

POWERTRONIX[®]
UNINTERRUPTIBLE POWER SUPPLY

**USER MANUAL
AURIGA HP
120 ÷ 200kVA**

Document : DT0503 English

<i>Revision</i>	<i>Date</i>	<i>Checked</i>	<i>Approved</i>
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1 UPS GENERAL INFO

1.1 UPS GENERAL DESCRIPTION

These UPS families have the compact construction, with the outer metal frame and the electronic circuits and power components inside. All user accessible elements on the control panel are placed on the front side. The top and side covers can be removed, giving an access to the internal part of the UPS for the service or maintenance purposes.

The front side of all units contains the user interface panel useful for monitoring, maintenance and control.

The UPS has a air forced cooling system, the air is going out to the top side of the cabinet.

The terminal block for the electrical connection to the mains, reserve, load, external batteries, and the main circuits breakers, are located on the front side of the unit.

1.1.1 UPS APPLICATIONS

The new UPS family was designed to provide stabilized and filtered power, especially for supplying sophisticated and sensitive electronic devices (i.e. for data processing systems). Auriga UPSes can be used to supply electronic systems of medical centres, police stations, motorway tunnels, broadcasting stations, banks, technical and administrative offices, requiring the power source free from voltage and frequency variations.

1.1.2 POWER AND AUTONOMY

Thanks to its modular design, the UPS models are available with rated power from 60kVA to 100kVA

For all the size of the family are not available the internal battery, an or more external battery modules can be used to increase the UPS autonomy.

1.1.3 SAFETY AND SIMPLICITY OF USE

All the UPS elements available for user daily maintenance are insulated and disconnected from hazardous voltages.

Control of the overload and excessive temperatures guarantees the immediate and most suitable intervention in the case when one of these conditions occurs during operation.

The operator can view the UPS status on the front panel and perform shut down or switching operations easily (see chap. 3)

The unit is provided with the E.P.O. (Emergency Power Off). This function is activated by pressing the button located on the front panel.

A remote E.P.O (optional) switch can be connected to UPS to provide remote emergency power off action.

The UPS state can be easily monitored with the personal computer and an interacting program (optional) or through the remote panel (optional), especially when the UPS is installed in unmonitored areas. Refer to the chapters 1.2.5 - 1.2.6.

1.2 CONFIGURATIONS AND OPTIONAL EQUIPMENTS

1.2.1 BASE CONFIGURATION

The UPS is available in the following configurations:

Three-phase input -- Three-phase output 120 ÷ 200 kVA

1.2.2 BATTERY CABINET

If required, the UPS can be furnish with additional optional battery cabinet to increase the autonomy
All the batteries will be mounted in a separate cabinet with oportune dimensions complete of power circuit breaker and protections.

1.2.3 TRANSFORMER CABINET

If required, there is available a galvanic isolating transformer, positioned in a separate cabinet.
The standard transformer is three-phase/three-phase with 1:1 ratio, but it can be supplied with a different transformation ratio upon customer request.

1.2.4 REMOTE COMMUNICATION CARD

Remote communication board (the code CS0191), gives possibility of monitoring and communicating with UPS.

Monitoring can be implemented with the PC and dedicated software or through a remote panel. There are also voltage free contacts available on the terminal board CN5(more info chapter 2.8.1 , 2.8.2).

1.2.5 UPS MANAGEMENT SOFTWARE

The "UPS MANAGEMENT" Genorex communication software allows interaction between UPS and PC or the network based on Windows, Win-NT, Novell, OS2, Dec, and Linux operating systems.

The software is used to monitor and control parameters of one or more UPSes supplying the network (more info chapter 2.8.4).

1.2.6 REMOTE PANEL

The remote panel is used for remote viewing of the UPS state; it shows the status of the main UPS blocks with LED indicators and the sound signalization in the case of alarm conditions (more info chapter 2.8.3).

1.2.7 REMOTE E.P.O. PUSHBUTTON

The remote E.P.O push-button provides the safe, remote way to fast and full disable the unit running in the event of an emergency (more info chapter 2.8).

1.2.8 REMOTE MANUAL BY-PASS

The remote Manual By-Pass is a security system that allows, when closed, to connect directly load to the power line, excluding the UPS (more info chapter 2.8).

1.3 OPERATING THEORY

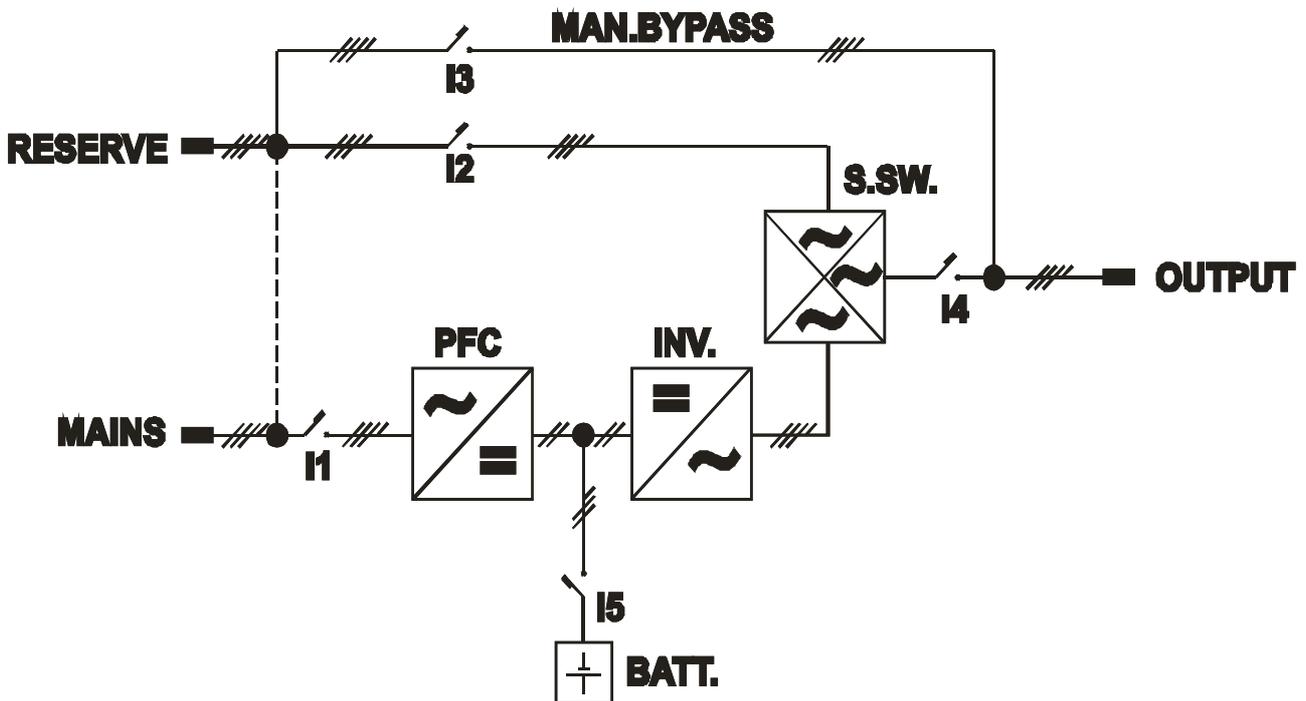
The UPS described here is an on-line dual conversion type UPS, with automatic by-pass in compliance with European standard EN62040-1-2. This UPS performs the dual conversion of the incoming voltage continuously and without interruption.

The absence of direct connection between mains and load eliminates the possibility of carrying disturbances from mains to the load. The dual conversion technique guarantees to the load delivering energy regulated both in voltage and frequency - thus ideal for the operation of professional applications.

When the input voltage exceeds the allowed range or - more simply - is not present, the load is supplied by energy transferred from the batteries.

The system is supplied with an automatic by-pass; in the event of the UPS fault or overload the by-pass connects the load directly to the mains via a reserve line, making possible maintaining normal load operation without supply interruptions. See the fig. 1.3.1

1.3.1 UPS BLOCK DIAGRAM



1.3.2 INPUT STAGE, POWER MODULE AND OUTPUT STAGE

From the input bars the mains voltage is connected through the MAINS INPUT I1 switch to the power module. The PFC controlled by the control logic, performs the AC/DC conversion of the mains voltage (during normal operating conditions) or the DC/DC conversion of the battery energy when the mains power is absent or not within the allowed range.

The DC voltage from the converter powers the inverter module, which creates AC voltage, adjusting the current depending on the load needs.

The last module is the automatic by-pass. It transfers the filtered and regenerated energy from the inverter module to the load during normal operating conditions, or - when UPS fault or overload occurs - from reserve line, still providing the energy to the load. When disappears the cause which forced UPS to switching to the reserve line, the by-pass automatically switches the load to the inverter power source.

The filtered, regenerated and stabilized mains voltage supplies the load through the UPS OUTPUT (I4) switch.

1.3.3 LOGIC AND AUXILIARY CIRCUITS

The control logic occupies the separate board (CS0170) and represents the “intelligence” of the UPS. It manages operations of the PFC, inverter and by-pass, based on feedback signals taken from the power module. The control logic also manages the other three boards: the battery charger, auxiliary power supply and signal interface.

The battery charger handles recharging of the outside batteries connected to the UPS.

The signal interface receives the signals from the control logic and converts them into the protocol required by the front panel of the UPS and also the relays board. Going backwards, the selected commands from the front panel (automatic by-pass forcing) and/or relay board (EPO) are sent from the signal interface to the control logic which interprets them and performs desired operation – like switch on/off inverter or shut down the unit.

The signal interface, except controlling standard relays board, can also control another (optional) one.

The auxiliary power supply supplies all the boards and electronic components in the UPS.

1.3.4 BATTERIES

The battery set provides energy to the system when the input mains is out of the allowed range or not present; in all other cases batteries are constantly recharged by the charger module. In this way the batteries are always ready for use when required.

1.3.5 MANUAL By-PASS

The manual by-pass is useful in the situations, when it is necessary to disable the UPS and keep the load supplied by the mains (i.e.: UPS stopped, fault, etc.). can be activated with using the MANUAL BY-PASS (I3) switch, located in the front part of the UPS (refer to chapter 4.7). In normal operating conditions this circuit breaker remains in rest position, protected with the mechanical lock (the padlock).

1.3.6 FRONT PANEL

The UPS can be managed via the front panel. Using the panel it is possible to execute the commands, display states and measurements and reset the alarm circuits.

The panel is equipped with an LCD screen used to display the operating status of the UPS, the load and all types of measurement (see chapter 3)

2 INSTALLATION INSTRUCTIONS

2.1 GENERAL INFORMATIONS

This chapter describes the system installation procedures and lists the following subjects:

- 2.2 Reception and identification
- 2.3 Storage
- 2.4 UPS positioning
- 2.5 Room specifications
- 2.6 Arrangement and connection to mains
- 2.7 UPS Auxiliary connections
- 2.8 Earth connection

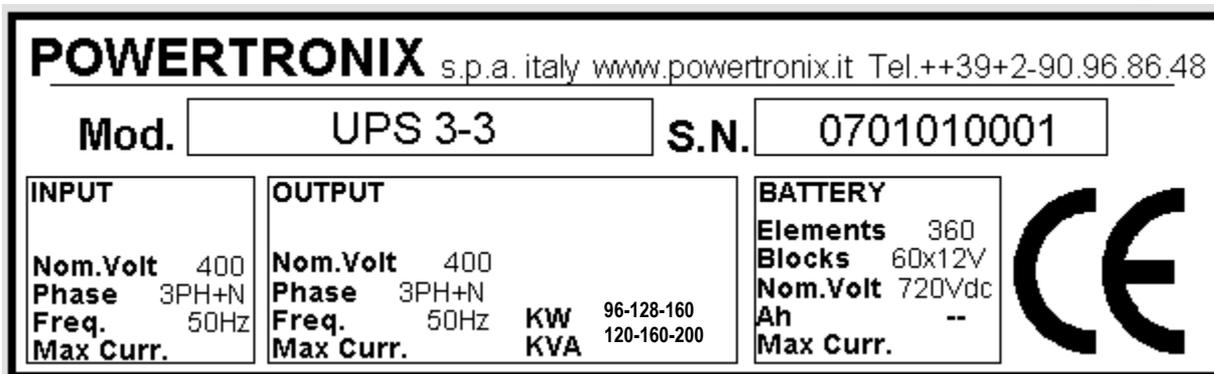
2.2 RECEPTION AND IDENTIFICATION

After removing the packing, visually inspect inside and outside the UPS and battery module (if included) to check for any damage that could occur during shipping. If there is any damage, inform the shipper or retailer immediately.

Check the supplied material against the packing slip.

The machine has an adhesive identification plate indicating the type, power and serial number; it is located on the right door (fig.2.2).

Fig. 2 . 2



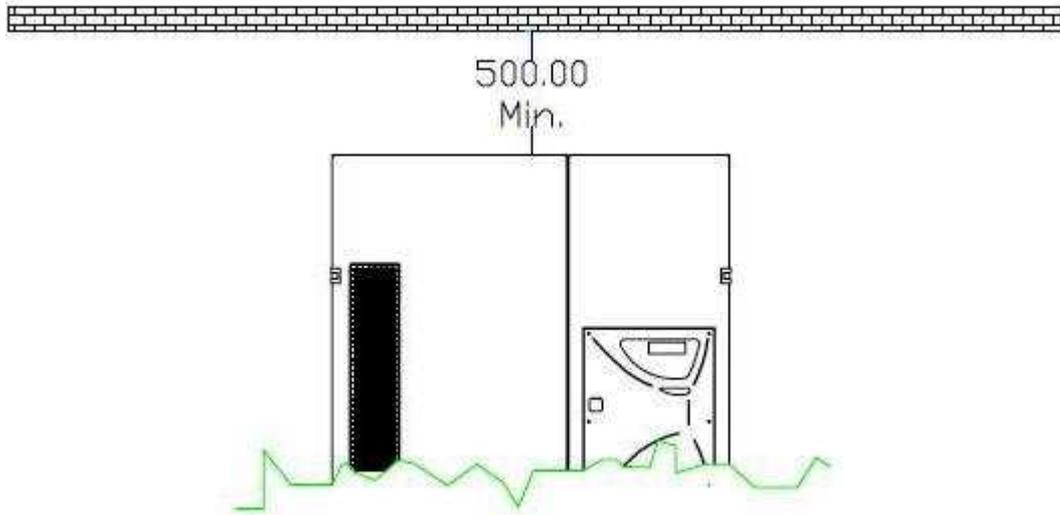
2.3 STORAGE

If the system is not going to be installed immediately it must be stored in an environment with adequate protection against excessive humidity and sources of extreme heat (from +5 to +40°C, humidity less than 95% without condensation).

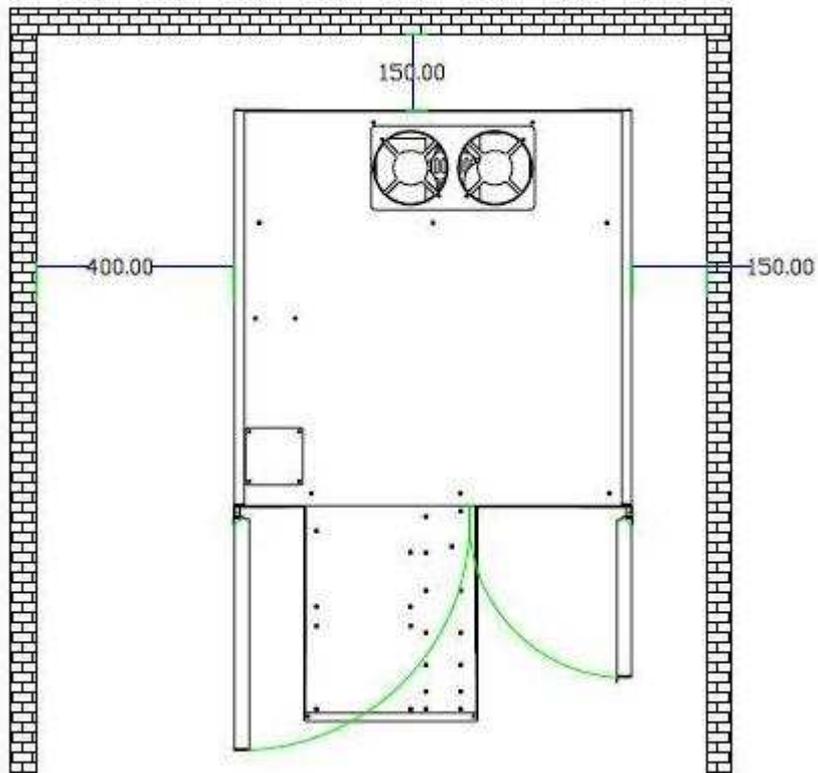
If the battery module is supplied, also make sure that no more than 6 months pass between one battery recharge and the next. Once this period of time has elapsed, temporarily hook the UPS up to the mains and run it for the time needed to recharge the batteries.

2.4 UPS POSITIONING

Front view :



Top view :



All dimensions are in mm.

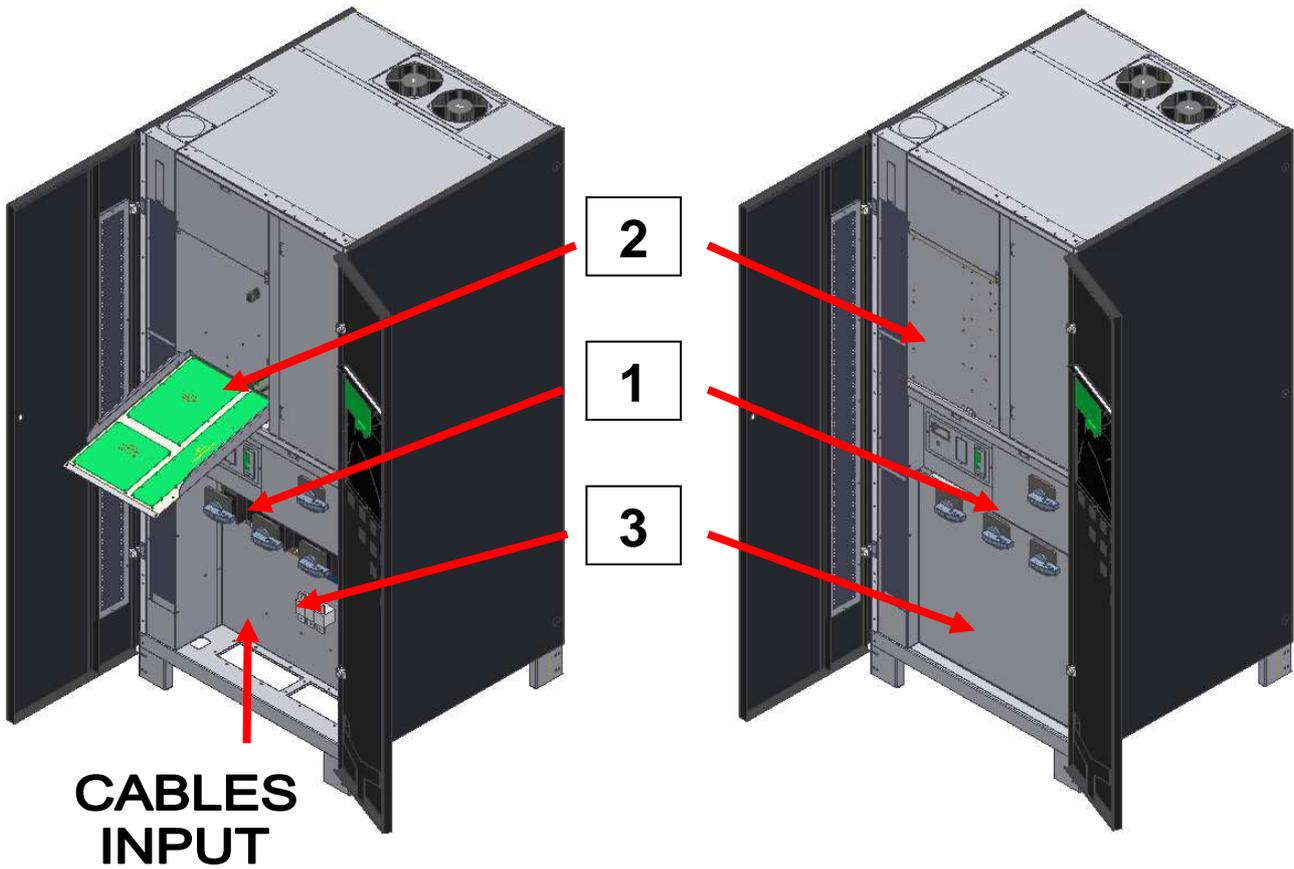
All the size and configurations are developed in the same cabinet

<i>POWER (KVA)</i>	<i>DIMENSIONS WxDxH (mm)</i>	<i>WEIGHT (Kg)</i>
120	800 x 840 x 1800	450
160		
200		

Tab. 2.4

All the connections are located rear the front door and can be reached by just removing the cover as shown on the fig. 2.4

In Fig. 2.4 shows the external connections.



1. Switches
2. Control Board
3. TagBlock cover

Looking at the front, the cables input is located on the lower side and accessible after opening the main UPS door (fig.2.4)

For the cables connection refer to fig. 2.7c

2.5 ROOM SPECIFICATIONS

The room where the UPS is installed must have pollution class 2 (CEI) and must be able to dissipate the heat produced by the machine, according to the following table 2.5a.

It is also required an appropriate conditioning to ensure an air exchange at least 500 m³/h

<i>P.nom (KVA)</i>	<i>Pot. Wasted @ 100% load (W)</i>
120	8640
160	10368
200	11520

Tab. 2.5.a

2.6 BATTERY ROOM SPECIFICATIONS

When battery cabinet is located in a separated room, is necessary to ensure an air exchange of at least 20m³/h

Remember that the average life of the batteries is closely correlated with the operating temperature; 20°C is the recommended temperature.

(when the temperature exceeds 20°C, the battery life drops by 50% for each 10°C)

2.7 CONNECTIONS TO THE MAINS

For connection to the mains a layout solution like the one shown in diagram 2.7a is recommended. The circuit breakers B-C-D are magnetothermic type without differential protection, or if this is required, with a triggering current greater than 0.3A, delayed and suitable for load with DC current (type A).flow equal or greater than that indicated on the label serial number on the back of the UPS (kVA) and comply with the requirements stipulated in the IEC.

Switch A is used as external BY-PASS.

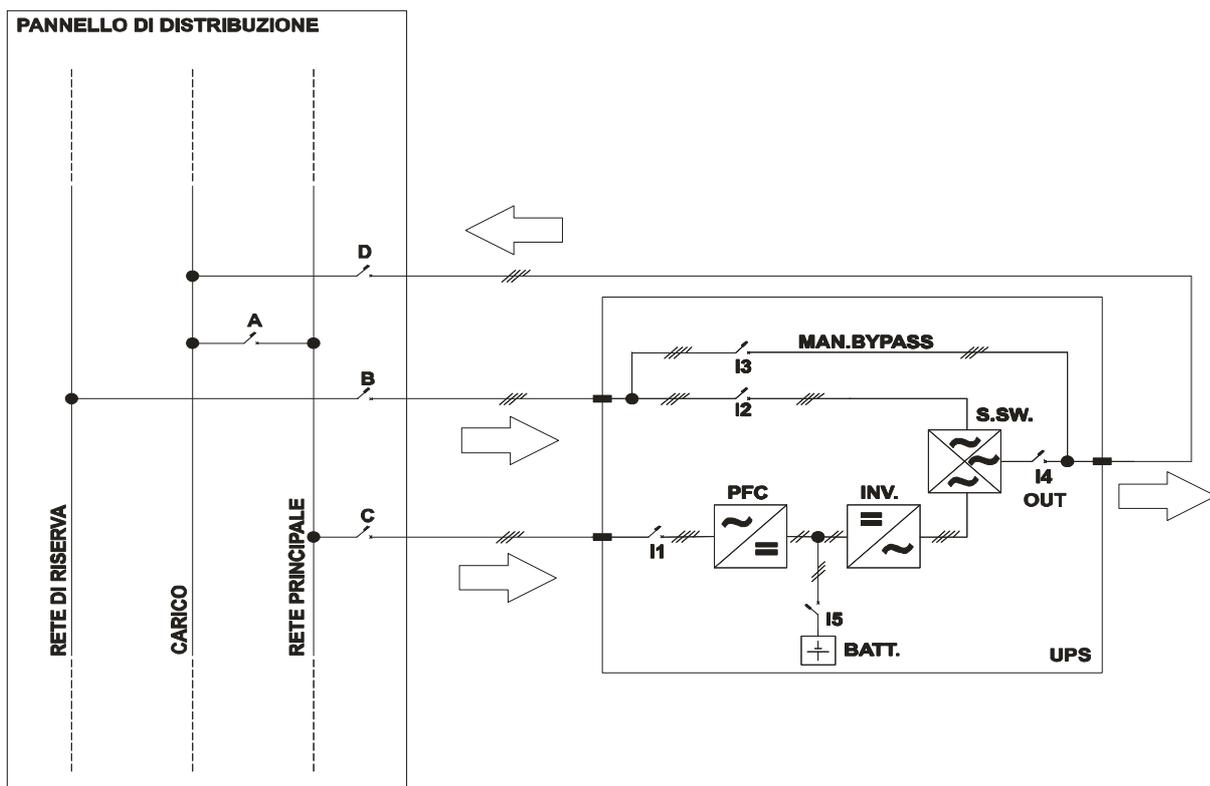


Diagram 2.7a

Before connecting the UPS it is necessary to:

- make sure that the mains voltage and frequency match those indicated on the adhesive plate located on the rear side of the UPS (input voltage, operating frequency, etc.);
- make sure that the earth connection of the system fully complies with the requirements of IEC standards or local laws.

The control parts and all the power connections of the UPS in question need to be able to permanently support the current shown in tab. 2.7.

UPS Power (kVA)	Input Mains I _{max} (A)	Input Reserve I _{max} (A)	Output I _{max} (A)	Battery discharge current (A)
120	228	215	183	200
160	304	286	243	267
200	380	358	304	334

Tabella 2.7



ATTENTION

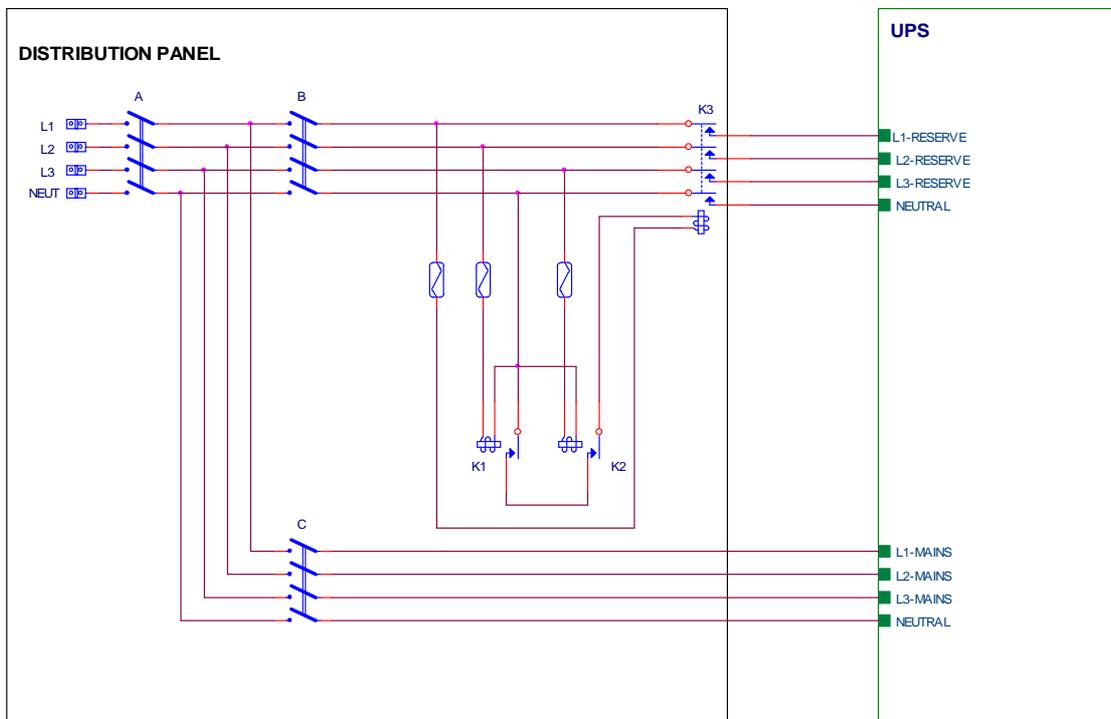
IN ADDITION TO THE CIRCUIT BREAKER AND PROTECTION IT IS ADVISABLE TO SET UP AN APPROPRIATE CHANGE-OVER CONTACT ON THE INPUT SIDE OUTSIDE THE UPS TO PROTECT AGAINST VOLTAGE RETURNS, AS INDICATED IN TABLE 2.6 AND THE FOLLOWING DRAWING:

2.7.1 BACKFEED PROTECTION CIRCUIT

If necessary it's possible to create a system against voltage return in the UPS distribution panel as shown in the diagram below.

- A: general mains circuit breaker / switch
- C: automatic switch or at least a fuse for the mains
- B: automatic switch or at least a fuse for the reserve network
- K3: protection contactor against return voltage
- K1-K2: additional relays on the change-over contact coil supply

Schema 2.7b





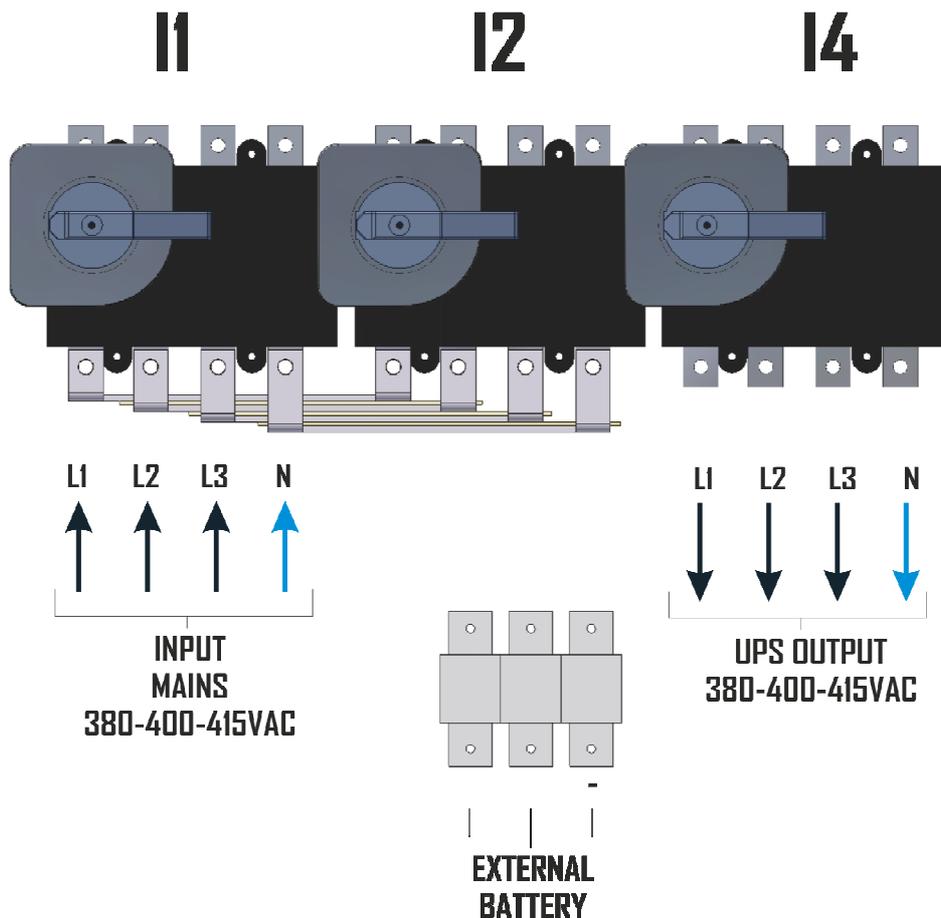
WARNING !!

**BEFORE CONNECTING THE UPS MAKE SURE THAT THE LINES WHICH CONNECT THE UPS MAINS AND RESERVE INPUT TO THE DISTRIBUTION PANEL ARE OPENED AND DISCONNECTED.
MAKE SURE THAT THE BATTERIES PANEL SWITCH IS OPEN.
PUT WARNING SIGNS ON THE DISTRIBUTION PANEL AND BATTERY PANEL
TO PREVENT ACCIDENTAL ACTIONS.**

2.7.2 UPS'S FRONT TAGBLOCK

Picture Fig 2.7c shows the UPS terminal blocks
The cables entry is located on the UPS basement

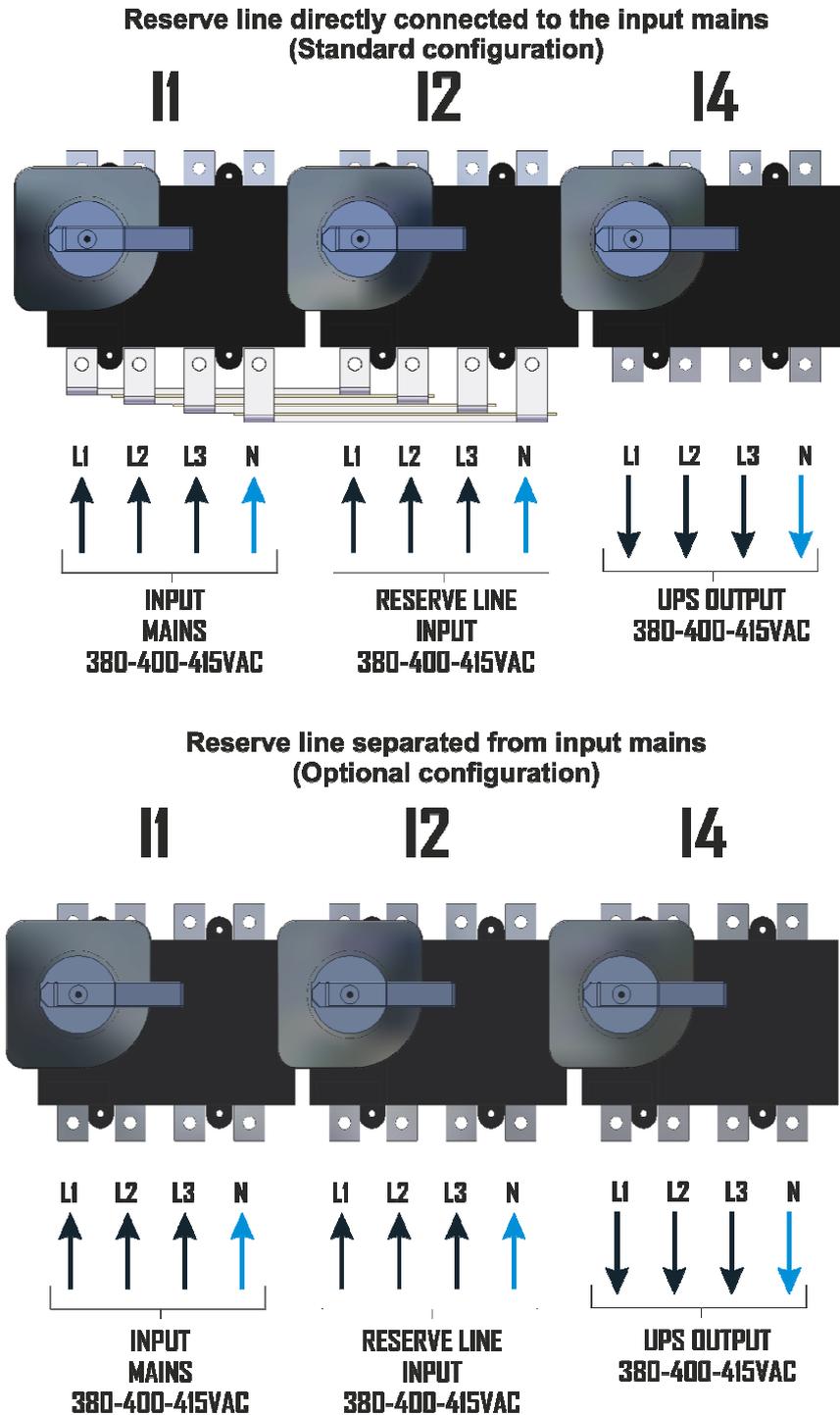
Fig. 2.7c



2.7.3 RESERVE LINE CONFIGURATION

The standard configuration includes the Reserve Line directly connected to Mains Input Line. If necessary, it is possible to separate two lines by removing the connection bars as described in the figures below:

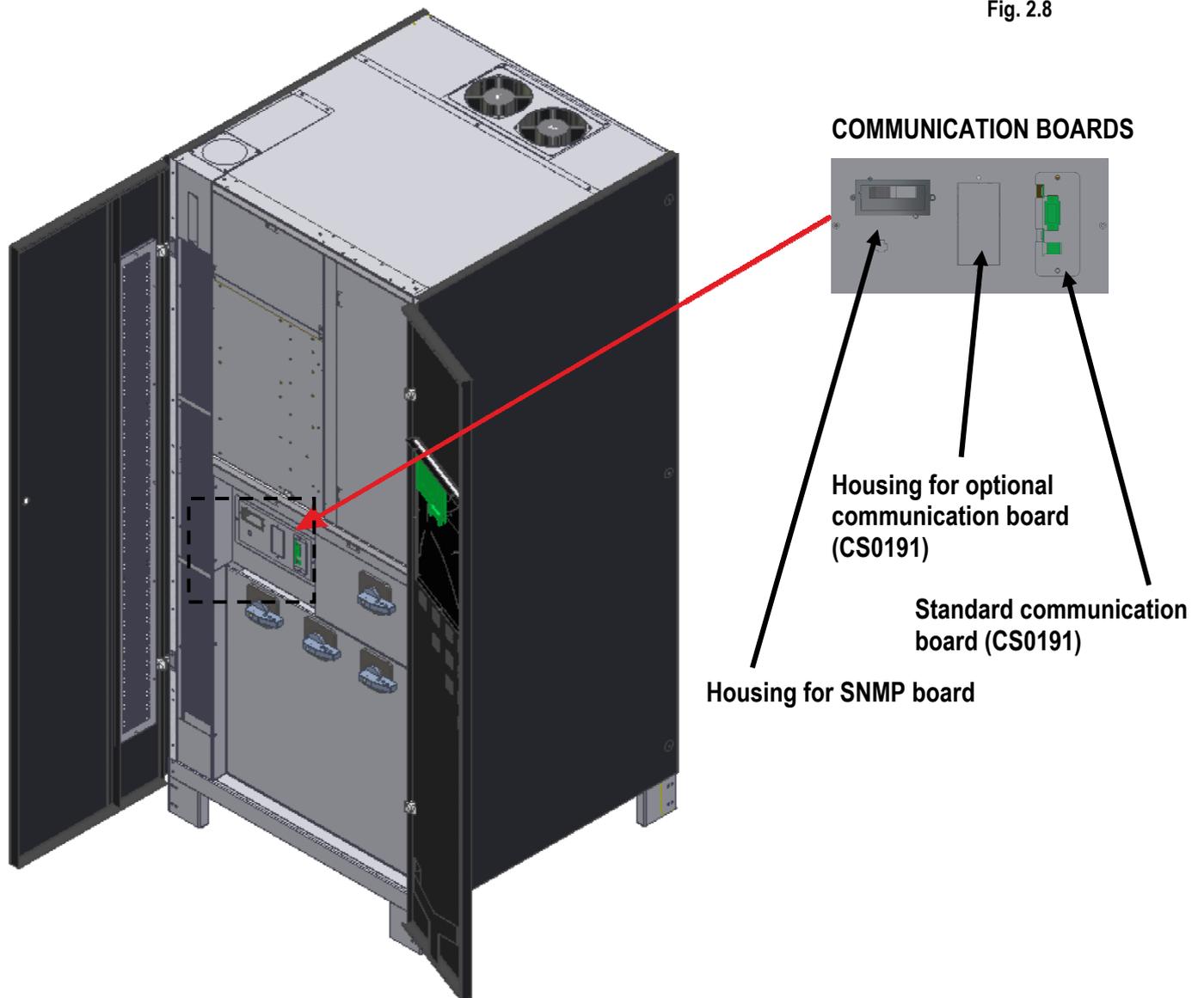
Fig. 2.7.3



To avoid any inconvenience or error during the maneuver, it is advisable to disassemble a bracket at a time, repositioning the cable from the terminal block in the same place.

2.8 COLLEGAMENTI AUSILIARI DELL'UPS

In the front of the UPS, behind the doors are located the communication boards (CS0191). The standard equipment is composed of the remote communication board (CS0191) and housing for the SNMP board. It is possible to connect a second (optional) communication board (CS0191) in addition to the standard as shown in a fig.2.8



2.8.1 REMOTE COMMUNICATION BOARD 0CS0191

Remote communication board is used to allow connection between the unit and external devices. The available connections are described in a picture below (Fig 2.8.1a):

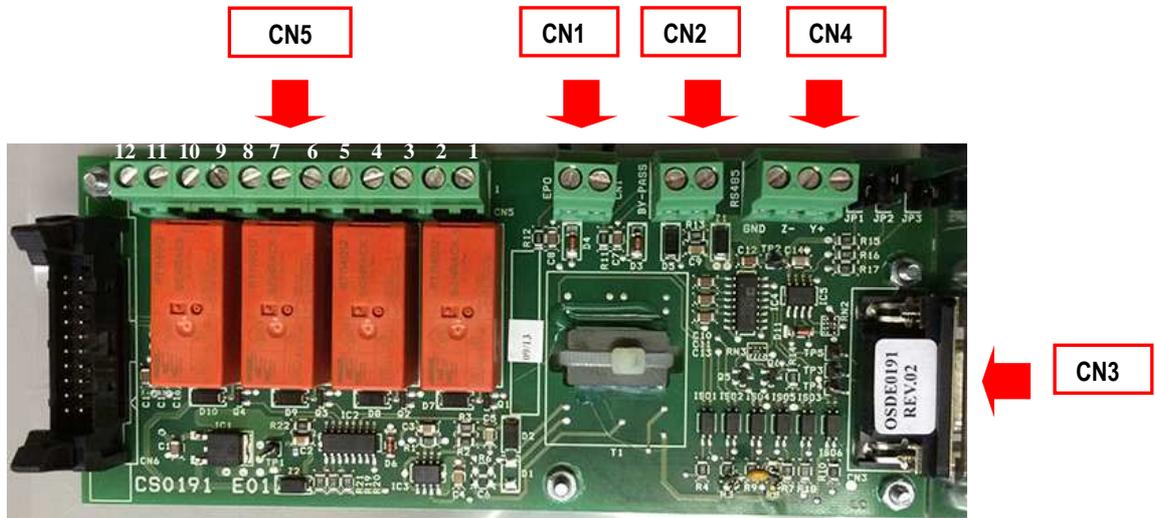


Fig2.8.1a

This board has 5 active connections:

- EPO (CN1)
- BY-PASS (CN2)
- RS232 serial port (CN3)
- RS485 serial port (CN4)
- Free contact status (CN5)

EPO : EPO (Emergency Power Off) remote contact (CN1) is a safety feature which allows in case of emergency to switch off and completely isolate the UPS from the installation (chap. 2.8.5)

BY-PASS : BYPASS remote contact (CN2) is used by the unit to detect the status of an external by-pass switch. When the plant uses an external by-pass switch for maintenance reasons, the unit can be seriously damaged if not well operated and this contact helps saving unit integrity. (chap. 2.8.6)

RS232 : The RS232 port can be used to monitor unit parameters and working values, and even for service purposes by trained technicians. (chap. 2.8.4)

RS485 : The RS485 port is only used for monitoring purposes. It implements Modbus protocol, to communicate with dedicated devices.

FREE CONTACTS : CN5 tagblock is used to transfer UPS basic status through free contacts to external world, for example remote panel (chap. 2.8.3) or various BMS (building management systems)

Following are the details about all connections :

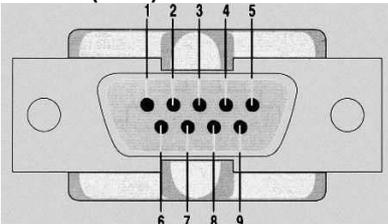
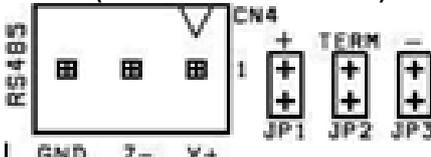
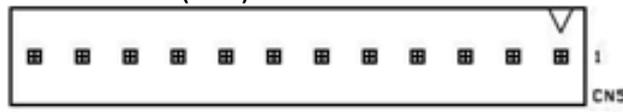
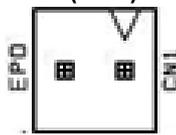
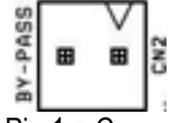
<p>RS232 (CN3)</p>  <p>Pin 2 = RS232 Receiver Pin 3 = RS232 Transmitter Pin 5 = RS232 Ground Pins 1-4-6-7-8-9 not connected</p>	<p>RS485 (CN4 + JP1 + JP2 + JP3)</p>  <p>Pin 1 (Y+) = RS485 A+ Pin 2 (Z-) = RS485 B- Pin 3 = RS485 Ground JP1 = RS485 A+ polarization JP2 = Termination resistance JP3 = RS485 B- polarization</p>
<p>Free contacts (CN5)</p>  <p>Pin 1 = Battery Low NC Pin 2 = Battery Low Common Pin 3 = Battery Low NO Pin 4 = Mains Failure NC Pin 5 = Mains Failure Common Pin 6 = Mains Failure NO Pin 7 = Load On Reserve NC Pin 8 = Load On Reserve Common Pin 9 = Load On Reserve NO Pin 10 = Inverter On NC Pin 11 = Inverter On Common Pin 12 = Inverter On NO</p>	<p>EPO (CN1)</p>  <p>Pin 1 = Common Pin 2 = Emergency Power Off Cut short circuit to activate</p>
	<p>BY-PASS (CN2)</p>  <p>Pin 1 = Common Pin 2 = By-Pass Cut short circuit when external By-Pass active</p>

Fig2.8.1b

2.8.2 REMOTE COMMUNICATION BOARD 0CS0191 (Optional)

In addition to the standard remote communication card, you can connect a second CS0191 option. The optional remote communication card performs the same function of CS0191 standard described in the chapter 2.8.1, except of the function of EPO remote and Manual By-Pass remote, which required activation by service.

2.8.3 REMOTE PANEL (Optional)

Remote panel is connected to the UPS via the terminal board CN5 located on the remote communication board (CS0191) (connection diagram fig. 2.8.3b). This device is used for remote monitoring of the main UPS blocks, the status of the main blocks is represented through LED, and there is also an acoustic alarm, which can be shut off with key 5.

LED description

- 1) Green ON UPS LED
If it's on, the UPS is operating correctly
If it's off, indicates that one or more inverter section alarms are present
(acoustic alarm enabled)

- 2) Yellow ON BATTERY LED
If it's on, the UPS is operating on battery
(acoustic alarm enabled)

- 3) Red LOW BATTERY LED
If it's on, indicates imminent end of battery discharge
(acoustic alarm enabled)

- 4) Yellow ON BYPASS LED
If it's on, indicates load supplied from reserve
(acoustic alarm enabled)

- 5) ALARM SILENCE key
Used to switch off the acoustic alarm

- 6) Green LED
If it's on, indicates correct power supply connected to the panel

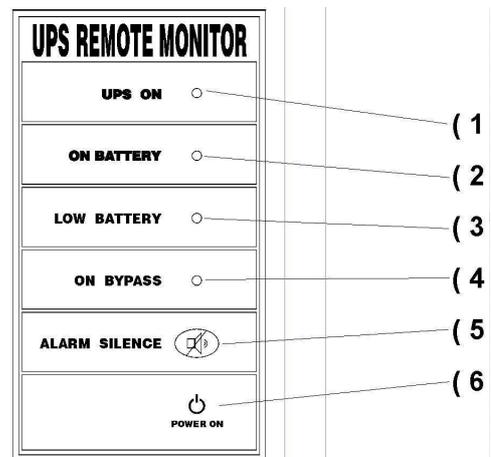


Fig. 2.8.3a

Following is the wiring diagram of the remote panel and communication card CS0191

Remote panel to communication board wiring	
Communication board	Remote panel
CN5 pin 1	M1 pin 1
CN5 pin 12	M1 pin 2
CN5 pin 9	M1 pin 3
CN5 pin 6	M1 pin 4
CN5 pin 2-5-8-11	M1 pin 5

Fig. 2.8.3b

2.8.4 UPS MANAGEMENT SOFTWARE

This software is used to monitor the conditions of the UPS via a PC connected to the system by the supplied cable.

For more information on the installation and use of the software see the user manual which came with it.

2.8.5 REMOTE E.P.O. BUTTON

Particular attention must be paid to the external connection of buttons or actuators for the EPO function (emergency stop). This connection is composed of a series of normally-closed switches (Fig.2.8.5) which open the series if commanded, generating the stop of the UPS with the consequent and irreversible interruption of voltage to the load. The series of external EPO buttons must be connected to the CN1 terminal board of the relay board CS0191*.

The remote communication card must be configured as described in fig. 2.8.5

The default configuration (with any ext. E.P.O connected) has the connector CN1 shorted with a wire connection, it must be removed, when one or more E.P.O. ext. is connected to the board

*If is required to enable the EPO remote on the optional communication card is necessary contact the service.

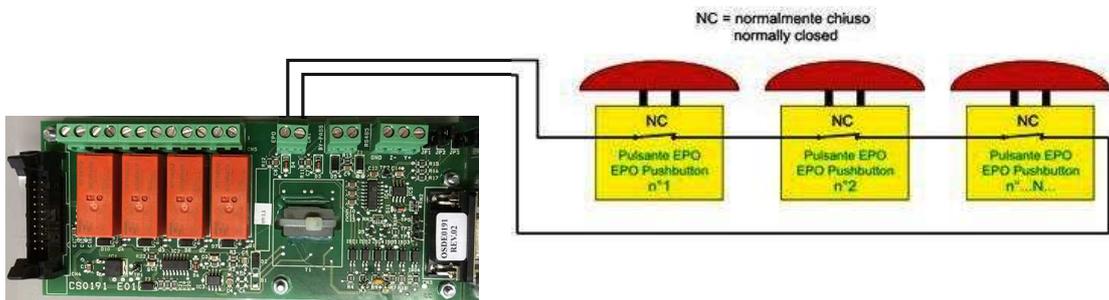


Fig. 2.8.5

2.8.6 REMOTE MANUAL BY-PASS

The remote Manual By-Pass is a security system that allows, when closed, to connect directly load to the power line, excluding the UPS.

The remote Manual By-Pass system is composed by a power switch for connect reserve line with load, and a N.C. contact (fig. 2.8.6) that opens when commanded.

This contact must be connected to CN2 of CS0191**.

The remote communication card must be configured as described in fig. 2.8.6

**If is required to enable the EPO remote on the optional communication card is necessary contact the service. During the feeding of loads through external by-pass is not guaranteed the uninterrupted supply of electric current.

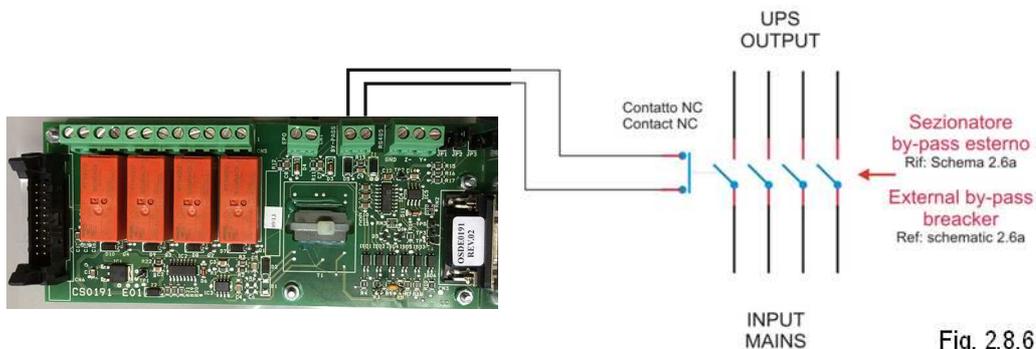


Fig. 2.8.6

2.8.7 EARTH CONNECTION

The earth input cable must be connected to the UPS opposite TagBlock and **MUST BE ALWAYS THE FIRST CABLE TO BE CONNECTED.**

It is advisable to insert an appropriate antioxidant between the earth bar and lug to keep the accurate contact over time.

All of the cabinets and accessories must be earthed in accordance with local regulations.



**INCORRECT EARTH CONNECTION MAY CAUSE A RISK
OF ELECTRIC SHOCKS TO PERSONNEL OR OF FIRE**

3 CONTROL PANEL

3.1 INTRODUCTIONS

The control panel is located on the upper front part of the UPS (Fig.3.1a)



Fig. 3.1a

It's used for easily check the general status of the UPS and batteries and related alarms.

The panel contains an LCD screen (which indicates the operating status, measurements and alarms of the UPS) and the red EPO button located at the left of the display.

The display panel shows text messages and operating parameters on an LCD screen with 4 lines and 20 characters per line.

The screens are organized in 6 multi-level menus, which can be selected using the membrane buttons under the LCD display.

Two LEDs are present on the left side of the display, a green one called "NORMAL" and a red one called "ALARM".

The actions of the LED are summarized in table 3.1a.

STATUS	UPS OK	Alarm present	Alarm Stopped
LED GREEN	ON	OFF	ON
LED RED	OFF	ON	FLASHING**

**Configurable (paragraph 3.2.5)

Tabella 3.1a

3.2 LCD CONTROL PANEL

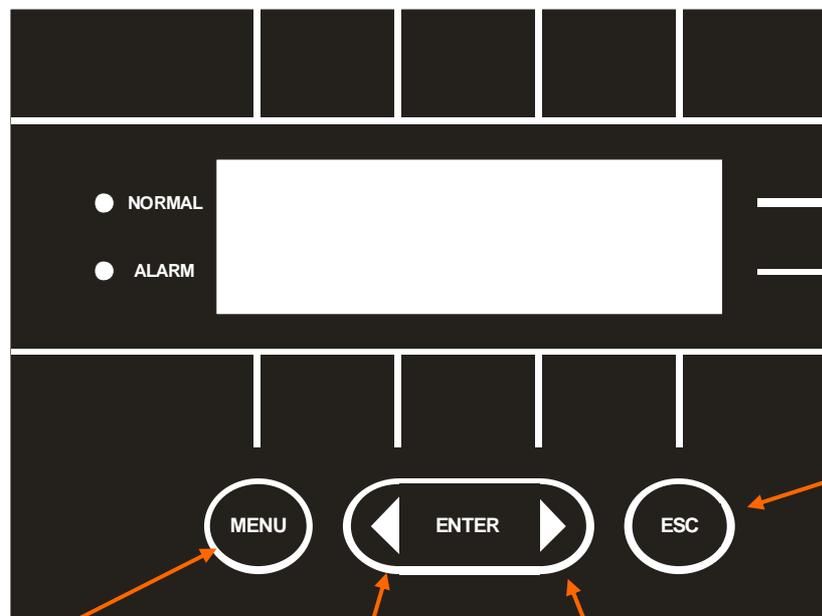


Figura 3.2

MENU' PUSH BUTTON
To return to the previous menu or to enter into main menu from the alarm display

BACK PUSH BUTTON NEXT PUSH BUTTON
To scroll among the menu and the sub menu.
Pressing them both at the same gives ENTER command

ESC PUSH BUTTON
To switch off the buzzer

During normal UPS operation the control panel uses a series of messages to display the operating status of the single component blocks of the system, thus the operator is informed in real time (also with sound signal) of any faults occurred in the system.

3.2.1 MENU MULTILEVEL INDEX

Table 3.2.1 summarizes the list of available menus.

MENU	N°	NOTE
UPS STATUS AND ALARMS	1	This is default content of the LCD screen. System returns to this level automatically when no keys are used for 3 min.
MEASUREMENTS	2	Used to display the values of all the measurements
UPS COMMANDS	3	System on / off, static switch, battery test
PANEL SETUP	4	Settings for date / time / battery test / language
EVENTS LOG	5	Displays the log of events and related alarms
SERVICE MODE	6	Reserved for technical assistance service

Table 3.2.1

It is possible to scroll among the listed 6 menu in table 3.2 using the NEXT(>) or BACK(<) keys.

By pressing the NEXT(>) and BACK(<) keys simultaneously, you select ENTER (< >) and by confirming the selection go to the next menu level.

To return to the previous menu level press the MENU key

Each alarm indication on the display is followed by a sound signal which can be switched off by pressing ESC (see figure 3.2)

If the operator does not perform any actions for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is automatically displayed.

3.2.2 MENU 1: UPS STATUS AND ALARMS

This menu is characterized by the first line of the message which can be UPS OPERATING (if the UPS is operating normally) or UPS ALARM (if the UPS has an alarm condition). The meanings of the displayed messages are given below:

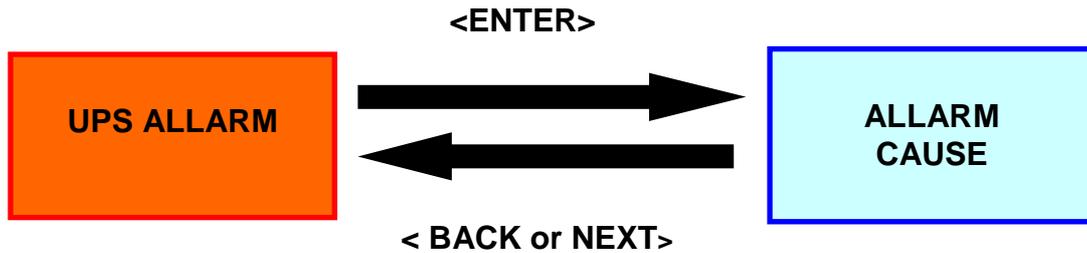
UPS IN NORMAL OPERATING CONDITIONS

MESSAGE	MEANING
INVERTER ON	The inverter is on and operating normally
LOAD ON INVERTER	The load is supplied by the inverter
LOAD ON RESERVE	The load is supplied by the by-pass line. This may be a temporary condition which lasts 20 seconds after short overload
RESERVE MAINS OK / NOT AVAILABLE	The input by-pass supply line is on and the voltage is / is not in the specified range
INPUT SECTION ACTIVE / NOT ACTIVE	PFC is on and working properly / PFC off
FAN SPEED REDUCED / NOMINAL	The fans work at reduced speed because module temperature is below 60°C or at nominal speed when module temperature is upper 60°C
MAINS OK / NOT AVAILABLE	The input mains line is on and the voltage is / is not in the specified range

Tabella 3.2.1

3.2.3 UPS IN FAULT CONDITIONS

If the UPS experiences the fault, the normal status message will be replaced with the alarm one. An alarm message will differ depending on the type of fault which occurred. Activated sound signal can be switched off by pressing the ESC key. The ENTER (< >) key can be used to display the list of indications which let the operator to understand the meaning of the alarm. The <BACK or NEXT> keys can be used to scroll through all the active alarms. When the alarm cause disappears, the LCD will return to the default message.



The possible alarms and associated with them help messages are listed below

ALARM MESSAGE	MEANING
INPUT SECTION NOT ACTIVE	PFC is off or not function
INVERTER OFF	the load is supplied directly from the reserve network
INVERTER OVERLOAD (>100% - >125% - >150%)	The inverter is off due to an overload and the load is supplied by the reserve network
PFC OVERLOAD (>100% - >125% - >150%)	The PFC is off due to an overload
STATIC SWITCH LOCKED	After 3 unsuccessful automatic switching attempts from the reserve to inverter, the UPS blocks the static switch in the reserve network position
BATTERY PREALARM	At the battery voltage of around 640V the UPS warns the user of a low battery voltage
BATTERY FAILURE	At 600V discharging ends and the UPS goes off
BATTERY TEST FAILURE	At 600V discharging ends and the inverter goes off and the load is supplied by the reserve network ()
WRONG RESERVE PHASES SEQUENCE	Displayed whenever the periodic test on the battery fails for any reason
MANUAL BY-PASS SWITCH CLOSED	The phase rotation on the reserve line is not correct.
SYNCHRO NOT OK	The manual bypass switch has been closed
	There is no synchro between reserve and inverter voltage.

MAINS NOT AVAILABLE	The mains is not proper for the UPS specifications, it might be out of the range allowed by the system, or simply not present
RESERVE NOT AVAILABLE	The reserve is not proper for the UPS specifications, it might be out of the range allowed by the system, or with incorrect cyclic direction, or not present
INV IGBT TEMPERATURE OVER ALARM LEVEL	The IGBT inverter temperature is over alarm level. The inverter is turned off and the load supplied by reserve line. During the feeding of loads through reserve line is not guaranteed the uninterrupted supply of electric current.
PFC IGBT TEMPERATURE OVER ALARM LEVEL	The IGBT PFC temperature is over alarm level. The PFC is turned off and the inverted is feeding by battery.
PARALLEL DATA EXCHANGE FAILURE	This alarm occurs when there is not data exchange between UPSes in parallel, for any reason. It may be due to a missing or incorrect connection of one or more parallel fibers
COMMAND E.P.O. (LOCAL, RELAY1, RELAY2)	Displayed if for any reason the E.P.O. button is pressed (local or remote)

3.2.4 MENU' 2: MESUREMENTS

To access this screen press ENTER on position “**2. Measurements**” on the main menu. The operator can now check the value of the following electrical measurements by using the arrows < or >:

V phase/neutral = Y voltage of mains input
 V phase/phase = Voltage between lines of mains input
 Input Current = UPS mains input current

V phase/neutral = Y voltage of reserve input
 V phase/phase = Voltage between lines of reserve input

Frequency = Input, reserve and output UPS voltage frequency
 Battery V,I = Battery voltage and current (+ -)

V phase/neutral = Y voltage of output
 V phase/phase = Voltage between lines of output
 Output Current = UPS output current

Temperatures = PFC and inverter temperature, external battery temperature (optional)
 Power supply KVA = UPS power supply

If the operator does not perform any actions for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is automatically displayed.

3.2.5 MENU' 3: UPS COMMANDS

Using this menu it is possible to have operating control to the UPS

MESSAGE	MEANING
3.1 SYSTEM START 3.2 SYSTEM STOP	With these commands, pressing ENTER 's user can turn on or turn off the system
3.3 SWITCH THE LOAD	With these commands, pressing ENTER 's user can switch load on inverter or reserve
3.4 START BATTERY TEST	With these commands, pressing ENTER 's user can start battery test
3.5 MANUAL COMMANDS***	Through this menu you have access to all power controls on individual blocks of the UPS

***The menu 3.5 is activated and can be used only by authorized personnel

If the operator does not perform any actions for 3 minutes, the "1. UPS STATUS AND ALARMS" menu is automatically displayed.

3.2.6 MENU 4: PANEL SET-UP

MESSAGE	MEANING
4.1 DATE SETTING	Used to set up the actual date, using the arrows to increase / decrease the numbers
4.2 TIME SETTING	Used to set up the actual time, using the arrows to increase / decrease the numbers
4.3 PANEL LANGUAGE SETTING	Used to select the display language available languages
4.4 ALARMS SETUP	It allows the user to select the possibility to hide or show a recorded alarm until the ESC button is pushed
4.5 BATTERY TEST SETTING	Used to set the periodic battery test, selecting the day of the week, the number of weeks between the tests and the time of day to start the test

If the operator does not perform any actions for 3 minutes, the "1. UPS STATUS AND ALARMS" menu is automatically displayed.

3.2.7 MENU 5: EVENTS RECORDER MANAGEMENT

In this menu the user can see last 2048 events / alarms in chronological order.

The event log display can be opened by selecting **5. EVENT LOG** in the main menu. The screen will show the date and time of the last event that occurred.

It is possible to scroll the list using the buttons *<BACK or NEXT>*

In all positions on the event list, pressing *MENU* causes the return of the display to the *MAIN MENU*.

If the operator does not perform any actions for 3 minutes, the "1. UPS STATUS AND ALARMS" menu is automatically displayed.

3.2.8 MENU 6: SERVICE MODE

Using this menu the user can change UPS rated data, reset the EPO, reset events log, identify the software and hardware version, and choose the start-up configuration (Normal or Automatic). This menu is password protected to prevent unauthorized access.

If the operator does not perform any actions for 3 minutes, the "1. UPS STATUS AND ALARMS" menu is automatically displayed.

4 INSTRUCTIONS TO USE THE UPS

IMPORTANT

Please follow carefully the below procedures to avoid damages to the system.

ATTENTION

Ups is not able to start from battery

**CHIUDERE SEZIONATORE FUSIBILI DI
COLLEGAMENTO DELLE BATTERIE
SOLO DOPO LA COMPLETA ATTIVAZIONE
DELL'APPARECCHIATURA**



**-IMPORTANTE-
L'ERRATA SEQUENZA DI ACCENSIONE
POTREBBE COMPROMETTERE
IL FUNZIONAMENTO DELL'UPS**

4.1 INTRODUCTION

This chapter describes how to correctly use the system.
The UPS may be in one of the following operating conditions:

- **Normal operation** - The load is supplied by the UPS.
The UPS is in normal operation and uses mains to supply energy to the load and charge the batteries.
This mode guarantees complete uninterrupted power passed to the load.
- **Operation with internal automatic by-pass** – The load is supplied by the mains
In the event of an inverter fault and/or overload, the power to the load is provided by the reserve line.
This mode does not guarantee complete uninterrupted power passed to the load.
- **Operation with maintenance manual by-pass enabled** – The UPS is disabled.
The load is connected directly to the mains through the maintenance or emergency manual by-pass line.
This mode does not guarantee complete uninterrupted power passed to the load.
- **Battery operation** - The load is supplied by the UPS.
The UPS is in normal operation and uses the battery to supply energy to the load because the mains voltage is out of the allowed range.
This mode guarantees complete uninterrupted power passed to the load.

4.2 POWER SWITCHES

The system maintenance elements are located behind the front doors, installed horizontally on two strips and described in order from top left in a counter clockwise (refer to the fig. 4.2 a-b):

MAINS INPUT SWITCH (I1): connects the UPS to the mains voltage.

RESERVE INPUT SWITCH (I2): connects the UPS to the reserve line voltage.

MANUAL BYPASS SWITCH (I3): allows disconnecting the entire UPS and providing mains supply to the load. This switch is protected with the small padlock to avoid accidental use.

UPS OUTPUT SWITCH (I4): connects the UPS to the load.

Above has been described UPS switches. There are also battery breakers, **placed inside battery module and in every external battery module**



ATTENTION

***To completely isolate the unit from hazardous voltages it is necessary to open also the battery switch, which is not present on the UPS.
Also remember about the presence of potentially charged capacitors inside the converter
It means that you must wait for at least 10 min. before accessing to the internal parts of the UPS.***



**THE SWITCH IN ORIZONTAL POSITION MEANS THAT THE CIRCUIT IS OPEN
THE SWITCH IN VERTICAL POSITION MEANS THAT THE CIRCUIT IS CLOSED**

The figure 4.2 presents all the switches in OFF position

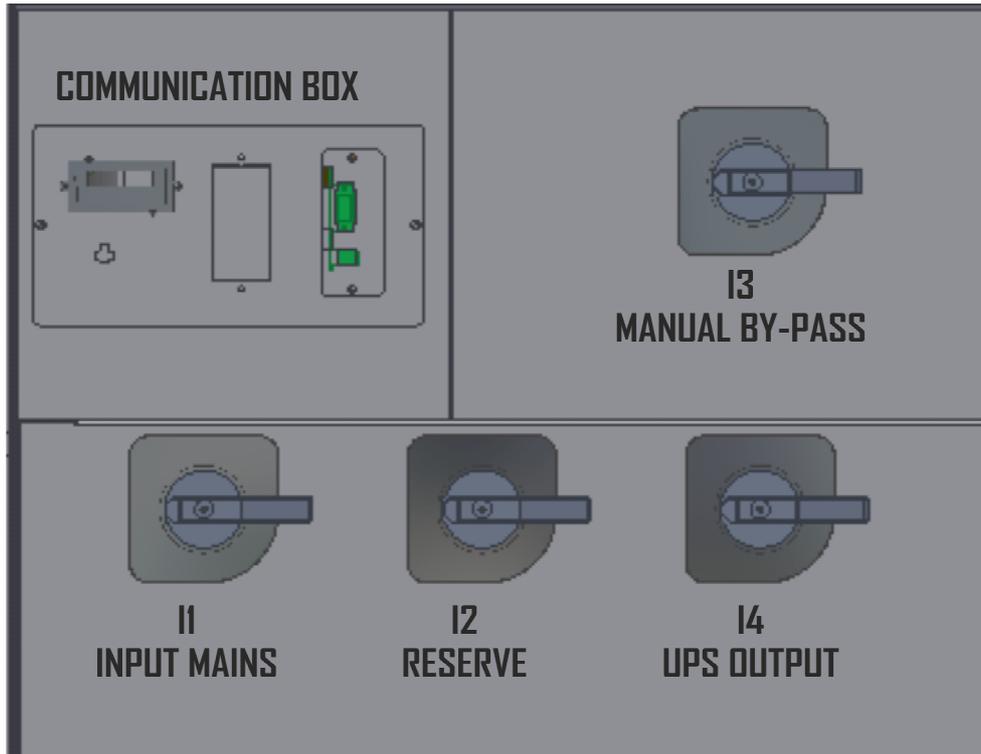


Fig.4.2



***All the operations described below can be executed
by authorized electrician or qualified personnel only***

4.3 UPS START-UP CONFIGURATION

This UPS can be configured in two different start-up mode, the first is “AUTOMATIC” and the second is “NORMAL”.

The default configuration of the UPS is “AUTOMATIC”
(see chapter 3.2.8)

The two configuration have the following characteristics:

_ AUTOMATIC mode (standard)

This mode initiate a start-up sequential totally automatic of all UPS block.

A scroll bar on the LCD display will show the percentage of advance of the start-up.

After the wizard on the display you can read the message “AUTOSTART PROCESS FINISHED” and a green LED switch-on on the control panel.

_ NORMAL mode (optional)

This mode initiate a start-up sequential fully automatic from Precharge to the input stadium to ensure a proper battery charger.

The manual activation by the operator of the inverter stadium complete the start-up procedure, at the end you will display the message “AUTOSTART PROCESS FINISHED” and a green LED switch-on on the control panel.

For proper UPS start-up follow the procedure described below.



If for any reason should stop the start-up procedure, is necessary perform the “3.2 SYSTEM STOP” command through the “menu 3. UPS COMMAND”

The start-up sequence will be immediately suspended and the LCD panel displays the message “AUTOSTART PROCESS INTERRUPTED”

If it is necessary to restart the UPS must use the “3.1 SYSTEM START” command in” menu 3. UPS COMMAND” or shut down complete the UPS and repeat the start-up as described in the below procedure

4.4 INSTRUCTION FOR SYSTEM START-UP IN “AUTOMATIC” MODE (Standard configuration)

For the switches explanations refer to the fig. 4.2a/b

1. Close the **INPUT RESERVE (I2) switch**

The LCD panel and all UPS logic boards will begin normal operation.

If the reserve line voltage parameters are correct, the UPS fans will switch on.

In case of anomaly if the fans don't switch on don't proceed with the start-up and call the service.

2. Close the **UPS OUTPUT (I4) switch**

The load connected to the UPS output will be supplied with the power provided by the reserve line.

3. Close the **MAINS INPUT (I1) switch**

After 5" will start an automatic start-up procedure and on the LCD display will show the percentage of advance.

At the end will show the 2° message: "AUTOSTART PROCESS FINISHED" and a green LED switch-on on the control panel.

In the event of anomaly on LCD displays the message "AUTOSTART PROCESS FAILED" and the control panel remain on the red light.

In this situation don't proceed with the start-up and call the service.

4. **Battery connection**

After checking the correct polarity of the batteries close the battery panel switch on battery cabinet. It makes the connection between the batteries and the UPS circuits.

At this point the unit is in normal operating mode, and guarantees uninterrupted power supply to the load.

It is suggested to simulate the short power failure to check the correct operation of the entire UPS / battery system. To perform this operation just open and then close the mains switch powering the UPS.



ATTENTION

If for any reason should stop the start-up procedure, is necessary perform the “3.2 SYSTEM STOP” command through the “menu 3. UPS COMMAND”

The start-up sequence will be immediately suspended and the LCD panel displays the message “AUTOSTART PROCESS INTERRUPTED”

If it is necessary to restart the UPS must use the “3.1 SYSTEM START” command in” menu 3. UPS COMMAND” or shut down complete the UPS and repeat the start-up as described in the below procedure

4.5 INSTRUCTION FOR SYSTEM START-UP IN “NORMAL” MODE (Standard configuration)

For the switches details refer to the fig. 4.2a/b

1. **Close the INPUT RESERVE (I2) switch**

The LCD panel and all UPS logic boards will begin normal operation.

If the reserve line voltage parameters are correct, the UPS fans will switch on.

On the control panel the red indicator will appear.

In case of anomaly if the fans don't switch on don't proceed with the start-up and call the service.

2. **Close the UPS OUTPUT (I4) switch**

The load connected to the UPS output will be supplied with the power provided by the reserve line.

On the control panel the red indicator remains on.

3. **Close the MAINS INPUT (I1) switch**

After 5 seconds the automatic start-up procedure will be started and the LCD display will show "Autostart process activated" message, and later - the percentage of process advance.

At the process end UPS will show message: "Autostart process finished" and on the control panel the red indicator will remain on.

In the event of anomaly on LCD displays the message "Autostart process failed" and on the control panel the red indicator remains on.

In this situation don't proceed with the start-up and call the service.

4. **Battery connection**

After checking the correct polarity of the batteries close the battery panel switch on battery cabinet. It makes the connection between the batteries and the UPS circuits.

5. **Switch on the inverter**

To complete the start-up procedure, enter into "3. UPS COMMANDS" of the menu, choose and confirm "3.1 SYSTEM START". The inverter will be activated and after 20 seconds automatically switch the load on it (if the UPS is configured to POWER SAVE, the load remains on reserve line).

At the end of procedure on the LCD panel displays the message "Autostart process finished" and the green indicator on the control panel will appear.

At this point the unit is in normal operating mode, and guarantees uninterrupted power supply to the load.

It is suggested to simulate the short power failure to check the correct operation of the entire UPS / battery system. To perform this operation just open and then close the mains switch powering the UPS.



If for any reason should stop the start-up procedure, is necessary perform the "3.2 SYSTEM STOP" command through the "menu 3. UPS COMMAND"

The start-up sequence will be immediately suspended and the LCD panel displays the message "AUTOSTART PROCESS INTERRUPTED"

If it is necessary to restart the UPS must use the "3.1 SYSTEM START" command in" menu 3. UPS COMMAND" or shut down complete the UPS and repeat the start-up as described in the below procedure

4.6 INSTRUCTIONS FOR COMPLETE SHUTDOWN OF THE UPS

For the switches explanations refer to the fig. 4.2a/b

1. **UPS Shutdown**

Enter in the "menu 3. *UPS COMMANDS*" and confirm "*3.2 SYSTEM STOP*"

Will start an automatic shutdown procedure and on the LCD display will show the percentage of advance.

At the end will show the 2° message: "System stop done" and on the control panel will be a red LED light

From this moment the load is supplied directly from the reserve network.

2. **Disconnect the battery**

Open the battery switch on the battery cabinet

3. **Open switches**

Open in sequence, MAINS INPUT SWITCH (I1), the OUTPUT SWITCH (I4) and finally RESERVE INPUT SWITCH (I2).

At this moment the UPS is completely isolated and load is not powered.



At this point the load is supplied directly by the reserve network and inside the UPS there are not hazardous voltages, except of the compartment (covered with metal panel) where the input and output cables are connected, and - for few minutes - inverter DC and AC capacitors (also covered with metal panel).

4.7 INSTRUCTIONS FOR SWITCHING SYSTEM TO MANUAL BY-PASS MODE

For the switches details refer to the fig. 4.2a/b

1. **Disconnect the battery**

Open the battery switch on the battery cabinet

2. **Switch load on reserve line (skip this step if the UPS is configured to POWER SAVE)**

Enter into "3. UPS COMMANDS" of the menu, choose and confirm "3.3 SWITCH THE LOAD".

The red indicator will appear on the control panel and the sound will be audible.

Since this moment the load is supplied directly from the reserve line.

3. **UPS Shutdown**

Enter into "3. UPS COMMANDS" of the menu, choose and confirm "3.2 SYSTEM STOP".

An automatic shutdown procedure will start and the LCD display will show percentage of it's advance.

When the procedure finishes, the message "System stop done" will be displayed and the red indicator will be present on the control panel.

4. **Close MANUAL BY-PASS (I3) switch**

Remove the padlock (or any other mechanical safety lock) from the switch and lift the knob to ON position

The warning sound will be activated and the LCD screen will display "Manual bypass switch closed".

The red indicator of the control panel will remain on.

5. **Open switches**

Open in sequence, MAINS INPUT SWITCH (I1), the OUTPUT SWITCH (I4) and finally RESERVE INPUT SWITCH (I2).

The load is supplied directly from the reserve line through the manual by-pass.



ATTENTION

At this point the load is supplied directly by the reserve network and inside the UPS there are not hazardous voltages, except of the compartment (covered with metal panel) where the input and output cables are connected, and - for few minutes - inverter DC and AC capacitors (also covered with metal panel).

4.8 INSTRUCTIONS FOR RETURN FROM MANUAL BY-PASS MODE TO NORMAL OPERATION

1. Close the *INPUT RESERVE (I2) switch*

UPS will begin normal operation.

If the reserve line voltage parameters are correct, the UPS fans will switch on.

On the control panel the red indicator will appear.

In case of anomaly if the fans don't switch on don't proceed with the start-up and call the service.

2. Close the *UPS OUTPUT (I4) switch*

On the control panel the red indicator remains on.

3. Open *MANUAL BY-PASS (I3) switch*

Since this moment load will be supplied from the reserve line.

Mount the padlock on the manual by-pass switch (I3).

On the control panel the red indicator remains on.

4. Close the *MAINS INPUT (I1) switch*

After few seconds the start-up procedure will be started. Depending of the UPS start-up configuration setting, refer to one of the following sections:

- see section 4.4 for "AUTOMATIC" Start-up mode: steps 3 - 4

- see section 4.5 for "NORMAL" Start-up mode: steps 3 - 4 - 5

4.9 E.P.O. (EMERGENCY POWER OFF) STOP

The purpose of the emergency stop is to completely shut down the UPS if necessary, with the resulting instant switch off the static switch from both reserve and inverter sources. This eliminates any power presence at the UPS output and - in consequence - at the load.

Obviously, hazardous voltages remain inside the UPS panel.

To reset EPO mode, the complete UPS shut down procedure is required.

4.10 MANAGING THE UPS BATTERY

In addition to the battery voltage and current measurements, displayed in menu “2. *MEASUREMENTS*”, it is also possible to test the battery efficiency without any interruption to the load.

During the test the input section lowers the DC voltage until the battery discharging level is reached. In this way all the current required to supply the load, will be taken from the battery set.

If the test is successful (about 45 seconds of battery discharging) the message “BATTERY TEST PASSED” will be displayed, otherwise the alarm “BATTERY TEST FAILED” will be activated. If for any reason the test cannot be executed, the “BATTERY TEST NOT EXECUTED” message will be displayed.

4.11 BATTERY TEST PROGRAMMING

The battery test can be executed at any time by selecting the menu “3. *UPS COMMANDS*” and pressing ENTER on “*START BATTERY TEST*” command.

The test lasts about 50 seconds.

It is also possible to schedule a periodic battery test following the instructions below:

1. Select the “4. *PANEL SETUP*” menu and press ENTER
2. Select the “*BATTERY TEST SETTING*” and press ENTER.

Select, using the arrows, the day of the week to perform the test, the number of weeks between tests (from 1 to 52, [--] means no automatic test) and the time of the day to start the test.

Press ENTER to confirm each choice.

5 TROUBLESHOOTING

5.1 GENERAL ALARMS

In the event of a UPS fault, the default screen will be replaced by one of the alarm messages shown in the table below:

ALARM	CAUSE	ACTION
INVERTER OFF	Initial start-up Permanent overload	Start the Inverter Check the output
INVERTER OVERLOAD (>100% - >125% - >150%)	Continuous overload on UPS output	Check the output load and restart the inverter Check the output short circuit
STATIC SWITCH LOCKED	High transient loads on UPS output 3 failed switching attempts on inverter	Check the output load and restart the inverter
BATTERY TEST FAILURE	Battery test not OK	Check the battery Check the battery fuses
BATTERY PREALARM	Battery almost discharged, the inverter is about to go off	Shut down connected non-critical load
MAINS NOT AVAILABLE	Switch is open No mains input	Check the mains line voltage and the switch position
RESERVE NOT AVAILABLE	The input phase rotation is not correct. No input voltage	Check the line cyclic direction Check the reserve line voltage.
UPS EMERGENCY POWER OFF	The EPO control has been activated	Turn off the UPS fully opening all switches and fuses for battery. Wait until the LCD is completely off, then restart the UPS or reset the EPO via menu 6.1 EPO RESET
PARALLEL DATA EXCHANGE FAILURE	The machine is disabled due to absence of communication	Call technical assistance

When an UPS experiences the fault which cannot be resolved and it is not able to guarantee uninterrupted power to the load, perform an EMERGENCY BY-PASS and then leave the machine isolated and off. Call the technical assistance.

5.2 FIRE

In the almost impossible case of fire, remember **to only use CO₂ or powder extinguishers**. Always activate the emergency BY-PASS and completely shut off the machine, **disconnecting the battery panel as well**.

5.3 FAULTS RELATED TO THE NATURE OF THE LOAD

Many times normal UPS reactions to the non-standard load or installation environment are incorrectly recognized by the users as the UPS faults.

The most common situations are described below:

- The UPS is left with load supplied by the reserve line even if the inverter section is operating correctly: this may occur on excessive absorbed peak current. It causes the major drop-down voltage, which – if is repetitive - leads to the switching load to the reserve line.
The system, after three failed attempts to switch and return to the inverter, blocks the static switch on the reserve line to protect the inverter, therefore it is necessary to study the load current and eliminate the causes of the overcurrents.
The repetitive peak current should not exceed 2.5 times the effective value.
- The accuracy of the UPS output voltage is not optimal: this may depend on an excessively unbalanced and/or distorting load.

6. SCHEDULED MAINTENANCE

The UPS while its lifetime requires **scheduled maintenance cycles** to maintain operating reliability and efficiency.

Scheduled maintenance must be performed by the company which provided the machine or company specialized and trained on the system by the seller.

6.1. ANNUAL MAINTENANCE (OR PERFORMED EVERY SIX MONTHS IN CASE OF UNITS IN CRITICAL APPLICATIONS)

The following actions and tests are performed while the scheduled maintenance:

- cleaning the machine
- cleaning the control logic and interface boards
- checking the tightening of all nuts and bolts and electrical connections (UPS and battery)
- testing the ventilation efficiency
- testing the inverter output wave form
- testing output voltage / frequency
- testing synchronization
- testing signals, alarms and EPO tripping
- display calibration with calibrated instrument
- operating test of manual switches and automatic devices
- operating test of switching circuits
- power failure test of UPS line, battery efficiency test and test of correct battery charger operation.