



***OPERATING AND MAINTENANCE
MANUAL***

E2001 COMPACT – E3001 COMPACT

UPS OPERATING AND MAINTENANCE MANUAL

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AVVERTENZA

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

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UPS GENERAL DESCRIPTION AND INSTALLATION

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1. INTRODUCTION

1.1 ENVIRONMENT

1.1.1 UPS treatment at the end of service life

The UPS manufacturer undertakes to recycle, by certified companies and in compliance with all applicable regulations, all UPS products recovered at the end of their service life (contact your branch office).

1.1.2 Packing

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

1.1.3 Lead battery

This product contains lead-acid batteries. Lead is a dangerous substance for the environment if it is not correctly recycled by specialised companies.

1.2 SAFETY RULES

1.2.1 Safety of persons

The UPS must be installed in a room with restricted access (qualified personnel only, according to standard EN62040-1).

UPS power outlets may be energised even if the UPS is disconnected from the AC-power source (because the UPS is connected to a battery).

Dangerous voltage levels are present within the UPS. It should be opened exclusively by qualified service personnel.

Warning, after the UPS shut-down, a dangerous voltage will be present on the battery selector BCB.

The UPS must be properly earthed.

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 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.**

1.2.2 Product safety

A protection circuit breaker must be installed upstream and be easily accessible.

Never install the UPS near liquids or in an excessively damp environment.

Never let a liquid or foreign body penetrate inside the UPS.

Never block the ventilation grates of the UPS.

Never expose the UPS to direct sunlight or a source of heat.

1.2.3 Special precautions

- ⦿ The UPS connection instructions contained in this manual must be followed in the indicated order.
- ⦿ Check that the indications on the rating plate correspond to your AC-power system and to the actual electrical consumption of all the equipment to be connected to the UPS.
 - ⦿ If the UPS must be stored prior to installation, storage must be in a dry place.
 - ⦿ The admissible storage temperature range is -10° C to +70° C.
 - ⦿ If the UPS remains de-energised for a long period, we recommend that you energise the UPS for a period of 24 hours, at least once every month. This charges the battery, thus avoiding possible irreversible damage.
 - ⦿ The UPS is designed for normal climatic and environmental operating conditions as defined in the data sheets.
 - ⦿ Using the UPS within the given limits guarantees its operation, but may affect the service life of certain components, particularly that of the battery and its autonomy. The maximum storage time of the UPS is limited due to the need to recharge its integrated battery.
- ⦿ Unusual operating conditions may justify special design or protection measures:
 - harmful smoke, dust, abrasive dust,
 - humidity, vapor, 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, etc.,
 - battery operating conditions.

The UPS must always be installed in compliance with:

- **the requirements of HD 384.4.42 S1/A2 - Chapter 42: Protection from thermal effects.**
- **standard IEC 60364-4-482 - Chapter 482: Fire protection.**

The manufacturer declines all responsibility for damages to people or equipment deriving from non-fulfilment of the above.

2. UPS GENERAL DESCRIPTION

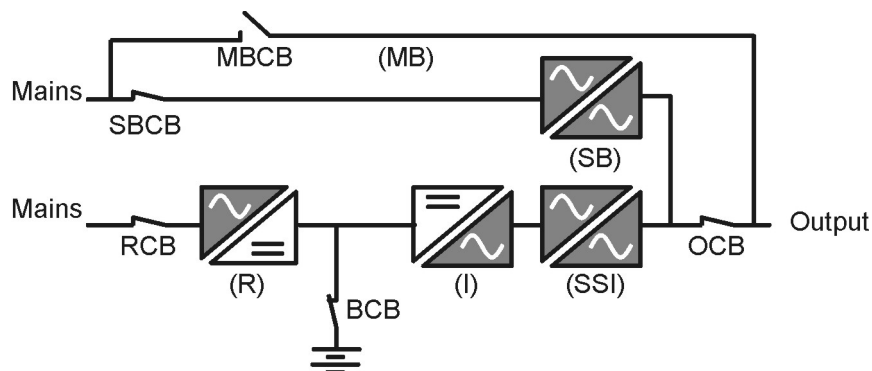
2.1 TYPOLOGY

All UPS covered by this manual are on-line, double conversion; the inverter supplies always energy to the load, whether mains is available or not (according to the battery autonomy time).

WARNING

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

This configuration guarantees the best service to the User, as it supplies clean continuously regulated power and guarantees the voltage and frequency will be stabilised at nominal value independently from mains status. Thanks to the double conversion, it makes the load completely immune from micro-interruptions due to excessive mains variation, and prevents damage to the critical load (Computer - Instrumentation - Scientific equipment etc.).



Picture 1 - Block diagram

2.2 SYSTEM DESCRIPTION

2.2.1 Rectifier

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

It's designed to supply the inverter at full load and the battery at the maximum recharge current. The system offers very low ripple content during the charging cycle.

2.2.2 12 pulses rectifier

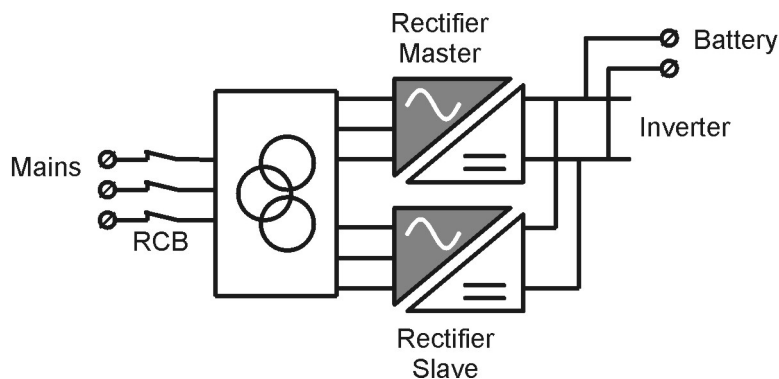
The 12 pulses configuration is used to reduce the distortion of the current absorbed from the mains (THD) to a value <12%.

This ensures that the rectifier does not distort the supply mains, with regard to the other loads; it also avoids unlikely overheating of the cables due to the harmonics circulation.

This technology uses two 6 pulse rectifier bridges, which operates with an input voltage having a phase displacement of 30°.

This configuration allows the system to cancel the typical harmonics of the 6 pulses rectifier, namely the 5th and 7th. As a consequence only the higher order harmonics remain (the 11th, 13th and the multiples). This system is highly recommended for high power equipment, where the current distortion caused by the rectifier might affect other loads connected to the mains. It's also advisable to use 12 pulses rectification in order not to overload an emergency diesel generator supplying the system in case of mains failure.

The 12 pulse configuration can be provided with galvanic isolation, using a transformer having two secondary windings displaced by 30° (delta/delta-star connection).



Picture 2 - 12 pulses rectifier with galvanic isolation

2.2.3 Inverter

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

The inverter uses IGBT technology with a frequency commutation of approximately 10 KHz.

The control electronics is completely digital and uses a 16 Bit μ P, that, thanks to its processing capability, generates an excellent output sine-wave, which has a very low distortion even in presence of loads having high crest factor currents.

2.2.4 Battery charger

The battery charger control logic is completely integrated inside the total-controlled rectifier control board; the battery is charged, according to the DIN 41773 Standard, every time it has been partially or completely discharged and it is kept floating, even when it's charged, to compensate for any autodischarge.

2.2.5 Static bypass

It's designed to transfer the load between INVERTER and MAINS, and vice-versa, without break, and uses SCR's as power commutation elements.

2.2.6 Manual bypass

It's used to by-pass the UPS, supplying the load directly to the mains in case of maintenance or serious failure.

WARNING

The sequence of bypass switching must be carried out with respect to the procedure indicated on the UPS and in the chapter "Start-up, shut-down and manual bypass". The manufacturer cannot accept responsibility for damages arising from incorrect operation.

2.2.7 Front panel

The front panel of the UPS, consisting of a four row alphanumeric displays plus a keyboard, allows the complete monitoring of the UPS status and the setting of the parameters.

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

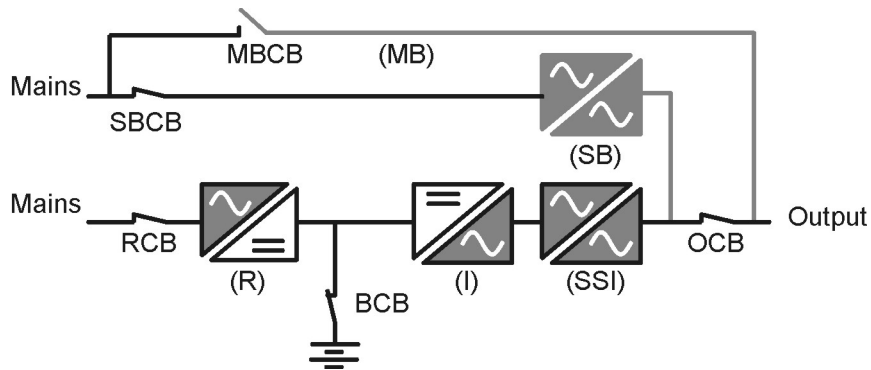
For more information see the chapter "FRONT PANEL".

2.3 OPERATING STATUS

The following paragraphs show all the possible operating status of the UPS.

2.3.1 Normal operation

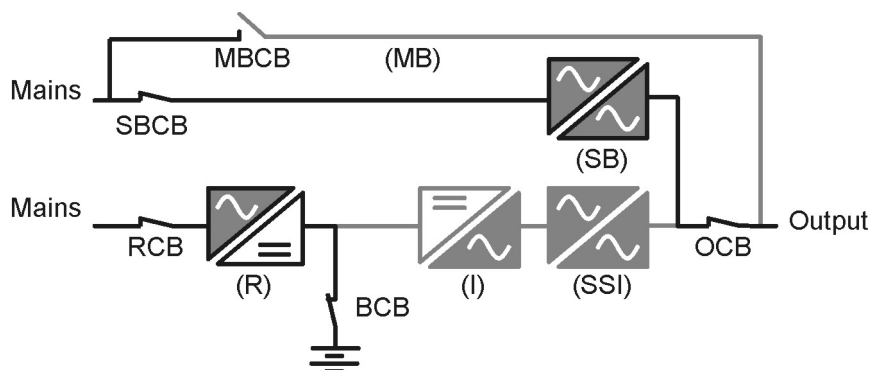
The inverter is supplied by the rectifier; the load, through the static switch, is supplied directly by the inverter output.



Picture 3 - Normal operation

2.3.2 Load supplied by bypass due to inverter fault

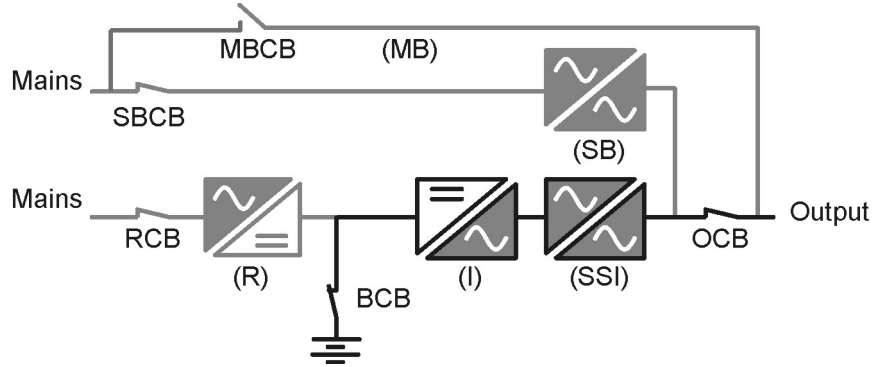
The load is transferred to bypass through the static switch; the transfer is carried out without interruption.



Picture 4 - Load supplied by bypass

2.3.3 Rectifier failure or mains failure

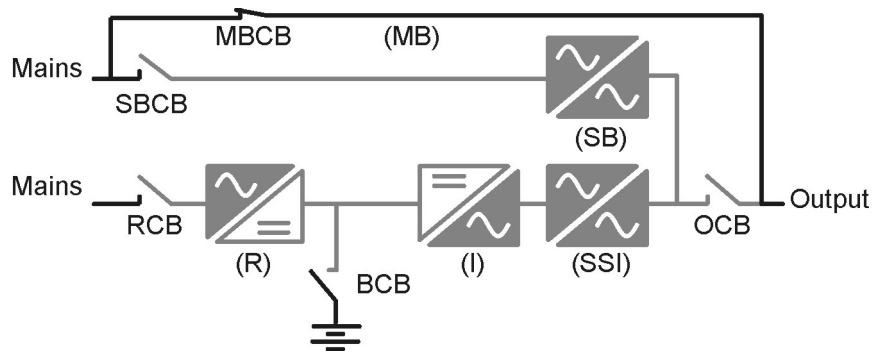
The inverter is supplied by the battery for the required autonomy time; the load, through the static switch, is supplied directly by the inverter output.



Picture 5 - Rectifier failure or mains failure

2.3.4 Manual bypass

The load is supplied by the mains through the manual bypass; the operator can work in safety on the UPS to carry out maintenance or repairing operations.



Picture 6 - Manual bypass

3. INSTALLATION

3.1 RECEIPT OF THE UPS

When the UPS is received, please attend immediately to its unpacking and carry-out an accurate visual check to be sure that the equipment has not been damaged during transport.

IMPORTANT

In case of objections relating to damage incurred during transport these must be immediately notified to the transportation company after receipt of the equipment.

When the UPS is not installed immediately it must be stored carefully in vertical position, as indicated on the packing and conserved in a dry and sheltered room in its box so that it is protected from dust.

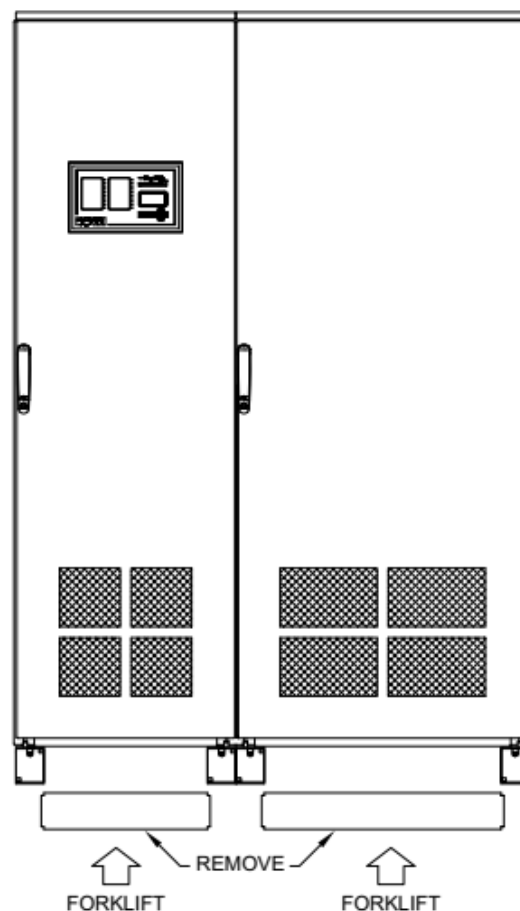
3.2 HANDLING OF THE UPS

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.

The UPS can be lifted and handled using a pallet truck or a forklift after having taken-off (manually), the lower frontal panel, so that a pallet truck or a forklift can be inserted (see picture 7).

The UPS technical data are shown on a label fixed on the internal side of the front door.



Picture 7 - Handling of UPS

3.3 POSITIONING AND INSTALLATION

The UPS must be installed in a clean and dry room, preferably not dusty. The User must ensure that there is enough air exchange in the room so that the equipment can be adequately cooled; if this is not guaranteed, the room must be adequately aired.

3.4 ELECTRICAL CONNECTION

The electrical connection is part of the work which is normally provided by the supplier 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 connections of the input and output in compliance with the local standards.

During the electrical installation take particular care to check the phase rotation with a suitable instrument.

The terminal boards are positioned at the front of the UPS, under the breakers. To access the terminals remove the protection, extracting the fixing bolts.

WARNING

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

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

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

3.5 BATTERY INSTALLATION

IMPORTANT

For battery installation please respect the prescriptions of the EN62040-1 standard.

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).

It is recommended to install the batteries 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.

FRONT PANEL AC-UPS GD 128X64

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1. INTRODUCTION

This manual describes the functions of the graphic front panel 128x64 of the machines AC-UPS. The details follow of all the menus which, via intelligent browsing provide the user with all the useful information to understand the status of the device. The menu, which is password protected, allows you to edit the parameters of the UPS to allow a high level of configurability to be obtained.



Further information

If the information outlined here is insufficient, contact the manufacturer of the device.

2. PANEL FUNCTIONALITY

The command panel of the UPS is used to:

- Check the functional parameters of the device
- Display the events log
- Show the information on the device
- Change the operating parameters

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

3. FRONT PANEL

The front panel of the rectifier is composed of an alphanumeric graphic display, 20 configurable LEDs and 7 function keys that allow navigation. A synoptic display shows the functional status of the device and the power flow.

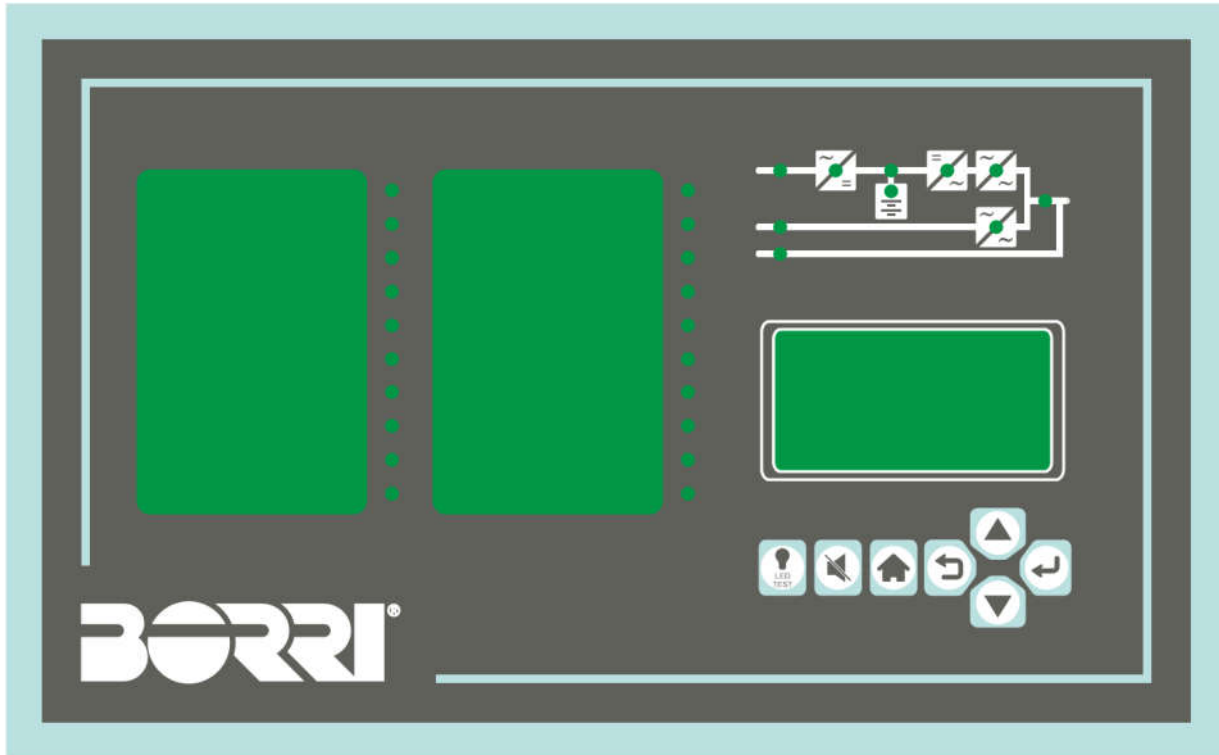




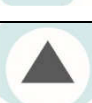




Figure 1 – Front panel

3.1 FUNCTION KEYS

The following table describes the meaning of the 7 function keys:

Key	Function
	➤ Tests all the leds. Quickly pressing the key only switches on the leds configured in the colour configured. Instead keeping the key pressed, after 5 seconds all the leds in all colours switch on.
	➤ Silence the buzzer (triggered by an alarm or anomaly)
	➤ Back to HOME menu.
	➤ Back to previous menu.
	➤ Scroll menu upwards
	➤ Scroll menu downwards.
	<ul style="list-style-type: none"> ➤ Select menu. ➤ Confirm changes.

3.2 LED FUNCTIONS SYNOPTIC DISPLAY

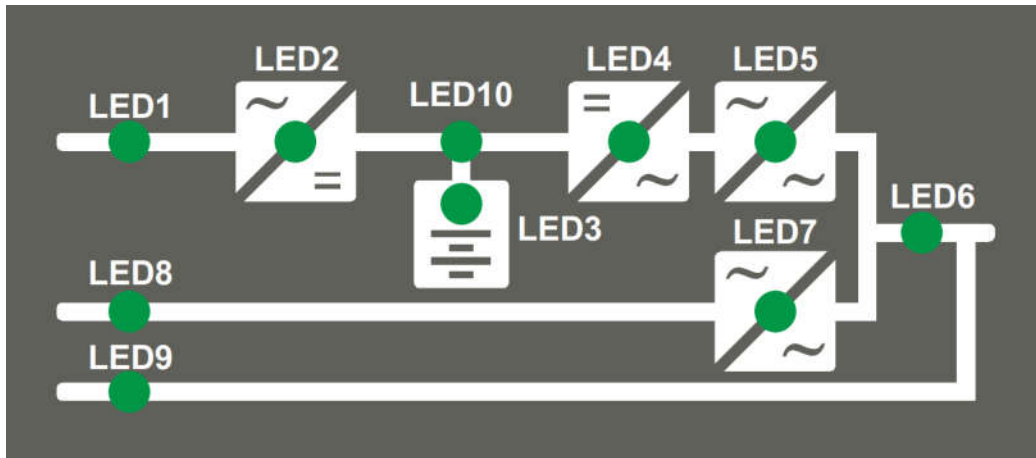


Figure 2 – Synoptic panel

LED 1	GREEN	Alternate input mains in tolerance range
	RED	Alternate input mains fault
LED 2	GREEN	Rectifier OK
	RED	Rectifier not OK
LED 3	GREEN	Battery ok
	ORANGE	Test battery or battery flat
	RED	Battery disconnected or test unsuccessful
LED 4	GREEN	Inverter OK
	RED	Inverter not OK
LED 5	GREEN	Inverter static switch closed
	OFF	Inverter static switch open
LED 6	GREEN	Output voltage OK
	RED	Output voltage out of tolerance range
LED 7	OFF	Bypass static switch open
	ORANGE	Bypass static switch closed
LED 8	GREEN	Alternate bypass mains in tolerance range
	OFF	Alternate bypass mains fault
LED 9	OFF	Manual bypass disabled
	RED	Manual bypass enabled
LED 10	GREEN	Buffer float charge
	ORANGE	Rapid recharge (Boost)
	RED	Manual or DC voltage not available from the rectifier or the battery

4. LCD

The Home Page of the display shows the name of the device, the status it is in and the voltage and current of output.

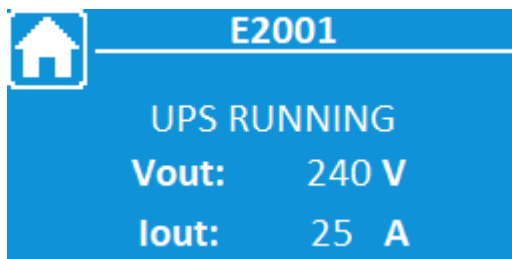


Figure 3 – Home Page

The possible statuses signalled on the display are as follows:

- TEST MODE
- INVERTER OFF
- RECTIFIER OFF
- BYPASS FEEDS LOAD
- BYPASS NOT AVAILABLE
- INV NOT SYNCHRONISED
- UPS RUNNING

From the Home Page, you can browse through the menus clicking on one of the two arrows. The main menus you can slide through are:

- MEASUREMENTS
- COMMANDS
- ALARMS
- SETTINGS
- INFO

For example pressing the bottom arrow you access the following screen.

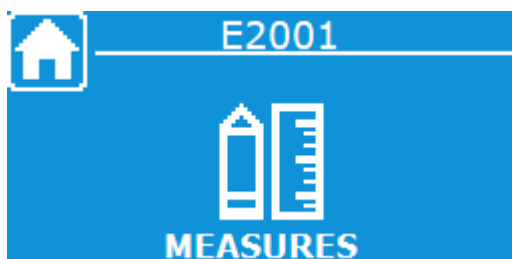


Figure 4 – Home Page - Menu Selection

From this screen press the ENTER key to access the measurements menus selection menu.

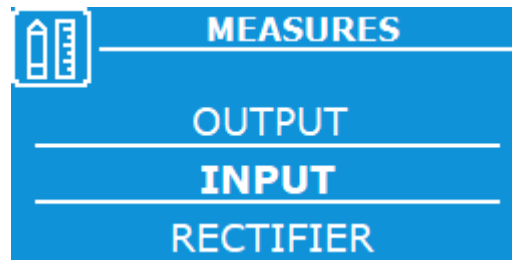


Figure 5 – Measurements Menu - Selection

The selected menu is that highlighted in bold and positioned at the centre; you can select a different menu, pressing the arrow keys. When the desired menu is selected, to access it you must press the ENTER key.

4.1 MEASUREMENTS DISPLAY

A typical screen is outlined below of the *Measurements*.

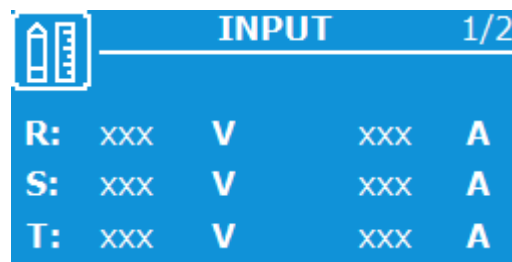


Figure 6 – Input Measurements Menu

On some menus, for example the screen above, the presence of multiple pages is indicated on the top right. In these menus, you can move from page to page using the arrow keys. The list of all the measurements available is outlined below.

Menu	Data displayed	Accuracy
INPUT	Rectifier input voltage ⁽¹⁾	1 V
	Rectifier input current	1 A
	Rectifier input frequency	0.1 Hz
RECTIFIER	Rectifier output voltage	0.1 V
	Rectifier output current	0.1 A
	Rectifier output power	0.1 kW
BATTERY ⁽²⁾	Battery voltage	0.1 V
	Battery current 1	0.1 A
	Battery current 2 ⁽³⁾	0.1 A
	Battery current 3 ⁽⁴⁾	0.1 A
	Residual autonomy	1 min
	Residual energy ⁽⁵⁾	1 %
TEMPERATURE ⁽⁶⁾	Probe 1 ⁽⁷⁾	0.1° C
	Probe 2 ⁽⁷⁾	0.1° C
	Probe 3 ⁽⁷⁾	0.1° C
	Probe 4 ⁽⁷⁾	0.1° C

INVERTER	Inverter output voltage ⁽¹⁾	1 V
	Inverter output current	1 A
	Inverter output frequency	0.1 Hz
BYPASS	Bypass output voltage ⁽¹⁾	1 V
	Bypass output frequency	0.1 Hz
OUTPUT	Output voltage ⁽¹⁾	1 V
	Output current	1 A
	Output frequency	0.1 Hz

- (1) This voltage measurement refers to the value between the phases
- (2) The battery measurements are only displayed for configuration with at least one battery installed.
- (3) The measurements are only available for the configuration with 2 batteries installed.
- (4) The measurements are only available for the configuration with 3 batteries installed.
- (5) The residual energy is only available on special request
- (6) The temperatures are only displayed with at least one probe installed
- (7) Only the probes installed are displayed

4.2 USER COMMANDS MENU

The *Commands* page allows the user to undertake direct actions on the UPS.



Figure 7 – Commands Menu - Selection

Commands	Commands Section	Description
RESET UPS.	-	Allow UPS reset. Typical use is resetting to restart it following a blocking alarm.
ON/OFF RECTIFIER ⁽¹⁾	-	Allows a switch on or off command to be sent from the display to the rectifier.
ON/OFF INVERTER ⁽¹⁾	-	Allows a switch on or off command to be sent from the display to the inverter.
BATTERY ⁽²⁾	BOOST REQUEST	Start/Stop rapid recharge (boost)
	FORCED BOOST	Start/Stop timed rapid recharge
	AUTO/MANUAL	Start/Stop manual charge
	BOOST TEST	Boost battery test
	TEST FAST DISCH.	Rapid discharge battery test
	TEST MANUAL	Manual battery test
RESUME STARTUP	-	Allows you to recover the start sequence
RESET HISTORY ⁽¹⁾	-	Allows you to reset the log

(1) Password protected menu

(2) The battery commands are only displayed for configuration with the battery installed.



Password protected access

The password is set by the manufacturer to prevent access to unauthorised staff.

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

4.2.1 Reset UPS command

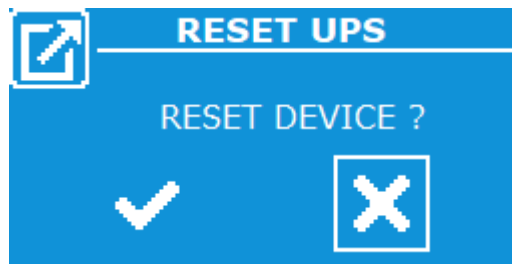


Figure 8 – Commands Menu - Reset UPS

The UPS is equipped with internal guards that block the system in the event of particular alarms. Using the arrows, you can change selection between the button and with the V tick and the button with the X. When the button with the V tick is selected confirming with the ENTER key you can release the alarm and reset normal operation. In the event of persistent anomalies, the RESET command has no effect.

RESET is however necessary to reset normal conditions due to blocking conditions, such as:

- Maximum rectifier direct voltage output (alarm A5).
- Alarm circuit error (Alarm A31).
- Inverter switch off for maximum DC voltage.

The RESET command also has the function of acknowledging certain alarms or events. The operator must press the RESET command to confirm the following alarms:

- Safety timer for rapid recharge or manual charge (alarm A10).
Rapid recharge (and timed rapid recharge) remain disabled up to when A10 is reset.
- Battery test unsuccessful (alarm A23).
The battery test remains disabled until A23 is reset.
- Manual charge shut-off (alarm A21).
In this case, RESET is sufficient to confirm the alarm without blocking any function.

4.2.2 Battery test commands

The UPS can give commands to execute the following battery tests (where available):

- **Request boost:** forces the machine in Boost mode for 60 seconds; after this interval if the amperometric relay does not intervene the machine returns to buffer mode.
- **Forced boost:** the machine is in Boost mode for the entire time set in eeprom.
- **Manual charging:** executes a manual charge cycle.
- **Rapid recharge test:** increase the output voltage of the rectifier from buffer float charge up to rapid recharge, monitoring the battery current.
- **Flat battery rapid test:** decrease the output voltage from the buffer float charge up to the second level of battery minimum voltage, monitoring the battery current.
- **Flat battery manual test:** allows the user to choose the minimum voltage level of the battery test and its duration; during the output voltage test of the rectifier, it will be set at 1V under the minimum voltage level of the battery test. The test will be exceeded if for its entire duration the voltage of the battery does not go under the minimum test level.

Another type of test is available, the **flat battery automatic test**; this test, being automatic, does not need any command in the setting menu, you can however choose the date and time from the two consecutive tests.



Further information

For further information on the battery test, consult the device manual.

4.3 BASIC DIAGNOSTICS

From the *Alarms* page, you can access the display page of the log or the display page of machine status with all the alarms and the active statuses.

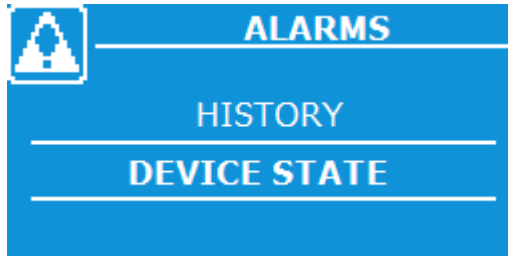


Figure 9 – Alarms Menu - Selection

4.3.1 Device status

This screen displays an alarm (or status) enabled on the machine. The display of an alarm (or status) at a time. You can scroll the list using the arrow keys.

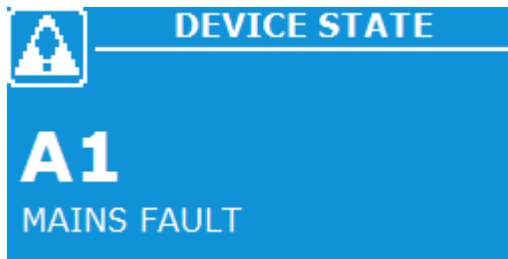


Figure 10 – Alarms Menu - Device Status

Each time an alarm activates, the page is updated. An acoustic signal indicates a new anomaly has occurred; in any case, the buzzer can be silenced pressing the **BUZZER** key.



Automatic alarm reset

For most of the alarms (except those described in the paragraph 4.2.1) reset is automatic and the alarms disappear together with the conditions that cause them.

4.3.2 Log

The *Log* page displays the log of machine events.

One element at a time is displayed according to the structure visible in the following screen.

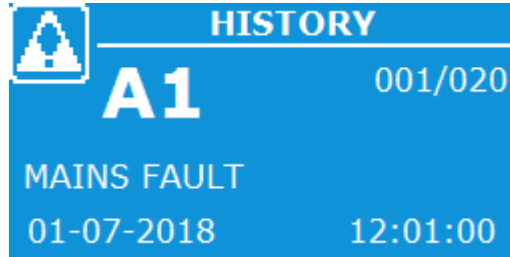


Figure 11 – Alarms Menu - Log

All the visible events on the page are similarly represented with:

- event code (a star beside the alarm code indicates alarm reset);
- description of the alarm;
- date and time of the event;
- position of the event in the log (xxx/yyy), which indicate the position of the event (xxx) with reference to the number of total events saved (yyy - maximum number equal to **500**).

On first access, the event displayed will be more recent as indicated on the top right (001/yyy).

You can move between saved events using the arrow keys.



Display and saving mode of the alarms and statuses

- In the alarm and statuses menus, the latter are always displayed in increasing order based on the numerical code.
- The alarms are displayed when they occur and must be silenced by the buzzer.
- The alarms are visible until they are present and are saved automatically in the events log, with the time and date.



Alarms and description of statuses

For further information on the alarms and the statuses, see the “Faults and alarms” section.

4.3.3 List of alarms and statuses of the rectifier

ALARM	DESCRIPTION OF THE ALARM	ALARM	DESCRIPTION OF THE ALARM
A1	Mains fault	A33	Disconnected probe ⁽⁴⁾
A2	Rectifier fuses blown	A34	Inverter off by user
A3	Rectifier high temperature	A35	Inverter input voltage not OK
A4	Rectifier overload	A36	Inverter high temperature
A5	Max rectifier voltage	A37	Inverter overload
A6	Min rectifier voltage	A38	ICB open ⁽³⁾
A7	Emergency level	A39	OCB open ⁽³⁾
A8	Max float battery	A40	External OCB open ⁽³⁾
A9	Min float battery	A41	MBCB closed
A10	Safety timer ⁽²⁾	A42	Inverter out of tolerance
A11		A43	Short circuit
A12	RICB open	A44	Inverter thermal image
A13	BCB open	A45	Bypass not ok
A14	ROCB open ⁽³⁾	A46	Bypass feeds load ⁽⁵⁾
A15	Flat battery ⁽²⁾	A47	Bypass switch
A16	Min battery level 1 ⁽²⁾	A48	Re-transfer blocked
A17	Min battery level 2 ⁽²⁾	A49	Minimum Output Voltage
A18	Min battery level 3 ⁽²⁾	A50	Maximum output voltage
A19	EPO pressed	A51	Inverter feeds load ⁽⁶⁾
A20	Rectifier thermal image	A52	Fans fail
A21	Manual interrupted ⁽²⁾	A53	Inverter CAN error ⁽⁷⁾
A22	Battery reverse polarity	A54	CAN Inverter disconnected ⁽⁷⁾
A23	Battery test failed ⁽²⁾	A55	Lost redundancy ⁽⁷⁾
A24	Q11 open ⁽³⁾	A56	
A25	Rect. CAN error ⁽¹⁾	A57	
A26	Rect. parallel fault ⁽¹⁾	A58	
A27		A59	
A28	SBCB open ⁽³⁾	A60	
A29	ELCB open ⁽³⁾	A61	Internal error
A30	Rectifier off by user	A62	Start sequence block
A31	Rect. control error loop	A63	EEPROM error
A32		A64	Common alarm

STATUS	STATUS DESCRIPTION	STATUS	STATUS DESCRIPTION
S1	Rectifier ON	S11	Rectifier parallel off ⁽¹⁾
S2	Rectifier OK	S12	Rectifier share OK ⁽¹⁾
S3	Floating charge ⁽²⁾	S13	Boost inhibition ⁽²⁾
S4	Boost charge ⁽²⁾	S14	Inverter ON
S5	Manual charge ⁽²⁾	S15	Inverter OK
S6	Battery test ⁽²⁾	S16	Inverter feeds load ⁽⁵⁾
S7	Floating imposition ⁽²⁾	S17	Inverter synchronised
S8	Manual inhibition ⁽²⁾	S18	Slave synchronised ⁽⁷⁾
S9	Master rectifier ⁽¹⁾	S19	Bypass OK
S10	Slave rectifier ⁽¹⁾	S20	Bypass feeds load ⁽⁶⁾

- (1) Alarms or statuses defined only on system in configuration with rectifiers parallel
- (2) Alarms or statuses defined only on configurations with battery
- (3) Alarms defined only if switch on configuration
- (4) Alarms defined only on configurations with at least one probe installed
- (5) Alarms or statuses defined only on ON-LINE configurations
- (6) Alarms or statuses defined only on OFF-LINE configurations
- (7) Alarms defined only on system in configuration with inverter parallel

4.4 SETTINGS AND ADVANCED OPERATIONS

A password is required to access the *Settings* page. Once the correct password is entered, you access the *Settings* page with a list to scroll of the pages which can be accessed. In the various menus, you can edit some internal parameters used for correct operation of the rectifier system.

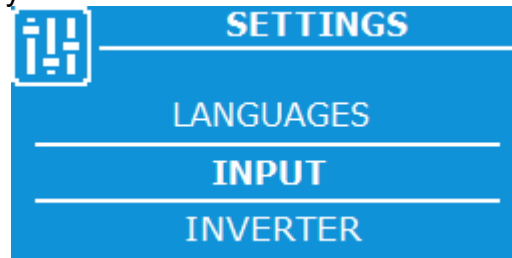


Figure 12 – Settings Menu - Selection

Drop-down menu	Data displayed
INPUT	Allows input tolerance parameters to be changed.
INVERTER	Allows changing the inverter switch off minimum voltage threshold.
OUTPUT	Allows output tolerance parameters to be changed.
BATTERY ⁽¹⁾	Allows setting the data of the battery including the automatic test parameters.
BATT. CHARGE ⁽¹⁾	Allows setting the float charge parameters with buffer, manual and rapid.
DC VOLTAGE	Allows changing the rectifier output voltage tolerance.
MODBUS 1	Allows setting the ModBus communication parameters of port 1
MODBUS 2	Allows setting the ModBus communication parameters of port 2
CLOCK	Allows setting the time and date.
LANGUAGE	Allows setting the language of the display

(1) The drop-down menu of the settings are only displayed for configuration with the battery installed.

4.4.1 Input Settings

The *Input Settings* menu allows changing the acceptability intervals for voltage and frequency of the mains.

Drop-down menu	Data displayed
MAX VOLTAGE (Maximum voltage)	Sets the percentage of the upper acceptability threshold of the RMS input mains voltage.
MIN VOLTAGE (Minimum voltage)	Sets the percentage of the lower acceptability threshold of the RMS input mains voltage.
MAX FREQUENCY (Maximum frequency)	Sets the percentage of the upper acceptability threshold of the input mains frequency.
MIN FREQUENCY (Minimum frequency)	Sets the percentage of the lower acceptability threshold of the input mains frequency.

4.4.2 Inverter Settings

The *Inverter Settings* menu allows changing the acceptability intervals for voltage and frequency of the inverter output.

Drop-down menu	Data displayed
MIN VDC INPUT (Inverter input minimum voltage)	Sets the minimum input voltage of the inverter, under this threshold the inverter will switch off.

4.4.3 Output Settings

The *Output Settings* menu allows changing the acceptability intervals for voltage and frequency of the output.

Drop-down menu	Data displayed
MAX VOLTAGE (Maximum voltage)	Sets the percentage of the upper acceptability threshold of the RMS output voltage.
MIN VOLTAGE (Minimum voltage)	Sets the percentage of the lower acceptability threshold of the RMS output voltage.
MAX FREQUENCY (Maximum frequency)	Sets the percentage of the upper acceptability threshold of the output frequency.
MIN FREQUENCY (Minimum frequency)	Sets the percentage of the lower acceptability threshold of the output frequency.

4.4.4 Battery settings

The *Battery settings* menu only available for configurations with the batteries installed, allows setting the battery data.

Drop-down menu	Section	Description
SIZE (Battery dimension)	-	Sets the dimension of the battery (e.g. following replacement of the battery after rectifier start-up).
ALARMS LEVEL (Setting the alarm levels)	HIGH FLOATING (Vmax buffer float charge (A8))	High voltage of floating charge: sets the threshold for alarm A8
	LOW FLOATING (Vmin buffer float charge (A9))	Low voltage of floating charge: sets the threshold for alarm A9
	MIN. LEV. 1 (Battery level min 1)	First level: sets the threshold for the alarm A16
	MIN. LEV. 2 (Battery level min 2)	Second level: sets the threshold for the alarm A17
	MIN. LEV. 3 (Battery level min 3)	Third level: sets the threshold for the alarm A18
AUTOM. TEST (Automatic test parameters setting)	ENABLE/DISABLE (Enables/disables the automatic test)	- Enables automatic testing of the battery if disabled. - Disables automatic testing of the battery if enabled.
	INTERVAL DAYS (Sets the interval of the automatic test)	Sets the interval (days) between an automatic test of the battery and the next.
	START TIME (Sets the start hour of the automatic test)	Sets the time in which the rectifier executes the automatic test of the battery.

4.4.5 Battery charger settings

The *Battery charger settings* menu only available for configurations with the batteries installed, allows setting the float charge parameter for buffer, manual and rapid.

Drop-down menu	Section	Description
FLOATING (Floating charge settings)	VOLTAGE (Floating charge)	Sets the floating charge.
	CURR. LIM. BATT. (Automatic mode max. battery current)	Sets the maximum recharge current.
	COMP. TERM. (Thermal compensation)	Sets the thermal compensation constant to protect the battery from any excess temperatures.
BOOST (Boost charge settings)	ENABLE/DISABLE (Enables/disables)	Enables or disables both types of boost charge (timed or automatic).
	BOOST MODE (Boost charge mode) ⁽¹⁾	Sets the automatic boost charge mode (current or voltage).
	VOLTAGE (Boost charge voltage)	Sets the voltage level for boost charge.
	SAFETY TIMER (Boost charge safety timer)	Sets the maximum time permitted for the rectifier to remain in boost charge mode.
	FORCED DURATION (Timed boost charge)	Sets the duration of timed boost charge.
	DURATION FORCED (Standby time Boost charge -> floating charge)	Sets the boost charge standby time for floating charge.
	CURRENT B -> F (Boost charge current -> floating charge)	Sets the boost charge current threshold at the floating charge.
	CURRENT F -> B (Floating charge current -> Boost charge)	Sets the floating charge current threshold at the boost charge.
	VOLTAGE B -> F (Boost charge voltage -> floating charge)	Sets the boost charge voltage threshold at the floating charge.
	VOLTAGE F -> B (Floating charge -> Boost charge)	Sets the floating charge voltage threshold at the boost charge.
MANUAL (Manual charge settings)	ENABLE/DISABLE (Enables/disables)	Enables/disables the manual charge.
	STARTING VOLT (Manual start-up voltage)	Sets the manual start-up current.
	MAX CURRENT (Manual start-up maximum battery current)	Sets the manual start-up recharge current.
	SAFETY TIMER (Manual charge timer)	Sets the maximum time permitted for the rectifier to remain in manual charge mode.

(1) Boost charge mode also defines the type of threshold (if amperometric or voltmetric) for the passage from floating charge to boost charge.

4.4.6 DC Voltage Settings

The *DC Voltage Settings* menu allows you to set the output voltage of the rectifier.

Drop-down menu	Description
MAX VOLTAGE (Maximum output voltage)	Sets the threshold for alarm A5 ⁽¹⁾ .
MAX VOLT. DELAY (Max voltage standby time)	Sets standby time on alarm A5 activation
MIN VOLTAGE (Minimum output voltage)	Sets the threshold for alarm A6.
EMERGENCY LEVEL (Emergency level)	Sets the emergency level voltage value.

⁽¹⁾ A5 is an alarm whose activation disables the rectifier bridge.

4.4.7 ModBus settings

There are two *ModBus Setting* menus which allow you to set the ModBus communication parameters for port 1 and 2.

Drop-down menu	Description
Address	Sets the ModBus slave address (from 1 to 247)
Transmission speed	Sets the transmission speed of the data on the communication serial port.
Mode	Sets the parity and number of bits for stoppage on the communication serial port.

4.4.8 Clock settings

The *Clock Settings* allow you to set the date and time of the rectifier.

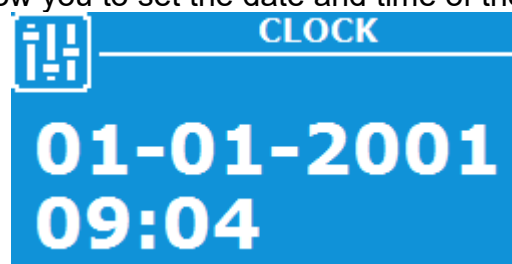


Figure 13 – Settings Menu - Clock



Date and time are regulated correctly.

The correct date and time settings are fundamental to save the archive of the events logs.

4.4.9 Language settings

This *Language settings* menu allows you to change the language of the menu choosing from ENGLISH (U.K.) and ITALIAN.

4.5 INFO

The *Info* page provides some general information on the rectifier logic and the panel logic.

Drop-down menu	Data displayed
FW VERSIONS (Firmware Versions)	Firmware version of the UPS (Static Micro-Controller, Rectifier DSP and Inverter DSP).
	Front panel firmware version.
MODBUS 1	Displays the ModBus parameters of integrated port 1.
MODBUS 2	Displays the ModBus parameters of integrated port 2.
DATE / TIME	Displays the date and time set on the rectifier.

The Firmware Versions screen follows



Figure 14 – Info Menu - Firmware Versions

5. FAULTS AND ALARMS

As already described in the previous chapters, the system is equipped with basic diagnostics which allow immediate display of the operating conditions. The LCD panel immediately displays the *Home Page* and the presence of any alarms by displaying instead of the home icon on the top left, a flashing icon similar to that outlined below and an acoustic indicator is enabled. To have a list of the active alarms and the active statuses, you can access the *Alarms* menu.

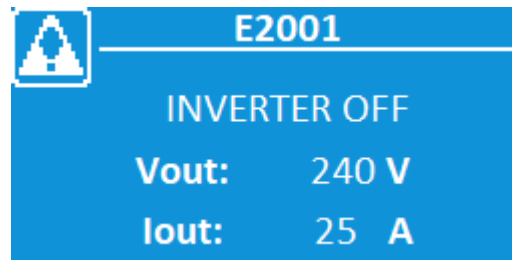


Figure 15 – Home Page if alarms present



Danger of injuries due to electric shock!

Before carrying out any operation on the UPS, ensure you have complied with all the safety precautions:

- All work on the unit must be carried out by qualified staff;
 - You can access internal components only having disconnected the device from power sources;
 - Always use protective equipment designed for each type of activity;
 - The instructions contained in the manuals must be strictly followed;
 - If in doubt or you cannot solve the problem, please contact Borri immediately.
-

5.1 DEFINITION OF THE OPERATING STATUS

Status	S1	RECTIFIER ON
Description	The rectifier bridge is on.	
Operating condition	The rectifier is on.	

Status	S2	RECTIFIER OK
Description	The rectifier is working properly.	
Operating condition	The rectifier has no system alarm on (e.g. ROCB open A14, etc.).	

Status	S3	FLOATING CHARGE
Description	The rectifier (battery charger) works in charge floating.	
Operating condition	The output direct voltage is at the floating charge level.	

Status	S4	BOOST CHARGE
Description	The rectifier (battery charger) executes a boost charge cycle.	
Operating condition	The output direct voltage is at the boost charge level.	

Status	S5	MANUAL CHARGE
Description	The rectifier (battery charger) is working in manual mode.	
Operating condition	The output direct voltage is adjustable using the manual charge potentiometer.	

Status	S6	BATTERY TEST
Description	The rectifier (battery charger) is executing a battery test.	
Operating condition	The output direct voltage is different based on the test request.	

Status	S7	FLOATING IMPOSITION
Description	Forced setting of the floating charge.	
Operating condition	The output direct voltage is set on the floating charge.	

Status	S8	MANUAL CHARGE INHIBITION
Description	The manual charge function is uninhibited.	
Operating condition	The rectifier does not allow activation of the manual charge.	

Status	S9	MASTER
Description	In parallel configuration the unit is the MASTER.	
Operating condition	The MASTER status is enabled if connected to another rectifier.	

Status	S10	SLAVE
Description	In parallel configuration the unit is the SLAVE.	
Operating condition	The SLAVE status is enabled when it is connected to another rectifier with the share current enabled.	

Status	S11	PARALLEL OFF
Description	The current allocation algorithm is disabled	
Operating condition	In the MASTER unit, this condition is alternative to S9-MASTER when the rectifiers are separated. In the SLAVE unit, this condition is alternative to S10-SLAVE when the rectifiers are separated or when the output current is too low to be shared.	

Status	S12	RECTIFIER SHARE OK
Description	Current share algorithm enabled and working.	
Operating condition	This condition is enabled when the output current of the rectifier is correctly shared among the rectifiers.	

Status	S13	BOOST INHIBITION
Description	The boost function is inhibited.	
Operating condition	The rectifier does not allow activation of the rapid charge.	

Status	S14	INVERTER ON
Description	Inverter on.	
Operating condition	The inverter is on.	

Status	S15	INVERTER OK
Description	The inverter is working properly.	
Operating condition	The inverter has no active system alarm (e.g. A37 overload, etc.).	

Status	S16	INVERTER FEEDS LOAD
Description	The inverter feeds the load.	
Operating condition	The inverter is running, the inverter static is closed and the output switch is closed. The inverter feeds the load.	

Status	S17	INVERTER SYNCHRONISED
Description	The inverter is synchronised with the mains.	
Operating condition	The bypass mains is available and in tolerance. The inverter is on and synchronised with the bypass.	

Status	S18	SLAVE SYNCHRONISED
Description	The inverter is synchronised with the MASTER.	
Operating condition	Status active only in configurations with the inverter parallel and only on SLAVE machines. The inverter is synchronised with the MASTER output.	

Status	S19	BYPASS OK
Description	The bypass mains is available and in tolerance.	
Operating condition	The bypass mains is available and in tolerance.	

Status	S20	BYPASS FEEDS LOAD
Description	The load is powered by the bypass.	
Operating condition	The bypass network is available and in tolerance, the bypass static is closed and the switch is closed. The load is powered by the bypass mains.	

5.2 ALARMS: 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 fault. ➤ Wrong rotation.
Solutions	<ol style="list-style-type: none"> 1. Check connections to the electrical mains. 2. Check stability of the mains voltage. 3. If the alarm persists, contact our technical support service.

Alarm	A2 RECTIFIER FUSES BLOWN
Description	Rectifier bridge input fuses fault.
Possible causes	<ul style="list-style-type: none"> ➤ Output short circuit. ➤ Overload.
Solutions	<ol style="list-style-type: none"> 1. Contact our technical support service.

Alarm	A3 RECTIFIER HIGH TEMPERATURE
Description	The temperature of the rectifier heat sink exceeds the higher threshold value.
Possible causes	<ul style="list-style-type: none"> ➤ Cooling system failure. ➤ Rectifier bridge irregular conduit.
Solutions	<ol style="list-style-type: none"> 1. Check the conduit conditions on all three input phases. 2. Check the fans and the cooling system are working properly. 3. If the alarm persists, contact our technical support service.

Alarm	A4 RECTIFIER OVERLOAD
Description	The current sensor has detected rectifier output overload. If the alarm persists, thermal image protection is activated (alarm A20), if enabled).
Possible causes	<ul style="list-style-type: none"> ➤ Output overload.
Solutions	<ol style="list-style-type: none"> 1. Check the charges connected in output of the rectifier. 2. Contact our technical support service.

Alarm	A5 MAXIMUM RECTIFIER VOLTAGE
Description	The direct voltage measured has surpassed the higher threshold value.
Possible causes	<ul style="list-style-type: none"> ➤ Circuit fault of control or measurement.
Solutions	<ol style="list-style-type: none"> 1. Check the actual value of the direct voltage measured and reset the device. 2. If the alarm persists, contact our technical support service.

Alarm	A6 MINIMUM RECTIFIER VOLTAGE
Description	The direct voltage measured has surpassed the lower threshold value.
Possible causes	➤ Circuit fault of control or measurement.
Solutions	<ol style="list-style-type: none"> 1. Check the actual value of the direct voltage measured and reset the device. 2. If the alarm persists, contact our technical support service.

Alarm	A7 EMERGENCY LEVEL
Description	Emergency level set at rectifier output voltage.
Possible causes	➤ Emergency level set using dedicated digital contact.
Solutions	<ol style="list-style-type: none"> 1. Check all the conditions imposing the emergency level. 2. If the alarm persists, contact our technical support service.

Alarm	A8 MAXIMUM FLOAT BATTERY
Description	The battery voltage on floating charge measured has surpassed the higher threshold value.
Possible causes	➤ Circuit fault of control or measurement.
Solutions	<ol style="list-style-type: none"> 1. Check the actual value of the output direct voltage measured. 2. If the alarm persists, contact our technical support service.

Alarm	A9 MINIMUM FLOAT BATTERY
Description	The battery voltage on floating charge measured has surpassed the lower threshold value.
Possible causes	➤ Circuit fault of control or measurement.
Solutions	<ol style="list-style-type: none"> 1. Check the actual value of the direct voltage measured. 2. If the alarm persists, contact our technical support service.

Alarm	A10 SAFETY TIMER
Description	Maximum time expired for manual charge or rapid charge.
Possible causes	➤ Irregular battery charging cycle.
Solutions	<ol style="list-style-type: none"> 1. Check the status of the battery and reset the device. 2. If the alarm persists, contact our technical support service.

Alarm	A12 RICB OPEN
Description	The input switch is open.
Possible causes	<ul style="list-style-type: none">➤ Input switch is open.➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none">1. Check the switch auxiliary contact is working.2. If the alarm persists, contact our technical support service.

Alarm	A13 BCB OPEN
Description	The battery switch is open.
Possible causes	<ul style="list-style-type: none">➤ Battery switch open.➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none">1. Check the switch auxiliary contact is working.2. If the alarm persists, contact our technical support service.

Alarm	A14 ROCB OPEN
Description	The rectifier output switch is open.
Possible causes	<ul style="list-style-type: none">➤ Output switch open.➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none">1. Check the switch auxiliary contact is working.2. If the alarm persists, contact our technical support service.

Alarm	A15 FLAT BATTERY
Description	Battery is flat.
Possible causes	<ul style="list-style-type: none">➤ Battery flat due to mains fault.➤ Rectifier fault.
Solutions	<ol style="list-style-type: none">1. Check which alarms are present and execute the indicated procedures.2. If the alarm persists, contact our technical support service.

Alarm	A16 MIN BATTERY LEVEL 1
Description	The battery reaches the first minimum level.
Possible causes	<ul style="list-style-type: none">➤ Level 1 flat battery due to mains fault.➤ Rectifier fault.
Solutions	<ol style="list-style-type: none">1. Check the actual value of the battery voltage.2. Check which alarms are present and execute the indicated procedures.3. If the alarm persists, contact our technical support service.

Alarm	A17 MIN BATTERY LEVEL 2
Description	The battery reaches the second minimum level.
Possible causes	<ul style="list-style-type: none"> ➤ Level 2 flat battery due to mains fault. ➤ Rectifier fault.
Solutions	<ol style="list-style-type: none"> 1. Check the actual value of the battery voltage. 2. Check which alarms are present and execute the indicated procedures. 3. If the alarm persists, contact our technical support service.

Alarm	A18 MIN BATTERY LEVEL 3
Description	The battery reaches the third minimum level.
Possible causes	<ul style="list-style-type: none"> ➤ Level 3 flat battery due to mains fault. ➤ Rectifier fault.
Solutions	<ol style="list-style-type: none"> 1. Check the actual value of the battery voltage. 2. Check which alarms are present and execute the indicated procedures. 3. If the alarm persists, contact our technical support service.

Alarm	A19 EPO PRESSED
Description	The EPO button was pressed.
Possible causes	<ul style="list-style-type: none"> ➤ EPO button pressed. ➤ Button auxiliary contact fault.
Solutions	<ol style="list-style-type: none"> 1. Check the emergency button auxiliary contact is working. 2. If the alarm persists, contact our technical support service.

Alarm	A20 RECTIFIER THERMAL IMAGE
Description	The thermal image is activated in the event of prolonged overload. Once the thermal image has intervened, the rectifier stops for 30 minutes and then re-starts.
Possible causes	<ul style="list-style-type: none"> ➤ Output overload. ➤ Measurement circuit fault.
Solutions	<ol style="list-style-type: none"> 1. Check the charges connected to the rectifier output and reduce the standby temperature. 2. If the alarm persists, contact our technical support service.

Alarm	A21 MANUAL INTERRUPTED
Description	Manual charge shut-off.
Possible causes	<ul style="list-style-type: none">➤ Emergency level setting.➤ Buffer charge setting.➤ Disabled manual charge.➤ Rectifier off.
Solutions	<ol style="list-style-type: none">1. Check which alarms are present and execute the indicated procedures.2. If the alarm persists, contact our technical support service.

Alarm	A22 BATTERY REVERSE POLARITY
Description	Inverse polarity detected on the connection terminals of the battery.
Possible causes	<ul style="list-style-type: none">➤ Wrong connection of the battery cables
Solutions	<ol style="list-style-type: none">1. Check the battery connection.2. If the alarm persists, contact our technical support service.

Alarm	A23 BATTERY TEST FAILED
Description	The battery has not passed the automatic test.
Possible causes	<ul style="list-style-type: none">➤ Battery disconnected.➤ The battery is not working properly.
Solutions	<ol style="list-style-type: none">1. Check the battery status.2. If the alarm persists, contact our technical support service.

Alarm	A24 Q11 OPEN
Description	Switch Q11 open (only in configurations using Q11).
Possible causes	<ul style="list-style-type: none">➤ Battery Q11 open.
Solutions	<ol style="list-style-type: none">1. Check the switch auxiliary contact is working.2. If the alarm persists, contact our technical support service.

Alarm	A25 RECTIFIER CAN ERROR
Description	The rectifier parallel CAN-BUS serial communication is not working.
Possible causes	<ul style="list-style-type: none">➤ Wrong setting of the unit position.➤ The CAN-BUS cable is disconnected.
Solutions	<ol style="list-style-type: none">1. Check the settings and the cable.2. If the alarm persists, contact our technical support service.

Alarm	A26 RECTIFIER PARALLEL FAULT
Description	In parallel configuration of the rectifier, the system cannot manage to sub-divide the load even if the conditions are present.
Possible causes	<ul style="list-style-type: none"> ➤ Current sensor disconnected. ➤ The parallel switch contacts are interrupted.
Solutions	<ol style="list-style-type: none"> 1. Check the sensors and the auxiliary contact. 2. If the alarm persists, contact our technical support service.

Alarm	A28 SBCB OPEN
Description	The SBCB bypass switch is open.
Possible causes	<ul style="list-style-type: none"> ➤ SBCB bypass switch open. ➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none"> 1. Check the switch auxiliary contact is working. 2. If the alarm persists, contact our technical support service.

Alarm	A29 ELCB OPEN
Description	The ELCB emergency line switch is open.
Possible causes	<ul style="list-style-type: none"> ➤ ELCB emergency line switch open ➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none"> 1. Check the switch auxiliary contact is working. 2. If the alarm persists, contact our technical support service.

Alarm	A30 RECTIFIER OFF BY USER
Description	Rectifier manually switched off.
Possible causes	<ul style="list-style-type: none"> ➤ Rectifier switched off from panel. ➤ Rectifier switched off from front switch. ➤ Rectifier switched off from specific digital contact.
Solutions	<ol style="list-style-type: none"> 1. Check the points in the "<i>Possible causes</i>". 2. If the alarm persists, contact our technical support service.

Alarm	A31 RECTIFIER CONTROL ERROR LOOP
Description	Control circuit fault.
Possible causes	<ul style="list-style-type: none"> ➤ Circuit fault of control or measurement.
Solutions	<ol style="list-style-type: none"> 1. Check the connections of the measurements and the control circuit. 2. If the alarm persists, contact our technical support service.

Alarm	A33 DISCONNECTED PROBE
Description	The temperature probe (if present) is disconnected.
Possible causes	<ul style="list-style-type: none"> ➤ Connection fault in probe cabling.
Solutions	<ol style="list-style-type: none"> 1. Check the probe connection. 2. If the alarm persists, contact our technical support service.

Alarm	A34 INVERTER OFF BY USER
Description	Inverter manually switched off.
Possible causes	<ul style="list-style-type: none"> ➤ Inverter switched off from panel. ➤ Inverter switched off from front switch. ➤ Inverter switched off from specific digital contact.
Solutions	<ol style="list-style-type: none"> 1. Check the points in the "<i>Possible causes</i>". 2. If the alarm persists, contact our technical support service.

Alarm	A35 INVERTER INPUT VOLTAGE NOT OK
Description	DC voltage inbound of inverter out of tolerance.
Possible causes	<ul style="list-style-type: none"> ➤ Out of tolerance input DC voltage Check output voltage of the rectifier and the battery.
Solutions	<ol style="list-style-type: none"> 1. Check the points in the "<i>Possible causes</i>". 2. If the alarm persists, contact our technical support service.

Alarm	A36 INVERTER HIGH TEMPERATURE
Description	The temperature of the inverter heat sink exceeds the higher threshold value.
Possible causes	<ul style="list-style-type: none"> ➤ Cooling system failure. ➤ Inverter bridge irregular conduit.
Solutions	<ol style="list-style-type: none"> 1. Check the conduit conditions on all three phases. 2. Check the fans and the cooling system are working properly. 3. If the alarm persists, contact our technical support service.

Alarm	A37 INVERTER OVERLOAD
Description	The current sensor has detected inverter output overload. If the alarm persists, thermal image protection is activated (alarm A44), if enabled).
Possible causes	<ul style="list-style-type: none"> ➤ Output overload.
Solutions	<ol style="list-style-type: none"> 1. Check the charges connected in output of the inverter. 2. Contact our technical support service.

Alarm	A38 ICB OPEN
Description	The input switch of the inverter ICB is open.
Possible causes	<ul style="list-style-type: none"> ➤ Inverter input switch ICB open. ➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none"> 1. Check the switch auxiliary contact is working. 2. If the alarm persists, contact our technical support service.

Alarm	A39 OCB OPEN
Description	The OCB output switch is open.
Possible causes	<ul style="list-style-type: none"> ➤ OCB output switch open. ➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none"> 1. Check the switch auxiliary contact is working. 2. If the alarm persists, contact our technical support service.

Alarm	A40 EXTERNAL OCB OPEN
Description	The external output switch is open.
Possible causes	<ul style="list-style-type: none"> ➤ External output switch open. ➤ Switch auxiliary contact faulty.
Solutions	<ol style="list-style-type: none"> 1. Check the switch auxiliary contact is working. 2. If the alarm persists, contact our technical support service.

Alarm	A41 MBCB CLOSED
Description	The MBCB bypass switch is closed.
Possible causes	<ul style="list-style-type: none"> ➤ Manual bypass switch MBCB closed ➤ Switch auxiliary contact fault.
Solutions	<ol style="list-style-type: none"> 1. Check the switch auxiliary contact is working 2. If the alarm persists, contact our technical support service.

Alarm	A42 INVERTER OUT OF TOLERANCE
Description	Out of tolerance inverter output voltage
Possible causes	<ul style="list-style-type: none"> ➤ Inverter bridge switched off or faulty ➤ Control logic malfunction
Solutions	<ol style="list-style-type: none"> 1. If the inverter is off, switch it on 2. If the alarm persists, contact our technical support service.

Alarm	A43 SHORT CIRCUIT
Description	Inverter output short circuit
Possible causes	➤ Inverter output short circuit
Solutions	1. Eliminate the causes of the short circuit in inverter output 2. If the alarm persists, contact our technical support service.

Alarm	A44 INVERTER THERMAL IMAGE
Description	The thermal image is activated in the event of prolonged overload. Once the thermal image has intervened, the inverter stops for 30 minutes and then re-starts.
Possible causes	➤ Output overload ➤ Measurement circuit fault
Solutions	1. Check the loads connected to the output to the inverter and, if necessary, reduce the load 2. If the alarm persists, contact our technical support service.

Alarm	A45 BYPASS NOT OK
Description	Bypass not available or voltage or frequency of bypass out of tolerance
Possible causes	➤ Voltage out of limit permitted ➤ Frequency out of limit permitted ➤ Bypass cyclic direction incorrect
Solutions	1. Check the bypass voltage parameters are within the range permitted 2. If the alarm persists, contact our technical support service.

Alarm	A46 BYPASS FEEDS LOAD
Description	The bypass feeds the load
Possible causes	➤ Transfer on bypass from bypass switch ➤ Inverter fault or switched off
Solutions	1. If the inverter is off, switch it on 2. If the alarm persists, contact our technical support service.

Alarm	A47 BYPASS SWITCH
Description	The bypass/normal switch is in the bypass position
Possible causes	<ul style="list-style-type: none"> ➤ The bypass/normal selector is in the bypass position ➤ Selector auxiliary contact fault
Solutions	<ol style="list-style-type: none"> 1. Move bypass switch 2. Check the selector auxiliary contact is working 3. If the alarm persists, contact our technical support service.

Alarm	A48 RE-TRANSFER BLOCKED
Description	The UPS is blocked under the bypass. The inverter static remains open.
Possible causes	<ul style="list-style-type: none"> ➤ There is a multiple transfer of the inverter/bypass and the bypass/inverter
Solutions	<ol style="list-style-type: none"> 1. Reset and check correct operation of the static 2. If the alarm persists, contact our technical support service.

Alarm	A49 MINIMUM OUTPUT VOLTAGE
Description	The output voltage is under the minimum tolerance threshold.
Possible causes	<ul style="list-style-type: none"> ➤ Inverter bridge switched off or faulty ➤ Control logic malfunction
Solutions	<ol style="list-style-type: none"> 1. If the inverter is off, switch it on 2. If the alarm persists, contact our technical support service.

Alarm	A50 MAXIMUM OUTPUT VOLTAGE
Description	The output voltage is over the maximum tolerance threshold.
Possible causes	<ul style="list-style-type: none"> ➤ Control logic malfunction ➤ Parallel system malfunction
Solutions	<ol style="list-style-type: none"> 1. Contact our technical support service.

Alarm	A51 INVERTER FEEDS LOAD
Description	The inverter feeds the load. Alarm active only for OFF-LINE configurations.
Possible causes	<ul style="list-style-type: none"> ➤ Transfer on inverter from bypass switch ➤ Fault or no emergency mains
Solutions	<ol style="list-style-type: none"> 1. Move bypass switch 2. Check the selector auxiliary contact is working 3. If the alarm persists, contact our technical support service.

Alarm	A52 FANS FAIL
Description	At least one of the system valves is not working correctly
Possible causes	<ul style="list-style-type: none">➤ Loss of fan power➤ Fans fault
Solutions	<ol style="list-style-type: none">1. Check fans power supply2. Replace faulty fan3. If the alarm persists, contact our technical support service.

Alarm	A53 INVERTER CAN ERROR
Description	The inverter parallel CAN-BUS serial communication is not working
Possible causes	<ul style="list-style-type: none">➤ Wrong setting of the unit position➤ Cable interrupted
Solutions	<ol style="list-style-type: none">1. Check the settings and the cable2. If the alarm persists, contact our technical support service.

Alarm	A54 CAN INVERTER DISCONNECTED
Description	The inverter parallel cable is not connected
Possible causes	<ul style="list-style-type: none">➤ Parallel cable not connected properly
Solutions	<ol style="list-style-type: none">1. Check the cable connection is correct2. If the alarm persists, contact our technical support service.

Alarm	A55 LOST REDUNDANCY
Description	The parallel inverter number is not sufficient to guarantee the minimum redundancy necessary for the system
Possible causes	<ul style="list-style-type: none">➤ One or more parallel systems are faulty or off
Solutions	<ol style="list-style-type: none">1. Reset the faulty or off systems2. If the alarm persists, contact our technical support service.

Alarm	A61 INTERNAL ERROR
Description	An error occurred inside the control logic
Possible causes	<ul style="list-style-type: none">➤ Internal malfunctions
Solutions	<ol style="list-style-type: none">1. Contact our technical support service.

Alarm	A62	START SEQUENCE BLOCKED
Description	The start sequence was blocked due to an error.	
Possible causes	➤ Wrong parameters entered during programming.	
Solutions	1. Contact our technical support service.	


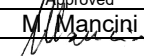
Alarm	A63	EEPROM ERROR
Description	The control unit detected an error of the parameters saved in E ² PROM.	
Possible causes	➤ Wrong parameters entered during programming.	
Solutions	1. Contact our technical support service.	

Alarm	A64	COMMON ALARM
Description	UPS common alarm	
Possible causes	➤ There is at least one alarm from the UPS logic.	
Solutions	1. Check which alarms are present and execute the indicated procedures.	

START-UP, SHUT-DOWN & MANUAL BYPASS

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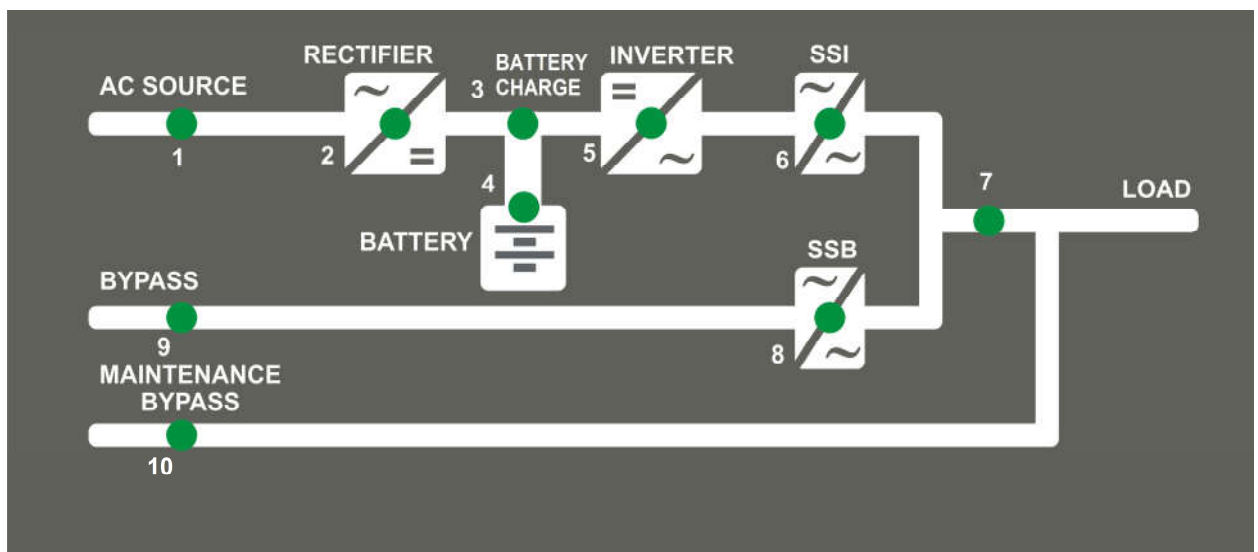
1. INTRODUCTION

Before carrying out the procedures described in this chapter, read the instructions carefully to avoid possible harm to people or damage to property due to wrong manoeuvres.

CAUTION

Wrong execution of the manoeuvres can cause harm to people and damage to property.

The image on the bottom represents a screen-printed representation which includes the leds of the synoptic panel.



2. START-UP PROCEDURE

To start the UPS, proceed as follows.

This general procedure is valid for each type of configuration; in parallel configurations, refer to Q11 output connection switch of the rectifier and the battery.

WARNING

Before switching on the UPS, ensure that:

- 1) the "EPO" emergency stop button (if present), situated near the front panel, is in the released position; on the contrary, press it before continuing with the start procedure.
- 2) rotation in the voltage phase for input and output is correct.

- 1) Close RICB and wait until the display switches on.

WARNING

Advance closure of the switches BCB or Q11 (before it is requested by the front panel) can damage the capacitor bench of the inverter and the battery.

- 2) Follow the instructions outlined on the display for closure of the circuit switches and the disconnecter switches.

No.	LCD MESSAGE	ACTION	UPS BEHAVIOUR
1	BLANK	Close RICB.	
2	UPS STARTUP PLEASE WAIT		The control unit is powered. All the LEDs of the front panel switch on for a second.
3	RECTIFIER STARTUP PLEASE WAIT		The UPS control unit is in standby for the power mains to work properly. The green indicator light of LED #1 is on.
4	RECTIFIER STARTUP MOVE SELECTOR ON	Move selector (if present)	If the rectifier ON/OFF selector is present and in the OFF position, the display asks for its movement to the ON position.
5	RECTIFIER STARTUP CLOSE ROCB	Close ROCB (if present)	If ROCB is open, the display asks the user to close it.
6	RECTIFIER STARTUP PLEASE WAIT		The rectifier output direct voltage increases up to the nominal value. The micro-processor checks all the start parameters are working properly. The green indicator light of LED #2 and LED #3 are on.
7	RECTIFIER STARTUP CLOSE Q11	Close Q11 (if present)	If switch Q1x is present and is open, the display asks to close it once rectifier start-up is complete.
8	RECTIFIER STARTUP PLEASE WAIT		The UPS control unit is going to start the battery.

9	BATTERY STARTUP CLOSE BCB	Close BCB (if present)	If switch BCB is present and is open, the display asks to close it. The green indicator light of LED #4 switches on once the battery is connected.
10	BATTERY STARTUP PRECHARGE CAPACITY	Press the precharge button of the capacitors	Only with ICB present
11	BATTERY STARTUP CLOSE ICB	Close ICB (if present)	If switch ICB is present and is open, the display asks to close it.
12	INVERTER STARTUP MOVE SELECTOR ON	Move selector (if present)	If the inverter ON/OFF selector is present and in the OFF position, the display asks for its movement to the ON position.
13	INVERTER STARTUP PLEASE WAIT		The inverter IGBT bridge starts to modulate and the output voltage of the inverter reaches the nominal value. The green indicator light of LED #5 is on. The inverter static is closed and the green indicator light of LED #6 switches on.
14	BYPASS STARTUP PLEASE WAIT		The UPS control unit is going to start the emergency network.
15	BYPASS STARTUP CLOSE ELCB	Close ELCB (if present)	
16	BYPASS STARTUP CLOSE SBCB	Close SBCB (if present)	
17	BYPASS STARTUP PLEASE WAIT		The micro-processor controls all the bypass parameters (voltage, phases succession, frequency) are within the tolerance limits. The green indicator light of LED #9 is on.
18	OUTPUT STARTUP CLOSE OCB	Close OCB	The load is powered. The green indicator light of LED #7 is on.
19	DEVICE STARTUP PLEASE WAIT		The micro-processor controls all the output parameters (voltage, phases succession, frequency) are within the tolerance limits.
20	UPS MODEL/SIZE OUTPUT VOLT/CURR		

3. SHUT-DOWN PROCEDURE (LOAD NOT SUPPLIED)

No.	ACTION	UPS OPERATION
1	Open OCB	The power supply of the load was interrupted. The orange indicator light of LED #6 is on
2	Open BCB and Q1x	The battery is disconnected from the rectifier. The red indicator light of LED #3 is on
3	Open SBCB	The bypass line is disconnected. LED #8 is off.
4	Open RICB	The rectifier and inverter are off.
5		The stop procedure has concluded.

4. MANUAL BYPASS PROCEDURE

WARNING

In manual bypass mode, the load is powered directly by the electrical mains: the uninterrupted power supply is therefore not guaranteed.

No.	ACTION	UPS BEHAVIOUR
1	Position the "NORMAL-BYPASS" switch on <i>BYPASS</i>	The load is transferred to the bypass static switch. The LED #6 is off, while the orange indicator light of LED #8 is on.
2	Close MBCB	The load is powered by the main network using the manual bypass circuit switch. The bypass static switch is still closed.
3	Open RICB	The rectifier is off, while the inverter is still on, being powered by batteries. The LED #1 is off, while the orange indicator light of LED #4 is on.
4	Open BCB and Q11 (if present)	The batteries are disconnected and the inverter is off. The load continues to be powered by the bypass static switch. The red indicator light of LED #4 is on
5	Open SBCB (if present)	The bypass line is disconnected.
6	Open OCB	The load is powered directly by the main network using the manual bypass circuit switch. The UPS is insulated.

5. START FROM MANUAL BYPASS MODE

Before starting from manual bypass mode (after maintenance or repair intervention), check the “NORMAL-BYPASS” switch is in the *BYPASS* position.

No.	LCD MESSAGE	ACTION	UPS BEHAVIOUR
1	BLANK	Close RICB	
2	UPS STARTUP PLEASE WAIT		The control unit is powered. All the LEDs of the front panel switch on for a second.
3	RECTIFIER STARTUP PLEASE WAIT		The UPS control unit is in standby for the power mains to work properly. The green indicator light of LED #1 and orange of LED #10 are on.
4	RECTIFIER STARTUP MOVE SELECTOR ON	Move selector (if present)	If the rectifier ON/OFF selector is present and in the OFF position, the display asks for its movement to the ON position.
5	RECTIFIER STARTUP CLOSE ROCB	Close ROCB (if present)	If ROCB is open, the display asks the user to close it.
6	RECTIFIER STARTUP PLEASE WAIT		The rectifier output direct voltage increases up to the nominal value. The micro-processor checks all the start parameters are working properly. The green indicator light of LED #2 and LED #3 are on.
7	RECTIFIER STARTUP CLOSE Q11	Close Q11 (if present)	If switch Q1x is present and is open, the display asks to close it once rectifier start-up is complete.
8	BATTERY STARTUP PLEASE WAIT		The UPS control unit is going to start the battery.
9	BATTERY STARTUP CLOSE BCB	Close BCB (if present)	If switch BCB is present and is open, the display asks to close it. The green indicator light of LED #4 switches on once the battery is connected.
10	BATTERY STARTUP PRECHARGE CAPACITY	Press the precharge button of the capacitors	Only with ICB present
11	BATTERY STARTUP CLOSE ICB	Close ICB (if present)	If switch ICB is present and is open, the display asks to close it.
12	BYPASS STARTUP PLEASE WAIT		The UPS control unit is going to start the emergency network.
13	BYPASS STARTUP CLOSE ELCB	Close ELCB (if present)	

14	BYPASS STARTUP CLOSE SBCB	Close SBCB (if present)	
15	BYPASS STARTUP PLEASE WAIT		The micro-processor controls all the bypass parameters (voltage, phases succession, frequency) are within the tolerance limits. The green indicator light of LED #9 is on. The bypass static is closed and the orange indicator light of LED #8 switches on.
16	OUTPUT STARTUP CLOSE OCB	Close OCB	The green indicator light of LED #7 is on.
17	OUTPUT STARTUP OPEN MBCB	Open MBCB.	The orange indicator light of LED #10 switches off.
18	INVERTER STARTUP MOVE SELECTOR ON	Move selector (if present)	If the inverter ON/OFF selector is present and in the OFF position, the display asks for its movement to the ON position.
19	INVERTER STARTUP PLEASE WAIT		The inverter IGBT bridge starts to modulate and the output voltage of the inverter reaches the nominal value. The green indicator light of LED #5 is on.
20	INVERTER STARTUP MOVE BYPASS SWITCH	Move the "NORMAL- BYPASS" switch to the <i>NORMAL</i> position	The inverter has started. The load is powered by the inverter. The green indicator light of LED #6 switches on and LED #8 switches off.
21	DEVICE STARTUP PLEASE WAIT		The micro-processor controls all the output parameters (voltage, phases succession, frequency) are within the tolerance limits.
22	UPS MODEL/DIMENSIONS OUTPUT VOLTAGE/CURRENT		