

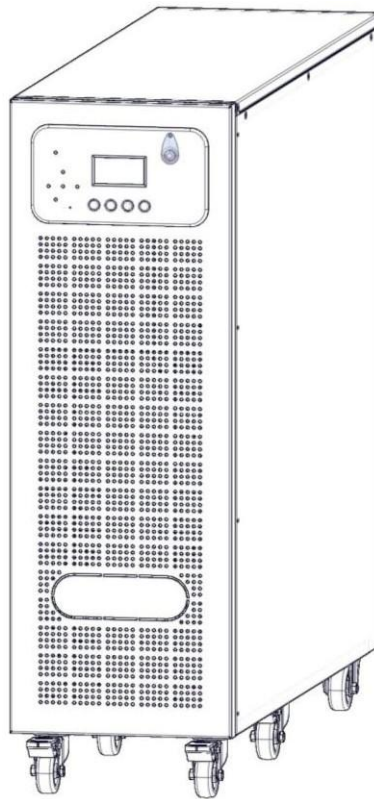


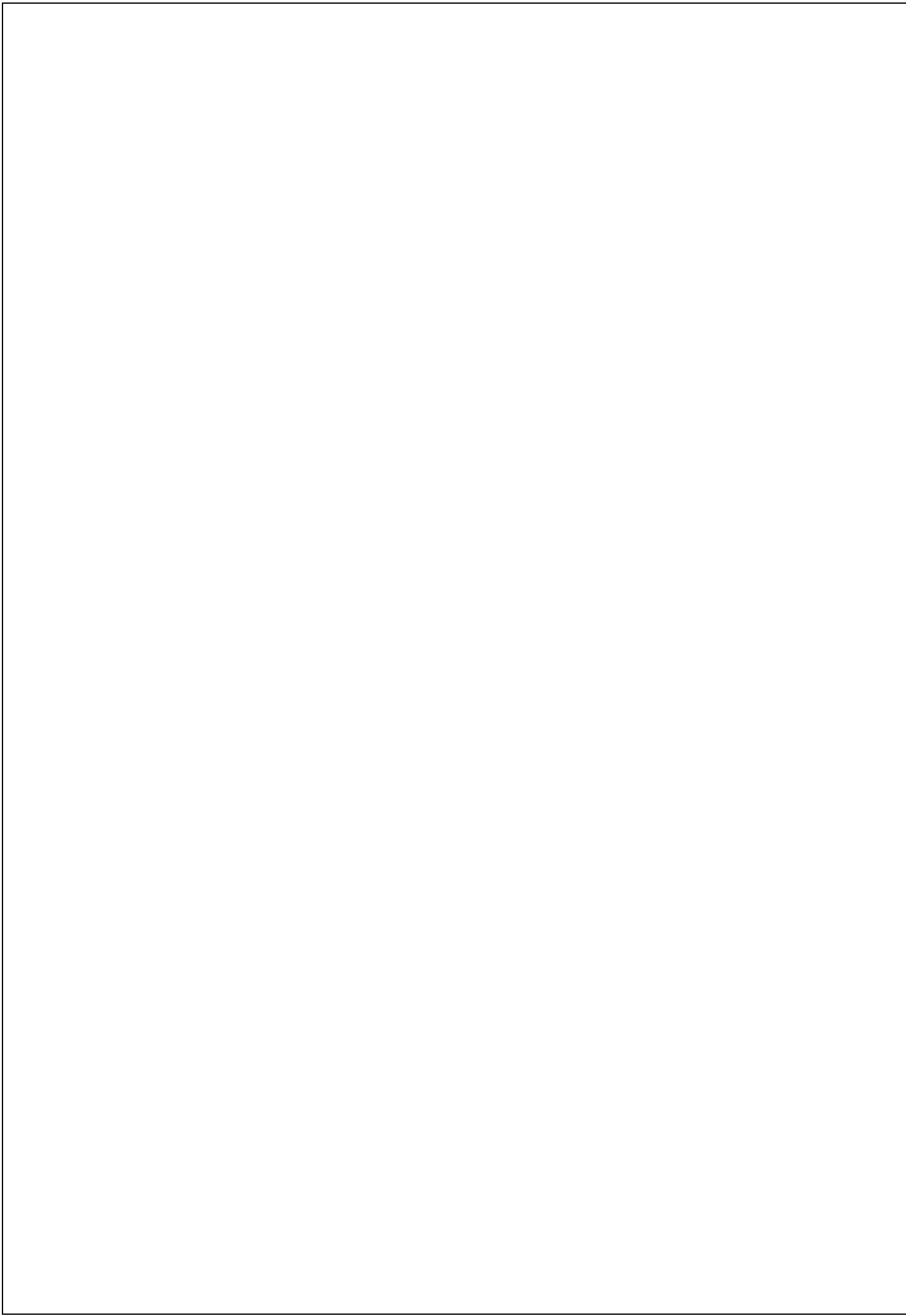
Uninterrupted Power Supplies

# USER'S MANUAL

## BOXERSSERIES

10-20KVA





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10-20KVA

GM-SD-108

Rev.:0

## About the Manual

This manual has been prepared for Boxer 10-20 kVA users.

### Helpful guides

For more information about this device and its options, please visit [www.makelsan.com.tr](http://www.makelsan.com.tr).

### Updates

Please, visit [www.makelsan.com.tr](http://www.makelsan.com.tr) for updates. Always use up-to-date manuals.

### Shipping

It is essential that the transport vehicle or its handles be of the character and ability to carry the weight of the UPS.



**DO NOT LIFT HEAVY LOADS WITHOUT ASSISTANCE!**

|                             |                   |
|-----------------------------|-------------------|
| 1Person                     | <18kg(<40lb)      |
| 2People                     | 18-32kg(40-70lb)  |
| 3People                     | 32-55kg(70-120lb) |
| Transport vehicle/equipment | >55kg(>120 lb)    |

Avoid sudden movements, especially when there are batteries in the device.



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# 1 SAFETY AND WARNINGS

## 1.1 Warnings

This manual must necessarily be read and understood before installing the UPS. Installation and initial start-up can only be carried out by authorized MAKELSAN personnel.

Installation and start-up by unauthorized persons may result in serious injury and/or death.

The UPS is designed for continuous vertical use in fixed-position applications.



**THE UPS MUST BE USED WITH GROUND CONNECTION.**

Before connecting the mains, make the ground

connection. Grounding leakage currents can rise up to 0.4

A.



**THE UPS MUST BE DISCONNECTED FROM THE MAINS AND BATTERIES BEFORE MAINTENANCE. FOR SERVICE AND MAINTENANCE, WAIT AT LEAST 5 MINUTES FOR DC BUS CAPACITIES TO DISCHARGE AFTER TURNING OFF THE DEVICE.**

## Service-maintenance

All service and maintenance procedures are carried out inside the device. Parts may be subject to maintenance and replacement by trained personnel only.



**It is recommended to carry out preventive maintenance by authorized technical personnel at least once a year from INSTALLATION. (This service will be provided by our authorized services for a service fee.)**



**BATTERY VOLTAGE CAN RISE UP TO 450 VDC!**

Battery voltage is lethal (450Vdc). Batteries should not be touched except by trained personnel. Batteries should never be thrown into fire. Regarding the collection and disposal of expired or defective batteries; waste batteries should not be thrown into nature, but should be delivered to MAKELSAN Technical Service technicians or to organizations authorized to collect batteries from the Ministry of Environment.

Fire extinguishing equipment should be available by the side of the UPS.

## 1.2 Clearance and

### TransportationClearan

### ce

There is no air inlet or outlet grille on the sides of our 10-20 kVA UPSs. All the air is taken from the front side, and exhausted from fan grille wires at the back side. A clearance of at least 1 meter must be left in front side of the UPS and a clearance of 1.2 meters must be left in the back side of the UPS. There should be no permanent or temporary use within these specified limits. Otherwise, the performance of the UPS will decrease.

## Transportation

In our products between 10-20 kVA, the operator reaches the UPS from the front side. Therefore, a sufficient space should be left for the operator. In addition, there is intervention option from the back side of the device for service and maintenance. Therefore, a sufficient space should always be left at the back side for the service personnel to work.

## 1.3 Storage

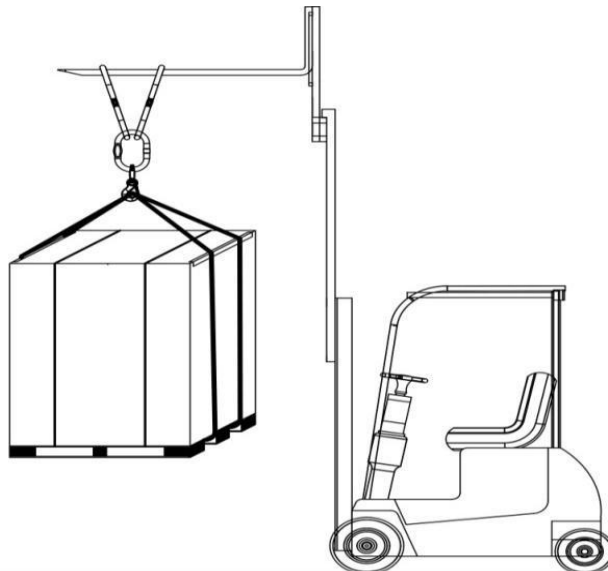
Before the UPS is commissioned, it should be stored in a room or area protected from excessive humidity and heat.

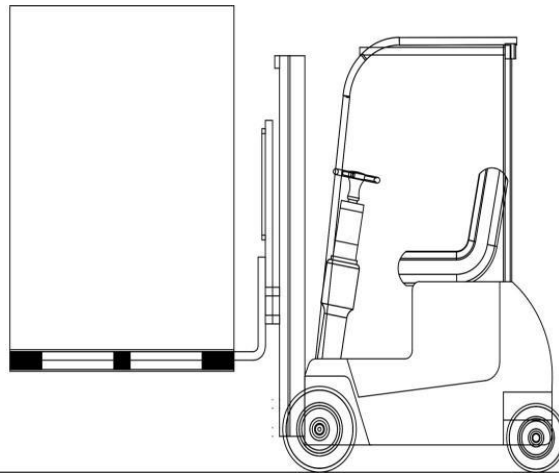


**Unused batteries should be charged periodically. This time interval has been determined by the battery supplier. Charging can be done by connecting the UPS to a suitable network for a certain period of time.**

## 1.4 Shipment

It is essential that the transport vehicle or handles be of the character and ability to carry the weight of the UPS.





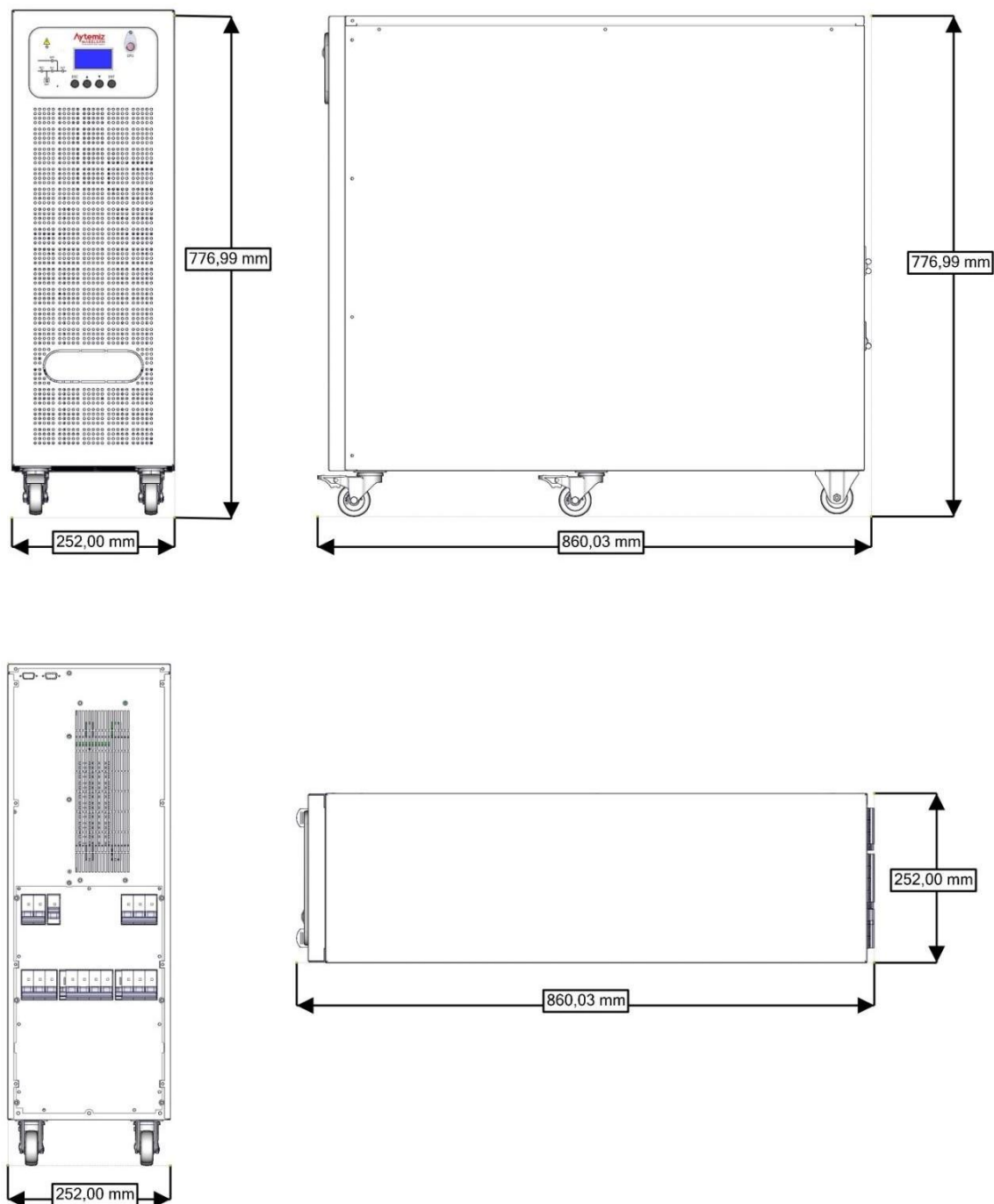
The cabin is equipped with four wheels. In this way, it can be easily moved and placed. These wheels should only be used on smooth surfaces.

The front wheels should be locked after the UPS is located in a suitable position. The rear wheels are fixed. Be more careful in sudden movements, especially when the batteries are in the cabin.

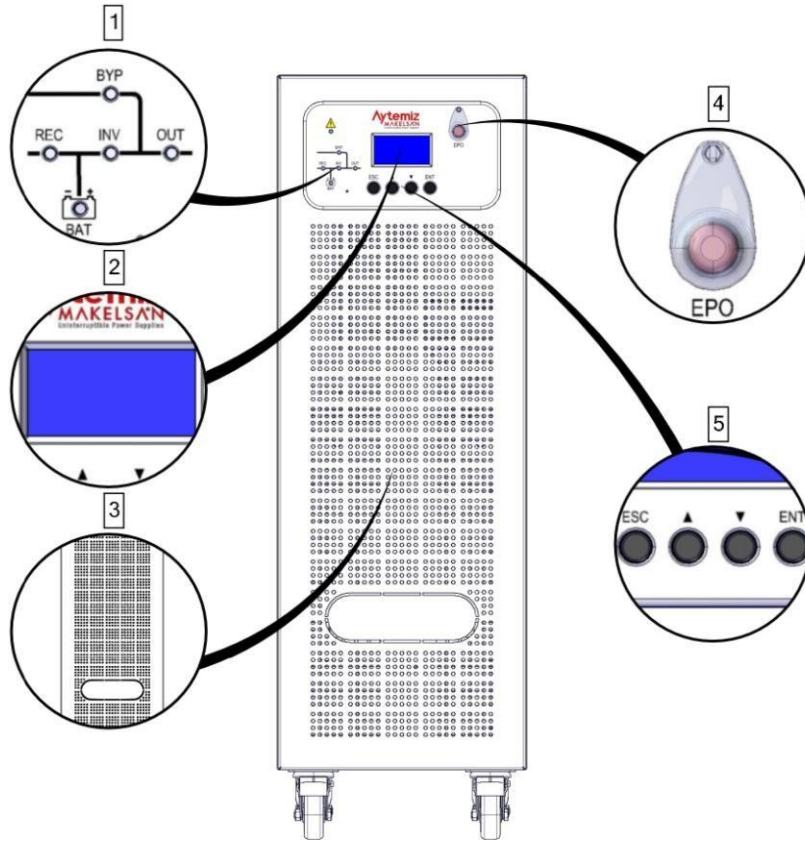
Move the device as little as possible.

## 2 PRODUCT INTRODUCTION

### General View

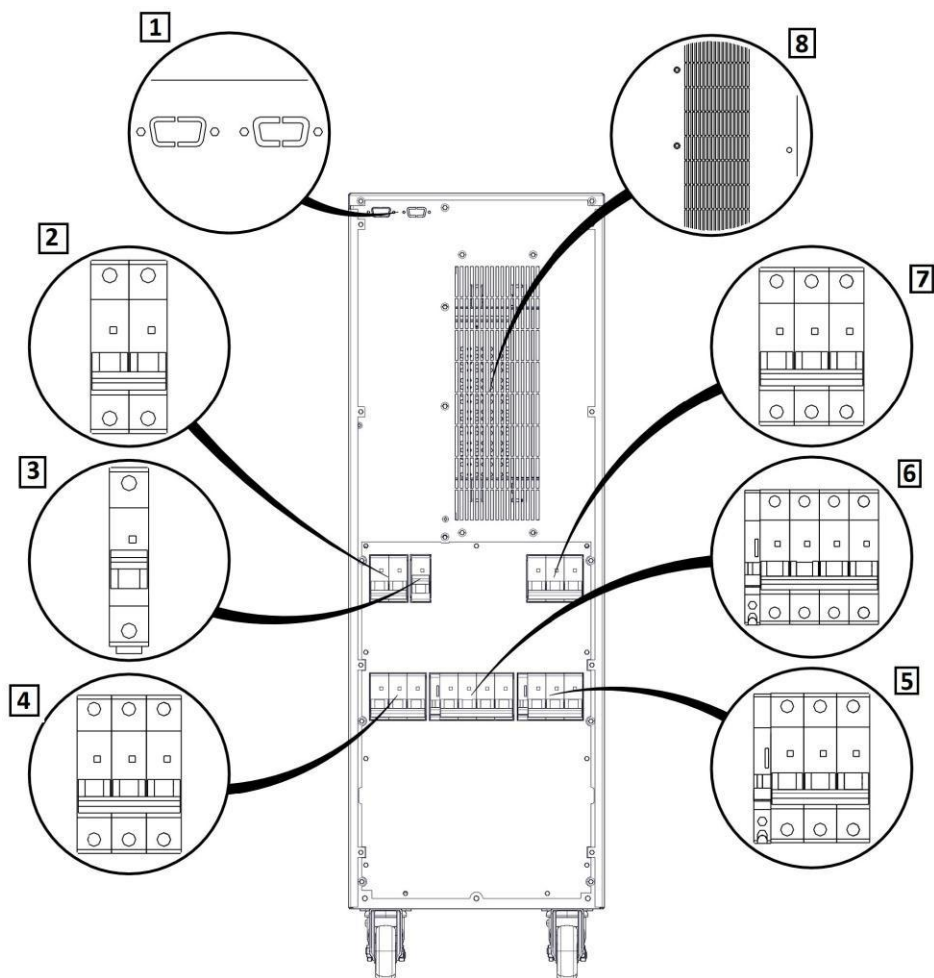


## Front Side View



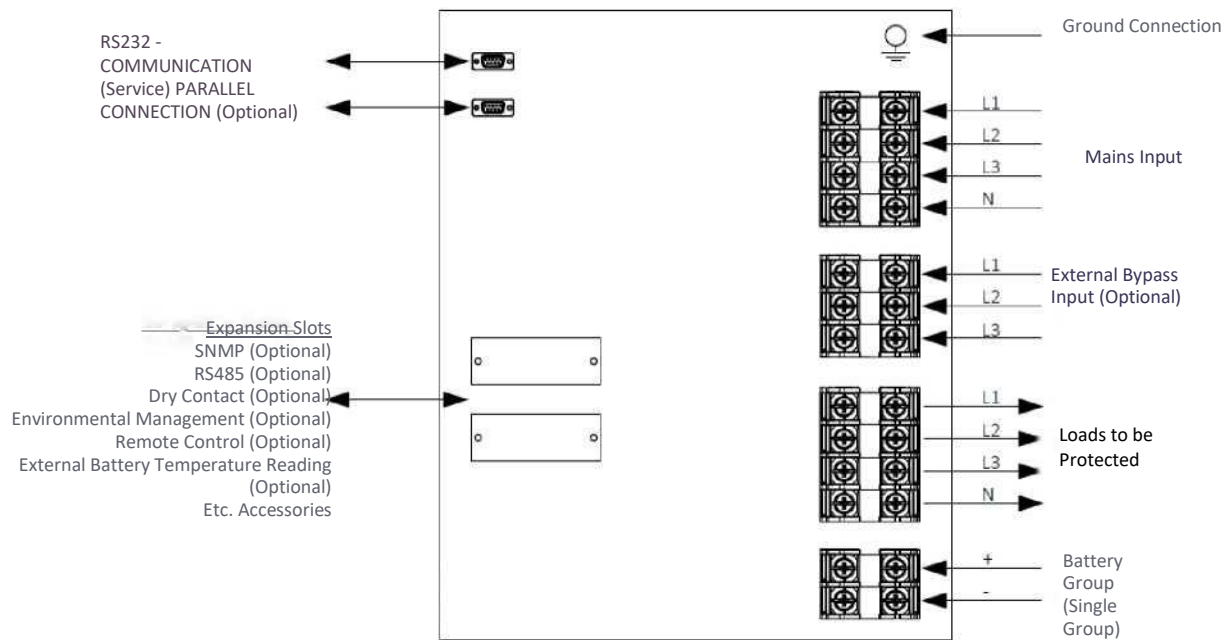
|   |                                 |
|---|---------------------------------|
| 1 | Mimic Diagram                   |
| 2 | LCD Display                     |
| 3 | Fresh Air Intake Grille         |
| 4 | EPO (Emergency Shutdown) Button |
| 5 | Menu Navigation Keys            |

## Back Side View



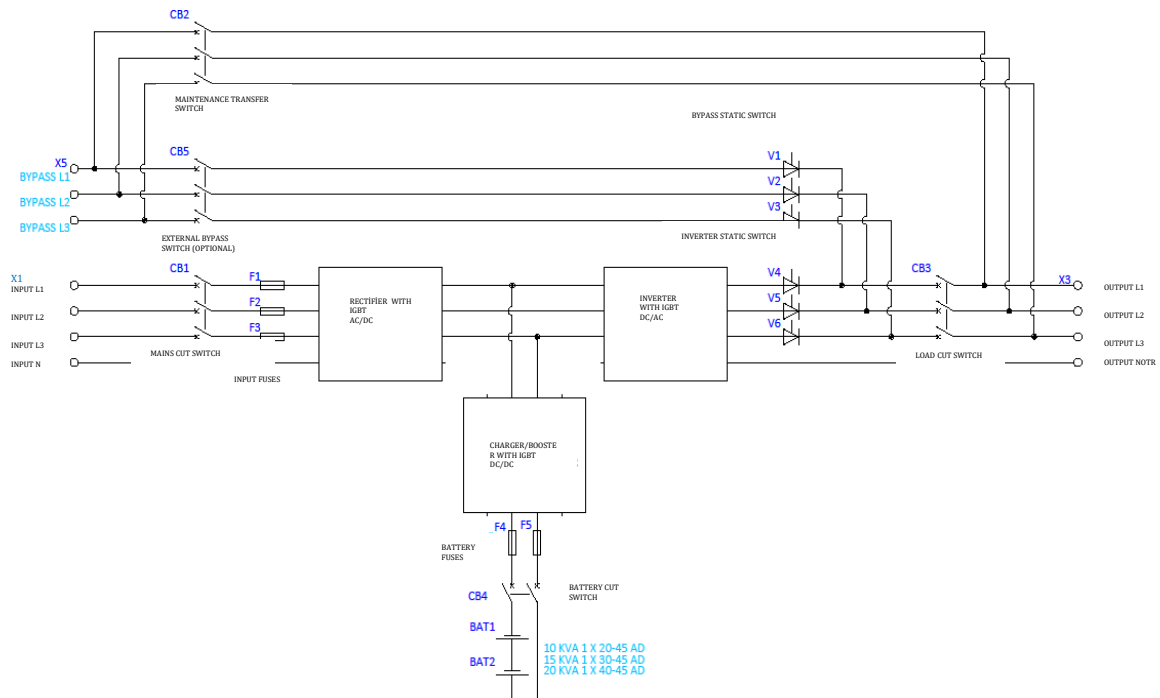
|   |                                                                            |
|---|----------------------------------------------------------------------------|
| 1 | RS232 Terminal for Optional Parallel Connection and Communication Software |
| 2 | Battery                                                                    |
| 3 | Cold Start                                                                 |
| 4 | Entry Fuse                                                                 |
| 5 | Output Fuse                                                                |
| 6 | Maintenance Bypass                                                         |
| 7 | Static Bypass                                                              |
| 8 | Winding Hot Air Discharge Duct                                             |

## Electrical Connection



## 2.1 General information

The operating topology of Boxer series devices can be understood from the figure below.



Energy enters the UPS through the CB1 switch. After this energy fills the DC bus capacitors, the rectifier works. The rectifier converts AC mains energy to DC voltage and charges the batteries in a controlled manner. Sufficient DC bus voltage is generated by using battery voltage when mains is not available. DC energy is converted to AC voltage, synchronous with the mains using an inverter. This voltage is of high quality. The generated AC energy is applied to the loads after the static semiconductor switches and output (load) breakers.

When maintenance or repair is required, the device is switched to the static bypass position before the input (CB1) and output (CB3) switches are taken to the OFF position (see 4.1.3.2). The maintenance switch (CB2) is then taken to the closed circuit ON position. Afterwards, first the output (CB3) and then the input (CB1) switches of the UPS are brought to the open circuit (OFF) position.

### 2.1.1 Static Transfer Switches

As seen in the figure above, some blocks are named as static switches. These blocks consist of reverse parallel connected thyristors. These switches are controlled by the main control unit and ensure that the loads are fed via the mains or inverter. In normal operating mode, loads are fed through the inverter. Therefore, inverter static switches are active unless there is a problem in the system.

The system ensures that the loads are fed from the mains or the inverter without any problems and without interruption. In order for this operation to take place with minimum risk, the UPS makes the output of the inverter in the same phase and synchronized with the bypass source. Therefore, the inverter frequency is the same as the mains frequency as long as the mains is within acceptable frequency limits.

The user can switch between the mains and inverter using the front panel. With the instruction of the user, the loads operating from the mains will automatically take over the load in case the mains are cut off or out of tolerance.

### 2.1.2 Battery Temperature Adjustment

Our products, between 10-20 kVA, have internal battery placement areas in their cabinets. There are temperature sensors in the external battery cabinets. The temperature of these batteries is detected by the "temperature sensor". The UPS adjusts the battery charging parameters according to the detected temperature information. These parameters can be easily adjusted by authorized personnel from the system's LCD interface or TELNET interface. With this sensor, the UPS also regulates the charging parameters in the same way. In this case, we recommend you to order an **"External Battery Temperature Reading Kit"** for the temperature detection of the UPS.

## **2.2 Operating Modes of UPS**

Our Boxer series UPSs have an on-line and double-cycle structure. Our products work in the following modes:

- Normal Mode
- Battery Mode
- Bypass Mode
- Auto Start Mode
- Maintenance Mode
- Eco Mode

### **2.2.1 Normal(Online)Mode**

In this mode, the UPS delivers the energy to the load via the inverter. The rectifier unit takes the energy from the AC mains. The inverter and battery charge are energized by the DC supply generated.

### **2.2.2 Battery (Stored)Mode**

While the UPS feeds its critical loads through the inverter due to any fault in the network, this energy is obtained from the batteries.

### **2.2.3 BypassMode**

If the UPS is overloaded or because of any problem in the inverter, a quality AC output cannot be produced and if the bypass voltage and frequency values are within the limits, the loads are fed from the bypass source. For this, the UPS makes an uninterrupted transition from the inverter to the AC source with static switches. In order for these transitions to be smooth, it is essential that the inverter source be synchronized with the mains. If the inverter output is not synchronous with the mains, this transition may take up to 15msec depending on the load type.

### **2.2.4 Auto Start Mode**

In case of any mains failure, the UPS supplies its critical loads until the battery reaches the discharge end voltage level. The UPS will run until the batteries are discharged and then turn off. After the mains returns to normal, the UPS can restart by itself at the specified time. In this case, the UPS continues to operate normally as long as the mains voltage is within the desired criteria. This feature is not factory based in Boxer series UPSs.

### **2.2.5 Maintenance Mode**

The UPS is equipped with a protective featuring switch so that the loads are not de-energized during maintenance. This switch has been selected in a manner to fully meet the UPS loads.

### **2.2.6 EcoMode**

Standard UPSs take their input power supply from the AC power mains. If there is a reliable backup power source in the facility that can be connected to the bypass line

and can feed the loads at the output of the UPS, the bypass line can be connected to this voltage source and the UPS can be operated in eco-mode. In this way, the overall efficiency of the UPS will increase due to no load current flowing through the rectifier and inverter.

When the UPS receives the Bypass voltage from the AC mains, the UPS operates with the bypass instead of using an Inverter in Eco Mode. When the UPS detects an interruption or fault in the mains line, it switches to the inverter supplies. You will therefore have uninterrupted power effectively, but it is important to note that any sensitive equipment will not operate stably during mains voltage fluctuations or very short switching times. However, for loads that are not sensitive to this problem, Eco mode will provide significant energy savings.

You can set the days and times when you want the device to work in Eco Mode by following the steps below.



## 2.3 Battery Management

### Constant Charging Current

A constant current, at a rate of 1/10 of the battery capacity, is applied until the battery reaches the float charge voltage.

### Float Charging

Depending on the battery discharge current, 1/3 of the battery energy is charged at this level. Thanks to this level, the batteries are kept ready for use at the highest capacity. In lead-acid batteries, this voltage is 2.2-2.35 V/cell. This voltage may vary slightly with temperature adaptation. This coefficient setting is provided in UPSs. If a temperature sensor is used, it is recommended to use it.

### Discharge End Protection

If the battery voltage drops below the discharge end voltage level while the system is running from the battery, the UPS shuts down and stops receiving energy from the batteries. This value can vary between 1.6-1.75 V/cell in lead-acid batteries. In Ni-Cd batteries, it varies between 0.9-1.1 V/cell.

### Low Battery Warning Level

While the system is running in backup, namely battery, mode, it gives an audible and visual warning when the estimated capacity, with the current loads, are reduced to its 40% capacity. This value can be adjusted by the user between 20% and 70%.

### 2.3.1 Advanced Functions(Automatic Battery Test)

The automatic battery test automatically discharges 10% of the existing capacity of the battery at certain time intervals (factory setting 90 days) set. The time between two tests can be adjusted by the user between 30-360 days. As a result of the test, one of two states as "iyi-değiştir (good-replace)"is determined.



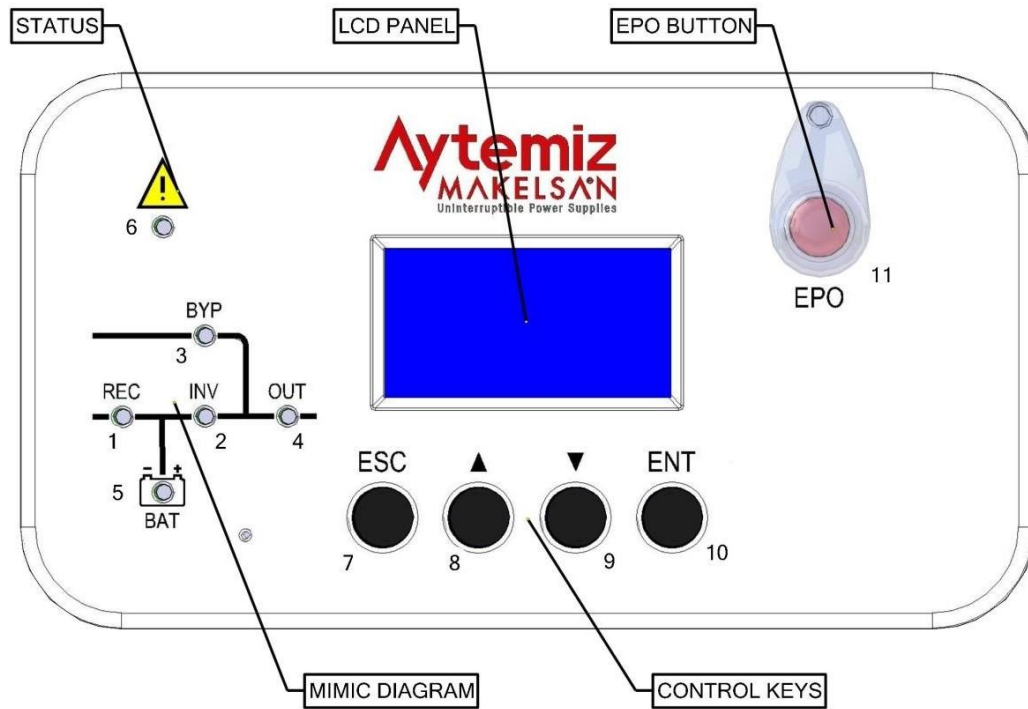
**If the batteries are reported as “replace” as a result of this test, the batteries are discharged as a result of the test. In this case, your loads may be de-energized in case of a power cut.**

Auto-starting the test can be triggered by command from front panel, via telnet interface, RS232 connection smart communication or UPSMAN (SNMP, see options.).

As a result of all these tests, it can be observed whether the existing used batteries meet the minimum requirements of the loads or not during the first mains cut. It is recommended the test results be checked at certain intervals.

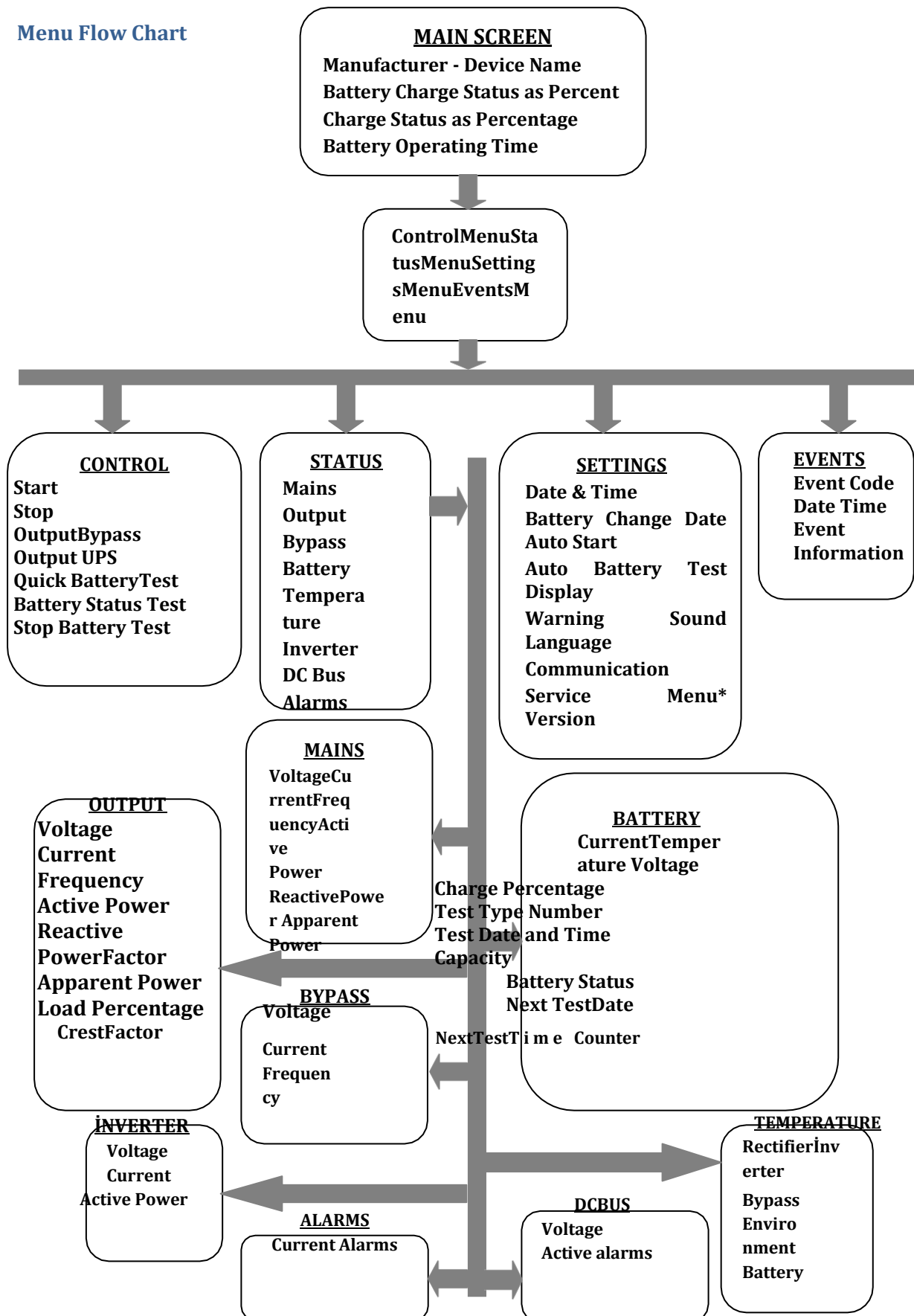
## 2.4 User Panel

User Panel consists of mimic diagram, LCD screen, EPO button and menu buttons. The device can be controlled through this panel.



|      |                                                                                       |
|------|---------------------------------------------------------------------------------------|
| 1    | Rectifier Led<br>It lights up continuously while the rectifier is running.            |
| 2    | Inverter static switch led<br>It lights up when the load is fed by the inverter.      |
| 3    | Bypass static switch led<br>It lights up when the loads are fed over the bypass line. |
| 4    | Output Led                                                                            |
| 5    | Battery Module                                                                        |
| 6    | Alarm/Warning led                                                                     |
| 7-10 | Menu buttons                                                                          |
| 11   | EPO Button                                                                            |

## Menu Flow Chart



\*Detailed service menu can only be opened by the authorized service personnel.

### 2.4.1 Splash Screen

The Splash Screen is displayed first when the front panel is opened. Model name, charge status, load status and remaining backup time are displayed. In the event of an alarm, alarms are transmitted as a marquee on the first line. If no key is pressed for five minutes, the system returns to the Splash Screen again.



### 2.4.2 Main Menu

Switch from Splash Screen to Main Menu with **ENT** key.



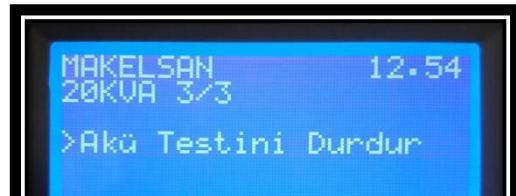
### 2.4.3 Navigating the Menus

Press the **UP/DOWN** keys to move the navigator arrow cursor on the screen.

Enter the submenu with the **ENT** key, return to the previous menu with the **ESC** key. The control submenu is shown to the side.

Some menus consist of more than one page. Switch between pages with the **UP/DOWN** keys.

Some menus contain changeable settings such as ON/OFF, duration, amount. To change settings in these menus, select the variable with **ENT**, set the new value with **UP/DOWN** keys and save with **ENT** key. Cancel with **ESC** key.



#### 2.4.4 Password Protected Menus

Some menus, such as Control Menu, are password protected. To enter a password, select each digit with the UP/DOWN keys and confirm with the ENT key.

User level default password is 0000.



#### 2.4.5 Control Menu

The following things can be done in the Control Menu.

- |                             |                                      |
|-----------------------------|--------------------------------------|
| ➤ <b>Start</b>              | Start the UPS.                       |
| ➤ <b>Stop</b>               | Stop the UPS.                        |
| ➤ <b>OutputBYPASS</b>       | Switch to static bypass mode.        |
| ➤ <b>Output UPS</b>         | Switch to online mode.               |
| ➤ <b>Quick Battery Test</b> | Test if battery is connected or not. |
| ➤ <b>BatteryStatus Test</b> | Test the health of the batteries.    |
| ➤ <b>Stop Battery Test</b>  | Stop battery test.                   |

Battery status test uses 10% of the energy of the batteries and according to the test result, it classifies the batteries with a capacity higher than 10% as "**İyi (Good)**"; and those batteries with less than 10% capacity as "**Değiştir (Replace)**".

After the device is started and every 24 hours, it automatically performs a quick battery test if the test counter value is at zero.

Note: In order to perform the quick battery test, it is essential that the batteries be fully charged and kept in floating state for 1 hour.

In order to perform the battery status test, it is essential that the batteries be fully charged and kept in floating state for 5 hours.

Battery tests are performed by transferring energy to the mains without being dependent on the load. If the mains go out of limits during the battery test, the test is canceled.

**Status>** The number of minutes remaining before the test command can be applied can be viewed from the **battery menu**.

If "**Akü Testini Durdur(Stop Battery Test)**" option is selected, the device cancels the test and returns to the previous operating status.



## 2.4.6 Status Menu

Mains, output, bypass, battery, inverter, DC bus values and alarms can be viewed here.



### Mains

|            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| VP,A Hz    | Voltage (phase-neutral), current and frequency of each phase.               |
| KW,KVA, PF | Active power, reactive power and power factor of each phase.                |
| Pt,St, VL  | Total active power and apparent power, voltage of each phase (phase-phase). |

### Output

|            |                                                                          |
|------------|--------------------------------------------------------------------------|
| VP,A ,Hz   | Voltage (phase-neutral), current and frequency of each phase.            |
| KW,KVA, PF | Active power, reactive power and power factor of each phase.             |
| Pt, St, %L | Total active power, total apparent power and percent load of each phase. |
| VL, CF     | Voltage and crest factor of each phase (phase-neutral).                  |

### Bypass

|         |                                                               |
|---------|---------------------------------------------------------------|
| VP,A Hz | Voltage (phase-neutral), current and frequency of each phase. |
| VL      | Voltage of each phase (phase-phase).                          |

### Battery

|                         |                                                                         |
|-------------------------|-------------------------------------------------------------------------|
| A, °C,V, Charge%        | Charging current, temperature, voltage and percentage of charge.        |
| SXXXX,DD/MM/YY,         | Test type number, date and time. Battery capacity and status.           |
| SS:DD, Capacity, Status |                                                                         |
| Next Test,time          | Countdown to next test date and battery test in the status of floating. |

### Temperature

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| °C, °C, °C, °C, °C | Rectifier, inverter, bypass, ambient and battery temperatures. |
|--------------------|----------------------------------------------------------------|

### Inverter

|          |                                                                   |
|----------|-------------------------------------------------------------------|
| VP,A, KW | Voltage (phase-neutral), current and active powers of each phase. |
|----------|-------------------------------------------------------------------|

### DC Bus

|        |                                             |
|--------|---------------------------------------------|
| P,N    | Positive bus voltage, Negative bus voltage. |
| Alarms | Active UPS alarms.                          |

## 2.4.7 Settings Menu

The following settings can be made from the setting menu:

### Date & Time

To set the date or time, select the variable you want to set with the arrow keys and press the ENT key.



Set the value with the arrow keys and repeat press ENT key.



### Battery Replacement Date

When new batteries are installed, set the battery INSTALLATION date from this menu.



### Automatic Start

In battery mode, the device works until the batteries are discharged and then turns off. Automatic start is used to operate the device by itself when the network goes within limits. You can turn on/off automatic start with the ON/OFF options and set the time after which the device will turn on after the network returns to normal with the time option below.



### Automatic Battery Test

You can this menu to turn on/off the user-independent automatic battery tests and set the period (how long a test will take).



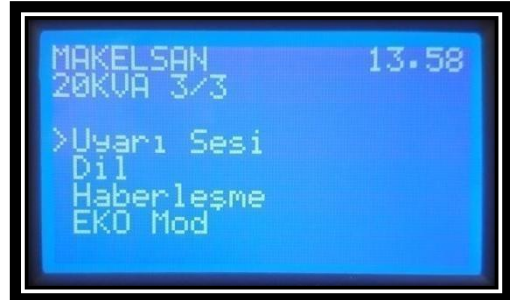
### Screen

You can change the contrast setting to increase the visibility of the screen in different environmental conditions.



### Alert Sound

You can turn on/off alert sound.



### Language

You can set the language of the menu.



### Communication

You can set the protocol of the RS232 connection. The options are SEC and Telnet.



### ServiceMenu

The Service menu is password protected.  
It can only be accessed by the service representative.



### Version

Inverter, rectifier, LCD front panel software version and UPS serial number; device apparent power(KVA), rated output voltage (phase-neutral), rated output frequency(Hz) can be accessed from version menu; Furthermore, the number of parallel battery arms x the number of serial battery arms and the adjusted battery capacity in the UPS can be reached via this menu.



### 2.4.8 Events Menu

The last 500 events can be viewed in the Events Menu. While displaying any event, If the **ENT** key is pressed, all information (mains, battery, bypass, output values, alarms etc.) at the time of the event can be seen. Older/newer events can be viewed by using the **UP/DOWN** keys.



## 3 INSTALLATION

### 3.1 Single Module Installation

In this section, the warnings you need to follow and the controls you need to perform before operating the device are specified. You can also find information about the points you need to pay attention to about positioning, the type of carriage of cabins and connections.

#### 3.1.1 Warnings



**UPS must be installed by MAKELSAN approved personnel. Operating the UPS that is not installed by the authorized personnel will leave your device out of the scope of warranty.**



**BATTERY DANGER!**

Some models have battery terminal voltages reaching 450 VDC when the battery and UPS are working together.

Precautions should be taken so as to protect your eyes from electrical arcs that might be caused by contacts.

Rubber gloves with ESD protection should be used.

Batteries that leak or oozes electro-liquid should not be used, and they should be replaced if any. Removed batteries must be safely stored, transported and shipped to disposal points.

In case of contact of electro-liquids with the skin, the exposed area should be cleaned very quickly with water.

The Operator should take of dangerous apparatus such as rings, watches, etc. before starting to work.

The product needs a three-phase and four-wire (+ground) supply at its input. The type of this supply complies with IEC60364-3. The devices optionally have transformers that can convert from three cables to four cables. If IT AC power distribution is supposed to be used, a four-pole circuit breaker must be used. The detail of the subject is explained in more detail in the standard, which is called IEC60364-3.

### 3.1.2 First Check Before Commissioning

Before commissioning the UPS product, the following checks should be performed. These are the first and most important steps in operating the product correctly.

- Definitely make sure that you check the product whether the internal and external structures of the UPS, its accessories and batteries are damaged during carriage or transportation. If there is any damage, report it without accepting the delivery.
- Make sure that the product is the correct model. Check whether or not the label on the back of the device matches with the product, which was ordered.

### 3.1.3 Positioning

The UPS and batteries are designed for indoor use; It is necessary that it be placed in places with clean and comfortable air flow.

#### 3.1.3.1 Positioning the UPS

In the Boxer 10-20 kVA series, clean and cool air enters from the front side of the device and exits from the back side of it by means of fans. Air inlet and outlet points should never be covered. It should be located in a place which is away from the risk of liquid, water etc. contact.

If the environment is very dusty, the filters optionally provided should be used. The use of these filters will be done according to the relevant instruction.

The UPS is a system with energy loss due to its nature. The lost energy emerges as heat. What kind of forced air cooling is needed is given in the table below. Using this table, it can be calculated at what capacity the air conditioner can be used so as to cool the environment where the UPS is located.

| Device | BTU/h amount for cooling | Estimated BTU/h value for 100% Bridge Load (Non-linear) load operation |
|--------|--------------------------|------------------------------------------------------------------------|
| 10KVA  | 2,663                    | 3,196                                                                  |
| 15KVA  | 3,790                    | 4,548                                                                  |
| 20KVA  | 3,892                    | 4,670                                                                  |

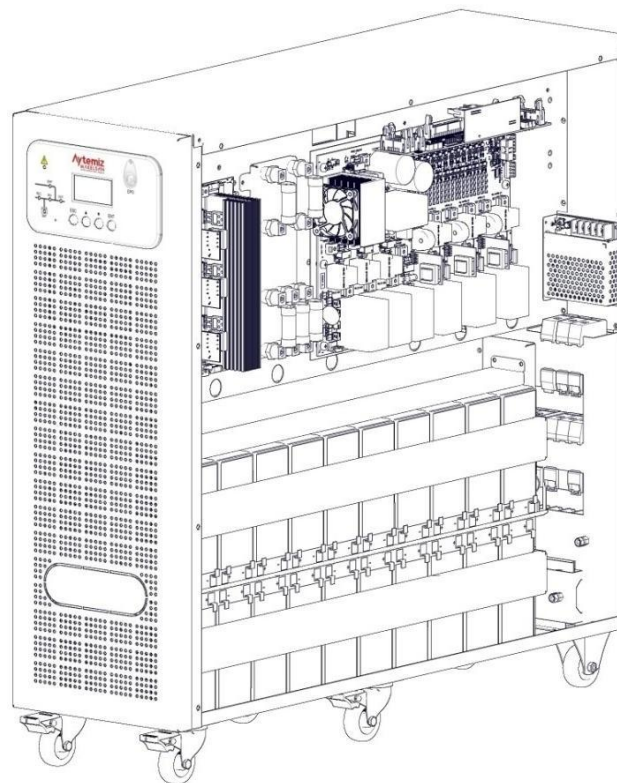
### 3.1.3.2 Configuration of Internal Batteries

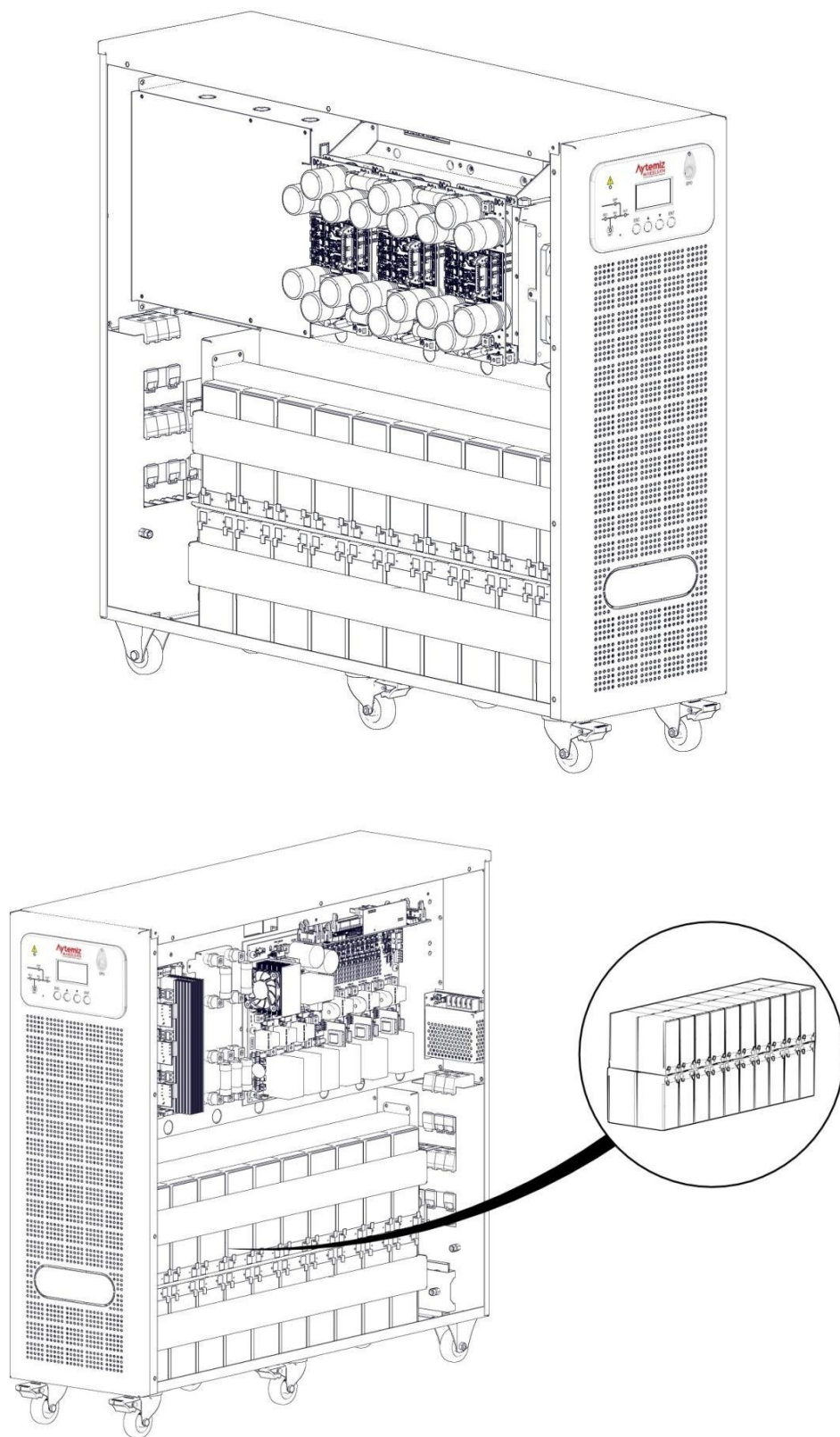
| BOXER INTERNAL BATTERY USAGE TABLE |    |    |    |
|------------------------------------|----|----|----|
| Device Power (KVA)                 | 10 | 15 | 20 |
| Serial Batteries Number            | 20 | 30 | 40 |
| Battery Group                      | 1  | 1  | 1  |
| Total Batteries Number             | 20 | 30 | 40 |
| Maximum Charging Current (A)       | 4  | 4  | 4  |
| Cutting Current (A)                | 46 | 46 | 46 |
| Battery Fuse (A)                   | 74 | 74 | 74 |

**\*These cells are recommended battery configurations.**

\* A type that can provide fast and semiconductor protection is used in battery fuses.

You can see the positioning types of 7/9 Ah and 4,5 Ah batteries into the UPS in detail in the figures below:





### 3.1.3.3 Positioning External Batteries

Batteries should be used in environments having stable and evenly distributed temperatures. Temperature is the most important factor that directly affects the capacity and lifetime of batteries. In general, battery manufacturers recommend that the batteries be used between 20-25 °C temperatures. In addition, battery manufacturers specify the performance of their products according to this temperature range. If the temperature rises above this value, the life of the battery will be reduced. On the contrary, if the temperature drops below this range, the battery capacity will drop seriously. Therefore, the expected amount of time will not be taken during the backup. As a result, it is necessary that the batteries be kept away from heat sources and areas with severe airflow. Considering these factors, you should pay attention to and follow the following points in the external connection of the batteries.

- Keep batteries away from heat sources.
- Keep away from areas with serious airflow.
- Keep batteries away from damp places. In this way, you prevent terminal oxidation and possible leakage currents.
- Use aR or gR semiconductor type fuses in battery cabinets and rooms.
- If possible, use unfused disconnect switches on the battery cabinet.
- Keep battery cabinets or shelves above the ground. Take care that it is protected against possible flooding and liquid contact.
- Battery rooms must be properly ventilated.
- If the batteries are in the battery room, the shelves will be open to contact. Therefore, limit access to battery rooms. Use the necessary safety signs and tapes.

It is essential that fuses be used in the battery cabinets, especially for batteries outside the UPS cabinet. These fuses should be as close to the batteries as possible. This proximity will increase the safety of working electrically with the battery.

| <b>BOXER EXTERNAL BATTERY CABINET CONFIGURATION</b> |    |    |    |
|-----------------------------------------------------|----|----|----|
| <b>Device Power (KVA)</b>                           | 10 | 15 | 20 |
| <b>Serial Batteries Number</b>                      | 20 | 30 | 40 |
| <b>Battery Group</b>                                | 1  | 1  | 1  |
| <b>Total Batteries Number</b>                       | 20 | 30 | 40 |
| <b>Maximum Charging Current (A)</b>                 | 4  | 4  | 4  |
| <b>Cutting Current (A)</b>                          | 46 | 46 | 46 |
| <b>Battery Fuse (A)</b>                             | 74 | 74 | 74 |

### 3.1.4 Type of Carriage of Cabins

It is essential that you pay attention that the transport vehicle or the handles are of the character and capacity to carry the weight of the UPS.

The UPS and optional cabins are designed to be transported by forklifts or similar vehicles.

Our UPSs can also be transported in short distances with the wheels placed on themselves. In particular, pay more attention to sudden movements to be made when the batteries are inside the cabin. Move it as little as possible.

### 3.1.5 Mains, Load and Battery Connections

Distribution board is recommended in the UPS outputs. Load protection fuses and switches must be used in the distribution panel. In addition, depending on the load, fuses at various speeds may be required. If the loads are appropriate, A and B type protective fuses or magnetic switches should be used.

#### 3.1.5.1 External Protections

In order to protect AC inputs, thermic magnetic switches or V-automat should be installed separately to the panel. The cable cross-sections made here and fuse values must be determined and connected by an expert.

The input main panel must have over-current protection. This protection should be selected in accordance with the UPS's over-current and overload withstand capacities. The fuses in the panel should be chosen according to 135% more of the current values given in the table below and should be C type (slow).

Grounding leakages flow to the ground through the EMI suppression circuits at the UPS input and output. MAKELSAN recommends a leakage current relay over 300 mA here.

Residual-current relays plugged into the UPS input;

- Sensitive to both directional DC pulses,
- Insensitive to sudden transfer currents,
- It should be sensitive to average currents between 0.3-1 ampere.

#### 3.1.5.2 Cable and Fuse Selection

Cable designs should be suitable for the currents and voltages mentioned here; furthermore, local guidelines regarding this subject should also be taken into account.

| UPS Power (KVA) | Rated Currents (A)                                          |      |      |                                                    |      |      |
|-----------------|-------------------------------------------------------------|------|------|----------------------------------------------------|------|------|
|                 | Mains Currents at Maximum Battery Charge (3 phase +neutral) |      |      | Output Currents Under Full Load (3 phase +neutral) |      |      |
|                 | 380V                                                        | 400V | 415V | 380V                                               | 400V | 415V |
| 10              | 19,2                                                        | 18,3 | 17,6 | 15,2                                               | 14,5 | 13,9 |
| 15              | 28,8                                                        | 27,5 | 26,4 | 22,8                                               | 21,8 | 20,9 |
| 20              | 38,4                                                        | 36,7 | 35,2 | 30,3                                               | 29,0 | 27,8 |

Non-linear loads (computer-type loads) can affect the cable cross-section design. Neutral currents can be more than phase currents, even up to 1.5 times the phase current.

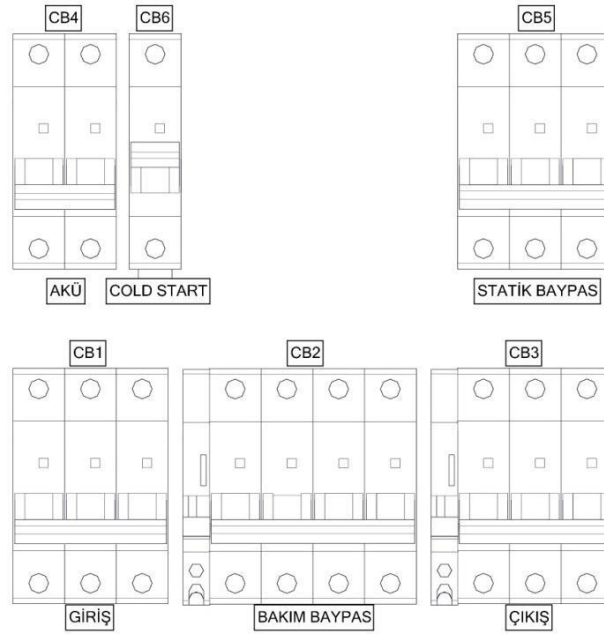
Each cabinet should be connected to the ground line directly and in the shortest way with a protection ground cable. Typical ground line wire cross-sections should be 2.5 mm<sup>2</sup> for 10 kVA, 6 mm<sup>2</sup> for 15 kVA and 10 mm<sup>2</sup> for 20 kVA. It is recommended that the cable length not exceed 5 meters.

### 3.1.5.3 Connecting the Cables

UPS input, output and battery connection inputs are made from the back side of the UPS. Cable entry is made after removing the large cover on the back side of the device.

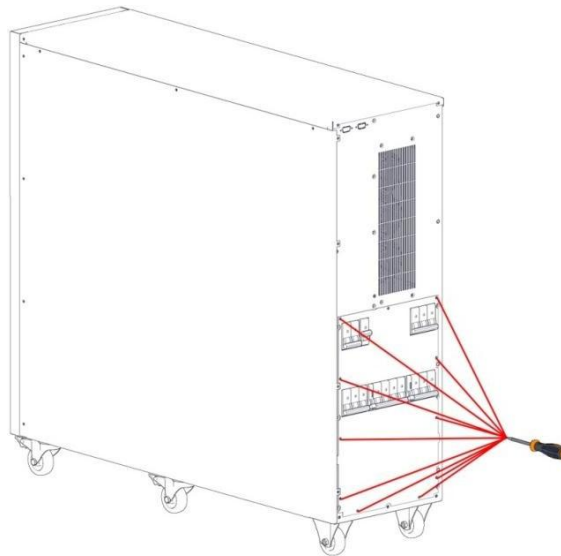


**CAUTION! 3-pole switches are used at the input and output of the device, the neutral line is not cut!**



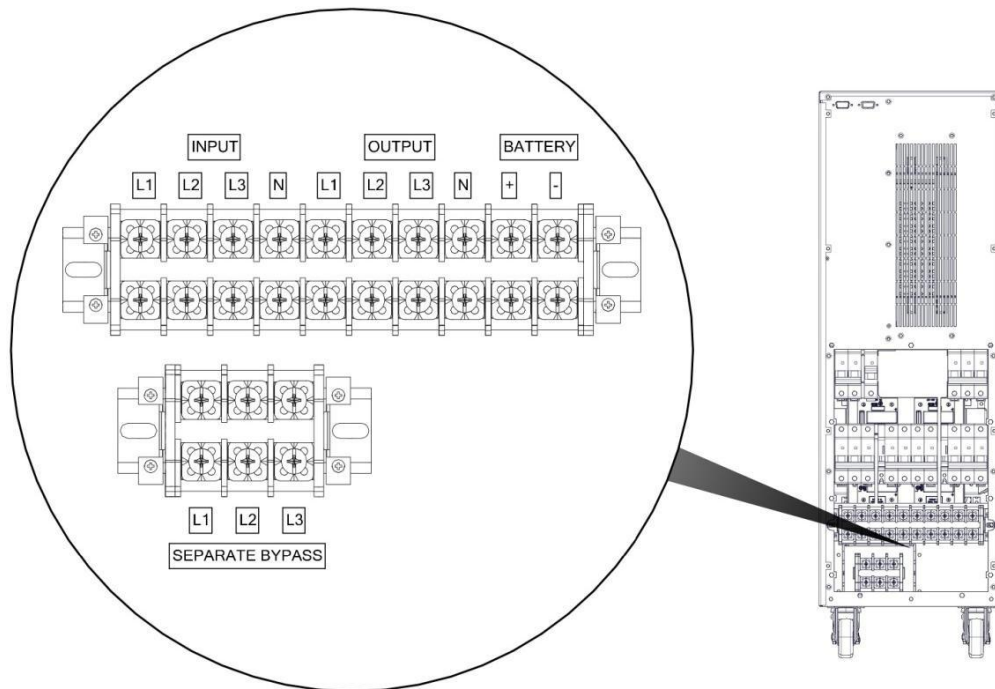
Follow the steps below for electrical connections:

1. Make sure that the loads and the mains are isolated from the cables by turning all the switches on the distribution boards to the open circuit (OFF) position.
2. Unscrew the metal cover on the back side of the UPS and remove the panel.



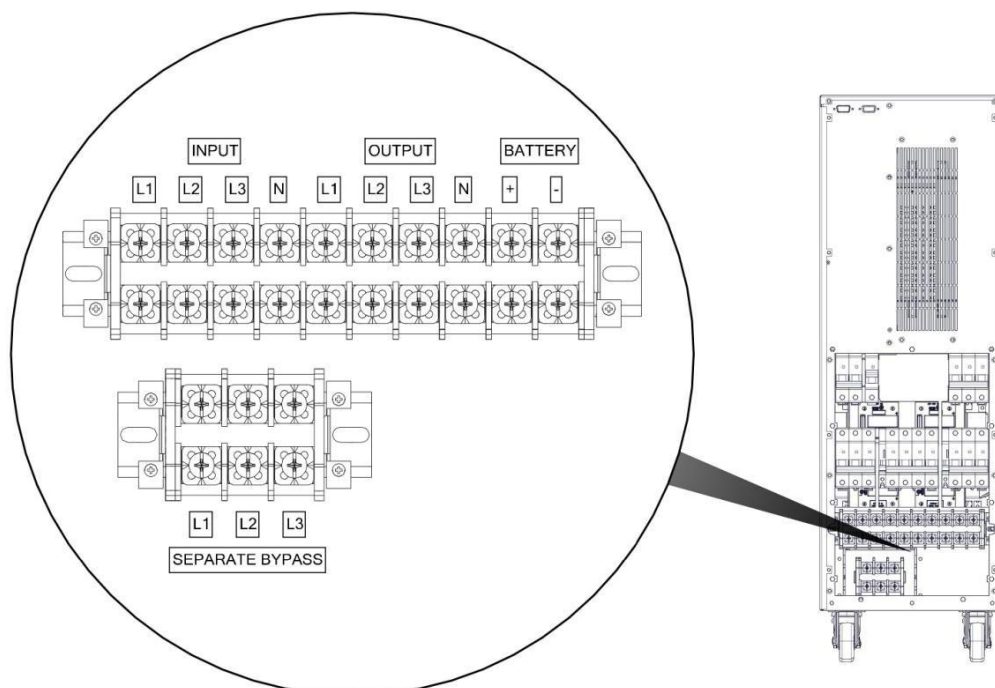
3. Connect the ground cable.

4. Make sure all switches are in the open circuit (OFF) position. The use of the switches will be explained in the next chapters.



5. Connect the input cables;

- Phase R to input L 1,
- S phase to input L 2,
- T phase to input L 3,
- N(neutral) to input N.



6. Check phase sequence.
7. Repeat steps 4 and 5 for output connections.
8. Put back the metal cover and tighten the screws.

After the connections are made, fix the cables using the cable clamps.



**If the loads at the prepared UPS output are not ready to be connected yet, pay attention that the loads are isolated during the connection.**



**Before starting the UPS, make sure that the cable connections are made in accordance with the warnings on the panels. Furthermore, check whether there is an isolated transformer at the UPS input or not and take into account the local regulations.**



**Make sure that the grounding is done correctly. Improper works and grounding to be made may damage the UPS and other systems in the installation.**

### 3.1.5.4 Battery Connection

In this chapter, you can find explanations about installation procedures and connections of internal and external batteries.

#### 3.1.5.4.1 Internal Battery Installation Procedure and Connection

##### Battery Installation Procedure

Follow the procedure below when commissioning the internal batteries.

1. Remove the battery fuse.
2. Make sure that the serial and parallel connections of the internal batteries are correct.
3. Connect the battery “- terminal” properly to the cable named “-BAT” released inside.
4. Connect the battery “+ terminal” properly to the cable named “+BAT” released inside.
5. Make sure that the polarities are correctly connected by checking the connections of the batteries one last time.



**Avoid short-circuiting the battery terminals. Exploding batteries can harm you and your environment!**

**Battery terminal can have 450 VDC!**

6. Put the back cover back and screw it completely.

### Internal Battery Temperature Reading

The temperature information of the internal batteries can be read through the NTC plugged into the J 26 socket of the main control card. For control of external batteries, see the chapter of options.

### 3.1.5.4.2 External Battery Installation Procedure and Connection

You can find out how to position the external batteries in detail under the "Positioning External Batteries" title above. In this chapter, information about connecting external batteries to the UPS is given.



**Avoid short-circuiting the battery terminals. Exploding batteries can harm you and your environment.**

**Battery terminal can have 450 VDC!**

1. Turn the "CB4" switch on the UPS to the open circuit (OFF) position.
2. If there is, turn the switches on the battery cabinet to the open circuit (OFF) position.
3. Remove the battery fuse in the battery cabinet.
4. Remove the battery fuse on the UPS.
5. Make sure the connections of the external battery packs are correct.
6. Connect the cable to one piece of the "+BAT" and one piece of "-BAT" terminals of the UPS, respectively.
7. Connect the four cables coming from the UPS to the terminals on the external cabinet or in the room in accordance with the external battery connection diagram given below.
8. Make sure that the polarities are correctly connected by checking the connections of the batteries one last time.
9. Re-place the battery fuse on the UPS.

10. Re-place the battery fuse in the battery cabinet.
11. If there is, turn the switches on the battery cabinet to the closed circuit (ON) position.
12. Check, with a suitable measuring instrument, whether there are appropriate battery voltages at the battery input terminals of the UPS.

External battery cable selection is determined by the application. Recommended fuses for UPS and battery cabinet are given. It is recommended to use the lowest cross section cable that can be connected to these fuses. Please refer to the standard, called EN 50525-2-31(VDE 0100-430), on this subject. The selection should be such that a maximum 0.5 VDC drop is allowed in the cable.

In the external battery cabinet application, there is an **"External Battery Temperature Reading Kit"** so as to optimize your batteries according to temperature. Therefore, the battery charge can be optimized according to the temperature.

### 3.1.5.5 Control and Communication Cable Connections

MAKELSAN UPS products have advanced external battery cabinet, environmental monitoring, panel control and various smart monitoring standard or optional connections.

Connections on the back side of the UPS:

- One RS232 Serial communication connection (standard),
- Two extension slots (Optional),
- One piece of parallel port (standard).

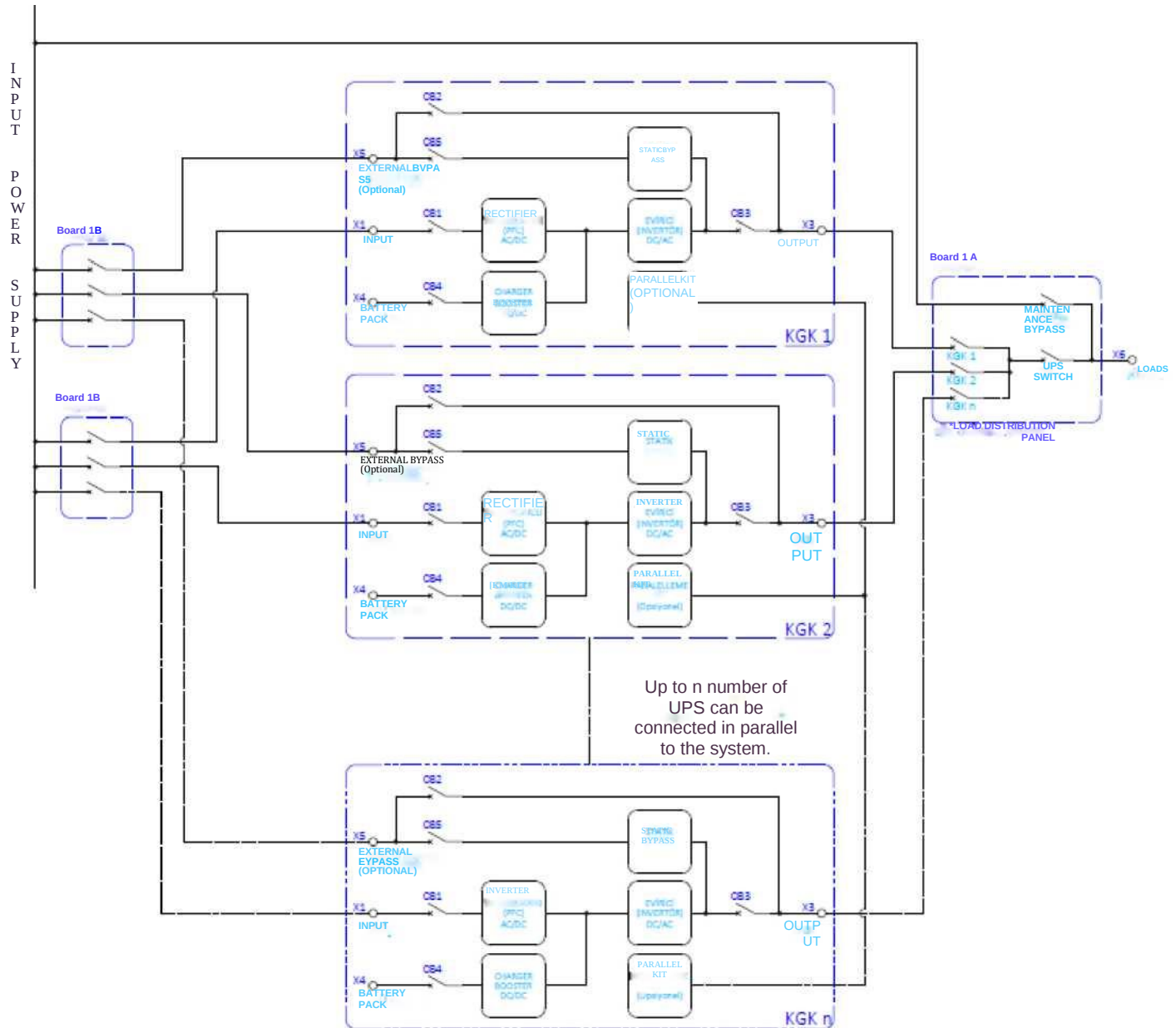
## 3.2 Parallel Installation

The product you have purchased has the ability to work in parallel; however, this feature is available as an option. Please contact your authorized dealer for parallel operation feature.



**Parallel application should be done by authorized personnel appointed by MAKELSAN!**

For cases of backup or more power requirements, Boxer series devices can run in parallel up to 8 units. The instructor diagram of a system where two UPSs are connected in parallel is given below.



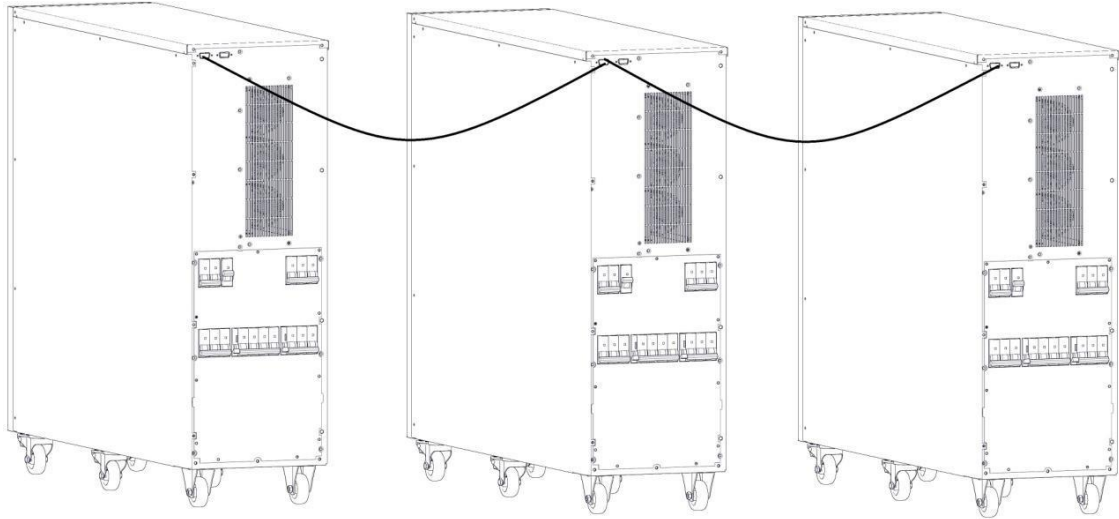
During parallel operation, the inputs and outputs of more than one device are connected to each other; however, the battery group of each is definitely separate, the batteries are not used in common. The following points should be taken into account when placing the devices and performing their electrical connections in the parallel system:

- Parallel connected devices must be of the same power and in the same series.
- Devices must be working with the same version and revision code software, devices working with old software must be updated.
- Devices should be placed as close to each other as possible. (Maximum 6\*110 cm Parallel cable)
- Each device must have a different neutral wire.
- Each device must have a different ground connection.
- The devices must be paralleled on the distribution panel and their phases must be connected correctly. (U1-U2-...-UN), (V1-V2-...-VN), (W1-W2-...-WN).
- The same battery group should not be connected to more than one device.

- For equal current sharing, the length of all cables connecting the devices to the panel must be equal and of the same cross section.

### ParallelSettings

Connect the parallel connection cable as shown in the figure. Only use cables manufactured by MAKELSAN.



The software settings in the User Panel are made by the service representative.

## 4 OPERATION

### 4.1 Operation procedure

In this chapter, you can find information about Circuit Breakers, Start-up, UPS operation types tests, shutting down the UPS, EPO and RS232 serial communication system.

#### 4.1.1 Circuit Breakers

The UPS has four circuit breakers, which are accessible from the back site of it. These are used for AC input, maintenance bypass, output and battery connections respectively.

Three-phase AC voltage is applied to the input of the UPS with **CB1**.

With **CB2**, AC input voltage is applied directly to the loads. In this way, switching for maintenance purposes is done without any problems. Thanks to the auxiliary contact information in **CB3**, if the UPS is activated while it is running, the mains activate the Bypass static switches. The system switches to maintenance mode without interruption.



**With CB3, the UPS is used to connect or disconnect the AC voltage, it takes from the static switches, to the loads.**

External batteries are connected to the UPS with **CB4**.

| Active Breakers     | Operation type   | Description                                                                      |
|---------------------|------------------|----------------------------------------------------------------------------------|
| CB1, CB3, CB4, CB5* | NormalMode       | The UPS operates in normal mode.                                                 |
| CB1, CB3, CB4, CB5* | StaticBypassMod  | The UPS is overloaded, loads are temporarily transferred to static bypass line.  |
| CB2                 | Maintenance Mode | The UPS is turned off for maintenance, it is powered through maintenance Bypass. |

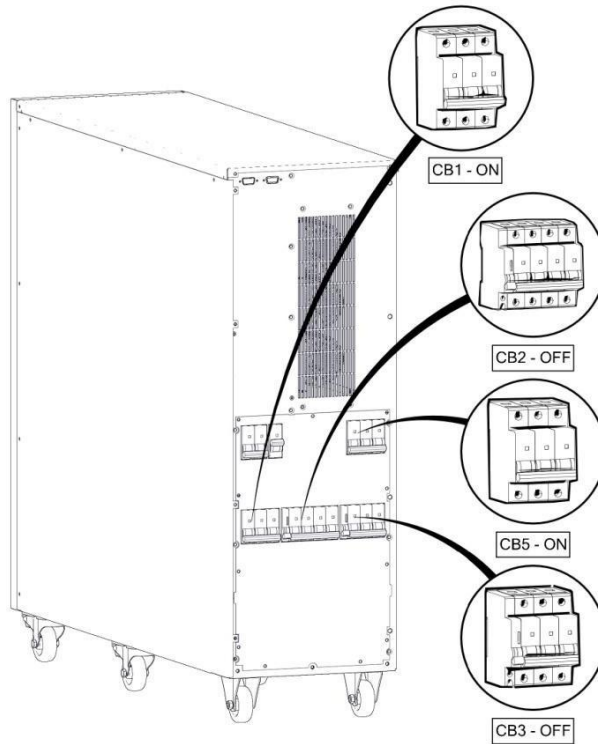
\* CB5-External Bypass switch is optional.

#### 4.1.2 Start-up



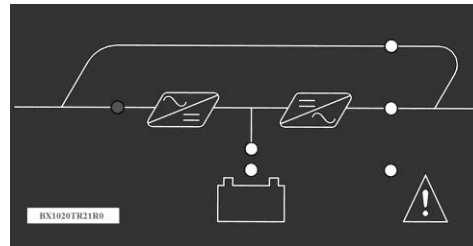
**Wait at least 5 seconds after each step.**

1. Turn all switches to the open circuit OFF position.
2. Press the Soft Start (SW1) button for at least 10 seconds.
3. Turn the input switch (CB1) to the closed circuit (ON) position. If there is an optional external bypass input, turn the external bypass switch (CB5) to the closed circuit (ON) position.

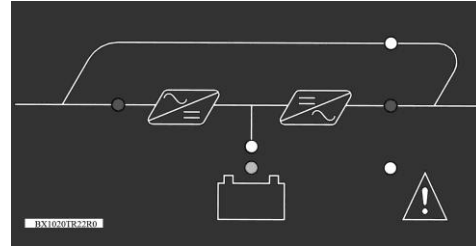


4. Start the UPS using the front panel.

**Ana Menü > Kontrol > Şifre > Çalıştır (Main Menu>Control>Password>Start)**

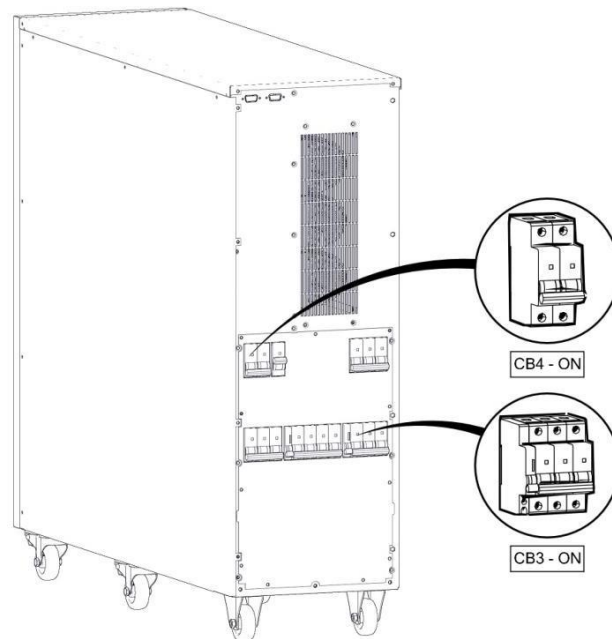


5. See, from the front panel indicator LEDs and LCD screen, that the device has switched to normal operating mode.



6. Turn the battery switch (CB4) to the closed circuit (ON) position.

7. Turn the output switch (CB3) to the closed circuit (ON) position.



8. You can open the loads connected to the device.

After all these operations, see from the mimic diagram that the load is fed through the inverter static switches. If otherwise, check the UPS total and phase loads. If there is an overload, the UPS will not take over the AC critical loads and will give a sound alert.

### 4.1.3 Testing Operation Types of the UPS

Switch between operating modes for control after the first run.

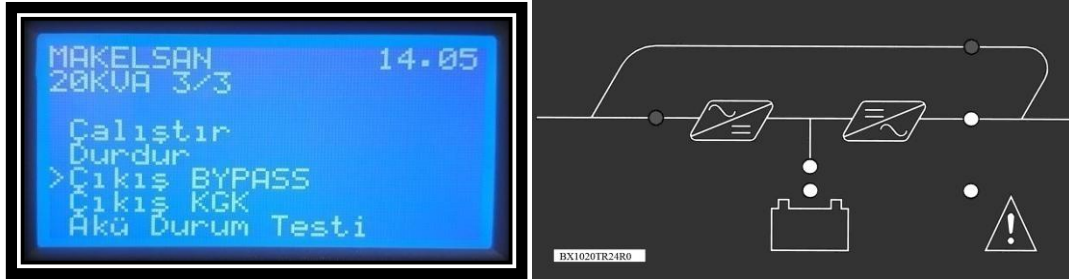
#### 4.1.3.1 Switching from Normal Mode to Battery Mode

Take CB1 to the open circuit (OFF) position. This process cuts the power coming from the mains and the UPS operates in battery mode. After checking the operation, turn CB1 back to the closed circuit (ON) position.

#### 4.1.3.2 Switching from Normal Mode to Static Bypass Mode

Switch the UPS to bypass mode from the User Panel. See that the static bypass led is on from the mimic diagram.

**Ana Menü > Kontrol > Çıkış BYPASS (Main Menu>Control>OutputBYPASS)**

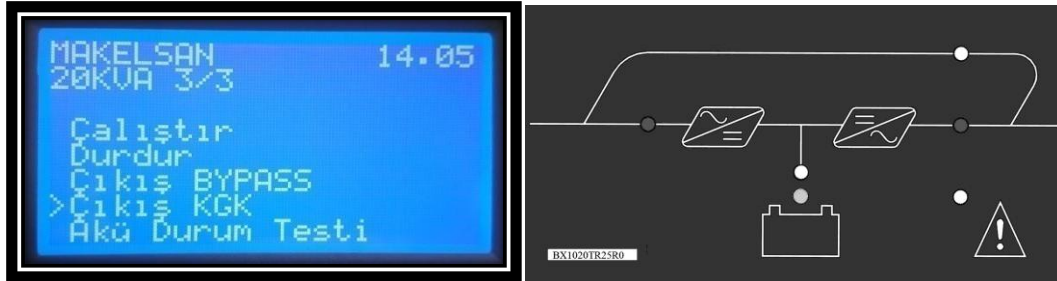


Note: If the network is out of limits or the phases are connected incorrectly, the UPS will not switch to the bypass line.

#### 4.1.3.3 Switching from Static Bypass Mode to Normal Mode

Switch the device to UPS mode from the User Panel. Verify the status from the mimic diagram.

**Ana Menü > Kontrol > Çıkış KGK (Main Menu>Control>OutputUPS)**



Note: If the inverter voltage is out of limits and there is an overload or overheating, the inverter will not take over the load.

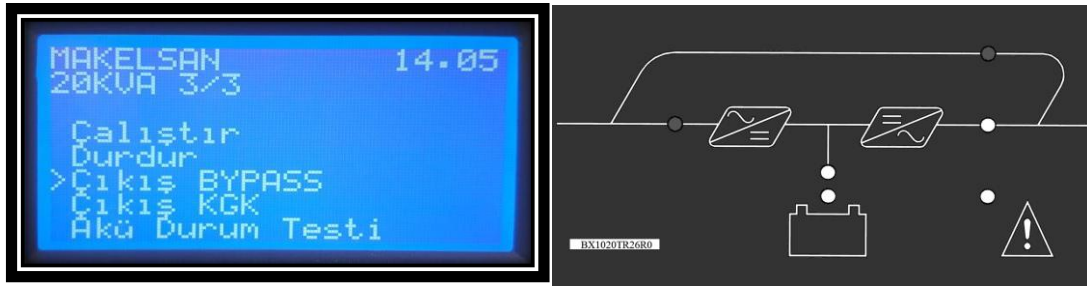
#### 4.1.3.4 Switching from Normal Mode to Maintenance Bypass Mode



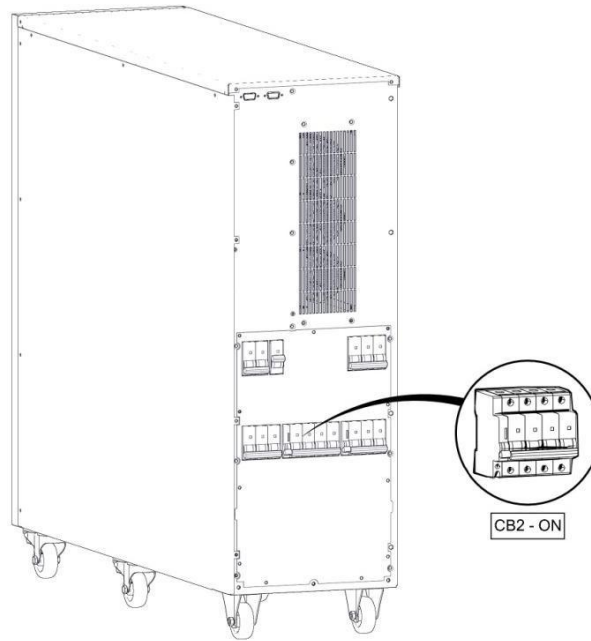
**Before switching to maintenance bypass mode, make sure that the inverter output is synchronized with the maintenance bypass line. Otherwise, a short-term interruption may occur in the energy going to the loads.**



**Switch the device to static Bypass mode using the front panel. See from the mimic diagram that the static bypass led is on.**

**Ana Menü > Kontrol > Çıkış BYPASS (Main Menu>Control>OutputBYPASS)**

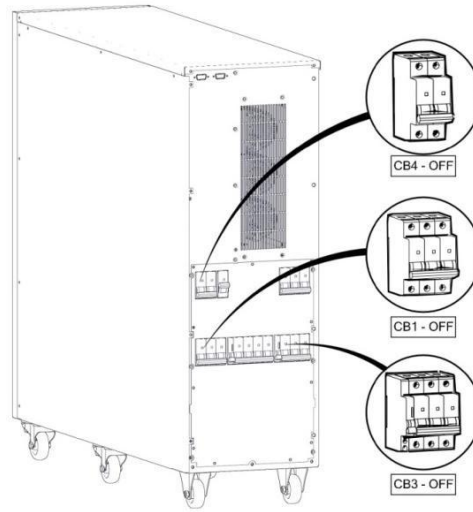
1. Turn CB2 to the closed circuit (ON) position.



2. Stop the UPS using the front panel.

**Ana Menü > Kontrol > Şifre > Durdur (Main Menu>Control>Password>Stop)**

3. Turn CB1, CB3 and CB4 to open circuit (OFF) position.



**FOR SECURITY, WAIT AT LEAST 5 MINUTES BEFORE OPENING THE DEVICE AFTER PUTTING THE DEVICE IN MAINTENANCE BYPASS MODE.**

#### 4.1.4 Shutting Down the UPS Completely

1. Turn off the loads connected to the device.
2. Stop the device using the front panel.

**Ana Menü > Kontrol > Şifre > Durdur (Main Menu>Control> Password> Stop)**



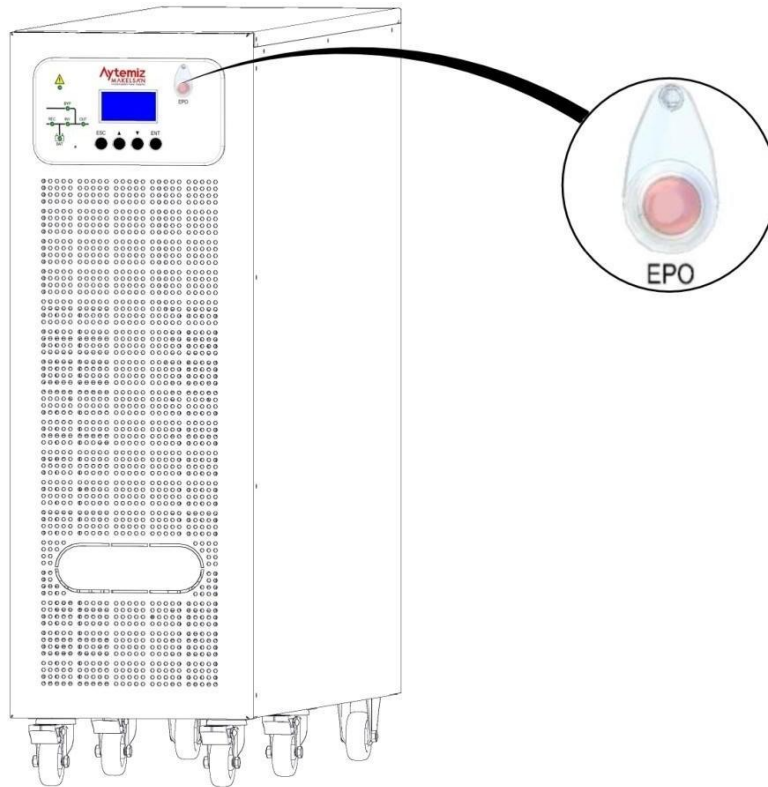
3. See from the LED indicators and LCD screen on the front panel that the device has switched to bypass mode.
4. Turn the output (CB3), battery (CB4), input (CB1) and external battery (CB5) switches to the open circuit (OFF) position, respectively.



**MAKE SURE THERE IS NO CRITICAL LOAD ON THE OUTPUT BEFORE TURNING OFF THE DEVICE COMPLETELY.**

#### 4.1.5 EPO(EmergencyPowerOFF)

When the EPO button is pressed, the UPS turns off the rectifier and the inverter respectively. If the output circuit breaker shutdown option is also set, the UPS is completely disconnected from the system.



#### 4.1.6 RS232 Serial Communication Installation and Inspection

Boxer series has, as standard, one RS-232 interface which supports SEC and TELNET protocols. This unit is completely isolated and safe. Using this protocol, the status of the UPS can be monitored remotely via a PC or SNMP. This connection works with any kind of option.

## 5 Events And Their Explanations

The UPS will give a sound alert when it detects any kind of problem. You can get the first information about the situation from the mimic status diagram. This may not be enough most of the time. In this case, you can reach the following warnings by using the LOG screen.

|    | Event                             | Its Explanation                                                                                                                                          |
|----|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | <b>RS232Start Command</b>         | The UPS is operated by RS232 communication software.                                                                                                     |
| 2  | <b>RS232Stop Command</b>          | The UPS is stopped by RS232 communication software.                                                                                                      |
| 3  | <b>Automatic Starting</b>         | After the batteries are depleted, with the mains return to normal, the UPS automatically restarted itself at the end of the set time.                    |
| 4  | <b>UPS opened</b>                 | The UPS main board is energized.                                                                                                                         |
| 5  | <b>Bus Not Charged</b>            | The UPS was unable to charge the bar to the desired value.                                                                                               |
| 6  | <b>Fast Battery test</b>          | Quick battery test started.                                                                                                                              |
| 7  | <b>Battery Status test</b>        | Battery capacity test started.                                                                                                                           |
| 8  | <b>Auto Battery test</b>          | Periodic battery test started.                                                                                                                           |
| 9  | <b>Battery Discharge finished</b> | When the UPS is operating in battery mode, the batteries fall below the cut-off voltage limit.                                                           |
| 10 | <b>Overloading finished</b>       | The UPS remained on overload for more than the set time limit. The loads will be transferred to the bypass line.                                         |
| 11 | <b>Battery Test finished</b>      | Battery test finished. Information about the test result can be seen from the battery Status Menu.                                                       |
| 12 | <b>Battery Test was cancelled</b> | During the battery test, the test was canceled manually or by the device because the criteria were not met.                                              |
| 13 | <b>Switch to Bypass Command</b>   | The direction of the static switches has been changed towards the Bypass line manually from the UPS commands menu.                                       |
| 14 | <b>No battery</b>                 | The UPS determined that the batteries were not available at the time of operation.                                                                       |
| 15 | <b>MaintenanceBypassSig. ON</b>   | The Maintenance Bypass switch has been activated.                                                                                                        |
| 16 | <b>Ambient Temp. Anormal</b>      | UPS operating ambient temperature is out of accessible limits.                                                                                           |
| 17 | <b>Inverter Overheated</b>        | The inverter temperature went beyond out of the specified limits, if there is an increase of 5 degrees, the load will be transferred to the Bypass line. |
| 18 | <b>PFCOverheated</b>              | The rectifier temperature is out of the determined limits, if there is an increase of 5 degrees, the load will be transferred to the Bypass line.        |

# BOXER S SERIES 10-20 KVEVENTS AND THEIR EXPLANATIONS

|    |                                 |                                                                                                                                                                               |
|----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19 | <b>STSOverheated</b>            | The temperature of the static transfer switches went out of the specified limits, the UPS will be stopped.                                                                    |
| 20 | <b>OutputFL1Over Current</b>    | Short-circuit protection has activated in output L 1 phase.                                                                                                                   |
| 21 | <b>Output FL2OverCurrent</b>    | Short-circuit protection has activated in output L 2 phase.                                                                                                                   |
| 22 | <b>OutputFL3Over Current</b>    | Short-circuit protection has activated in output L 3 phase.                                                                                                                   |
| 23 | <b>BypassVoltage Bad</b>        | Bypass voltage went beyond the limits when UPS is in bypass mode, the UPS will switch to normal mode if temperature and load condition are normal; if not it will stop.       |
| 24 | <b>BypassFrequencyBad</b>       | Bypass frequency went beyond the limits when UPS is in bypass mode, the UPS will switch to normal mode if temperature and load condition are normal; if not it will stop.     |
| 25 | <b>Coil Over Heated</b>         | There is overheating in the UPS inverter or rectifier windings.                                                                                                               |
| 26 | <b>Inverter Voltage Bad</b>     | Inverter voltage limit values were exceeded. The load will be transferred to the bypass line, the UPS will return to normal mode when the inverter voltage returns to normal. |
| 27 | <b>Overload</b>                 | The output load value has exceeded 105%, the overload counter will work, and if the UPS is in normal mode, the charge will turn off until the load returns to normal.         |
| 28 | <b>MaintenanceBypassSig.OFF</b> | Maintenancebypassswitch was deactivated.                                                                                                                                      |
| 29 | <b>Ambient Temp. Normal</b>     | UPS operating ambient temperature has returned to accessible limits.                                                                                                          |
| 30 | <b>Mains Voltage Normal</b>     | The mains voltage is within the specified limits, the UPS will switch to normal mode.                                                                                         |
| 31 | <b>Inverter Temp. Normal</b>    | The inverter temperature is within the specified limits, if the load and other temperatures are normal, the UPS will switch to normal mode.                                   |
| 32 | <b>PfcTemp. Normal</b>          | The rectifier temperature is within the specified limits, if the load and other temperatures are normal, the UPS will switch to normal mode.                                  |
| 33 | <b>Charge Temp. Normal</b>      | The charge/boost module temperature is within the specified limits, the charge will be activated again.                                                                       |
| 34 | <b>STSTemp. Normal</b>          | The temperature of the static transfer switches is within the specified limits.                                                                                               |
| 35 | <b>BypassVoltage Normal</b>     | Bypass voltage is within specified limits.                                                                                                                                    |
| 36 | <b>BypassFrequency Normal</b>   | Bypass frequency is within specified limits.                                                                                                                                  |
| 37 | <b>CoilTemp. Normal</b>         | The temperature in the UPS inverter or rectifier windings has returned to normal.                                                                                             |
| 38 | <b>Inverter Voltage Normal</b>  | The inverter voltage is within limits, the UPS will return to normal mode.                                                                                                    |
| 39 | <b>Load Normal</b>              | Output load has decreased below 100%, if the charge is turned off, it will be activated again.                                                                                |

# BOXER S SERIES 10-20 KVAEVENTS AND THEIR EXPLANATIONS

|    |                                    |                                                                                                                                 |
|----|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 40 | <b>BYP.ThyristorL1K . Circuit</b>  | The UPS detected a short circuit in the Bypass L 1 thyristor. UPS will be shut down.                                            |
| 41 | <b>BYP.Thyristor L2K. Circuit</b>  | The UPS detected a short circuit in the Bypass L 2 thyristor. UPS will be shut down.                                            |
| 42 | <b>BYP.Thyristor L3K.Circuit</b>   | The UPS detected a short circuit in the Bypass L 3 thyristor. UPS will be shut down.                                            |
| 43 | <b>UPSThyristor L1K.Circuit</b>    | The UPS detected a short circuit in the inverter L 1 thyristor. UPS will be shut down.                                          |
| 44 | <b>UPSThyristor L2K.Circuit</b>    | The UPS detected a short circuit in the inverter L 2 thyristor. UPS will be shut down.                                          |
| 45 | <b>UPSThyristor L3KCircuit</b>     | The UPS detected a short circuit in the inverter L 3 thyristor. UPS will be shut down.                                          |
| 46 | <b>UPSThyristorL1A. Circuit</b>    | The UPS detected that the inverter L 1 thyristor could not be activated. The load will be transferred on the bypass line.       |
| 47 | <b>UPSThyristor L2A.Circuit</b>    | The UPS detected that the inverter L 2 thyristor could not be activated. The load will be transferred on the bypass line.       |
| 48 | <b>UPSThyristor L3A.Circuit</b>    | The UPS detected that the inverter L 3 thyristor could not be activated. The load will be transferred on the bypass line.       |
| 49 | <b>BYP.ThyristorL1 A. Circuit</b>  | The UPS detected that the Bypass L 1 thyristor could not be activated. The load will be transferred onto the inverter line.     |
| 50 | <b>BYP.ThyristorL2A . Circuit</b>  | The UPS detected that the Bypass L 2 thyristor could not be activated. The load will be transferred onto the inverter line.     |
| 51 | <b>BYP.ThyristorL3A . Circuit</b>  | The UPS detected that the Bypass L 3 thyristor could not be activated. The load will be transferred onto the inverter line.     |
| 52 | <b>Parallel Sys.Freq.Seq.Error</b> | The input phase sequence of one or more of the UPSs operating in parallel does not match.                                       |
| 53 | <b>Starting From Battery</b>       | The UPS has been commanded to start from battery.                                                                               |
| 54 | <b>Parallel Starting Error</b>     | One or more of the parallel connected UPSs could not be prepared for operation.                                                 |
| 55 | <b>Inverter Error</b>              | The UPS failed to prepare the inverter voltage when it was started.                                                             |
| 56 | <b>Output Closed</b>               | All static transfer switches are deactivated. Loads cannot be energized.                                                        |
| 57 | <b>NormalMode</b>                  | The UPS works in normal mode. loads are energized via rectifier-inverter line.                                                  |
| 58 | <b>Battery Mode</b>                | The UPS works in battery mode. loads are energized via battery-inverter line.                                                   |
| 59 | <b>BypassMode</b>                  | The UPS works in bypass mode. loads are energized via bypass line.                                                              |
| 60 | <b>MaintenanceBypassMode</b>       | The UPS is operating in maintenance bypass mode, loads are energized via maintenance bypass line.                               |
| 61 | <b>ParallelMode</b>                | 2 or more UPS operating in power sharing mode. The load is fed through the inverter lines of the UPSs.                          |
| 62 | <b>TestMode</b>                    | The UPS has switched to battery test mode, loads are working in resource sharing mode over the rectifier-battery-inverter line. |

# BOXER S SERIES 10-20 KVAEVENTS AND THEIR EXPLANATIONS

|    |                                   |                                                                                                                           |
|----|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 63 | <b>Switch to Inverter Command</b> | Switch to inverter command was given from the front panel.                                                                |
| 64 | <b>Output Voltage error</b>       | A voltage was detected at the output of the UPS at the time of start-up. The UPS was stopped.                             |
| 65 | <b>PFCStop Command</b>            | Rectifier detected abnormal condition during operation, the UPS gave stop command.                                        |
| 66 | <b>Starting Command</b>           | Starting command was applied from the UPS command menu.                                                                   |
| 67 | <b>Stopping Command</b>           | Stopping command was applied from the UPS command menu.                                                                   |
| 68 | <b>UPSStopped</b>                 | The UPS was stopped.                                                                                                      |
| 69 | <b>BypassError</b>                | The UPS went into bypass mode too many times in a short time, the UPS will be shut down.                                  |
| 70 | <b>Parameter Changed</b>          | Device related parameters have been changed from the Service menu.                                                        |
| 71 | <b>Batteries Changed</b>          | Battery installation date has been changed. Battery statistics will be reset.                                             |
| 72 | <b>Load Effect transfer</b>       | The load that the inverter cannot handle has activated. The loads will be transferred to the bypass line.                 |
| 73 | <b>Parallel Command</b>           | A UPS operating in parallel mode has received a command to change the status of the static switches.                      |
| 74 | <b>ParallelCAN Com.Absent</b>     | Slave UPS, operating in parallel mode, cannot reach master device from CAN BUS. If the UPS is working, it will shut down. |
| 75 | <b>ExternalStarting Command</b>   | The UPS, operating in parallel mode, has received a start command from another UPS.                                       |
| 76 | <b>ExternalStopping Command</b>   | The UPS, operating in parallel mode, has received a stop command from another UPS.                                        |
| 77 | <b>Ext.BYP.Switch Command</b>     | The UPS, operating in parallel mode, has received a command to transfer the load to the bypass line.                      |
| 78 | <b>Ext.UPSSwitch Command</b>      | The UPS, operating in parallel mode, has received a command to transfer the load to the inverter.                         |
| 79 | <b>ParallelCom.FE Error</b>       | Slave UPS, operating in parallel mode, detected an error in the incoming current sharing information.                     |
| 80 | <b>Inverter Created</b>           | After the UPS was started, the inverter voltage reached the desired value. It can feed the loads through the inverter.    |
| 81 | <b>Battery Temp. Anormal</b>      | The battery temperature is out of the limits, the batteries may be damaged.                                               |
| 82 | <b>EPO was pushed</b>             | The EPO button was pushed.                                                                                                |
| 83 | <b>Battery Low</b>                | The battery capacity fell below the preset battery low limit while the UPS was operating in battery mode.                 |
| 84 | <b>Parallel485 Com.Absent</b>     | RS485 communication is not available between parallel systems.                                                            |
| 85 | <b>STSOver Current</b>            | Overload time from bypass line has expired.                                                                               |

|     |                             |                                                                                                              |
|-----|-----------------------------|--------------------------------------------------------------------------------------------------------------|
| 86  | <b>BYP.Phase Seq. Error</b> | It was detected that the phase sequence was reversed in the mains at the time of UPS start-up.               |
| 87  | <b>Output DCV. Error</b>    | Inverter DC voltage limit was exceeded. The loads will be transferred to the bypass line.                    |
| 88  | <b>OutputOffset Error</b>   | In parallel systems, one or more phases of the slave device's output are not connected to the master device. |
| 89  | <b>BatteryTemp. Normal</b>  | Battery temperature is within limits.                                                                        |
| 90  | <b>PFCP busY. Voltage</b>   | Positive bus voltage limit exceeded.                                                                         |
| 91  | <b>PFCNbusY. Voltage</b>    | Negative bus voltage limit exceeded.                                                                         |
| 92  | <b>PFCFL1Over Current</b>   | Short circuit protection has been activated in the rectifier L 1 phase.                                      |
| 93  | <b>PFCFL2Over Current</b>   | Short circuit protection has been activated in the rectifier L 2 phase.                                      |
| 94  | <b>PFCFL3Over Current</b>   | Short circuit protection has been activated in the rectifier L 3 phase.                                      |
| 95  | <b>Single Stopping</b>      | A command was given to the UPS, operating in parallel, to stop itself, apart from the parallel system.       |
| 96  | <b>Master Changed</b>       | In the parallel system, the UPS became the master device.                                                    |
| 97  | <b>ParallelID Conflict</b>  | In the parallel system, the ID value of one or more devices is the same.                                     |
| 98  | <b>Stop all of them</b>     | The command to stop the entire parallel system was given from the front panel.                               |
| 99  | <b>PowerSupply Error</b>    | A fault signal was received from power supply fault locator circuit.                                         |
| 100 | <b>Generator mode</b>       | A signal was received from generator mode input of dry contact board. It will go into generator mode.        |

## 6 TECHNICAL SPECIFICATIONS TABLE

| Technical Specifications          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Power                             | 10kVA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 15kVA | 20kVA |
| Active Power                      | 8Kw                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12kW  | 16kW  |
| INPUT                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| Input Voltage Range               | 220/380VAC-15%+18%3P +N+PE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
| Input Power Factor                | Under full load >0,99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| Input Frequency Range             | 45-65Hz(Adjustable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| Rectifier                         | IGBT Rectifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
| Input Harmonic Distortion (THDi)  | <4%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| OUTPUT                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| Output Voltage                    | 220/380VAC 3P+N ±1% Static,±1% Unbalanced                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| Recovery                          | Under 0% - 100% - 0% load, output tolerance is up to 5%, return to 1% band <40 msec.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
| Yield                             | up to 93%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| Output Frequency Range            | Synchronous with mains at 50 Hz ±0.5%, 50 in battery mode Hz ±0.2%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| Output Harmonic Distortion (THDv) | Linear Load (Linear) <2%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |       |
|                                   | Bridge Load (Non-Linear) <6%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
| Peak Factor (CF)                  | 3:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| Overload Capacity                 | 10 minutes at 125% load, 1 minute at 150% load.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| Protections                       | Input voltage exceeding out of tolerance, input frequency exceeding out of tolerance, phase interruption in input, output voltage exceeding out of tolerance, output frequency exceeding out of tolerance, phase interruption at output, DC component that may occur in output voltage, overload that may occur at output (outside the specified time), heating at a level that will cause temperature-related failure, high voltage that can occur at DC bus voltage, low voltage that can occur at DC bus voltage, short circuit at the output. |       |       |

| BATTERY                         |                                                                                         |    |    |
|---------------------------------|-----------------------------------------------------------------------------------------|----|----|
| Number of Batteries (12VDCVRLA) | 20                                                                                      | 30 | 40 |
| Charge Value (C)                | Nominal 0.1 C, adjustable.                                                              |    |    |
| Charging Power                  | 25% of device power                                                                     |    |    |
| COMMUNICATION                   |                                                                                         |    |    |
| Connection                      | RS232Standard,RS485and SNMPAdapter option                                               |    |    |
| Dry Contact                     | Optional                                                                                |    |    |
| Protocol                        | SEC,TELNET                                                                              |    |    |
| CERTIFICATES                    |                                                                                         |    |    |
| Quality                         | ISO9001                                                                                 |    |    |
| LVD/Security                    | IEC62040-1,IEC60950                                                                     |    |    |
| EMC                             | IEC62040-2                                                                              |    |    |
| GENERAL                         |                                                                                         |    |    |
| Operating Temperature           | Between 0 °C ~ 40 °C (0 ~ 25 °C for batteries)                                          |    |    |
| Storage Temperature             | Between-15°C ~ 45 °C(-10~60°C for batteries)                                            |    |    |
| Protection Class                | IP20                                                                                    |    |    |
| Chassis                         | Anti-Static Paint Protected                                                             |    |    |
| Moisture                        | 0-95%                                                                                   |    |    |
| Working Height                  | <1000m,Correction Factor 1.<2000m,Correction Factor>0,92,<3000m;Correction Factor >0,84 |    |    |
| Event Log                       | 500detailed events.(Status Menu is recorded)                                            |    |    |
| Paralleling                     | Parallel power increases up to 8                                                        |    |    |
| EPO (Emergency Power Off)       | Standard                                                                                |    |    |
| Isolation Transformer           | Optional                                                                                |    |    |
| Weight Without Battery          | 103kg                                                                                   |    |    |
| Dimensions (WxDxH)              | 490x805x1190mm                                                                          |    |    |

## 7 WARRANTY

### 7.1 1Warranty Conditions

- Our products are guaranteed for two years from the date of delivery against malfunctions that may occur due to production, material and workmanship errors. Such defaults will be covered without demanding the labor cost and the cost of the replaced parts due to such malfunctions.
- Whether there are usage errors in malfunctions or not is determined by a report to be issued by the service stations, in case the service station is not available, by a report to be prepared by the seller, dealer, agency, representative, importer or manufacturer-manufacturer of this product, respectively.
- The repair time of the defective product is maximum twenty working days. This period starts from the date when the product is delivered to one of the seller, dealer, agency, representative, importer and manufacturer. In the event that the product fails during the warranty period, the time to be spent in repair is added to the warranty period. Provided that the defect of the product cannot be fixed within ten working days, the manufacturer-producer or the importer has to allocate another product with similar characteristics to the use of the consumer until the product is completely repaired.
- Although the consumer uses his/her right to repair;
  - From the date of delivery of the product to the consumer, on the condition that it stays within the warranty period, at least four times within a year or six times within the warranty period determined by the manufacturer-producer and / or importer, as well as the fact that these failures cause not to benefit from the product continuously.
  - Exceeding the maximum time required to repair the goods,
  - In the event that it is determined by a report to be prepared by the service station of the company, in case there is no service station available, a report to be prepared by one of the seller, dealer, agency, representative, importer or manufacturer-producer, respectively that the repair of the defect is not possible, the consumer may request free replacement of the product, a cost refund or a discount at the rate of defects.
- During repairs or changes within the scope of warranty, the consumer is obliged to show the warranty card if requested.
- Before receiving the products sent by courier, you should definitely check the outer packaging for damage. In case of an existing damage, a "damage determination report" should be prepared by the cargo officer. (For example: When the product arrived, it was checked and found that it was damaged.)
- We kindly request you to inform the MAKELSAN center after the damage determination report is prepared. The product received from the cargo against the signature means that it has been received undamaged and complete.

- For “plug and play” products that do not have on-site service, repairs are made at the MAKELSAN factory or at the nearest service point, according to the direction to be made from the MAKELSAN center. The defective product is delivered to the nearest service point by hand or to the contracted cargo company to be sent to the MAKELSAN factory, in its “original packaging”, according to the guidance to be made from the MAKELSAN center. For the malfunctions covered under the warranty scope, the cargo fee is under the responsibility of MAKELSAN company provided that it is delivered to the contracted cargo company.
- Unless requested by the Service, the device should be sent as being boxed in its original packaging. It is obliged to keep the original packaging of the device in order to use it while shipping the device in case of repair. Otherwise, no responsibility will be accepted in case of problems to be experienced.
- All products, as being malfunctioned, that are sent by hand or by cargo will fulfill the necessary transportation conditions. (Such as antistatic protector, bubble bag and box, etc.) The product must have a readable barcode serial number on itself. Otherwise, it is not covered in the scope of the warranty.
- In the products to be sent by courier, it is essential that the products be sent with the delivery note, and that the product serial / model / fault information be written on the dispatch note (example: defect form) to be sent and that the contents of the package match the products specified in the dispatch note. Otherwise, the cargo will not be accepted.
- In the use of the Warranty Certificate supplied with MAKELSAN branded products, it accepts and undertakes to comply with the obligations determined in accordance with the Consumer Protection Law. With No. 6502 and the 29029 Warranty Certificate Regulation, issued based on this law.

## 7.2 Cases Out of Warranty Coverage

- The defects to be caused by the use of the product contrary to the items in the user manual or outside the specified ambient conditions (temperature, humidity, etc.) are not covered by the warranty scope.
- Software, hardware, interface accessories or consumables to be used with the product and other than those recommended, displacement, incorrect and insufficient maintenance, calibration or misuse, operation contrary to the environmental specifications published for the product, inadequate air installation, use of the product in an excessively humid or hot environment, operating in a corrosive environment harmful to electronic circuits, defects and malfunctions to be caused by accidents, impacts, electricity, transportation, natural disasters, including but not limited to those listed, makes the product out of warranty.
- In the general examination to be made during the acceptance of the defect, some problems that make the product out of warranty may not be understood. If these defects are revealed after the detailed examination to be made with technical service equipment, the product is returned to the customer.

- Those products, which are out of warranty, are intervened at the request of the customer, within the possibilities of the authorized service. Those products, which are out of warranty, and cannot be repaired, are returned to the customer.
- Damages and malfunctions to be caused by intervention on the product, internal or external tampering, attempts to repair and replacement of parts without MAKELSAN's approval, and those malfunctions that may occur as a result of an unauthorized service/dealer/person/organization intervenes are not covered by the warranty scope. Deterioration, breakage, scratching of the outer surfaces of the products (cabinet-cover-front panel) and aging, wear to be caused by time and its usage and malfunctions to be caused dusting are not covered by the warranty scope.
- In the event that the original serial numbers, warranty labels and seals on the product are removed or destroyed, the product is out of warranty scope. No guarantee is given that the products are suitable for any purpose other than those specified in the introduction or user manual.
- Shelf life of VRLA batteries is 6 months at 15 °C ambient temperature, and 3 months at 25 °C ambient temperature.
- It is obligatory to commission the purchased system within 3 months.

## 8 CONTACT INFORMATION



Uninterrupted Power Supplies

**[www.makelsan.com.tr](http://www.makelsan.com.tr)**

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