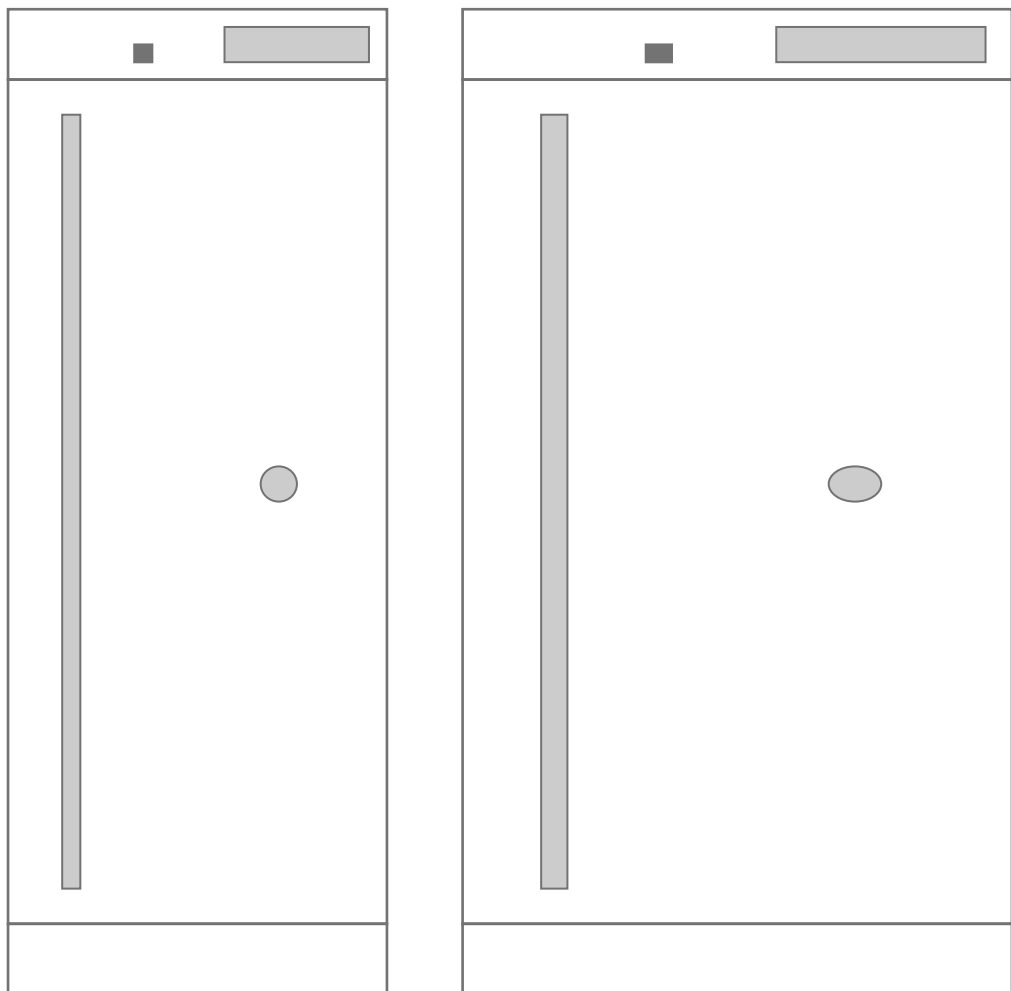


# ***OPERATING MANUAL***

***Uninterruptible Power Supply***

***ECOWAVE***

***10 - 60 kVA (three phase)***





## SAFETY INSTRUCTIONS AND RESPONSIBILITY

BEFORE ATTEMPTING TO INSTALL OR START UP THIS UPS THE USER MUST ENSURE THAT THE SAFETY INSTRUCTIONS IN THIS MANUAL ARE CAREFULLY READ AND OBSERVED BY THE TECHNICAL PERSONNEL. KEEP THIS MANUAL NEXT TO THE UPS FOR FUTURE REFERENCES.

ALL SERVICING MUST BE PERFORMED BY QUALIFIED PERSONNEL. DO NOT ATTEMPT TO SERVICE THE UPS YOURSELF.

BY OPENING OR REMOVING THE UPS-COVERS YOU RUN RISK OF EXPOSURE TO DANGEROUS VOLTAGES !

NEWAVE S.A. WILL ASSUME NO RESPONSIBILITY NOR LIABILITY DUE TO ERRONEOUS MANIPULATION OF THE UPS.

NEWAVE S.A. HAS TAKEN EVERY PRECAUTION TO PRODUCE AN ACCURATE, COMPLETE AND EASY TO UNDERSTAND MANUAL AND WILL THEREFORE ASSUME NO RESPONSIBILITY NOR LIABILITY FOR DIRECT, INDIRECT OR ACCIDENTAL PERSONAL OR MATERIAL DAMAGE DUE TO ANY MISINTERPRETATION OR UNDESIRED MISTAKES IN THIS MANUAL.

THIS MANUAL MAY NOT BE COPIED NOR REPRODUCED PRIOR TO WRITTEN PERMISSION OF NEWAVE S.A.

### **HIGH LEAKAGE CURRENT !**

MAKE SURE THAT THE EARTHING IS PERFORMED CORRECTLY BEFORE YOU CONNECT THE MAINS POWER SUPPLY !

### **WARNING !**

THE ECOWAVE 10 - 60kVA IS CLASS A - UPS-PRODUCT (ACCORDING TO EN 50091-2). IN A DOMESTIC ENVIRONMENT IT MAY CAUSE RADIO INTERFERENCE. IN THAT CASE THE USER MAY BE REQUIRED TO TAKE ADDITIONAL MEASURES

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## 1. **ECOWAVE: A RELIABLE AND ENVIRONMENTALLY FRIENDLY U P S**

Congratulation on your purchase of the UPS ECOWAVE. This UPS has been developed and manufactured at NEWAVE SA according to the most modern criteria's and technological know-how. The UPS ECOWAVE will provide your equipment with a steady and reliable power supply for many years. NEWAVE SA is situated in Switzerland and is specialised in the design and manufacture of Uninterruptible Power Supplies.

The compact and powerful UPS ECOWAVE, belongs to the newest generation of the midrange UPS-Systems. High reliability, low operating losses and excellent electrical performance are only some of the highlights of this innovative UPS-solution.

### 1.1 ***The Quality of the UPS ECOWAVE***

The criteria's and methods which are used at NEWAVE SA correspond to the most stringent quality standards. The Certification Quality System (QS) according to the model of the International Standard ISO 9001 / EN 29001 is in process.

## 2. **INSTALLATIONS INSTRUCTIONS**

### 2.1 ***Introduction***

This Installation Manual contains all the necessary information for the correct installation of the UPS ECOWAVE.

This section covers the information on correct unpacking, positioning, cabling and installation of the UPS.



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ALL THE OPERATIONS IN THIS SECTION MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

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The manufacturer will take no responsibility for any personal or material damage caused by wrong cabling or manipulations which are not described in this Manual.

#### 2.1.1 ***Reception of UPS***

The packing container of the ECOWAVE serves to protect the UPS from mechanical and climatic impacts. To increase its protection the ECOWAVE is wrapped with a plastic sheet. Upon receiving the UPS, carefully examine the packing container and the UPS for any sign of physical damage.

Ensure that the received UPS corresponds to the material indicated in the delivery note.

#### 2.1.2 ***Nameplate***

The technical specifications of the ECOWAVE are provided on the nameplate which is situated at the front of the UPS.

#### 2.1.3 ***Unpacking***

When unpacking the UPS observe the signs "FRAGILE" and "ARROW" on the packing container of the ECOWAVE.

Perform the following steps to unpack the UPS :

- Cut the wrappers and remove the packing container by pulling it upwards
- Remove the plastic cover from the UPS
- Remove the UPS from the pallet
- Make sure you retain the packaging materials for future shipment of the UPS
- Examine the UPS for any sign of damage. Notify your dealer immediately if damage is present.

#### **2.1.4 Battery Cabling**

The standard batteries of the UPS are interconnected and internally mounted in the manufacturers' plant.

#### **2.1.5 Storage**

If you plan to store the UPS prior to use, store it unpacked in a storage environment with a temperature between +5 °C to +40°C and humidity of less than 90%.

If the packing container is removed protect the UPS from dust.

The ECOWAVE is equipped with sealed, maintenance-free battery, whose storage time depends on the ambient temperature. It is therefore important not to store the UPS longer than 6 months at 20 °C, 3 months at 30 °C and 2 months at 35 °C storage temperature without a battery recharge.

*For longer term storage make sure that the battery is energised than every 6 months.*

#### **2.1.6 Physical Set-up of UPS**

The ECOWAVE is a compact and light UPS and can therefore easily be moved to its final position.

We advise you to move the UPS to a position where:

- the humidity and temperature are within prescribed limits;
- the fire protection standards are respected;

We recommend longer connecting cables to enable moving of the UPS (in case it must be opened) without a prior shutdown.

- the cabling can be performed easily;
- there is enough room for to easily operate the UPS and if necessary to perform periodic maintenance.

The battery life depends very much on the ambient temperature. In the temperature range between +20° and +25°C the battery will reach the longest battery life.

## 2.2 **INPUT CABLING**

### 2.2.1 **Connection Diagram**

To achieve a correct operation of the UPS and its additional equipment it is necessary to provide the mains lines with appropriate fuse protection. To connect the ECOWAVE to the mains power supply see DRAWING: FRONT VIEW and TECHNICAL DATA, page 4.



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PERSONNEL.

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### 2.2.2 **Preparation for the Input Cabling**

Before you start connecting the UPS make sure, that:

- the values of the mains voltage (INPUT VOLT.) and frequency (FREQUENCY) correspond to the values indicated on the nameplate of the UPS
- the earthing is performed in accordance with the prescribed IEC Standards or with the local regulations
- the UPS is connected to the mains through a LV-Distribution Board where there separate mains line (protected with a circuit breaker) for the UPS

Provide input fuses and cables according to TECHNICAL DATA SHEET (page 4) at the end of this OPERATING MANUAL or in accordance with the prescribed IEC Standards or with the local regulations.

### 2.2.3 **Earthing**



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PERSONNEL.

=====

To ensure protection of the personnel during the installation of the UPS make sure that the connections are performed under the following conditions:

- no mains voltage is present
- the loads are shut down
- UPS ECOWAVE is shut down and voltage-free

To perform the complete shutdown of the ECOWAVE proceed as follows:

- a) Turn the "MAINTENANCE BYPASS" IA1 to the position "DOWN" (front of the UPS).
- b) Open fuses F1 (rectifier), F2 (by-pass line), F3 (output load) and F4 (battery) (front of the UPS). See connections schematic at the end of this Manual.

**Connect the earthing wire coming from the LV-Distribution Board to the terminal "PE"**

Under the connection terminal of the UPS there is a cable fastening rail to ensure that the cables have been fastened properly.

### 2.2.4 Connection of the Mains Supply




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To ensure protection of the personnel during the installation of the UPS make sure that the connections are performed under the following conditions:

- no mains voltage is present
- the loads are shut down
- UPS ECOWAVE is shut down and voltage-free

To perform the complete shutdown of the ECOWAVE proceed as follows:

- a) Turn the "MAINTENANCE BYPASS" IA1 to the position "0" (front of the UPS).
- b) Open fuses F1 (rectifier), F2 (by-pass line), F3 (output load) and F4 (battery) (front of the UPS). See connections schematic at the end of this Manual.
- c) Press the Main Switch (on front Control Panel) to the position "OFF" (  )
- d) Perform connection sequence of mains supply to UPS as follows:

#### 2.2.4.1 Three phase input

(see drawing « ECOWAVE « Three phase input / Three phase output)

Connect the input power cable coming from the LV-Distribution Board to the following terminals of the UPS:

- 1L1 = Phase L1, 1L2 = Phase L2
- 1L3 = Phase L3, 1N = Neutral

Provide input power cables according to TECHNICAL DATA SHEET (page 4) at the end of this OPERATING MANUAL or in accordance with the prescribed IEC Standards or with the local regulations. Under the connection terminal of the UPS there is a gland plate to ensure that the cables have been secured properly.

**NOTE:** THIS UPS COMES (STANDARD VERSION) WITH A SINGLE CABLE FEED (FOR RECTIFIER AND BYPASS). IF DUAL FEED IS REQUESTED PLEASE CONTACT YOUR SERVICE OFFICE BEFORE PERFORMING ANY CABLING OF UPS.

### 2.2.5 Preparation for the Output Cabling

Before you start performing the connection sequence of the loads ensure that the indicated UPS rated power (OUTPUT POWER) on the nameplate (on the rear side of the UPS) is equal or larger than the total load requirements. It is necessary to provide the output of the UPS with **circuit breakers** or other kind of protection. The circuit breakers will be connected between the loads and the UPS and will therefore protect the UPS additionally from overloads and short circuits. The circuit breakers must comply with the prescribed IEC Standards. It is recommended to provide a separate output distribution board for the load.

Ensure that the earthing is performed in accordance with the prescribed IEC Standards or with the local regulations.

Connect the outputs of the circuit breakers in parallel with the load-sockets; it is recommended to protect each of these outputs with an additional circuit breaker. These circuit breakers will enable the protection of each load separately. The size of the circuit breakers depends on the load rating of the load-sockets.

The following values should be indicated on the output distribution board:

- maximum total load rating
- maximum load rating of the load-sockets

**NOTE:**

In case a common distribution board is used (sockets for Mains and UPS voltage), ensure that on each socket there is an indication of the applied voltage ("Mains" or "UPS").

**2.2.6 Connection of the Load**



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=====

To ensure protection of the personnel during the installation of the UPS make sure that the connections are performed under the following conditions:

- no mains voltage is present
- the loads are shut down
- UPS ECOWAVE is shut down and voltage-free

To perform the complete shutdown of the ECOWAVE proceed as follows:

- a) Turn the "MAINTENANCE BYPASS" IA1 to the position "0" (front of the UPS).
- b) Open fuses F1 (rectifier), F2 (by-pass line), F3 (output load) and F4 (battery) (front of the UPS). See connections schematic at the end of this Manual.
- c) Press the Main Switch (on front Control Panel) to the position "OFF" (  )

Connect the loads to the UPS-terminals "PE" (Earth), "2L1", "2L2", "2L3" (Phases) and "2N" (Neutral) with the circuit breaker in the Output Distribution Board. Perform the connections according to DRAWING "FRONT VIEW" ECOWAVE.

Provide output power cable according to TECHNICAL DATA SHEET (page 4) at the end of this OPERATING MANUAL or in accordance with the prescribed IEC Standards or with the local regulations.

**3. CONTROL PANEL**



The user-friendly control panel of the ECOWAVE is composed of a LCD-Display, LED-indicators and pushbuttons. On the left of the control panel there is a main ON/OFF-Switch. This switch has the function of a "Load -Off" switch. By means of the LED-indicators, which are situated on the front panel, the operating status and the main functions of the UPS may be controlled. The LCD-display serves to operate, to monitor the UPS and to indicate messages and alarms.

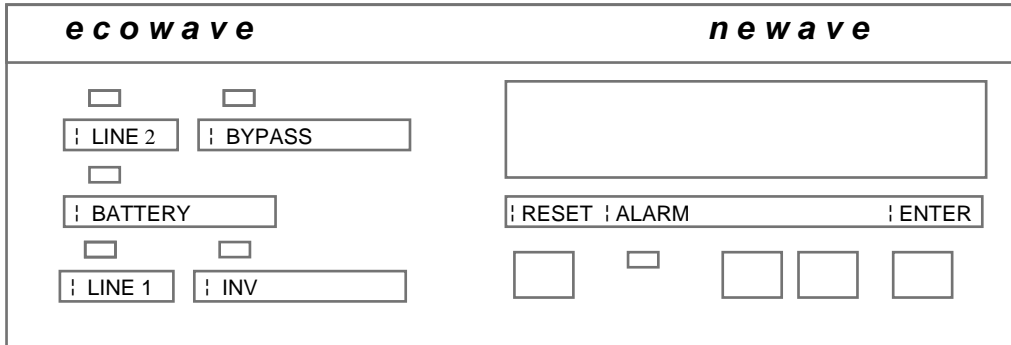


Fig. 1. Control Panel ECOWAVE

**3.1 Main Switch "ON/OFF"** (  )

With the main switch ON / OFF the UPS can be switched on or shut down. It is also used as a security LOAD-OFF-switch, making it possible to quickly disconnect the load from the UPS in emergency cases when competent personnel working on the UPS is in danger, or when the UPS has some kind of anomaly. The main switch is provided with a plastic cover to prevent accidental shutdown or start-up of the UPS.

**3.2 LED Indicators**

LED "LINE 1"	Mains present Mains not available	LED green LED red
LED "LINE 2"	Mains bypass not OK or not present Mains bypass OK	LED red LED green
LED ALARM	No alarm condition Alarm condition Alarm condition but reseted	not lit LED red flashing+buzzer LED red
LED "INV"	Load on inverter Inverter fault Inverter not operating	LED green LED red LED not lit
LED "BY-PASS"	Load on bypass Bypass not operating	LED green LED not lit
LED "BATTERY"	Battery OK Battery fault or discharged Battery fuses blown	LED green LED red LED red flashing

### 3.3 LCD Display and Keyboard

The LC-display serves to operate, to monitor and to indicate messages and alarms on the UPS. The keyboard serves to operate the ECOWAVE together with LC-display.

#### 3.3.1 Keys

- RESET This key serves to cancel the audible alarm.
- UP (arrow) This key serves to move upwards in the menu of the UPS
- DOWN (arrow) This key serves to move downwards in the menu of the UPS
- ENTER This key serves to confirm a chosen operation in the menu of the UPS.

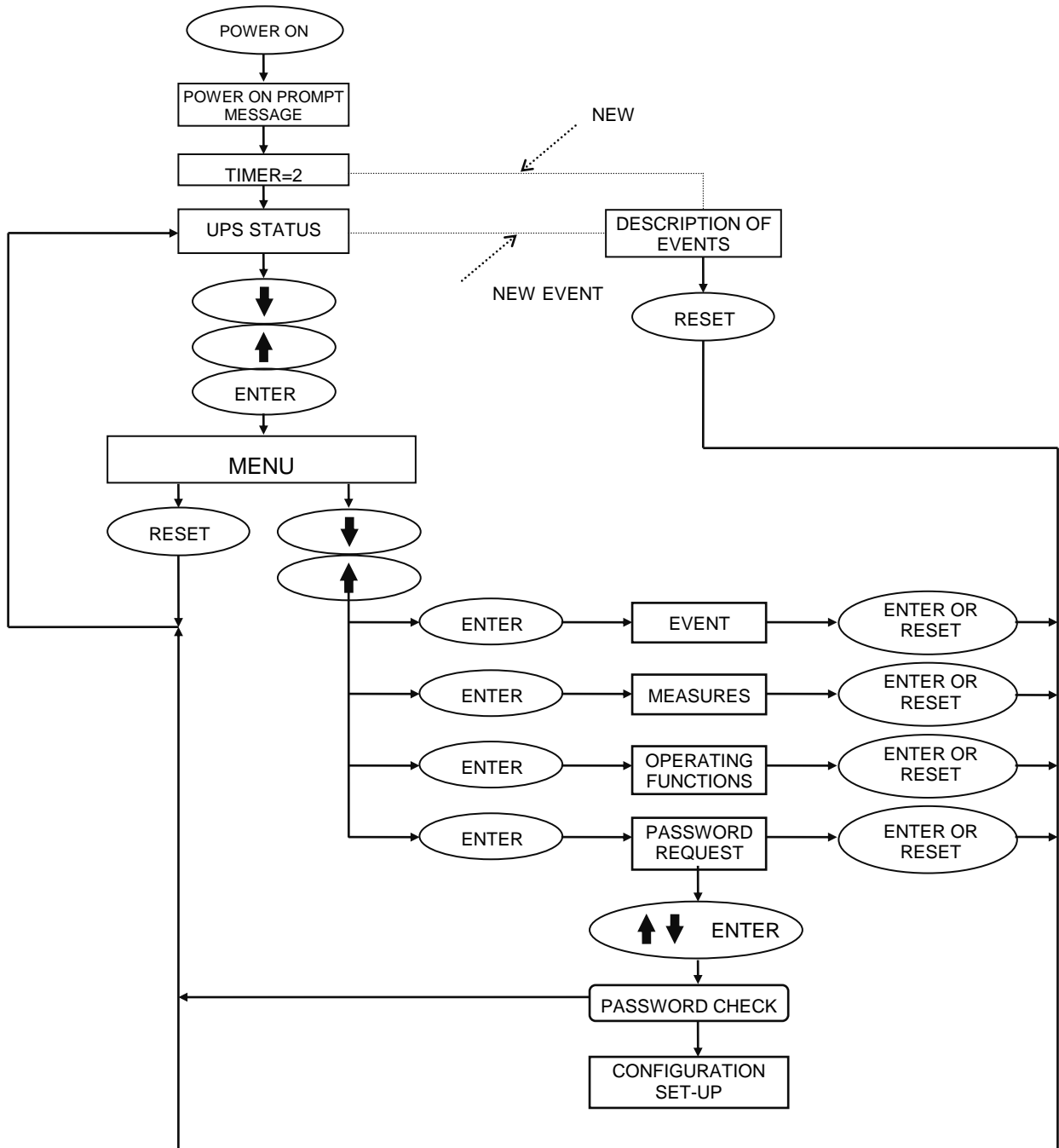


Fig. 2. Function diagram for control panel

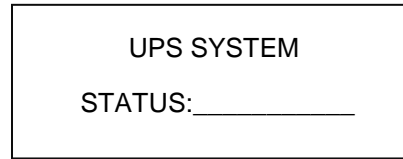
### 3.3.2 Status of UPS

Description:

After the *Power-on of UPS*

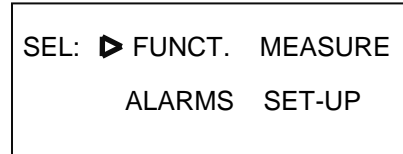
Example: If load is on inverter the status is INV ON  
If load is on mains the status is ECON.MODE

Display readings:



Press button ENTER to select the requested information.

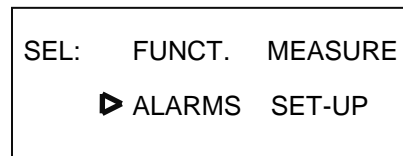
By means of the buttons UP and DOWN you may select the desired MENU (FUNC., MEASURE, ALARMS or SET-UP). When the cursor is in the right position press ENTER to confirm.



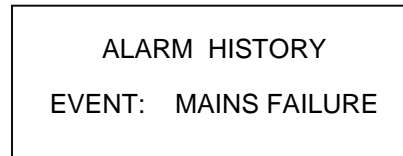
### 3.3.3 Alarms and Messages (Event Memory)

By means of the LCD Display and the keys it is possible to read the event memory in the chronological order of their appearance. A history of up to 999 events may be displayed.

Select SUBMENU ALARMS and press ENTER.



By means of the UP and DOWN buttons you may read all the events that are related to the operation of the UPS.  
Example of events UPS FAULT, MAINS FAILURE, OVERLOAD, SHORT CIRCUIT, BATTERY FAULT etc.



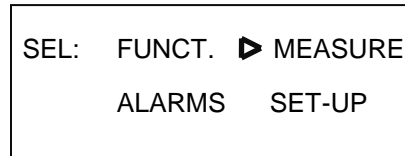
Description of major alarm conditions:

UPS FAULT	There is a fault in the UPS and it can therefore not guarantee normal operation.
MAINS FAILURE	Mains power supply (U / f) is not within prescribed tolerance
OVERCURRENT/SHORT	There is a short circuit at the output of UPS (on load side)
OVERLOAD	The load on ups exceeds the UPS rated power
OVERTEMPERATURE	The UPS temperature has exceeded the allowed value.
BATTERY CHARGER OFF	The attached battery and the battery charger set-up do not correspond or battery charger fault.
INVERTER FAULT	Inverter is faulty.
NON-SYNCH	The inverter and mains are not synchronised.
BATTERY LOW	Battery is near end of autonomy
MANUAL SWITCH OFF	Maintenance Bypass closed. Load supplied by mains.

**3.3.4 Measurements**

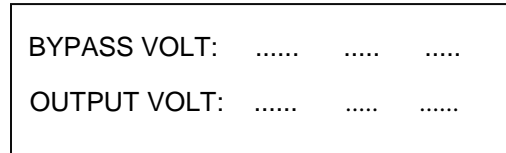
By means of the LCD Display and the keys it is possible to read the following measurements:

Select SUBMENU MEASURE and press ENTER.

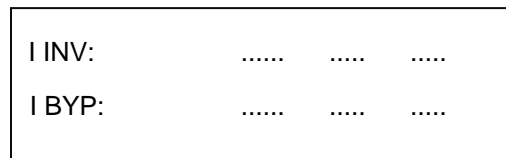


By means of buttons UP and DOWN it is possible display the different measurement values:

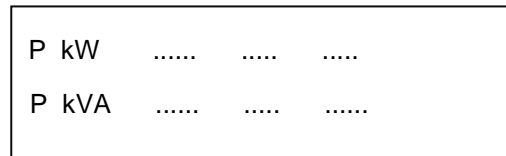
Input bypass voltage (3phase) and UPS output voltage (3phase).



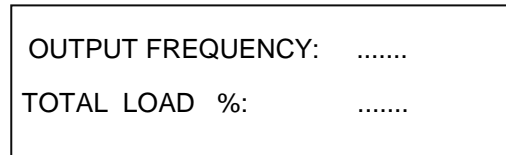
Inverter current and bypass current.



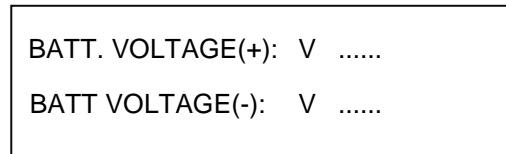
Power in kW and kVA.



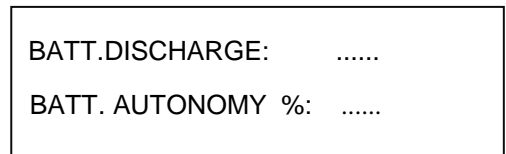
Output frequency and load %..



Battery voltage of positive and negative string.



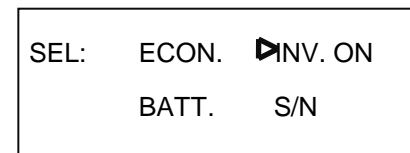
Battery discharge current and battery autonom



**3.3.5 Operative Functions**

The SUBMENU FUNC. (stands for FUNCTION) allows you to perform the major commands on UPS. Four commands are possible in the SUBMENU FUNC

Select INV. ON and press ENTER; the load will be transferred to inverter operation. Select ECON. and press ENTER to transfer load to mains supply. If mains fails the load will automatically be transferred to inverter within 4ms.



Select BATT. for battery testing. In this case the load will be transferred to mains (if available) and battery will be tested during 2-3 minutes. If battery is OK the UPS will automat. return to its normal operation. If the battery is faulty the corresponding alarm BATT. ALARM will appear.

**4. DESCRIPTION OF OPERATING MODES**

**4.1 *Operating Mode "ON LINE" (INVERTER MODE)***

By means of the control panel (see § 3.2), which is connected to the UPS ECOWAVE the UPS can be switched to the ON-LINE-Mode. The ON-LINE-Mode guarantees the highest degree of protection, especially in the event of a mains failure; the transfer time is zero. This operating mode is always recommended if the critical loads (computer systems) will not tolerate any interruption of the supply (not even the shortest).

**4.2 *Operating Mode "OFF-LINE" ("ECON-MODE")***

By means of the control panel (see § 3.2), which is connected to the ECOWAVE the UPS can be switched over to the OFF-LINE-Mode. During the OFF-LINE-Mode the load is supplied directly from the mains. In the event of a mains failure the load will automatically be transferred to the inverter. The OFF-LINE-Mode is recommended only if the loads can tolerate interruptions of 3-5 ms (transfer time from OFF-LINE-Mode to ON-LINE-Mode). The battery charger remains on during the OFF-LINE-Mode. From the point of view of energy saving the OFF-LINE-Mode is the ideal operating mode for battery recharge (e.g. during the night or weekends).

**4.3 *Operating Mode "MAINTENANCE BYPASS".***

The Bypass-Mode through the maintenance bypass is used only in emergency situations. In this case the load is supplied directly from the mains power supply and it is possible to orderly shut down the UPS. The load **MUST ALWAYS BE TRANSFERRED** to the Bypass-Mode through the maintenance bypass, when it is necessary to shutdown the UPS (e.g. repair, battery replacement etc.).

**BEFORE YOU CLOSE THE MAINTENANCE BYPASS, MAKE SURE THE UPS IS IN ECON MODE.**

The Bypass-Mode is performed by means of the BYPASS-SWITCH on the front of the UPS

Position 1: Operating mode through Bypass-Switch  
(power supply directly from mains)

Position 0: Normal operating condition (The Maintenance Bypass Switch is open)

=====  
IF THE UPS IS OPERATING IN THE BYPASS MODE THROUGH THE BYPASS SWITCH  
THE LOAD WILL NOT BE PROTECTED IN HE EVENT OF A MAINS FAILURE. IT IS  
THEREFORE STRONGLY RECOMMENDED TO SWITCH OVER TO THE ON-LINE-  
MODE (INV. ON) OR OFF-LINE-MODE (ECON. MODE)AS SOON AS POSSIBLE.  
=====

## 5. START-UP OF THE UPS ECOWAVE



ALL THE OPERATIONS IN THIS SECTION MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

- 1) - Make sure all connections (input and output cabling) have been performed correctly (see Chapter 2)
- 2) - Make sure all the loads are disconnected  
 - Close the input Line Fuses( F1 Rectifier-Line and F2 Bypass-Line) upwards  
 - Make sure the battery fuses of the UPS are inserted correctly  
 - Close the battery fuseholder ( F4) upwards.  
 - Close the fuse ( F3) upwards.
- 3) - Turn the MAINTENANCE BYPASS (IA1) on the front of UPS to the position "0".
- 4) Press the Main Switch ON/OFF on the control panel. After a short time the ECOWAVE will be switched on and the corresponding LED-Indicators on the control panel will turn on.
- 5) It is recommended to transfer the UPS to the ON-LINE-Mode (highest degree of load protection):
- 6) Check the LED-Indicators SITUATION:
 

LED LINE 2	lit, colour green
LED BATTERY	lit, colour green
LED LINE 1	lit, colour green

LED INV and LED BYPASS :

If the green LED-Indicator LED INV is green and LED BYPASS is not lit , the UPS is in the ON-LINE-Mode.

If the green LED-Indicator LED BYPASS is green and LED INV is not lit , the UPS is in the OFF-LINE-Mode.
- 7) The UPS is now set-up and the load may be connected to the output of the UPS.

## 6. **SHUTDOWN OF THE UPS ECOWAVE**



ALL THE OPERATIONS IN THIS SECTION MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

The UPS ECOWAVE may be shutdown completely in case the load does not need any power supply for a longer time, or it may be switched to Maintenance Bypass Mode for service or maintenance purposes, or it may be transferred to the OFF-LINE-Mode in case the load doesn't need the highest reliability degree, or the load may be disconnected by means of the ON/OFF (LOAD-OFF) switch for security reasons.

### 6.1 **Complete Shut Down of the UPS**

The UPS ECOWAVE may be shut down completely if the loads do not need a reliable power supply for a longer time period.

- 1) Verify that the loads are shutdown.
- 2) If the loads are all disconnected, press the ON/OFF button on the front panel.
- 3) Open the fuses F1, F2, F3 and F4. Turn Maintenance Bypass "IA1" to position "0".

The UPS is now voltage free.

### 6.2 **Transfer to Maintenance Bypass Mode**

If it is necessary to perform service or maintenance on the UPS it is possible to transfer the UPS in to MAINTENANCE MODE.

Before you switch the MAINTENANCE BYPASS to position « 1 », make sure that the load has been transferred to mains supply ECON- MODE



ALL THE OPERATIONS IN THIS SECTION MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

- 1) Transfer the UPS to ECO-MODE by means of the menu on control panel.
- 2) Turn the MAINTENANCE BYPASS (IA1) on the front of UPS to the position « 1 ».

### 6.3 **Activation of the ON/OFF Main Switch on Control Panel**

If for security reasons it is necessary to disconnect the load from the UPS immediately, press the red ON/OFF Main Switch (LOAD OFF). This switch has a plastic cover to avoid any accidental manipulation.

- 1) Press the ON/OFF button on the front panel.
- 2) Verify that both indicators LED BYPASS and LED INVERTER are off. The load is not supplied anymore.

## 7. **WHAT SHOULD BE DONE IN THE EVENT OF AN ALARM**

In the event of an alarm condition the red LED-Indicator "Alarm" and the audible alarm will turn on.

In this case proceed as follows:

- 1) Silence the audible alarm by pressing the button "Reset".
- 2) Identify the cause of the alarm condition by means of the events register in the menu.
- 3) In case of doubts please contact the nearest Service Office.

## 8. **MAINTENANCE OF THE ECOWAVE**



=====

ALL THE OPERATIONS IN THIS SECTION MUST BE PERFORMED  
BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL  
PERSONNEL.

=====

To ensure an optimum operation of the ECOWAVE and a continuous and efficient protection of the connected load it is recommended to check the batteries every 6 months. The ECOWAVE does not need any special maintenance:

**WITH THE UPS SWITCHED OFF** it is recommended to clean the dust away with a vacuum-cleaner from the rear of the UPS, once every 6 months or more often if the environment is particularly dusty.

**WITH THE UPS SWITCHED OFF** it is recommended to clean the dust away with a broom from the air vents (fan) at the rear of the UPS, once every 6 months or more often if the environment is particularly dusty.



**DANGER FROM ELECTRIC SHOCK:** Never clean the UPS with a wet sponge !

### 8.1 **How to Perform a Battery Test**

The battery test takes approximately 4 minutes and should be performed only if:

- there is no alarm conditions
- the battery is fully charged

The battery charge can be carried out independently of the operating mode (OFF-LINE or ON-LINE) and if the load is connected or not.

The battery test procedure can be performed by means of the corresponding command in the menu of control panel.



**9. INTERFACES OF ECOWAVE**

The ECOWAVE is provided with two ports:

- SMART PORT (Serial RS 232)
- DRY PORT (volt-free contacts)

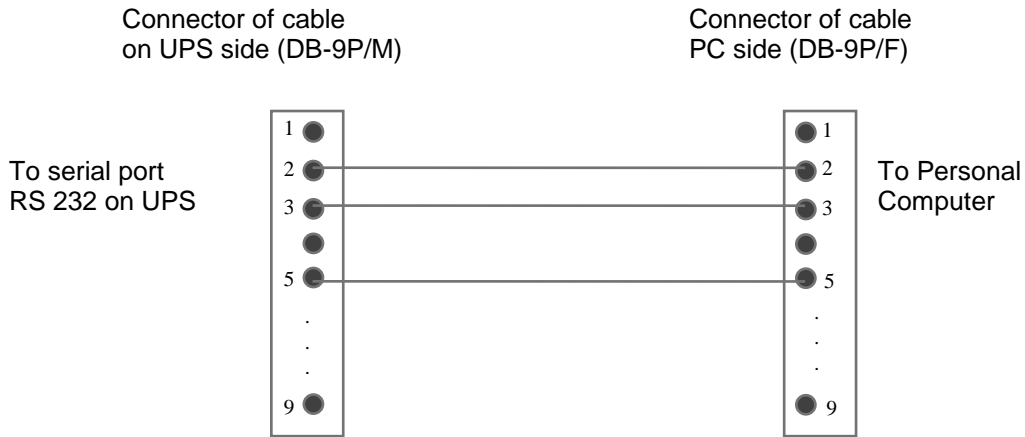
**9.1 SMART PORT (Serial RS 232)**

The ECOWAVE is provided with a SMART PORT (RS 232 serial port). Through this intelligent port (DB - 9P/F) it is possible to connect a computer. The corresponding external software makes it possible to monitor the mains voltage and the UPS-status continually. In the event of any changes the computer terminal will display the details.

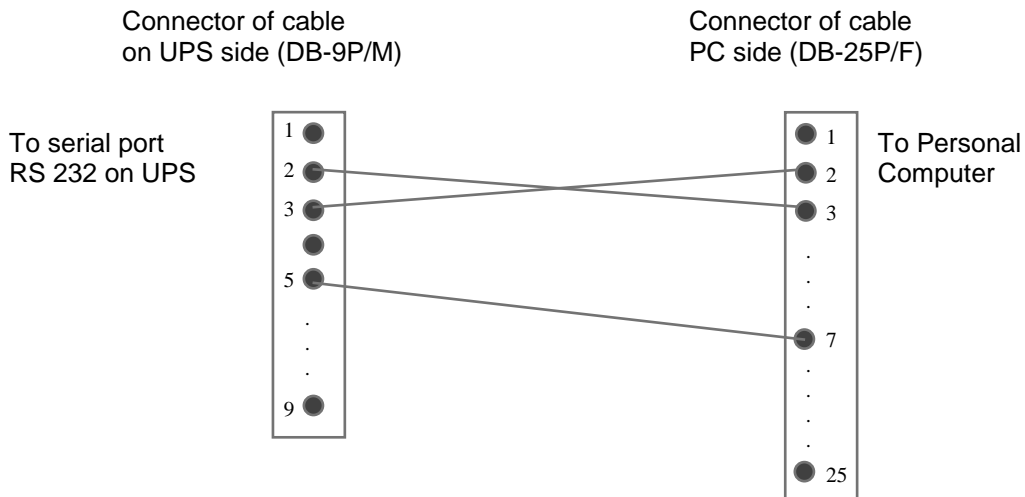
(For details see our Monitoring Package: **WAVEMON** \*.

The Fig. 3 shows how to connect a PC to the UPS ECOWAVE.

- a) in case the PC has a 9 pin serial port
- b) in case the PC has a 25 pin serial port



a) PC serial port RS232 with 9 Pin.



b) PC serial port RS232 with 25 Pin.

Fig. 3: Connection cable between UPS and PC.

## 9.2 Description DRY PORT (volt-free contacts)

The DRY PORT ( DB-25P/F) serves to:

- transmit the most important signals of the UPS for Remote Signalling;
- transmit signals for the automatic and orderly shut-down of servers or AS400;

In Table 3 the contacts of the DRY PORT (DB-25P/F) are described.

### 9.2.1 Connection of external EMERGENCY-OFF-SWITCH

1. Preparation of the connection cable:
  - Use a screened cable with 1 pair (section of wires 0.6 mm<sup>2</sup>) and maximum length of 100 m, according to Fig.4.
2. Connection of the external EMERGENCY-OFF-SWITCH
  - Connect one of the wires on EMERGENCY OFF (X1) on the front of UPS;
  - Connect the EMERGENCY-OFF-SWITCH to the bipolar terminal block (see Fig. 4).

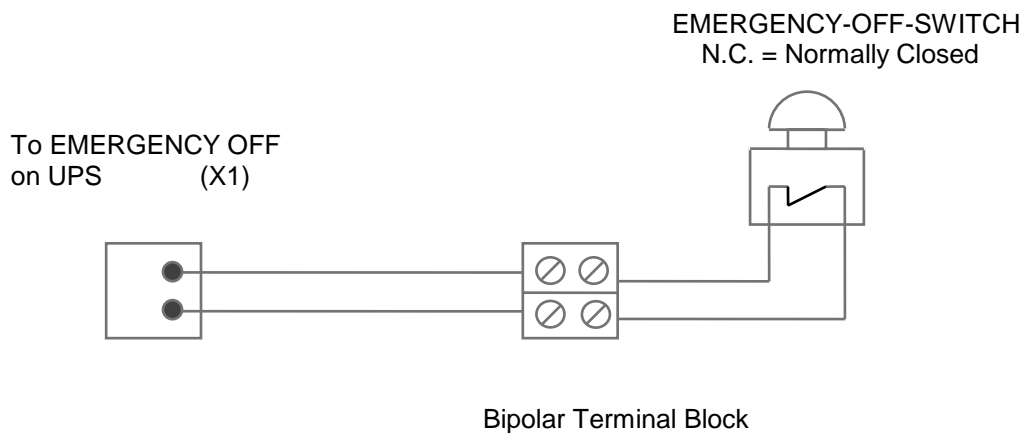
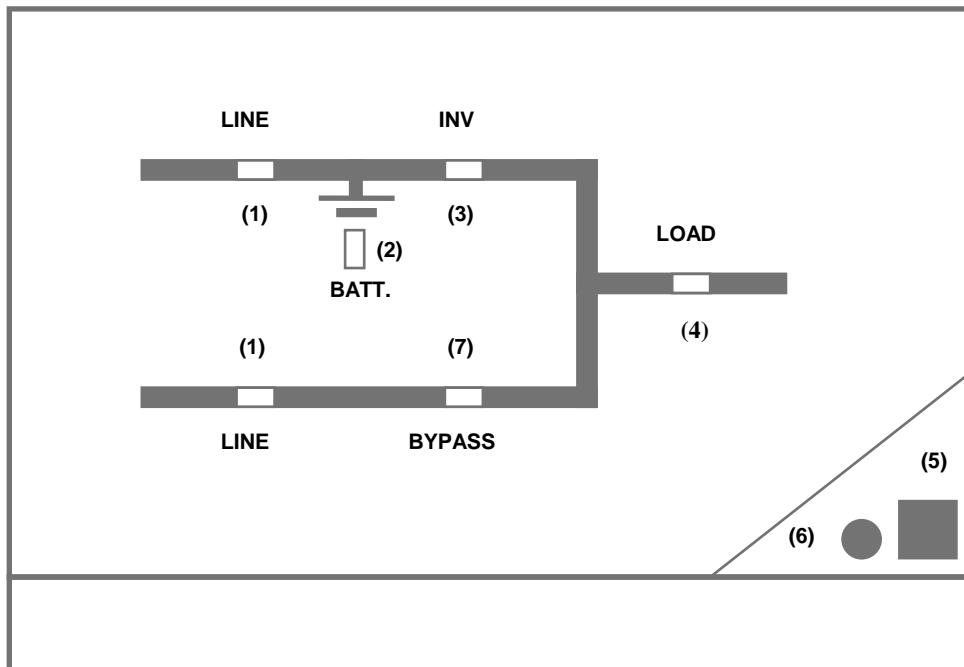


Fig 4. Drawing of the preparation for the connection cable for the EMERGENCY-OFF-SWITCH

### 9.2.2 Remote Signalling Panel (RSP)

If it is desired to have a remote signalling of the ECOWAVE UPS-status the optional Remote Signalling Panel (RSP) may be used up to a distance of 100m.



- |    |               |             |                                     |   |
|----|---------------|-------------|-------------------------------------|---|
| 1) | LED-indicator | "LINE"      | green on                            | = mains OK  |
|    |               |             | red on                              | = mains failure   |
| 2) | LED-indicator | "BATTERY"   | green on                            | = battery OK  |
|    |               |             | yellow on                           | = battery near the end of capacity  |
|    |               |             | not lit                             | = no UPS supply or UPS on bypass  |
| 3) | LED-indicator | "INVERTER"  | green on                            | = load supplied by inverter   |
|    |               |             | not lit                             | = inverter supply not available   |
| 4) | LED-indicator | "LOAD"      | green on                            | = load is supplied  |
|    |               |             | red flashing                        | = load is not supplied  |
| 5) | Push button   | ALARM RESET | serves to silence the audible alarm |   |
| 6) | LED-indicator | "ALARM"     | red on                              | = alarm condition; check other LEDs for indication of mains and/or UPS-status |
|    |               |             | not lit                             | = UPS is in normal operating condition  |
| 7) | LED-indicator | "BYPASS"    | red on                              | = the load is being supplied from mains                                       |
|    |               |             | not lit                             | = load is supplied by inverter  |

Fig. 5: Remote Signalling Panel (RSP)

**How to connect the Remote Signalling Panel:**

- Provide a 3 pair cable (up to max 100 meters) with a wire section of 0.6mm<sup>2</sup>
- Connect on one end of the cable the connector DB-25P/M and on the other end a DIN 8P/M connector
- Connect one end of the cable with connector DB-25P/M on UPS DRY PORT and the other cable end with DIN 8P/M connector in Remote Signalling Panel (see Fig. 6.)

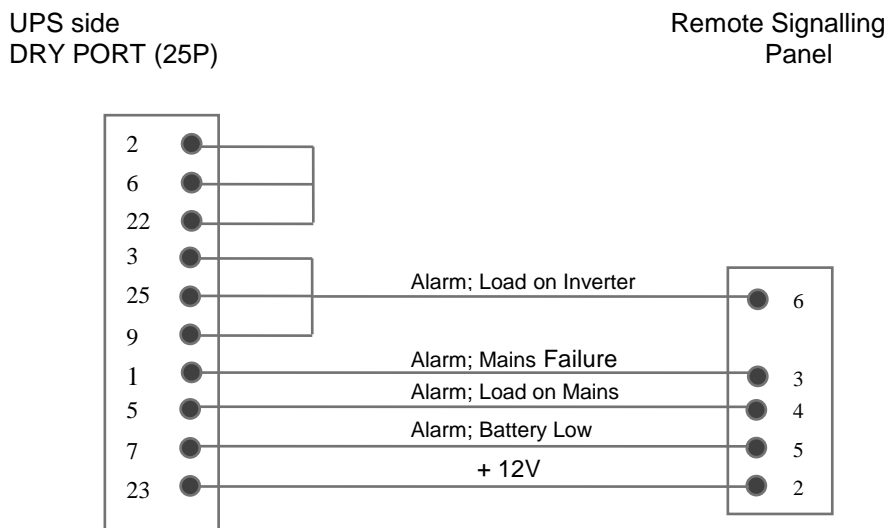


Fig. 6: Connection of Remote Signalling Panel (RSP) to UPS

**9.2.3 Definition of PINs on DRY PORT (25 PIN):**

No. PIN	Signal	Function
1	AUX_MNS	Alarm; Mains Failure
2	AUX_MNS	open
3	AUX_MNS	common
4	AUX_LD_INV	Alarm; Load on Inverter
5	AUX_LD_INV	open
6	AUX_LD_INV	common
7	AUX_BATT_LOW	Alarm; Battery near the
8	AUX_BATT_LOW	open
9	AUX_BATT_LOW	common
10	AUX_LD_MNS	Alarm, Load on Mains
11	AUX_LD_MNS	open
12	AUX_LD_MNS	common
13	AUX_COMMON_ALARM	Alarm
14	AUX_COMMON_ALARM	open
15	AUX_COMMON_ALARM	common
16	NC	not connected
17	NC	not connected
18	NC	not connected
19	NC	not connected
20		
21	GND	GND
22	PS_12V	GND ( I <sub>max</sub> =100mA)
23	PS_12V	+12V ( I <sub>max</sub> =100mA)
24	TOTAL_OFF	EMERGENCY POWER OFF(*)
25	TOTAL_OFF	EMERGENCY POWER OFF(*)

**Table :** Description DRY PORT (X1)

(\*) N.C. CONTACT

**10. CONNECTION OF ADDITIONAL BATTERY CABINET**

**10.1. Safety Instructions**



ALL THE OPERATIONS IN THIS SECTION MUST BE PERFORMED BY AUTHORISED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

To ensure protection of the personnel during the installation of the ups make sure that the connections are performed under the following conditions:

- no mains voltage is present in the UPS
- all the loads are disconnected
- the UPS ECOWAVE and the external battery are voltage-free

To verify the complete shut down of the ECOWAVE perform following steps:

- a) make sure that the "SERVICE BYPASS" (IA1) is in position "0"
- b) make sure that the fuses F1(Mains rectifier), F2 (Mains-Bypass), F3 (Output-Load), F4 (Battery) are open; (see drawing at the end of this Manual)
- c) make sure that the battery fuses in the external battery cabinet are open

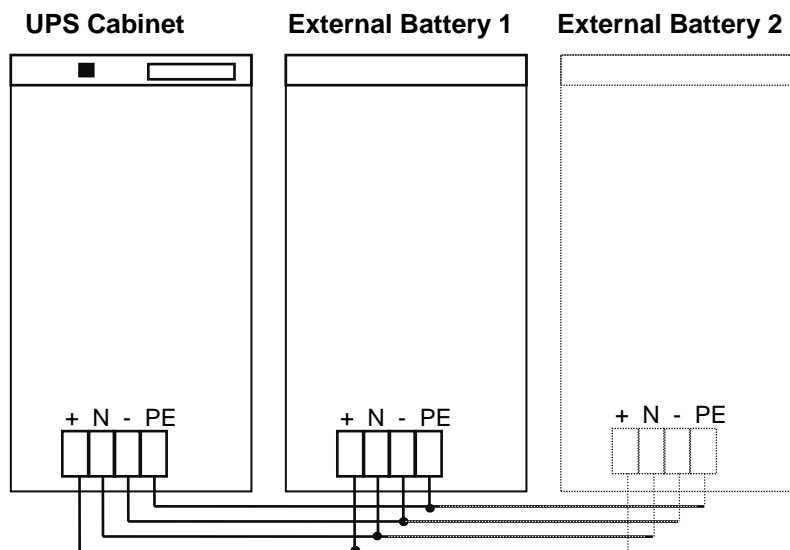
**10.2. Connection of the external battery cabinet**

Remove both terminal cover plates on UPS and external battery cabinet and perform following steps:

- connect terminal "PE" (Earth) of the UPS terminal block with the terminal "PE" (Earth) of the external battery cabinet.
- connect terminal "N" (Neutral) of the UPS terminal block with the terminal "N" (Neutral) of the external battery cabinet.
- connect terminal "+" (positive Battery pole) of the UPS terminal block with the terminal "+" (positive Battery pole) of the external battery cabinet.
- connect terminal "-" (negative Battery pole) of the UPS terminal block with the terminal "-" (negative Battery pole) of the external battery cabinet.

Under the connection terminal blocks there is gland plate to ensure that the cables are fastened properly.

After having performed the connections, screw the terminal cover plates back on the UPS and external battery cabinet.



# 11. TECHNICAL DATA SHEET

# e c o w a v e

10, 15, 20, 30, 40 and 60 kVA

three phase input / three phase output

## GENERAL DATA

Rated output power	(kVA)	<b>10</b>	<b>15</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>60</b>
Power factor		0.8					
Topology		continuous operation with static and service bypasses					
Technology		high frequency, microprocessor controlled					
Overall efficiency (from 50% to 100% load) (%)		up to 97%					
Heat dissipation at inverter nominal load	(W)	250	400	500	700	900	1500
Audible noise with 100% load	(dBA)	50	50	50	55	55	55
Autonomy time (100/50% of load)	(min.)	10/25	10/25	10/25	10/25	10/25	6/14
Ambient temperature	- for UPS (°C)	0 - 40					
	- for battery (°C)	20 - 25 (ideal)					
Storage temperature	(°C)	-15 to + 50					
Input cooling air temperature	(°C)	max. +35					
Battery storage time at ambient temperature		max. 6 months					
Cooling		fan-assisted					
Relative humidity	(%)	max. 95					
Protection degree		IP 20					
Transport palett		provided with UPS					
Color		RAL 9002					
Mains input connection		hardwired					
Output power connection		hardwired					
Cabling of UPS		from front at bottom					
Dry Port (volt-free contacts)		remote signalling / automatic shutdown of computers					
Smart Port (RS 232)		remote control/integration in network management syst.					
Standards	- Safety - EMC	EN 50091-1 EN 50091-2					
Dimensions (WxHxD)	(mm)	490 x 1300 x 800			800 x 1300 x 800		
Weight	- UPS with battery (kg)	200	250	290	490	570	590
	- UPS without battery (kg)	100	100	100	130	150	170

## RECTIFIER

Input voltage	(V)	380, 400, 415 (400 -25%+15%)
Input frequency	(Hz)	45 - 65
Input power factor		0.99
THD of input current	(%)	< 10
Inrush current		limited by soft-start circuit
Max. battery charge current at rated load	(A)	10A (batt. up to 100 Ah; 60kVA up to 90 min. autonomy)

## BATTERY

Battery type	sealed lead-acid maintenance free					
Battery cells (12V)	40 x 7Ah	(2x30)x7Ah	(2x40)x7Ah	36x24Ah	48x24Ah	48x24Ah
Battery test	yes					
Battery charging characteristic	IU (DIN 41773)					
Battery saver charger	No ripples					

## INVERTER

Nominal output power	(kVA)	10	15	20	30	40	60
Nominal output voltage	(V)	380, 400, 415					
Output voltage tolerance							
- static	(%)	< +/- 1					
- at load step ( 0-100%, 100-0%)	(%)	< +/- 4					
- distortion with non-linear load	(%)	< +/- 3 (according to EN 50091-1)					
Output waveform		sinewave					
Output frequency	(Hz)	50 / 60					
Output frequency tolerance							
- free-running, quartz oscillator	(%)	+/- 0.1					
- with mains synchronized (adjustable)	(%)	+/- 4					
Overload capability		125% continuous, 150% 10 min. (60kVA: 125% 10min., 150% 1min.)					
Crest-factor		1 : 3					

## CONTROL PANEL

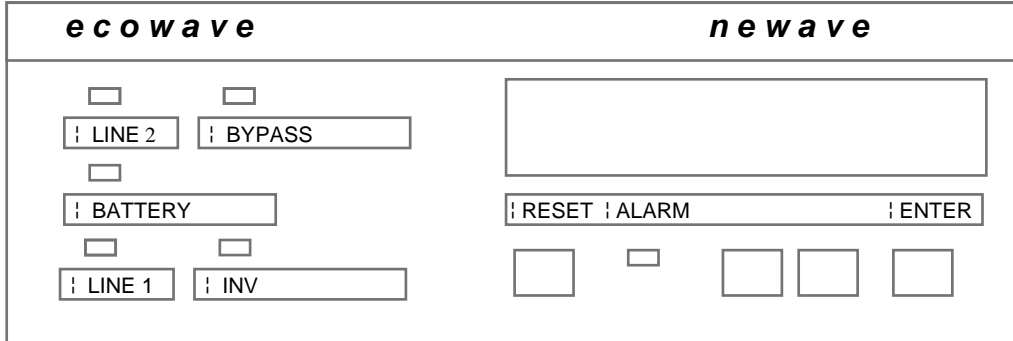


Mimic diagram	represents actual operational status of UPS by integrated LED-indicators	
LED "LINE 1"	Mains present / Mains not available	LED green / LED red
LED "LINE 2"	Mains bypass not OK / Mains bypass OK	LED red / LED green
LED "INV"	Load on inverter / Inverter fault	LED green / LED red
LED "BY-PASS"	Load on bypass / Bypass not operating	LED green / LED not lit
LED "BATTERY"	Battery OK / Battery fault or discharged	LED green / LED red
LED ALARM	No alarm condition / Alarm condition	LED red not lit / flashing+buzzer

ON / OFF switch                    red button with protective cover

Keyboard                    By means of the buttons RESET, UP, DOWN and ENTER and alphanumeric multifunctional LCD display, 2 lines with 20 characters per line, it is possible to perform commands, monitor measured values and for visualize the event memory (messages and alarms).

<u>Commands</u>	<u>Measured values</u>	<u>Alarms and messages</u>
On-line mode	Input mains voltage	UPS fault
Off-line mode	Input bypass Voltage	Mains failure
Battery test	Output voltage	Synchronization lost
Set up (service)	Output frequency	Battery autonomy
	Battery voltage	Overload
	Active power (kW)	Overcurrent / short
	Apparent power (kV)	Current sensor fault
	Discharge current	High temperature
	Battery autonomy	Battery charger OFF
	Load current	Battery fully discharged
		Inverter fault
		Manual Turnoff
		Battery switch open
		Service bypass

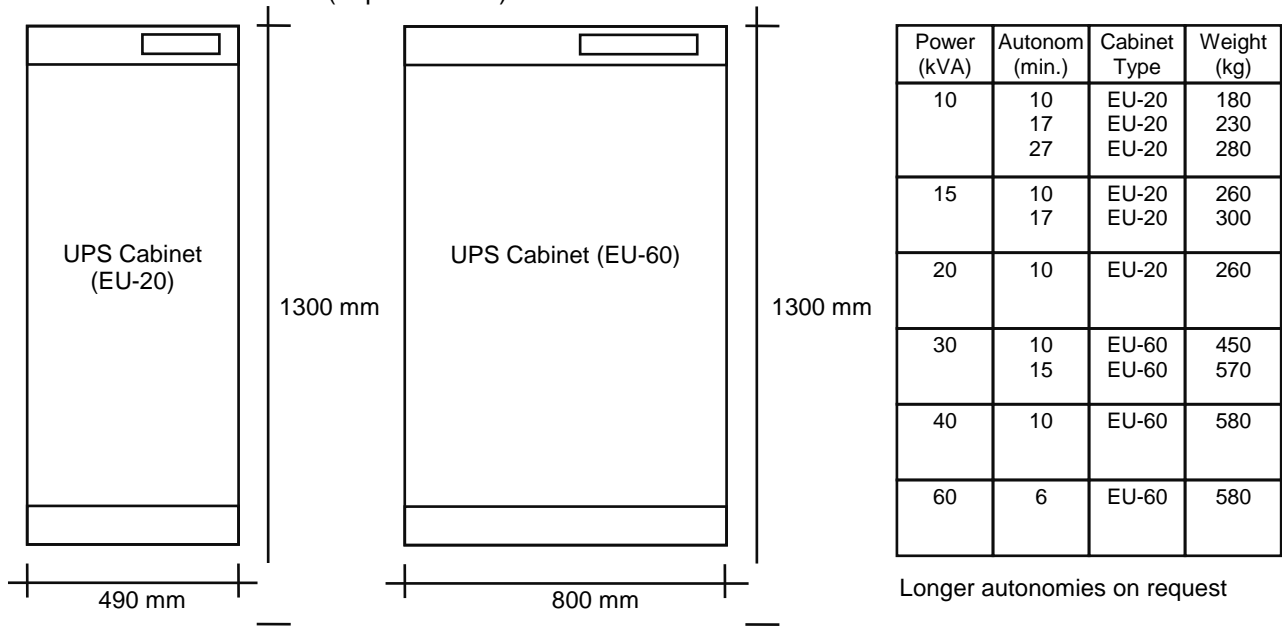


Control Panel Ecowave 10 - 60 kVA

**OPTIONALS**

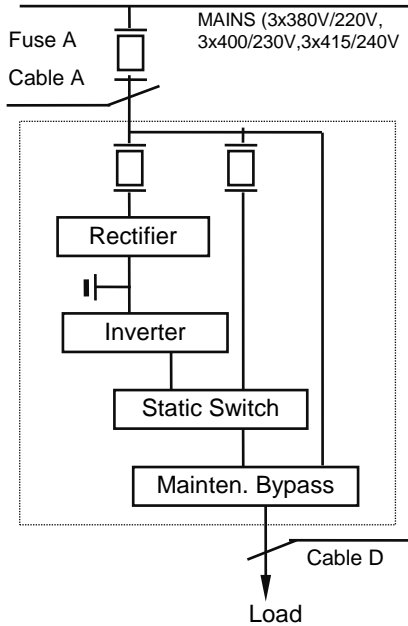
Extended battery autonomies	in additional matching cabinets
Remote signalling panel	with UPS-status indication and common alarm
Parallel Configurations	it is possible to parallel Ecowave UPSs up to 4 units to increase capacity or for redundancy

Dimensions of ECOWAVE (depth 800mm)

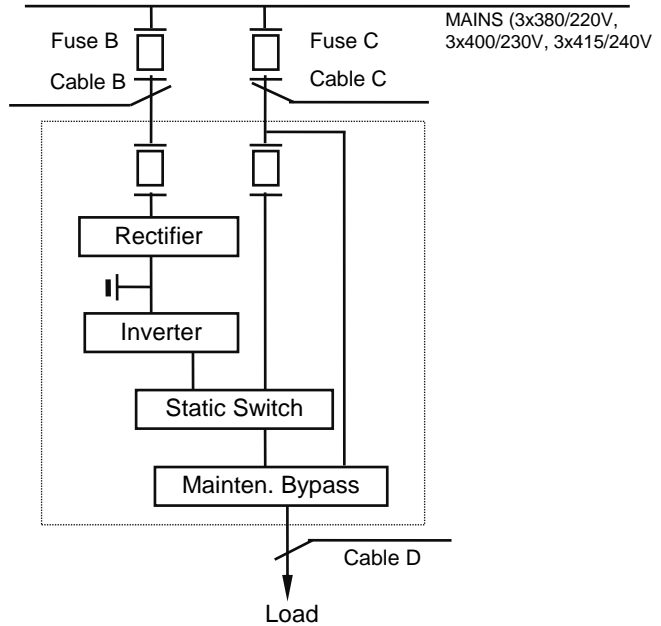


**BLOCK DIAGRAM WITH RECOMMENDED CABLE SECTIONS AND FUSE RATINGS**

STANDARD VERION (SINGLE FEED INPUT)



VERSION ON REQUEST (DUAL FEED INPUT)



Power (kVA)	Fuse A (Agl/CB)	Cable A (SEV/VDE)	Cable D (SEV/VDE)
10	3x20	5x4(3x2.5)	5x4(3x2.5)
15	3x25	5x6(5x4)	5x6(5x4)
20	3x40	5x10(5x6)	5x10(5x6)
30	3x63	5x16(5x10)	5x16(5x10)
40	3x80	5x25(5x16)	5x25(5x16)
60	3x100	5x35(5x25)	5x35(5x25)

Power (kVA)	Fuse B (Agl/CB)	Cable B (SEV/VDE)	Fuse C (Agl/CB)	Cable C (SEV/VDE)	Cable D (SEV/VDE)
10	3x20	5x4(3x2.5)	3x20	5x4(3x2.5)	5x4(3x2.5)
15	3x25	5x6(5x4)	3x25	5x6(5x4)	5x6(5x4)
20	3x40	5x10(5x6)	3x40	5x10(5x6)	5x10(5x6)
30	3x63	5x16(5x10)	3x63	5x16(5x10)	5x16(5x10)
40	3x80	5x25(5x16)	3x80	5x25(5x16)	5x25(5x16)
60	3x100	5x35(5x25)	3x100	5x35(5x25)	5x35(5x25)