolbar with icons for a keyboard, a warning triangle, settings, information, back, and home.

Picture 50 – NTP parameters setting

13.3.9.3 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.

The screenshot shows the same 'SPECIAL - NETWORK CONFIGURATION' screen as in Picture 50. A numeric keypad is overlaid on the screen, allowing for the modification of numerical parameters. The keypad includes digits 1-9, a decimal point, and a zero. There are also 'Delete', 'Cancel', and 'Confirm' buttons. The 'Delete' button is yellow, 'Cancel' is red, and 'Confirm' is green. The keypad is positioned over the 'NETWORK MASK' field, which currently displays '255.255.255.0'. The 'PRIMARY NTP SERVER' field displays '192.168.2.77'. The 'SECONDARY NTP SERVER' field displays '192.168.2.1'. The 'NETWORK GATEWAY' field displays '192.168.2.1'. The 'PRIMARY DNS SERVER' field displays '8.8.8.8'. The 'SECONDARY DNS SERVER' field displays '8.8.4.4'. The status bar at the top shows the date '22/06/2016' and the time '14:09'. The right side of the screen has the same vertical toolbar as in Picture 50.

Picture 51 – 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.

The screenshot shows a web interface for 'SPECIAL - NETWORK CONFIGURATION'. At the top, there's a blue header with the title and a date/time stamp '22/06/2016 14:09'. Below the header, the current NTP address '193.204.114.232' is displayed in a large text field. Below this, there's a blue button with the same address '193.204.114.232'. A numeric keypad is visible, with buttons for digits 0-9, a 'Del' button, and a 'Confirm' button. To the right of the keypad, there are several icons: a network card, a warning triangle, a gear, an information 'i' icon, a back arrow, and a home icon.

Picture 52 – Modification of NTP address parameters

13.3.10 Modifying the operating mode – ECO MODE

The section *ECO MODE* allows the modification of the UPS operating mode, from the VFI – Voltage Frequency Independent operation (on-line double conversion) to VFD – Voltage Frequency Dependent. In such mode the load is directly supplied by the AC and the inverter is turned on, ready to take over in case of anomalies of the mains. The transfer occurs in a maximum time of 10 ms.

The stability of the AC mains is controlled by a specific algorithm which provides to automatically deactivate the *LINE INTERACTIVE* mode in case the voltage or frequency are not compliant with the programmed requirements.



Modifying the UPS operating mode – ECO MODE

The modification of the UPS operating mode is reserved to skilled personnel.

Before setting the system in ECO MODE verify that the load is suitable for operating in such mode, and that it withstand voltage interruptions for a maximum duration of 10 ms.

It is recommended to operate under the supervision of manufacturer's personnel or following its specific indications.

The manufacturer cannot be considered liable for any damages due to incompetence or inexperience of the customer's authorized personnel.

13.4 System information

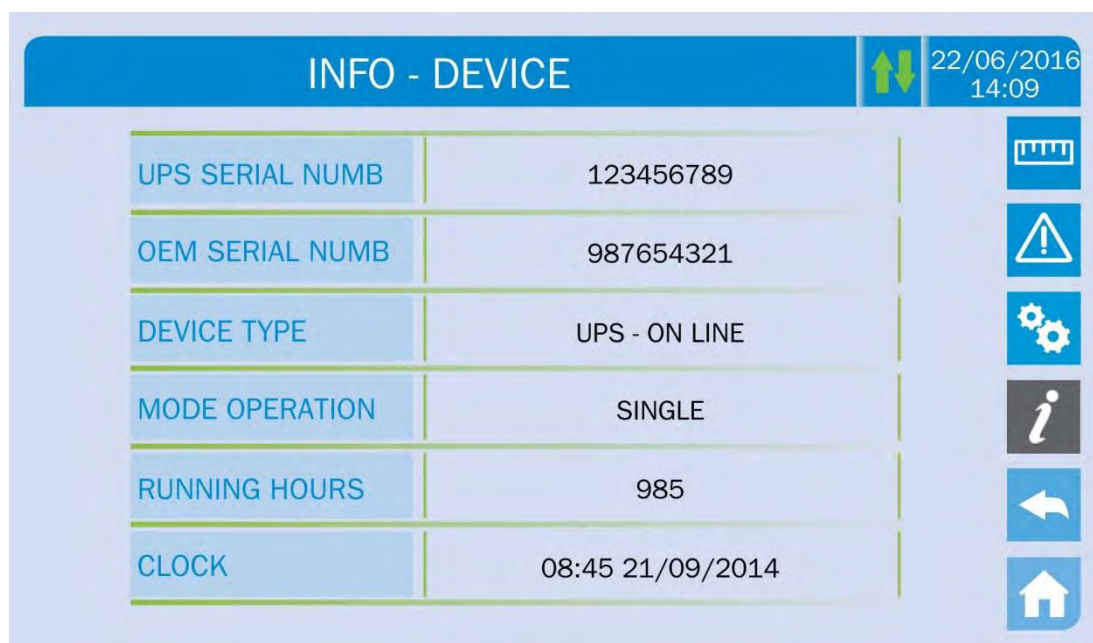
The *INFO* section provides general information about the UPS; press the related icon to open the main page.



Picture 53 – INFO section

All the data shown in the various sections are set during the factory test via a specific interface software and cannot be modified by anyone, except for personnel authorized by the manufacturer.

13.4.1 Device information

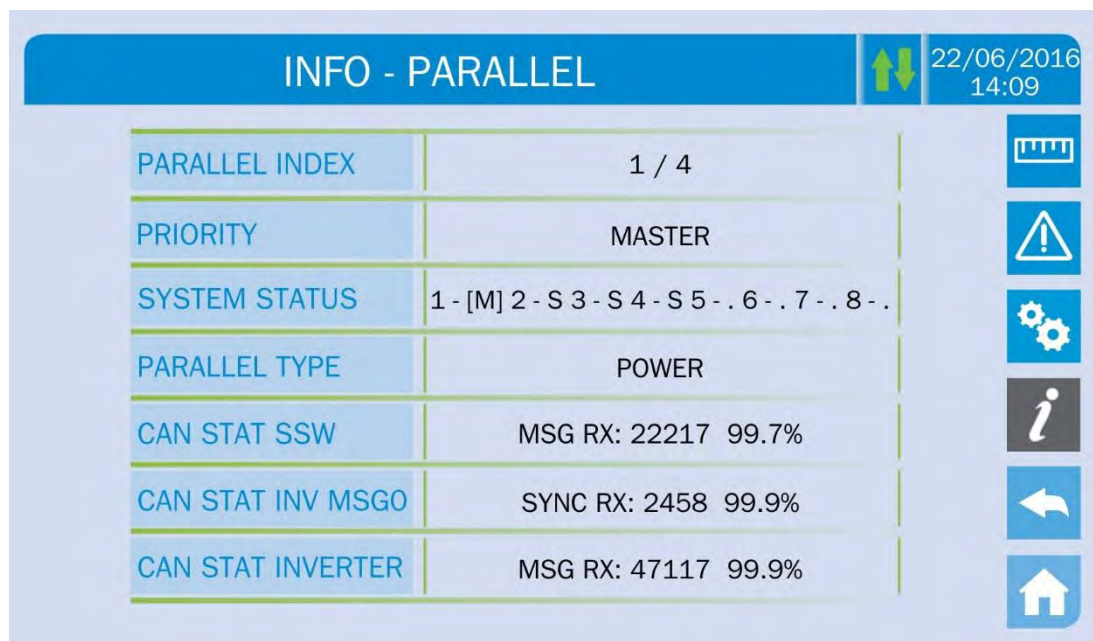


Picture 54 – Device information

Sub-page	Displayed data
SERIAL NUMBER	Serial number assigned by the manufacturer and by a possible OEM distributor
DEVICE TYPE	Device type (ON LINE, ECO, ecc.)
MODE OPERATION	It may be <i>SINGLE</i> , or <i>PARALLEL</i> in case the system is in parallel with other UPS's
RUNNING HOURS	Equipment operating hours
CLOCK	Current system date and time setting

13.4.2 Parallel information

The page containing the information about the parallel is only enabled if the UPS is in parallel with other UPS systems.



INFO - PARALLEL		22/06/2016 14:09
PARALLEL INDEX	1 / 4	
PRIORITY	MASTER	
SYSTEM STATUS	1 - [M] 2 - S 3 - S 4 - S 5 - . 6 - . 7 - . 8 - .	
PARALLEL TYPE	POWER	
CAN STAT SSW	MSG RX: 22217 99.7%	
CAN STAT INV MSGO	SYNC RX: 2458 99.9%	
CAN STAT INVERTER	MSG RX: 47117 99.9%	

Picture 55 – Parallel information

13.4.2.1 Parallel index

The first number identifies the *position* of that specific UPS within the parallel system. The second number represents the total number of *UPSaver* units.

13.4.2.2 Master / Slave priority

The string on the second line may have two values, “MASTER” or “SLAVE”. Only one *MASTER UPS* can be present in the system; if not there will be a conflict on the data communication bus.

13.4.2.3 System status (communication bus monitoring)

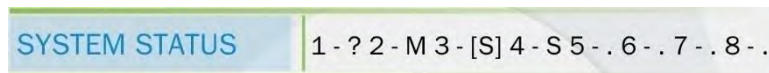
This field gives a general indication regarding the communication between the UPS units composing the system.

- The numbers represent the single UPS 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 UPS unit.
- A question mark next to a number indicates that that UPS unit is not communicating on the data bus.

Let us assume to have the following situation:

- system composed of 4 UPS units;
- UPS2 is currently the MASTER UPS;
- we are checking the data communication on UPS3;
- UPS4 is not communicating.

The section will be as shown below.



Picture 56 – Parallel bus communication status

13.4.2.4 Parallel type

The string may have two values, "POWER" or "REDUNDANT+x".

- POWER means that the parallel system is so set as to require the presence of all the UPS 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 UPS units, "REDUNDANT+2" means that only one of the UPS units is sufficient to feed the load.

13.4.2.5 Message statistics

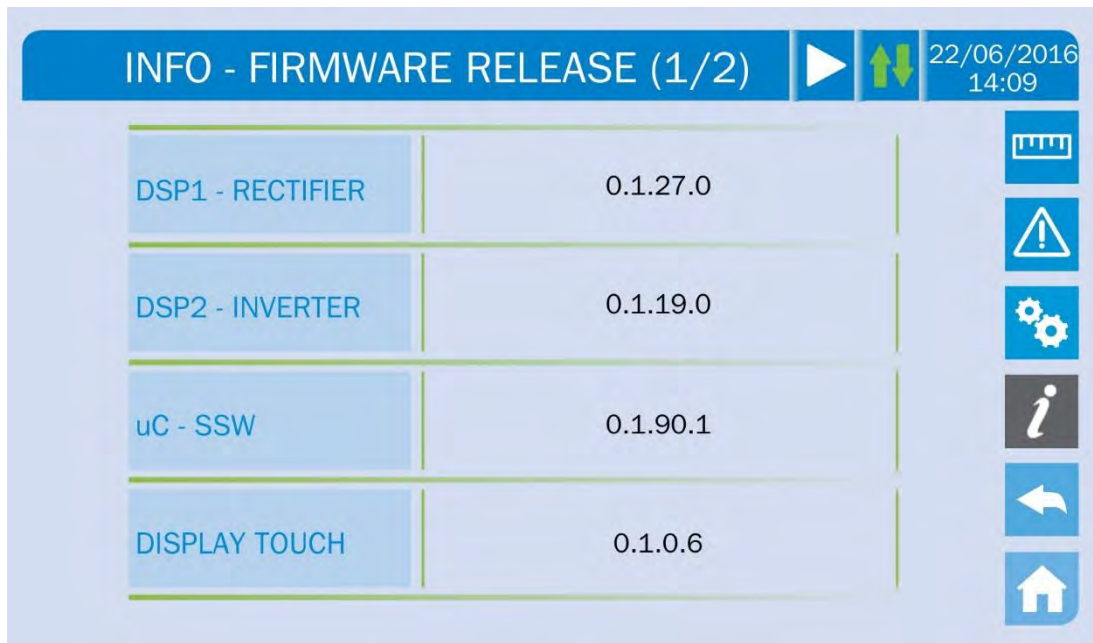
The statistics section regarding the messages exchanged on the communication buses consists of three different parts.

STAT CAN SSW → Number of messages received and percentage of reception accuracy regarding the status of the static switches. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

STAT CAN INV MSG0 → Number of messages received and percentage of reception accuracy regarding the synchronism signals. The messages are sent by the MASTER UPS, therefore the number will only increase on the SLAVE UPS units.

STAT CAN INVERTER → Number of messages received and percentage of reception accuracy regarding the status of the system. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

13.4.3 Firmware release



INFO - FIRMWARE RELEASE (1/2)	
DSP1 - RECTIFIER	0.1.27.0
DSP2 - INVERTER	0.1.19.0
uC - SSW	0.1.90.1
DISPLAY TOUCH	0.1.0.6

Picture 57 – Firmware release

The second page of the firmware release info contains the license contract related to the *touch screen* operating software.

13.4.4 Service information

The SERVICE menu provides important information regarding the technical service on the UPS. The information is displayed via a text string which shows the contact main details.

However, please also see the addresses and contact numbers indicated in the present manual

13.4.5 RS485 communication information

The MODBUS RS485 section provides information about the settings of the communication port, as regards the assigned ModBus address, the communication mode and the data transmission speed.

14 Faults and Alarms

As indicated in the previous chapters, the system is provided with basic diagnostics which allow immediate visualization of the operating conditions.

The alarms icon turns red and the buzzer is activated (if enabled). The UPS status page shows the alarm code and a brief description of the alarm itself.



Injury hazard due to electric shock!

Before carrying out any operation on the UPS, make sure that all the safety precautions are adhered to:

- **Any work on the unit must be carried out by qualified personnel;**
- **Internal components can only be accessed after disconnecting the device from supply sources;**
- **Always use protective devices designed for each type of activity;**
- **The instructions contained in the manuals must be strictly followed;**
- **In case of doubt or impossibility of solving the problem, please contact JOVYATLAS immediately.**

14.1 Operating Status Definition

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

Status	S2	BATTERY OK
Description	The battery is connected to the UPS.	
Operating condition	The battery is kept charged by the rectifier and is ready to feed the inverter.	

Status	S3	INVERTER OK
Description	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	S5	INV BYPASS SYNC
Description	The inverter is synchronized with the bypass.	
Operating condition	The synchronization between the inverter and the bypass is locked, and the static switch can change over from one source to the other.	

Status	S6	BYPASS OK
Description	The bypass voltage and frequency are within the allowed range.	
Operating condition	The bypass line is ready for changeover in case of inverter failure.	

Status	S7	BYPASS --> LOAD
Description	Load fed by the bypass line.	
Operating condition	The load is fed by the bypass via the static switch, waiting for the inverter to restart.	

Status	S9	INV MASTER SYNC
Description	The inverter is synchronized with the MASTER UPS.	
Operating condition	This status is only present on the SLAVE UPS units, and shows that the inverter is synchronized with the signal sent by the MASTER UPS.	

Status	S12	BATT STANDBY
Description	The battery is in standby mode.	
Operating condition	The battery static switch is open and the battery is disconnected from the DC bus.	

Status	S13	BATT CHARGING
Description	The battery is charging.	
Operating condition	The battery is connected to the DC bus and absorbing charging current.	

Status	S14	BATT FLOATING
Description	The battery cyclic charge is activated.	
Operating condition	The battery static switch is closed and the battery is connected to the DC bus for the cyclic charge (no discharge has occurred over the last 25 days).	

14.2 Troubleshooting

Alarm	A1	MAINS FAULT
Description	The voltage or frequency of the input line are out of tolerance.	
Possible causes	<ul style="list-style-type: none"> ➤ Mains instability or failure. ➤ Wrong phase rotation. 	
Solutions	<ol style="list-style-type: none"> 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 SEQ
Description	The phase rotation on the rectifier input line is wrong.	
Possible causes	<ul style="list-style-type: none"> ➤ Wrong connection of power cables. 	
Solutions	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ➤ Instability of the AC line voltage or frequency. ➤ Possible fault in the rectifier control circuit. 	
Solutions	<ol style="list-style-type: none"> 1. Check the parameters of the AC line voltage. 2. Restart the device. 3. 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	<ul style="list-style-type: none"> ➤ Possible fault in the rectifier control circuit. 	
Solutions	<ol style="list-style-type: none"> 1. Check which alarms are present and carry out the indicated procedures. 2. Restart the device. 3. 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	<ul style="list-style-type: none"> ➤ The battery has reached the discharge voltage due to a power failure. ➤ Measuring circuit failure. 	
Solutions	<ol style="list-style-type: none"> 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 procedures. 4. Restart the device. 5. If the alarm persists, contact our Technical Support Service. 	

Alarm	A6	BATTERY IN TEST
Description	The rectifier voltage is reduced to start a short controlled discharge of the battery.	
Possible causes	<ul style="list-style-type: none"> ➤ A battery test has been started automatically (if set), or manually by the user. 	
Solutions	<ol style="list-style-type: none"> 1. Wait for the test to end, and check possible battery faults. 	

Alarm	A7	BCB OPEN
Description	The battery isolator is open.	
Possible causes	➤ Battery isolator open.	
Solutions	1. Check the status of the battery isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. Check the connection between the auxiliary contact of the isolator and the auxiliary terminals of the UPS (if provided). 4. 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 procedures. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A9	BATTERY AUT END
Description	The battery has reached the pre-alarm discharge level.	
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. 2. Reset the system. 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.	
Solutions	1. Check the loads connected to the UPS output. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A12	STOP TIMEOUT SC
Description	Inverter shutdown due to an extended short-circuit during a power failure, or due to an overcurrent on the inverter bridge input.	
Possible causes	➤ Short-circuit on the loads during a power failure. ➤ Inverter bridge fault. ➤ Temporary current peak.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A13	INV OUT OF TOL
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 procedures. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A14	BYPASS WR SEQ
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 mains. 2. Check the stability of mains 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 failure.	
Solutions	1. Verify the inverter status and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A17	RETRANSFER BLOCK
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 system. 2. Check the in-rush currents of the loads. 3. If the alarm persists, contact our Technical Support Service.	

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

Alarm	A19	OCB OPEN
Description	The output isolator is open.	
Possible causes	➤ Output isolator open.	
Solutions	1. Check the status of the output isolator. 2. Check the functionality of the auxiliary contact of the isolator. 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. The inverter is shut down for 30 minutes and then restarted.
Possible causes	<ul style="list-style-type: none"> ➤ Output overload. ➤ Measuring circuit failure.
Solutions	<ol style="list-style-type: none"> 1. Check the loads connected to the UPS output. 2. Should you need to restore the inverter supply immediately, reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A22 BYPASS SWITCH
Description	The "Normal/Bypass" selector has been operated.
Possible causes	<ul style="list-style-type: none"> ➤ Maintenance operation.
Solutions	<ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ➤ Activation of the (local or remote) emergency power off button.
Solutions	<ol style="list-style-type: none"> 1. Release the emergency power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A24 HIGH TEMPERATURE
Description	High temperature of the heat sink on the inverter bridge or tripping of the DC fuses which protect the inverter bridge.
Possible causes	<ul style="list-style-type: none"> ➤ Fault of the heat sink cooling fans. ➤ The room temperature or cooling air temperature is too high. ➤ Tripping of the DC protection fuses.
Solutions	<ol style="list-style-type: none"> 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. Check the status of the DC fuses on the inverter bridge input. 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	<ul style="list-style-type: none"> ➤ Various.
Solutions	<ol style="list-style-type: none"> 1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A26 COMMUNIC ERROR
Description	Internal error.
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems.
Solutions	<ol style="list-style-type: none"> 1. If the alarm persists, contact our Technical Support Service.

Alarm	A27 EEPROM ERROR
Description	The controller has detected an error in the parameters stored in EEPROM.
Possible causes	<ul style="list-style-type: none"> ➤ Wrong parameters entered during programming.
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service.

Alarm	A28	CRITICAL FAULT
Description	An alarm has been activated which causes the shutdown of part of the UPS (rectifier, inverter, static switch).	
Possible causes	➤ System 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	A29	MAINTENANCE REQ
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 which alarms are present and carry out the indicated procedures.	

Alarm	A31	MBCB BUS CLOSED
Description	The manual bypass isolator is closed.	
Possible causes	➤ Manual bypass isolator closed.	
Solutions	1. Check the status of the manual bypass isolator. 2. Check the functionality of the auxiliary contact of the isolator. 3. If the alarm persists, contact our Technical Support Service.	

Alarm	A32	EPO BUS CLOSED
Description	The system is blocked due to the activation of the emergency power off button.	
Possible causes	➤ Activation of the (local or remote) emergency power off button.	
Solutions	1. Release the emergency power off button and reset the alarm. 2. If the alarm persists, contact our Technical Support Service.	

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.	
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.	

Alarm	A34	SERVICE REQUIRED
Description	A UPS check is necessary.	
Possible causes	➤ 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, to terminals X10-11/12. 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 sudden DC voltage variations.
Possible causes	➤ Battery fault.
Solutions	1. Check the battery. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service.

Alarm	A38 INV --> LOAD
Description	The load is fed by the inverter. This alarm is active for UPS systems in "ECO" mode, where the preferential supply is from the bypass line.
Possible causes	➤ Temporary changeover due to bypass line failure.
Solutions	1. Verify the status of the bypass line and check whether other alarms are present. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A39 INV ERROR LOOP
Description	The control is not able to regulate the inverter voltage precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A40 SSI FAULT
Description	The system has detected a failure in the static inverter switch.
Possible causes	➤ Possible problems on the loads. ➤ Static switch fault.
Solutions	1. Check the absorption of the loads and the presence of DC components, if any, on AC current. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A41 RECT ERROR LOOP
Description	The control is not able to regulate the rectifier output voltage precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A43 CURR ERROR LOOP
Description	The control is not able to regulate the rectifier output current precisely.
Possible causes	➤ Regulation system failure.
Solutions	1. Reset the system. 2. If the alarm persists, contact our Technical Support Service.

Alarm	A45 HIGH TEMPERATURE SSW
Description	High temperature of the heat sink on the static switch.
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	PAR LOST REDUND
Description	This alarm is only active on PARALLEL systems. Continuity is not ensured in the event of a fault on one of the UPS units.	
Possible causes	<ul style="list-style-type: none"> ➤ The total load is higher than the maximum expected value. ➤ Possible failure on the measuring circuit. 	
Solutions	<ol style="list-style-type: none"> 1. Check the load fed by the system. 2. If the alarm persists, contact our Technical Support Service. 	

Alarm	A47	SEND PARAM ERROR
Description	Internal error.	
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems. 	
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service. 	

Alarm	A48	RCV PARAM ERROR
Description	Internal error.	
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems. 	
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service. 	

Alarm	A49	TEST MODE ERROR
Description	Internal error.	
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems. 	
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service. 	

Alarm	A50	SSW BLOCKED
Description	The static switch is blocked. The load is no longer supplied.	
Possible causes	<ul style="list-style-type: none"> ➤ Loads failure. ➤ Possible UPS fault. 	
Solutions	<ol style="list-style-type: none"> 1. Check the loads for possible failures. 2. Reset the system. 3. If the alarm persists, contact our Technical Support Service. 	

Alarm	A51	BATT TEMPERATURE
Description	The battery temperature is out of tolerance. This alarm is only active when the temperature probe is installed and enabled on the battery.	
Possible causes	<ul style="list-style-type: none"> ➤ Anomalous temperature in the battery cabinet. ➤ Possible failure on the measuring circuit. 	
Solutions	<ol style="list-style-type: none"> 1. Check the temperature on the batteries and remove the cause of the alarm, if any. 2. If the alarm persists, contact our Technical Support Service. 	

Alarm	A53	FIRMWARE ERROR
Description	The controller has detected an incompatibility in the control software.	
Possible causes	<ul style="list-style-type: none"> ➤ The software update was not performed properly. 	
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service. 	

Alarm	A54	CAN ERROR
Description	Internal error.	
Possible causes	<ul style="list-style-type: none"> ➤ Microcontroller communication problems. 	
Solutions	<ol style="list-style-type: none"> 1. Contact our Technical Support Service. 	

Alarm	A55	PAR CABLE DISC
Description	Parallel cable doesn't communicate.	
Possible causes	➤ Parallel cable disconnected or damaged.	
Solutions	1. Check the connection of cable 2. Contact our Technical Support Service.	

Alarm	A56	MAINS UNBALANCE
Description	The rectifier input voltage is unbalanced.	
Possible causes	➤ Problems on the LV or MV distribution network ➤ Defect of the measuring circuit	
Solutions	1. Check the input voltage 2. Contact our Technical Support Service.	

Alarm	A57	INPUT CURRENT UNBALANCED
Description	UPS input currents are not balanced.	
Possible causes	➤ Possible problems in the UPS input stage. ➤ Anomaly of the system control.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A58	INVERTER CURRENT UNBALANCED
Description	The inverter currents are not balanced.	
Possible causes	➤ Possible problems in the UPS input stage. ➤ Anomaly of the system control.	
Solutions	1. Contact our Technical Support Service.	

Alarm	A59	BACKFEED RELAY ON
Description	The backfeed protection has been activated. Alarms present only in the history log.	
Possible causes	➤ Problems on the bypass static switch	
Solutions	1. Check the static switch thyristors 2. Contact our Technical Support Service.	

Alarm	A63	START SEQ BLOCK
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. ➤ Possible internal fault.	
Solutions	1. Make sure the position of the control devices (isolators, selectors) is as specified in the procedures (see "Installation and start-up" section). 2. If the alarm persists, contact our Technical Support Service.	

15 Technical Data

JOVYSTAR COMPACT L	
Online UPS-Type	200 kVA
Output	
Output apparent power ($\cos \varphi = 1$)	200 kVA
Output active power ($\cos \varphi = 1$)	200 kW
Rated output voltage	3 x 380/220 V/3 x 400/230 V/3 x 415/240 V
- Tolerance static, symmetric load	$\pm 1 \%$
- Tolerance static, asymmetric load	$\pm 2 \%$
- Tolerance dynamic load (20 % \rightarrow 100 % \rightarrow 20 %)	$\pm 5 \%$
- Correction time after load step	< 20 ms
Rated output frequency	50/60 Hz
- Tolerance at free running quartz oscillator	$\pm 0,001$ Hz
- Tolerance at inverter-synchronization with mains	± 2 Hz
Rated output current	289 A
THDU (according to IEC EN 62040-3)	
- Linear load	< 1 %
- Non linear load	< 5 %
Input Rectifier	
Input voltage	3 x 400/230 V $\pm 15 \%$ -20 %
Input frequency	50/60 Hz $\pm 10 \%$
Input current (at 100 % load, without battery charging)	302 A
Input current (at 100 % load, max. battery current)	338 A
Input power factor (at 100 % load)	> 0,99
Input current THD (at 100 % load)	< 3 %
Input Bypass	
Input voltage	3 x 380/220 V/3 x 400/230 V/3 x 415/240 V $\pm 10 \%$
Input frequency	50/60 Hz $\pm 10 \%$
Battery	
Number of battery cells	360
Compensation charging voltage	812 V (2,26 V/Z) @ 360 cells
Cut-off voltage	620 V (1,72 V/Z) @ 360 cells
Max. battery charging current (at 100 % load)	30 A
Max. battery charging current with activated DCM (Dynamic charging mode, only at partial load)	100 A
Battery charging characteristic	IU (DIN 41773)
Overload capability/Output short circuit characteristic	
Overload capability inverter	> 100 % to 125 % for 10 min > 125 % to 150 % for 30 s > 150 % to 199 % for 100 ms
Overload capability static bypass	150 % continuously 1000 % for 1 cycle
Short circuit characteristic (Bypass is available)	Immediate transfer to the bypass
Short circuit characteristic (Bypass is not available)	
Current limitation to 100 ms	720 A
Short Circuit Current after 100ms up to 5seconds	433 A
Selectivity	$\frac{1}{2}$ cycle (fuse gG 20 % In)
Design	
Dimensions (W x H x D)	850 x 1976 x 953 mm
Weight (without battery)	720 kg
Paint	RAL 9005
Noise level	< 65 dB
protection degree	IP 20
Conformity according IEC 62040	
Reference Standards	EN 62040 – 1, EN 62040 – 2, EN 62040 - 3
UPS classification	VFI SS 111
Other data	
Efficiency normal mode (at 100 % load) (AC to AC)	> 95,5 %
Efficiency battery mode (at 100 % load) (DC to AC)	> 97,9 %
Efficiency eco-mode (Offline-mode)	> 98 %
Efficiency UHE mode	> 99 %
Max. crest factor without power reduction	3: 1
Heat dissipation (at 100 % load and rated input voltage)	9,4 kW
Requirements to the installation position	
Max. installation altitude without power reduction	< 1000 m
Power reduction for installation altitude according to IEC EN 62040-3	0,5 % every 100 m over 1000 m up to 2000 m
Required air cooling volume	1800 m ³ /h
UPS operating ambient temperature	0 up to +40 °C
UPS storage temperature	-10 up to +70 °C
Battery ambient -/storage temperature (recommended battery ambient temperature, see also battery operating instruction)	0 up to +25 °C +20 °C
Relative humidity (non condensing)	< 95 %

16 Service and Download

Following documents are available at our website:

- Battery data sheets
- Battery operating instructions
- Material safety data sheet
- CE – Compliance Declaration

<http://www.jovyatlas.com/ja/Waertsilae-JOVYSTAR-COMPACT,120-93-2>

<http://www.jovyatlas.com/Batteries>

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