

Quasar II

UPS 10÷40 kVA

User Manual



Item no. (10 kVA)
 (15 kVA)
 (20 kVA)
 (25 kVA)
 (30 kVA)
 (40 kVA)

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1. General Overview

1.1 UPS – General Description

These UPS series are characterized by their compact construction. They consist of an outer metal housing with the electronic circuits and power components inside. All user accessible elements are placed on the rear. The control panel is located on the front.

The top and side covers can be removed, giving an access to the internal part of the UPS for service or maintenance purposes.

The user interface panel for monitoring, maintenance and control is located on the front side of all units.

The terminal block for the electrical connection to the mains, reserve, load, external batteries, and the main switch, is located on the rear of the unit.

The internal batteries are located in the lower part of the UPS, with access from the front.

1.1.1 UPS Application Areas

The new UPS family was designed to provide stabilized and filtered power for sophisticated and sensitive electronic devices, especially data processing equipment. Quasar II can be used to supply electronic systems in medical centers, police stations, motorway tunnels, broadcasting stations, banks, technical and administrative offices, which require a power source that is free from voltage and frequency variations.

1.1.2 Power and Autonomy

The UPS can use an internal battery block consisting of 60 batteries with 5 - 7.2 or 9 Ah. External battery modules can be added to increase the autonomy of the UPS.

1.1.3 Safety and Simple Operation

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

Overload and excessive temperature controls guarantee immediate and appropriate intervention if one of these conditions should occur during operation.

The operator can view the UPS status on the front panel and perform shut down or switching operations easily (see Chapter. 3)⁹.

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

An (optional) remote E.P.O switch can be connected to the UPS, to provide remote emergency power off functionality.

The UPS state can be easily monitored via an (optional) personal computer and an interactive program or through the (optional) remote display panel, especially when the UPS is installed in unmonitored areas.

See Chapter 1.2.5 - 1.2.6.

1.2 Configuration and Additional Equipment

1.2.1 Basic Configuration

The UPS is available in the following configurations:

Input	Output	Power Quasar II
Three-phase input	Three-phase output	10÷40 kVA
Three-phase input	Single-phase output	10÷40 kVA
Single-phase input	Single-phase output	10÷40 kVA

1.2.2 Battery Housing

If the autonomous time provided with the basic configuration is not sufficient, an additional optional battery housing can be connected to the UPS.

The battery housing can contain up to 2 blocks with 4.5 - 5 - 7.2 - 9 Ah batteries.

1.2.3 Transformer Housing

If a galvanic isolating transformer is required, it can be positioned inside the UPS housing instead of the internal batteries. In this case an external battery housing is essential.

The standard transformer is three-phase/three-phase (or single-phase/single-phase or three-phase/single-phase) with a 1:1 ratio, but it can be supplied with a different transformation ratio if customer requirements demand this.

1.2.4 Remote Communication Board

The remote communication board (code no. CS0098) enables monitoring of and communication with the UPS.

Monitoring can be implemented via a PC and a dedicated software or through a remote display panel. There are also voltage free contacts available on the terminal board M1 (for more info see Chapter 2.7).

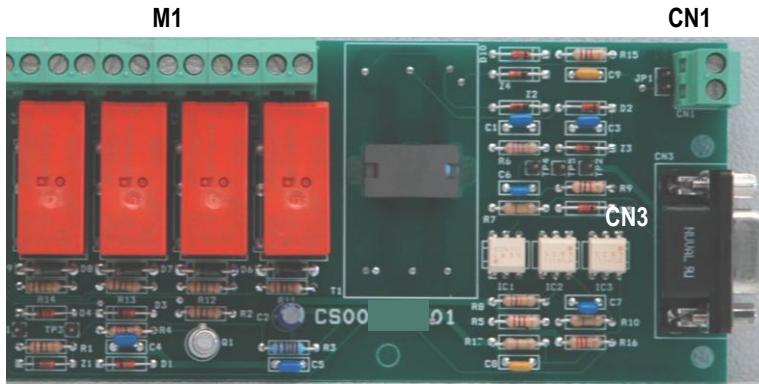


Fig. 1.2.4

1.2.5 UPS Management Software

The Generex communication software “UPS MANAGEMENT” allows communication between UPS and PC or a network with the Windows, Win-NT, Novell, OS2, Dec, and Linux operating systems.

The software is used to monitor and control the parameters of one or more UPS units supplying the network (for more info see Chapter 2.7.2).



Fig. 1.2.5

1.2.6 Remote Display Panel

The remote display panel is used for the remote monitoring of the state of the UPS. It shows the status of the main UPS blocks with LED indicators and an acoustic sound in the case of alarm state (for more info see Chapter 2.7.1).



Fig. 1.2.6

1.2.7 Remote E.P.O. Button

The remote E.P.O button provides a reliable way to shut down the unit immediately and completely, in the event of an emergency (for more info see Chapter 2.7.2).

1.3 Operating Principle

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 a dual conversion of the input voltage continuously and without interruption.

The absence of a direct connection between mains and the load prevents a transfer of voltage and frequency disturbances. The dual conversion guarantees that the output energy is always well regulated and has correct voltage and frequency values, which makes it the ideal tool for the operation of professional equipment.

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

The system is supplied with an automatic by-pass. In the event of a UPS fault or overload, the by-pass connects immediately the load directly to the mains through a reserve line, making normal operation possible again, without interruption. See Fig. 1.3.1.

1.3.1 UPS Block Diagram

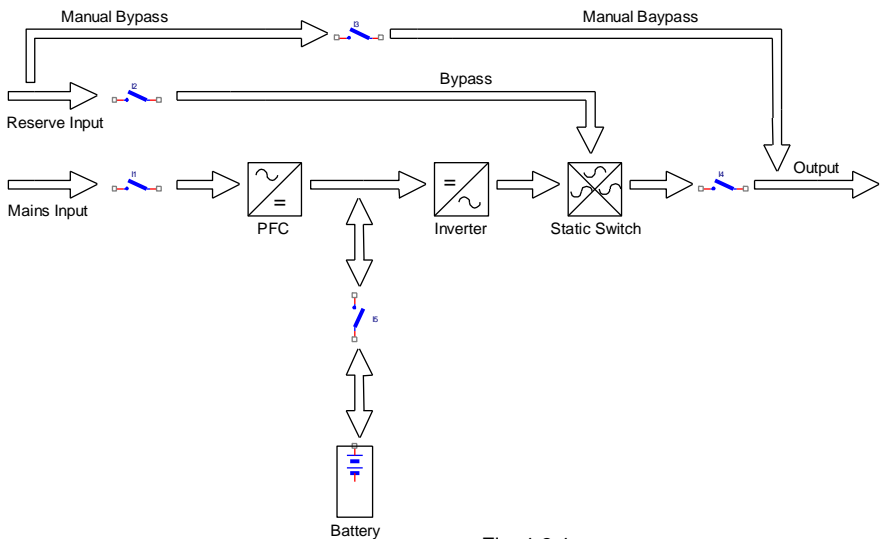


Fig. 1.3.1

1.3.2 Input Stage, Power Stage and Output Stage

The mains power flows from the input conductor lines, via the MAINS INPUT I1 switch to the power stage.

The rectifier regulates the DC voltage to a reference value, providing a continuous charging of the battery .

Then the DC voltage flows to the inverter, which feeds the load with regulated sinusoidal voltage (phase and amplitude controlled).

In normal operating conditions, the static switch (providing energy to the load) selects the inverter as the voltage source. In the case of fault or overload, the UPS output is redirected to the reserve line. In this way, the load is always supplied with energy. When the cause of the fault is rectified, the static switch automatically selects the inverter to feed the load again.

1.3.3 Logic and Auxiliary Circuits

The control logic is located on the separate board (0SDE0150) and represents the “intelligence” of the UPS.

It manages operations of the boost converter, inverter and by-pass, based on feedback signals taken from the power module. The control logic also manages the other three boards, i.e. the battery charger, auxiliary power supply and signal interface.

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

The signal interface receives the signals from the control logic and converts them into the protocol that can be processed by the front panel of the UPS and the relay board. In the opposite direction, 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 executes the desired operation – like switching the inverter on/off or shutting down the UPS. 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 Bypass

Manual by-pass is useful in situations when it is necessary to disable the UPS and keep the load supplied by the mains (i.e.: UPS failure, fault, etc.). This function can be activated with using the MANUAL BY-PASS (I3) switch, located in the rear of the UPS (see Chapter 4). Under normal operating conditions, this circuit breaker remains in the rest position, through being protected by a mechanical lock (padlock).

1.3.6 Front Panel

The UPS can be administered through the front panel. Using the panel it is possible to execute commands, display states and measured values 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 measured values (see Chapter 3).

2. Installation Instructions

2.1 General Information

This Chapter describes the system installation procedures and deals with the following subjects:

- Receipt and checking
- Storage
- UPS positioning
- Environmental specifications
- Assignment and connection to mains
- UPS Auxiliary connections
- Earth connection

2.2 Receipt and Checking

After unpacking, visually inspect (inside and outside) the UPS and battery module (if included) to check for any damage that may have occurred during shipping. If there is any damage, inform the shipper or dealer 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 rear of the unit (Fig. 2.2).

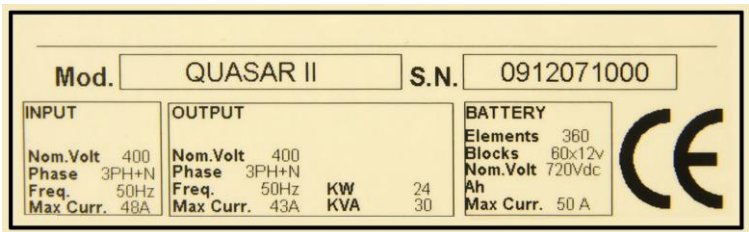


Fig. 2.2

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, with humidity less than 95% and 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 connect the UPS up to the mains and run it for the time needed to recharge the batteries.

2.4 UPS Positioning

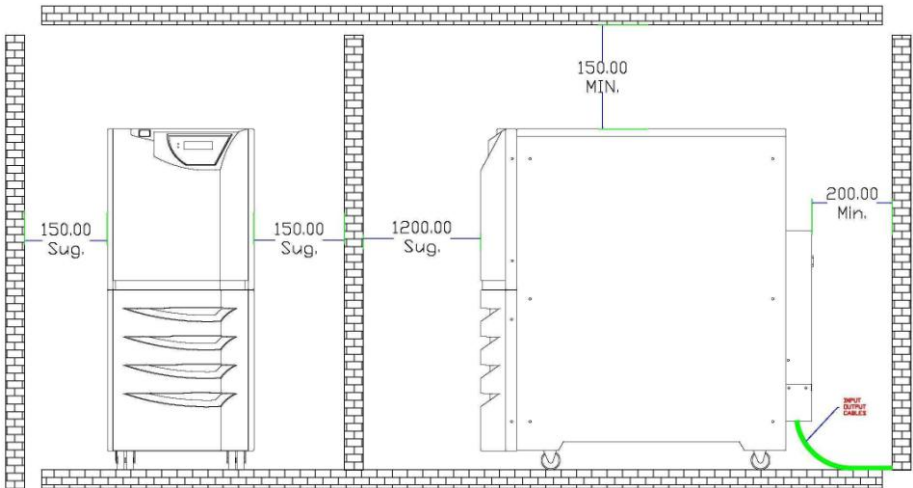


Fig. 2.4a

All dimensions are in millimeters.

The same housing is used for both series.

The mechanical parameters are described in the following tables:

UPS 10—15 kVA

POWER (kVA)	DIMENSIONS WxDxH (mm)	WEIGHT (kg) w/o batteries	WEIGHT (kg) with batteries
10	390 x 900 x 900	70	220
15			

Table 2.4a

USV 20-30 kVA

POWER (kVA)	DIMENSIONS WxDxH (mm)	WEIGHT (kg) w/o batteries	WEIGHT (kg) with batteries
20	390 x 900 x 900	80	230
25			
30			

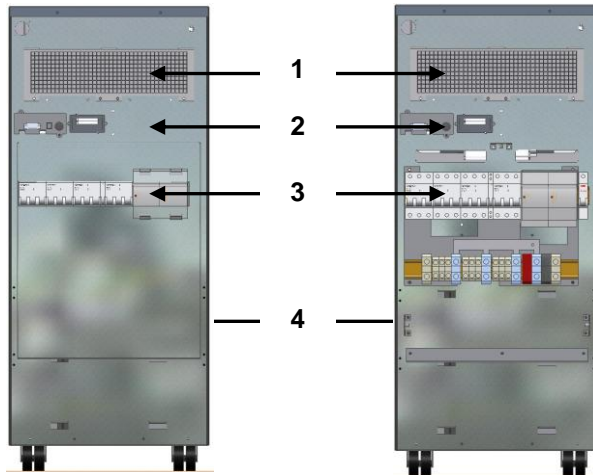
Table 2.4b

The weight difference depends on whether batteries are mounted in the UPS housing or not.

For handling you need to remember that the machine, unless other arrangements are made, is shipped and handled with the batteries inside, . Therefore, the higher weight description is valid.

All the connections are located on the rear panel and can be reached after removing the cover, as shown in Fig. 2.4b.

Figure 2.4b shows the cover and the external connections.



- 1 Protective air cooling grid
- 2 Communication card slot
- 3 Fuses
- 4 Metal cover

Fig. 2.4b

The cable input is located at the bottom of the rear wall, and is accessible after removing the metal cover (Fig.2.4b).

The cable connections correspond to the UPS configuration and are shown in Fig.2.6 c/d/e.

2.5 Environmental specifications

The room where the UPS is installed must be clean. It must comply with pollution class 2 (CEI) and be able to dissipate the heat produced by the machine, as shown in table 2.5a.

Rated power (kVA)	Dissipated power (W)
15	750
30	1440

Table 2.5a

For correct battery ventilation, the room must be able to ensure an exchange of air equal or greater than shown in table 2.5b.

Air exchange just for battery hydrogen		
4.5 Ah batteries	7 Ah batteries	9 Ah batteries
(60 blocks)	(60 blocks)	(60 blocks)

Table 2.5b

Please note that the average battery lifetime is closely dependant on the operating temperature. A temperature of around 20°C is normally recommended.

(If the temperature rises above 20°, the battery life drops by 50% for each 10° increase).

2.6 Mains Connection Cabling

A layout like the one shown in diagram 2.6 is recommended for the mains connection. 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).

Switch A is used as external BY-PASS.

Block diagram

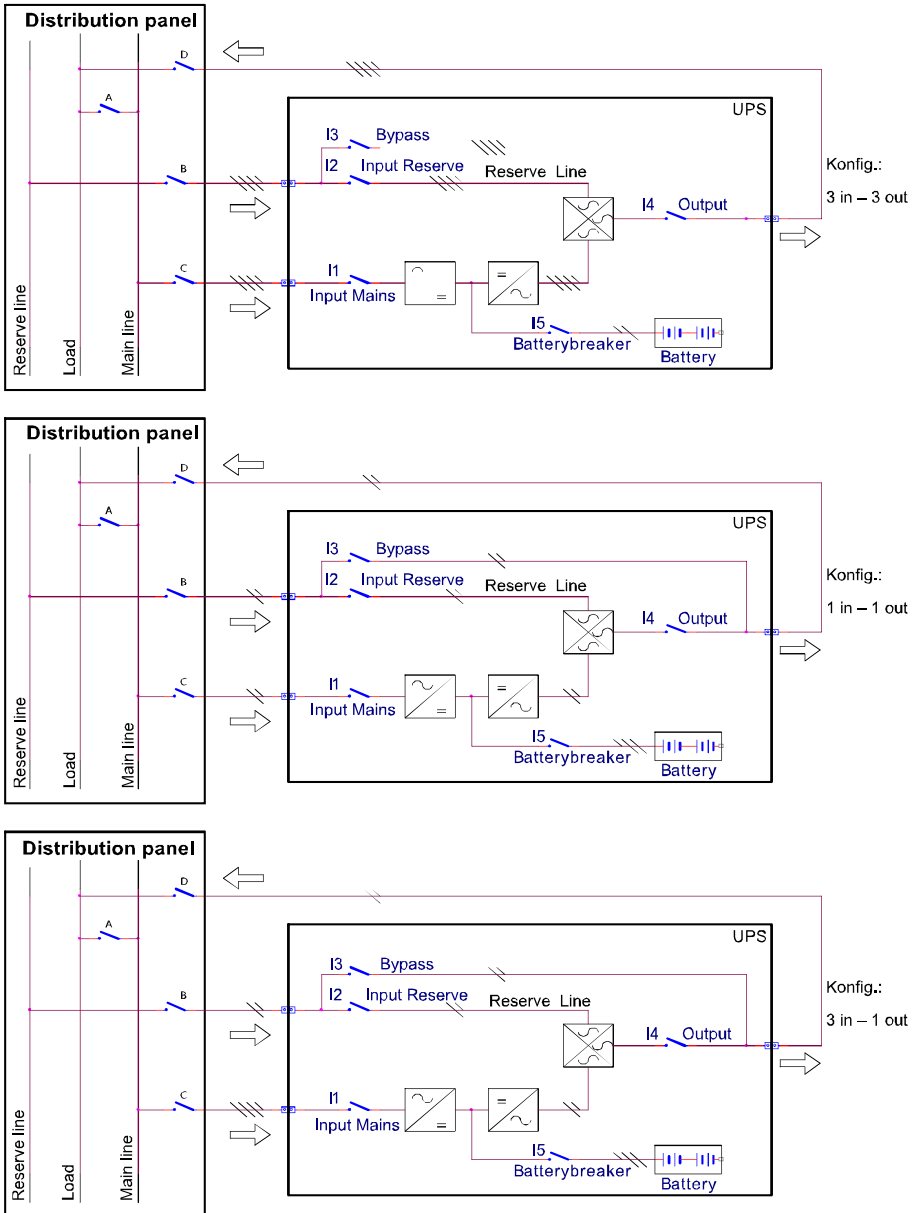


Fig. 2.6a

Quasar II – Instructions for installation

Configuration 3/3 Power kVA	10	15	20	25	30	40
Input fuse [A]	3 x 25	3 x 32	3 x 50	3 x 50	3 x 63	3 x 80
Input cable cross section [mm ²]	4 x 6	4 x 10	4 x 16	4 x 16	4 x 25	4 x 35
Output cable cross section [mm ²]	4 x 6	4 x 10	4 x 16	4 x 16	4 x 25	4 x 35
Ground/earth cable cross section [mm ²]	6	10	16	16	25	35


Table 2.6a

Configuration 3/1 Power kVA	10	15	20	25	30	40
Input fuse [A]	3 x 25	3 x 32	3 x 50	3 x 50	3 x 63	3 x 80
Input cable cross section [mm ²]	4 x 6	4 x 10	4 x 16	4 x 16	4 x 25	4 x 35
Reserve line input fuse [A]	63	80	100	125	160	200
Reserve line cable cross-section [mm ²]	2 x 16	2 x 25	2 x 35	2 x 35	2 x 50	2 x 70
Output cable cross section [mm ²]	2 x 16	2 x 25	2 x 35	2 x 35	2 x 50	2 x 70
Ground/earth cable cross section [mm ²]	16	25	35	35	50	70


Table 2.6b

Configuration 1/1 Power kVA	10	15	20	25	30	40
Input fuse [A]	63	80	100	125	160	200
Input cable cross section [mm ²]	2 x 16	2 x 25	2 x 35	2 x 35	2 x 50	2 x 70
Output cable cross section [mm ²]	2 x 16	2 x 25	2 x 35	2 x 35	2 x 50	2 x 70
Ground/earth cable cross section [mm ²]	16	25	35	35	50	70

Table 2.6c



WARNING



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 (THIS OPTION IS ALREADY AVAILABLE IN THE MIZAR SERIES), AS INDICATED IN TABLE 2.6a/2.6b/2.6c AND THE FOLLOWING DRAWING.

If necessary, a system to protect against voltage return in the UPS distribution panel as shown in diagram 2.6b must be installed for the Alcor series 20-25-30kVA (option already available in the Mizar series).

- 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: Contactor to protect against return voltage
- K1-K2: Additional relays on the change-over contact coil supply

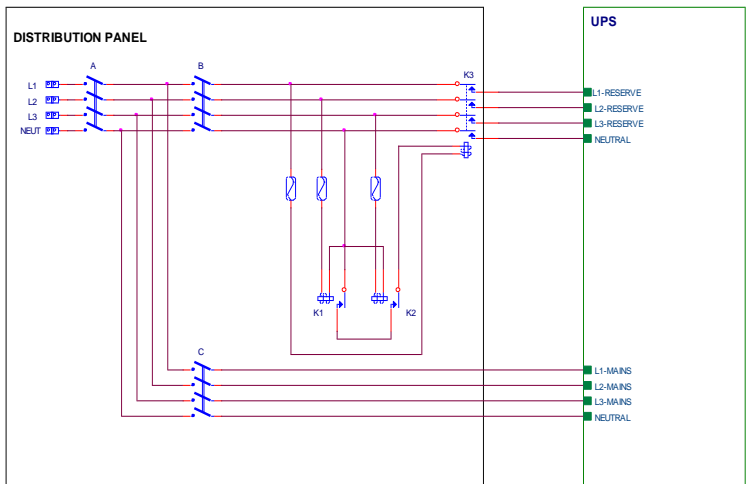





Fig. 2.6b

  **WARNING**  

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

REAR of the UPS

Disconnect

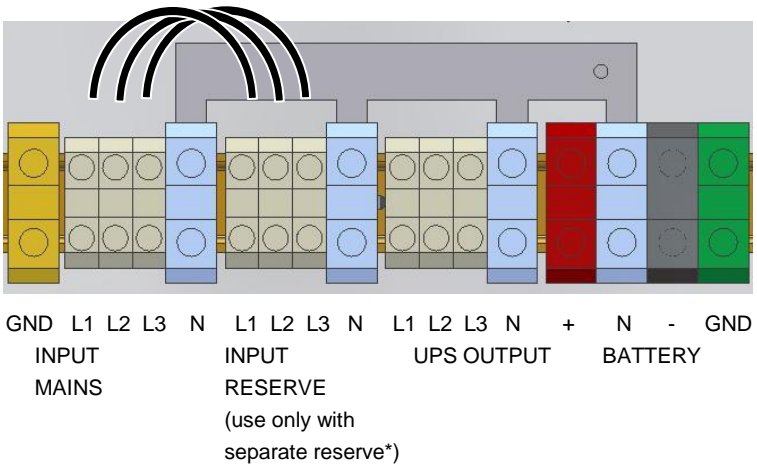


Fig. 2.6c

Fig. 2.6c
UPS terminal block in three-phase/three-phase configuration

* Remove jumpers to separate input mains from reserve.

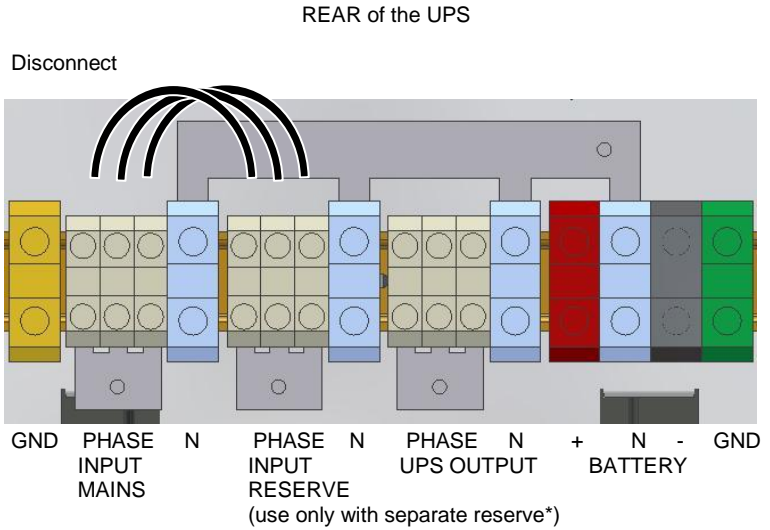


Fig. 2.6d

Fig. 2.6d:

UPS terminal block in single-phase/single-phase configuration

* Remove cables no. 32 (for Mizar) or 10 (for Alcor) to separate the mains input from the reserve.

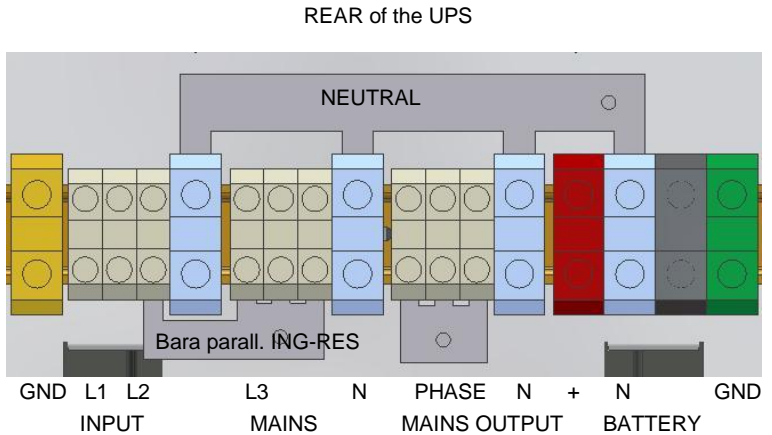


Fig. 2.6e1

Fig. 2.6e1:

UPS terminal block in three-phase/single-phase configuration

REAR of the UPS

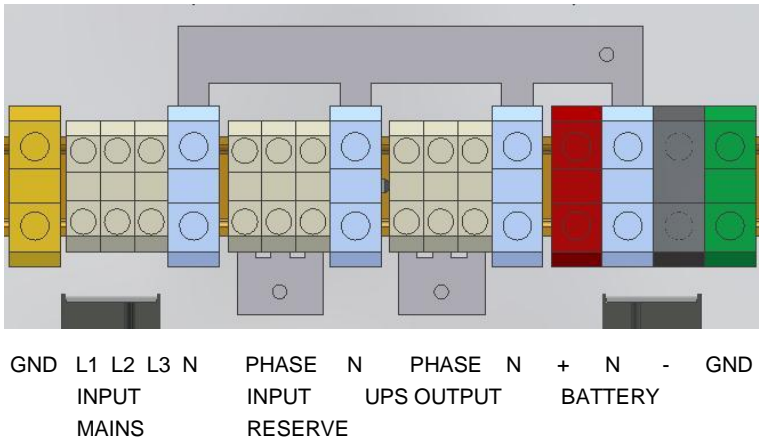


Fig. 2.6e2

Fig. 2.6e2:

UPS terminal block in three-phase/single-phase configuration (input and reserve separated)

Fig. 2.6 c/d/e1/e2: UPS connection charts for input wires

If not required, the UPS is supplied with mains and reserve line in parallel (Fig.2.6c). It is possible to separate them by removing the connecting bars.

Before connecting the UPS it is necessary to check:

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

After that, install four pole circuit breakers upstream and downstream from the UPS with the following specifications:

- Rated power equal to or greater than what is indicated on the rating plate on the rear of the UPS (kVA);
- Specifications in compliance with IEC standards or local laws for "Curve C" circuit breakers.

2.7 UPS Auxiliary connections

The communication boards are mounted in the rear of the UPS. The standard equipment is composed of the remote communication board (CS0098) and the set-up for the SNMP board.

Access to the connections for these two components is located on the rear of the UPS (Fig. 2.7a).

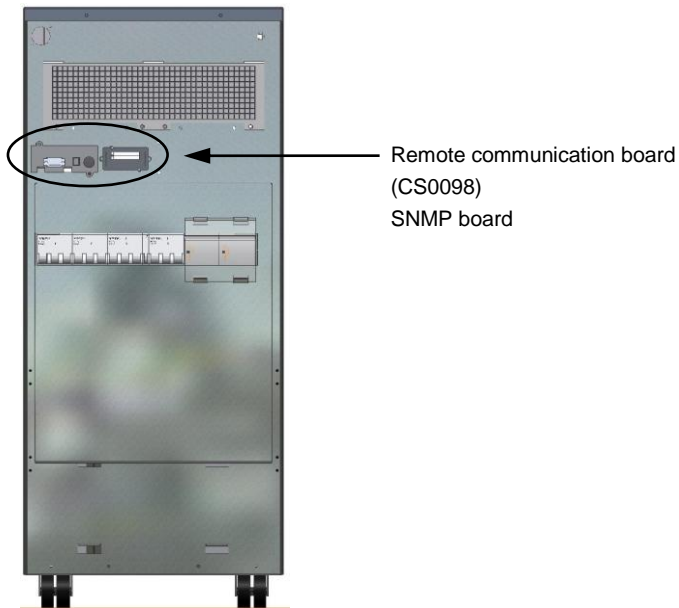


Fig. 2.7a

2.7.1 Remote Communication Board

The remote communication board is used to establish a connection between the UPS and external devices.

The board has a series of voltage free contact terminals (M1) which can be connected to a dedicated synoptic panel Chapter 2.7.2), acoustic or visual warning devices or remote signaling systems.

One or more remote EPO buttons (Chapter 2.7.4) can be connected via the other two contacts (CN1).

Finally, it is possible to connect the system to a PC via a DB9 (CN3) connector and use a special software (Chapter 2.7.3).



Fig. 2.7.1a

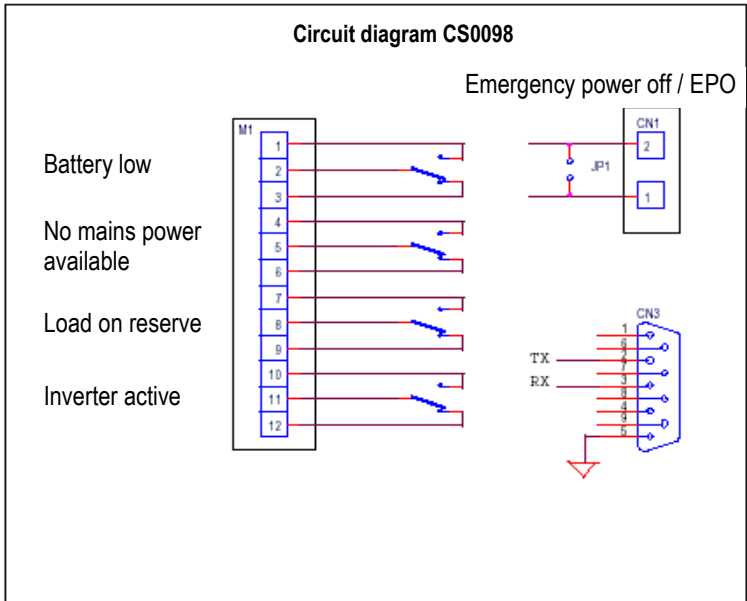


Fig. 2.7.1b

2.7.2 Remote Display Panel (optional)

The remote display panel is connected to the UPS via the connection block M1 located on the remote communication board (CS0098) (connection diagram Fig. 2.7.2b). This device is used for the remote monitoring of the main UPS blocks, the status of the main blocks is represented through LEDs and there is also an acoustic alarm, which can be shut off with key 5.

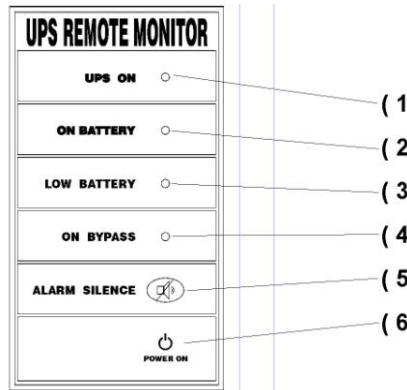


Fig. 2.7.2a

LED description

1) Green LED: UPS On

If on, the UPS is functioning correctly. If off, one or more inverter section alarms have been activated (acoustic alarm enabled)

2) Yellow LED: BATTERY on

If on, the UPS is functioning in battery mode (acoustic alarm enabled).

3) Red LED: BATTERY low

If on, the battery is almost completely discharged (acoustic alarm enabled).

4) Yellow LED: BYPASS on

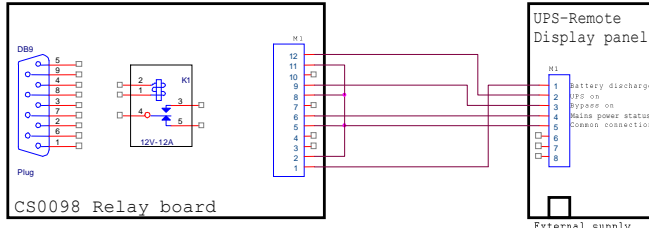
If on, the load is supplied from reserve (acoustic alarm enabled)

5) ALARM SILENCE key

Is used to switch off the acoustic alarm.

6) Green LED

If on, it indicates a correct power supply connected to the panel.



CS0098 Relay board	UPS-Remote Display panel
1	1
12	2
9	3
6	4
2-5-8-11	5

Fig. 2.7.2b

2.7.3 UPS Management Software

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

For more information on the installation and use of the software please refer to the respective software manual.

2.7.4 Remote E.P.O. Button

Particular attention must be paid to the external connection of buttons or actuators for the EPO function (emergency power off). This connection is composed of a series or normally-closed switches which open the series on command, triggering the shutdown of the UPS. The consequence of this is an 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 CS0098 (Fig.2.7.4). If there are no external EPO contacts to the system, jumper JP1 must be enabled. (indicated in Fig. 2.7.1a).

The factory-set configuration (with external E.P.O connected) comes with the connector CN1 short-circuited with a wire connection. It must be removed (as well as the jumper JP1), when one or more external E.P.O. is connected to the board as described above.

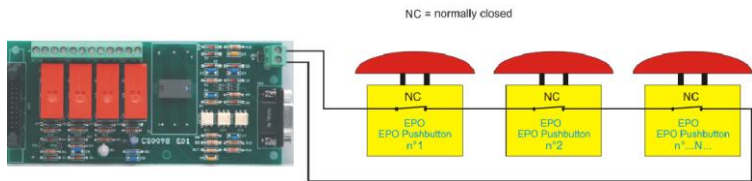



Fig. 2.7.4


2.7.5 Earth Connection

The earth input cable must be connected to the earth terminal of the UPS and **must be always the first cable to be connected**. It is advisable to insert an appropriate antioxidant between the earth bar and connection lug, in order to ensure a correct contact is maintained over time.

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



WARNING



INSUFFICIENT EARTH CONNECTIONS MAY CAUSE
ELECTRIC SHOCK OR FIRE.

3. Control Panel

3.1 Introduction

The control panel is located on the front of the UPS. It is used for a simple check of the general status of the UPS and batteries and related alarms. The panel contains an LCD screen (which indicates the operating status, measured values and UPS alarms) and the red EPO button located top left on 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 below the LCD display.



Fig. 3.1

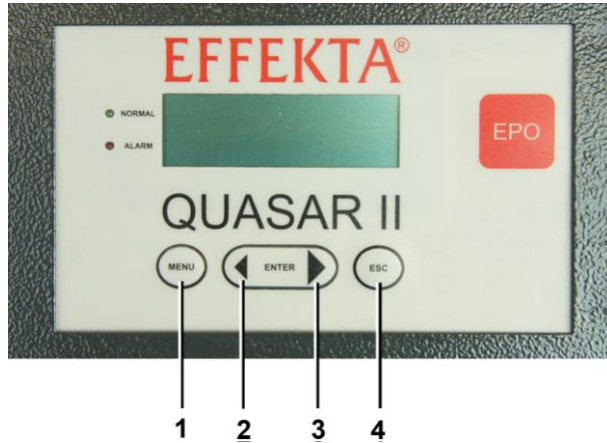
There are two LEDs on the left side of the display: A green one (“NORMAL”) and a red one (“ALARM”).

The functions of the LEDs are described in table 3.1.

STATUS	UPS OK	Alarm activated	Alarm acknowledged
GREEN LED	On	Off	On
RED LED	Off	On	Flashing

Table 3.1

3.2 LCD Control Panel



1 MENU key

To return to the previous menu or to the main menu from the alarm display

2 BACK key

To scroll the options in the menu and submenu. Pressing both at the same time generates an ENTER command.

3 NEXT key

To scroll the options in the menu and submenu. Pressing both at the same time generates an ENTER command.

4 ESC key

To switch off the buzzer.

Fig. 3.2

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. In this way, the operator is informed in real time (also with an acoustic signal) of any faults occurring in the system.

Table 3.2 shows a list of available menus.

MENU	No.	DESCRIPTION
UPS STATUS AND ALARMS	1	This is the default setting of the LCD screen. The system returns to this level automatically if no keys are used for 3 minutes.
MEASUREMENTS	2	Used to display all the measured values
UPS COMMANDS	3	Inverter on / off, static switch, battery test
PANEL SETUP	4	Settings for date / time / battery test / language
EVENTS RECORDER MANAGEMENT	5	Displays the log of events and related alarms
SERVICE MODE	6	Reserved for technical service staff

Table 3.2

It is possible to scroll through the menus listed 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 an acoustic 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.

3.2.1 MENU 1: UPS Status and Alarms

This menu is identified 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 mode

MESSAGE	DESCRIPTION
MAINS OK / NOT AVAILABLE	The input mains line is on and the voltage is / is not in the specified range
RESERVE MAINS OK / NOT AVAILABLE	The bypass input mains line is on and the voltage is / is not in the specified range
BATTERY FLOAT CHARGE	The battery voltage is within the specified limits
INVERTER ON	The inverter is on and operating normally
INVERTER – RESERVE SYNCHRONIZED / NOT SYNCHRONIZED	Indicates the normal synchronization status between the inverter and by-pass line
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 a short overload.
UPS MASTER	Controls the other UPS units in a parallel system.
UPS SLAVE	Is controlled by another UPS in a parallel system.

Table 3.2.1

3.2.2 UPS Fault Conditions

If the UPS has a fault, the normal status message is replaced by an alarm message.

The alarm messages differ depending on the type of fault that has occurred. An activated acoustic signal can be switched off by pressing the ESC key. The ENTER (< >) key can be used to display the list of information, which explain the alarm to the operator. The <BACK or NEXT> keys can be used to scroll through all the active alarms. When the cause of the alarm is rectified, the LCD returns to the default message.

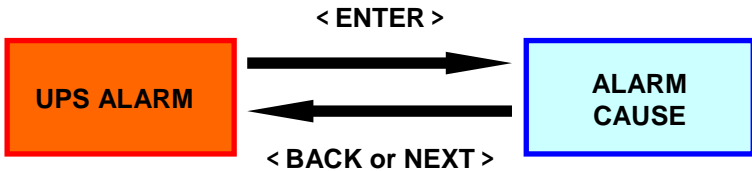


Fig. 3.2.2

Possible alarms and their explanations are listed in the following table.

ALARM MESSAGE	DESCRIPTION
INVERTER OFF	The load is no longer supplied by the inverter A mains failure has occurred.
INVERTER OVERLOAD	The inverter is switched off due to an overload and the load is supplied by the reserve network.
STATIC SWITCH LOCKED	After 3 unsuccessful attempts to automatically switch from reserve to inverter, the UPS blocks the static switch in the reserve network position.
BATTERY FAILURE	The battery is not functioning properly or is not connected.
BATTERY TEST FAILURE	Is displayed if the periodic battery test fails for any reason.
BATTERY PREALARM	At a battery voltage of approx. 640V, the UPS warns the user of low battery voltage. At 600V, discharging ends and the UPS switches off.
STATIC SWITCH FAILURE	At least one of the output phases is missing.
MANUAL BY-PASS ON	The manual bypass switch has been closed.

ALARM MESSAGE	DESCRIPTION
MAINS NOT AVAILABLE	The mains is not compatible with the UPS specifications. It might be out of the permissible system range or simply not present.
RESERVE NOT AVAILABLE	The reserve is not compatible with the UPS specifications. It might be out of the permissible system range or working in the wrong cyclic direction, or it is not present.
UPS EMERGENCY POWER OFF	Is displayed when the E.P.O. button is pressed for any reason.
BATTERY CHARGER FAILURE	The battery charger is not functioning properly or is not connected.
PARALLEL DATA EXCHANGE FAILURE	This alarm occurs when there is no data exchange between parallel UPS devices for any reason. This may be due to a missing or incorrect connection of one or more parallel fibers.

Table 3.2.2

3.2.3 MENU 2: Measurements

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 measured values by using the arrows < or >:

- V in phase – neutral = Reserve line Y-voltage
- V in phase/phase = Reserve line voltage between lines
- Input current = UPS input three phase currents

- V out phase/neutral = UPS output Y-voltage
- Output current = Output current at load
- Battery V,I = Battery voltage and current
- Frequency = UPS output frequency

- Temperature = Temperature of the power stage, input stage, output stage and housing
- Temperature = Temperature of the external battery housing in order to regulate the battery voltage according to the measured value.

If no operation is performed for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is displayed again.

3.2.4 MENU 3: UPS Commands

The UPS can be controlled through this menu.

MESSAGE	DESCRIPTION
3.1 INVERTER ON 3.2 INVERTER OFF	When this message is displayed, the user can switch the inverter on or off permanently by pressing ENTER. The inverter must be switched on at the start and after the switch-off following the permanent overload.
3.3 SWITCH LOAD TO INVERTER	When this message is displayed, the load is switched from the reserve line to the inverter when ENTER is pressed.
3.4 SWITCH LOAD TO RESERVE	When this message is displayed, the load is switched from the inverter to the reserve line when ENTER is pressed.
3.5 START BATTERY TEST	When this message is displayed, an automatic battery test is started upon pressing ENTER. The test lasts for about 30 seconds.

Table 3.2.4

If no operation is performed for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is displayed again.

3.2.5 MENU 4: Panel Setup

MESSAGE	DESCRIPTION
4.1 DATE SETTING	Sets the current date. Use the arrow keys to increase/decrease the numbers.
4.2 TIME SETTING	Sets the current time. Use the arrow keys to increase/decrease the numbers.
4.3 PANEL LANGUAGE SETTING	Used to select the display languages (from the available preinstalled languages)
4.4 ALARMS SETUP	Allows the user to define whether a recorded alarm is hidden or displayed until the ESC key is pressed.
4.5 BATTERY TEST SETTING	Used to set the periodic battery test by selecting the day of the week, the number of weeks between the tests and the time of day to start the test.

Table 3.2.5

If no operation is performed for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is displayed again.

3.2.6 MENU 5: Event Log Management

In this menu the user can see last 1024 events / alarms in chronological order. The event log display can be opened by selecting 5. EVENT LOG in the main menu and then choosing the DISPLAY LOG command. The screen shows the date and time of the last event that occurred.

It is possible to scroll through the list using the <BACK or NEXT> keys.

Pressing MENU at any position on the event list returns you to the MAIN MENU.

To delete all the events select DELETE EVENTS from the submenu and then press <ENTER>.

If no operation is performed for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is displayed again.

3.2.7 MENU 6: SERVICE MODE

Through this menu the user can change UPS related data, reset the EPO, request the software and hardware version, etc. This menu is password-protected to prevent unauthorized access.

If no operation is performed for 3 minutes, the “1. UPS STATUS AND ALARMS” menu is displayed again.

4. Instructions for Using the UPS

IMPORTANT

Please follow the procedures described below carefully to avoid damage to the system.

ATTENTION

The UPS cannot be started from the battery.

**CLOSE CONNECTION FUSES BATTERY
BREAKER ONLY AFTER THE COMPLETE
TURN ON OF THE EQUIPMENT**



**-IMPORTANT-
WRONG PROCEDURES COULD
COMPROMISE THE UPS OPERATION**

4.1 Introduction

This Chapter describes the correct use of the system.

The UPS may be in one of the following operating modes:

- **Normal mode** - The load is supplied by the UPS.
The UPS is in normal operation and uses mains power to supply energy to the load and charge the batteries.
This mode guarantees that complete, uninterrupted power is supplied to the load.
Operation with internal automatic by-pass – The load is supplied by mains power
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 that complete, uninterrupted power is supplied 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 that complete, uninterrupted power is supplied to the load.
- **Battery mode** - The load is supplied by the UPS.
The UPS is in normal operation mode and uses the battery to supply energy to the load because the mains voltage is out of the allowed range
This mode guarantees that complete, uninterrupted power is supplied to the load.

4.2 Power Switches

The system maintenance elements are located behind the front doors, installed horizontally and the following describes them in order from left to right side (see Fig. 4.2):

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 the disconnection of the entire UPS and the provision of mains supply to the load. This switch is protected with a small padlock to avoid accidental use.

UPS-OUTPUT SWITCH (I4): Connects the UPS to the load.

The UPS switches were described above. There are also battery breakers **inside the battery module and in every external battery module.**

To completely isolate the unit from hazardous voltages it is necessary to open the battery switch as well, which is not located on the UPS. Also, the presence of potentially charged capacitors inside the converter should be considered. This means that you must wait for at least 10 min. before accessing the internal parts of the UPS.

Follow the steps below to correctly switch on the UPS.

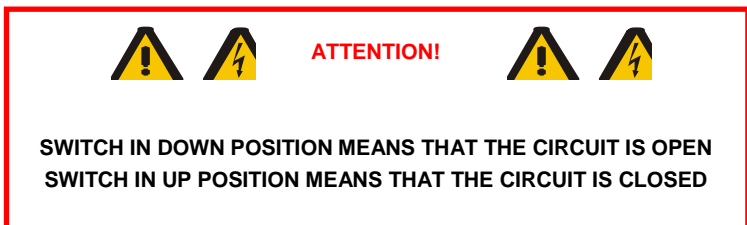


Figure 4.2 shows all the switches in the OFF position.

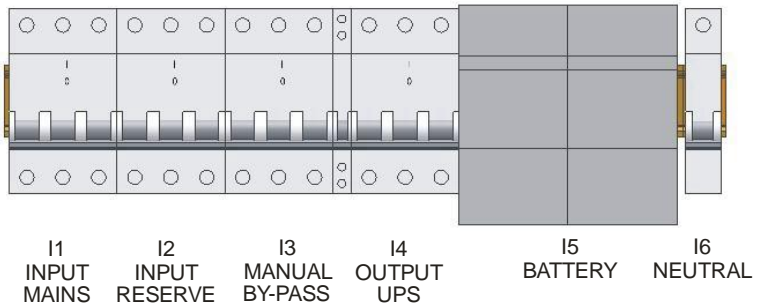






Fig. 4.2

ATTENTION!





All operations described below must be completed by authorized electricians and/or qualified staff only.



4.3 UPS Start-Up

This procedure describes how to setup the UPS for normal operation after the system has been completely de-energized.


Prior to starting, make sure that all electrical connections of the system are checked by an authorized person. All external power breakers remain closed.

- 

Ensure that the **MANUAL BYPASS** switch remains in the **OFF** position (down) and is mechanically blocked by a padlock.


- 

Ensure that the direction of the phase rotation for the mains and reserve lines is correct. The direction must be clockwise.



For an explanation of the switches refer to fig. 4.2.

Once all the points above have been verified, proceed following the steps below.

1. Close the INPUT RESERVE (I2) switch.

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

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

2. Close the UPS OUTPUT (I4) switch

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

3. Close the MAINS INPUT (I1) switch

Wait for about 10 seconds. In this time a progressive capacitors pre-charge process is initiated, which protects the mains from overload.

The INVERTER OFF message appears on the LCD.

4. Switch on the inverter

Using menu **3. UPS COMMANDS**, select Inverter ON and press ENTER. This activates the inverter.

5. Verify the UPS operating status

Wait for about 30 seconds. After this the static switch should automatically switch the load from the reserve line to the inverter.

Check the correct operating status, indicated by the green LED on the control panel.

6. Battery connection

After checking the correct polarity of the batteries close the interior battery panel switch This 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 recommended that you simulate a 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.

4.4 Instructions for Switching the System to Manual Bypass Mode

If for maintenance purposes or other reasons the UPS has to be separated from the system, while at the same time mains power has to be supplied to the critical load, proceed as follows:

1. Select menu 3. UPS COMMANDS

Select the item **Transfer load to reserve network** and press ENTER. From this moment the load is supplied directly from the reserve network.

2. Switch off the inverter

Using menu 3. **UPS COMMANDS** select **Inverter ON/OFF** and press ENTER. This turns off the inverter and uninterrupted supply to the load is no longer guaranteed.

3. Close MANUAL BY-PASS (I3) switch

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

4. Open the INPUT MAINS (I1) switch

5. Open the INPUT RESERVE (I2) switch.

The load is supplied directly from the mains through the manual By-Pass.

6. Open the UPS OUTPUT (I4) switch

7. Disconnect the battery

8. Open the NEUTRAL (I6) switch (only

if there is work to be done on the module



Attention

Hazardous voltage may still be present inside the UPS

Please contact the manufacturer.

4.5 Instructions for Return from Manual Bypass Mode to Normal Mode

To return to normal operation from the manual bypass mode, proceed as follows:

1. Close the INPUT RESERVE (I2) switch.

At this point, if the supply of the reserve **line** is present and **within allowed range**, the LCD display will switch on and also all UPS circuits will initiate their operations. The fan starts working.

2. Close the UPS OUTPUT (I4) switch

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

At this point the load is supplied from the reserve line.
Hang the padlock on the manual by-pass switch (I3) again.

4. Close the INPUT MAINS (I1) switch

Wait for about 10 seconds. During this time, the progressive capacitors pre-charge process is initiated, which protects the mains from overload.
The **INVERTER OFF** message appears on the LCD.

5. Switch on the inverter

Using menu **3. UPS COMMANDS** select **Inverter ON/OFF** and press ENTER

6. Verify the UPS operating status

Wait about 30 seconds. After this the static switch automatically switches the load from the reserve line to the inverter.
Check the correct operating status, indicated by the green LED on the panel display.

7. Battery connection

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

4.6 Instructions for a Complete UPS Shutdown

If for maintenance purposes or other reasons the UPS has to be switched off and the load is no longer supplied, proceed as follows:

1. Select menu 3. UPS COMMANDS

Select the item **Transfer load to reserve network** and press ENTER

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

2. Switch off the inverter

Using menu 3. **UPS COMMANDS** select **Inverter ON/OFF** and press ENTER.

This turns off the inverter and uninterrupted supply is no longer guaranteed to the load.

3. Open UPS OUTPUT (I4) switch

The load is not supplied with power.

4. Open the INPUT RESERVE (I2) switch.

5. Open the INPUT MAINS (I1) switch

6. Disconnect the battery

7. Open the NEUTRAL (I6) switch (only if work has to be done on the module)



Attention

Hazardous voltage may still be present inside the UPS

Please contact the manufacturer.

4.7 E.P.O. (Emergency Power Off)

The purpose of the emergency power off is to shut down the UPS completely, if required. This also includes the immediate switching off of the static switch from both reserve and inverter sources. This eliminates any power at the UPS output and – as a result - at the load.

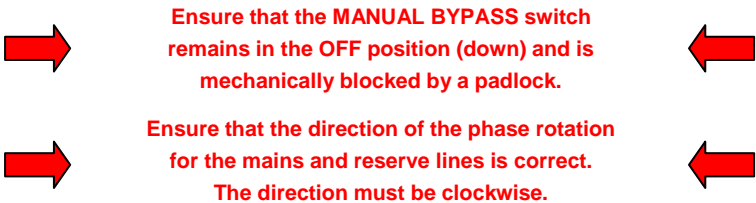
Obviously, hazardous voltages remain inside the UPS panel.

To reset EPO mode, the complete UPS shut down procedure has to be executed.

4.8 Instructions to Start the UPS from Power Save Mode

This procedure must be followed to start the UPS from a completely de-energized state.

Prior to starting, make sure that all electrical connections of the system are checked by an authorized person. All external power breakers remain closed.



For an explanation of the switches refer to fig. 4.2.

Once all the points above have been verified, proceed following the steps below.

1. Close the INPUT RESERVE (I2) switch

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

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

2. Close the UPS OUTPUT (I4) switch

The load connected to the UPS output is supplied with power.

3. Close the INPUT MAINS (I1) switch

Wait for about 10 seconds. During this time, the progressive capacitors pre-charge process is initiated, which protects the mains from overload.

The **INVERTER OFF** message appears on the LCD.

4. Switch on the inverter

Using menu **3. UPS COMMANDS** select **Inverter ON/OFF** and press ENTER.

Check the correct operating status, indicated by the green LED on the panel display.

5. Battery connection

After checking the correct polarity of the batteries close the interior battery panel switch. 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 recommended that you simulate a 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.

4.9 Instructions for Switching the System from Power Save Mode to Manual Bypass Mode

If for maintenance purposes or other reasons the UPS has to be separated from the system, while at the same time mains power has to be supplied to the critical load, proceed as follows:

1. Switch off the inverter

Using menu **3. UPS COMMANDS** select **Inverter ON/OFF** and press ENTER

This turns off the inverter and uninterrupted supply is no longer guaranteed to the load.

2. 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.

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

4. Open the **INPUT RESERVE (I2)** switch

The load is supplied directly from the mains through the manual By-Pass

5. Open the **UPS OUTPUT (I4)** switch

6. Disconnect the battery



Attention

**Hazardous voltage may still be present inside the UPS
Please contact the manufacturer.**

4.10 Instructions for Return from Manual Bypass Mode to Normal Mode in Power Save Mode.

To return to normal operation from the manual bypass mode, proceed as follows:

1. Close the INPUT RESERVE (I2) switch

At this point, if the supply of the reserve line is present and within allowed range, the LCD display switches on, all UPS circuits initiate their operations and the fan switches on.

2. Close the UPS OUTPUT (I4) switch

3. Open MANUAL BY-PASS (I3) switch

At this point the load is supplied from the reserve line.
Hang the padlock on the manual by-pass switch (I3) again.

4. Close the INPUT MAINS (I1) switch

Wait for about 10 seconds. During this time, the progressive capacitors pre-charge process is initiated, which protects the mains from overload.
The **INVERTER OFF** message appears on the LCD.

5. Switch on the inverter

Using menu 3. UPS COMMANDS select Inverter ON/OFF and press ENTER.

Check the correct operating status, indicated by the green LED on the panel display

6. Battery connection

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

4.11 Instructions for the Complete Shutdown of the UPS in Power Save Mode

If for maintenance or other reasons the system should be completely shut down without supplying any power to the consumer loads, proceed as follows:

1. Switch off the inverter

Using menu **3. UPS COMMANDS** select **Inverter ON/OFF** and press ENTER.

This turns off the inverter and the uninterrupted supply is no longer guaranteed to the consumer loads.

2. Open LOAD I3 circuit breaker

In this situation the consumer loads are not supplied.

3. Open the INPUT RESERVE (I2) circuit breaker.

4. Open the MAINS (I2) circuit breaker.

5. Disconnect the battery

6. Open the NEUTRAL (I6) switch (only if work has to be done on the module)



Attention

Hazardous voltage may still be present inside the UPS

Please contact the manufacturer.

4.12 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 power without any interruption to the load supply.

In case of battery failure, the message **“BATTERY TEST FAILED”** is displayed on the LCD.

Contact the technical support staff in this case.

4.12.1 Battery Test Programming

The battery test can be executed at any time by selecting the menu **“3. UPS COMMANDS”** and pressing **ENTER** on **“BATTERY TEST”** command. The test lasts for about 30 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 **“BATTERY TEST SETTING”** and press **ENTER**

Using the arrows, select the day of the week to perform the test, the number of weeks between tests (from 1 to 99, 0 means no automatic test) and the time of the day to start the test.

Press **ENTER** to confirm your selection.

5. UPS Devices in Parallel

5.1 System Set-up

The installation of many UPS in parallel requires creating one or more panels of the individual UPSs. The type of panel created guarantees different levels of operation, depending on the complexity of the chosen solution. The typical, normally suggested solution is described below, which guarantees complete operation of the system. (fig.5.1) Separators are included on all the power lines of the individual groups, to disconnect their return line and to protect the batteries. Moreover, it is advisable to set-up a general by-pass for the system. For this purpose, we recommend the implementation of a functional interlocking device. This interlocking device is necessary to prevent damage to the system. The solutions shown here permit all the test functions during the installation and maintenance phases of the individual groups. The general manual by-pass can be used to isolate the entire system without load supply interruptions.

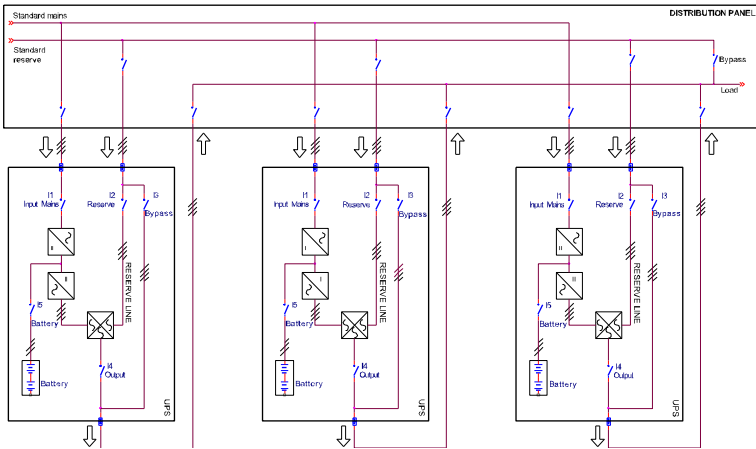


Fig. 5.1

The complexity of the system requires a suitable monitoring of the status of each UPS by remote or SNMP see Chapter 1.2.4)

For additional information, see the attached technical report DT0367. (only for parallel systems)

6. Troubleshooting

6.1 General Alarms

In the event of a UPS fault, the default screen is 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	Continuous overload on the UPS output.	Check the output load and restart the inverter. Check for an output short circuit.
STATIC SWITCH LOCKED	High transient loads on the UPS output. 3 failed attempts to switch over to the 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 switch off.	Shut down all non-critical connected loads.
MAINS NOT AVAILABLE	No mains input	Check the mains line voltage
RESERVE NOT AVAILABLE	Input phase rotation is not correct. No input voltage	Check the cyclic direction of the line. Check the reserve line voltage.
UPS EMERGENCY POWER OFF	EPO control was activated	Select the BYPASS setting of the rotary switch and wait until the LCD is completely switched off. Then restart the UPS.
PARALLEL DATA EXCHANGE FAILURE	The device is disabled due to an absence of communication.	Contact technical assistance.

Table 6.1

If a UPS experiences a fault that 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 switched off. Contact technical assistance.

6.2 In Case of Fire

In the very unlikely event of a fire, **only CO₂ or powder extinguishers should be used**. Always trigger the emergency BY-PASS. Then, shut down the machine completely **and disconnect the battery panel**.

6.3 Faults Due to Load Disorder

Often, normal UPS reactions to non-standard loads or installation environment conditions are incorrectly identified by users as UPS faults.

The most common situations are:

- The UPS supplies the load through the reserve line even if the inverter section is operating correctly: This may occur in the case of excessive absorbed peak current. It causes a major voltage drop, which, if it is repeated, leads to the switching of the load to the reserve line. If the system has made three failed attempts to switch over to the inverter and back, the static switch on the reserve line is blocked, in order to protect the inverter. Therefore it is necessary to investigate the load current and eliminate the causes of such current peaks. **The repeated 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 asymmetrical and/or distorted load.

7. Scheduled Maintenance

During its lifetime, the UPS requires **scheduled maintenance cycles** to maintain operating reliability and efficiency.

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

7.1 Note

The EFFEKTA UPS is a technically mature and proven system that provides a high degree of safety. Due to its modern construction, the careful selection of materials, state-of-the-art production technology and conscientious work done by committed staff, EFFEKTA UPS has all the typical characteristics such as efficiency, reliability and long-term quality.

As we are convinced that your UPS is a quality device, we offer you:

a 24 month warranty, free from faults.

Thanks to its modern technology, the UPS needs very little maintenance. Usually, only one inspection needs to be done per year. This is important for any warranty claim!

You will certainly be pleased to know that an efficient service organization is at the ready to take care of your UPS system.

The service plan includes:

- The most important characteristics of your UPS system
- Any work necessary during inspection

The service plan handbook is used to confirm any work completed (important for warranty claims).

In the case of faults in your UPS system, please call the following telephone number:

- **On working days from 8.00 AM to 5.00 PM** +49 (0)741 1745152
+49 (0)741 174510
- **From 5.00 PM to 8.00 AM, on weekends and on holidays**, we are available if previously agreed.