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Introduction

Thank you for choosing our **Uninterruptible Power Supply** product for protection of your electrical devices.

The L2 Series Uninterruptible Power Supply (UPS) was manufactured using the latest technology. We recommend you to read this manual to learn many specifications and superior features of your new UPS.

We do pay attention to the environmental impacts of this product. Example of some of our measures to protect environment are as follows:

- ✓ *Product design is based on economical size and high efficiency approach.*
- ✓ *Quality and uninterruptible power is provided without distorting source voltage.*
- ✓ *Manufacturing is carried out in our ISO 14001:2004 Environment Management System certified factory.*
- ✓ *It is ensured that battery and metal wastes are disposed properly.*

To discover the entire range of our products and to receive up-to-date information, please visit our web site:

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Before you call us...

If you require assistance for a failure or any related issues, call our **Technical Support Center**.

For quick assistance, please have the following information available.

Model	L2 Series
Power (KVA)
Serial Number
Purchase Date
Installation Date
Mains Voltage/Frequency
Battery Quantity x Ah
Company

The L2 Series products are protected under a patent. Therefore, implementation of our proprietary technology by competitors is not permitted. Given the relevant standards and technology, device hardware configuration may be changed without notice. Technical specifications and dimension information are not binding unless formally confirmed by us.

Important Safety Information (Be Sure To Read)

Life Safety



- ! Use UPS in an access-restricted room (EN 62040-1-2).*
- ! The UPS has its own power source (batteries). Therefore, there may be live power at the output even if the mains voltage is disconnected.*
- ! There is dangerous level of voltage in the UPS, and it must be opened by an authorized service personnel only.*
- ! The UPS must be grounded in adherence to the rules.*
- ! Do not expose batteries to extreme high temperatures to prevent fire risks.*
- ! Do not attempt to open the battery. Chemical composition of the battery may be dangerous for your skin and eyes.*
- ! Adhere to all regulations that govern disposal of waste batteries.*

Safe Handling



- ! Be careful while carrying loads. Do not carry heavy loads without help.*
- ! Slide roller devices on smooth and even surfaces.*
- ! Do not use slopes with angles over 10°.*
- ! Adhere to following recommendations about load weights.*
 - ! An adult can carry loads up to 18 kg weight.*
 - ! Two adults can carry loads up to 32 kg weight.*
 - ! Three adults can carry loads up to 55 kg weight.*
 - ! Use pallet jack, forklift or similar devices for carrying loads over 55 kg weight.*
- ! Keep packaging material for use in case the UPS has to be transported to an authorized service or to another location.*

UPS Safety



- ! The UPS must be safeguarded against voltage overload or short circuit voltages by means of a readily accessible circuit breaker.*
- ! Do not operate the UPS at environment temperatures or relative humidity that exceeds the limits given in the manual.*
- ! Never operate the UPS in liquid environments or in overly humid environments.*
- ! Never allow water or foreign substances to penetrate in the UPS.*
- ! Strictly do not clog ventilation grids of the UPS.*
- ! Never expose the UPS to direct sunlight or a direct heat source.*
- ! The UPS' useful life is 10 years.*

Special Safety Information

- ! UPS' electrical connections must be provided as shown in the manual.
- ! Be sure to check the compatibility of the UPS power to mains voltage and to total load that will be supplied with UPS.
- ! UPS must be stored in a dry environment between -10°C and 45°C temperature prior to commissioning.
- ! UPS must be operated at least once a month continuously for 24 hours to charge the batteries.
- ! Because the battery life commences on the manufacture date, storage life is limited.
- ! UPS is designed to operate at height, operating environment temperature, relative humidity rate, and handling and storage conditions described in UPS manual.
- ! Special design and protection measures are essential for non-normal operating conditions. Such non-normal operating conditions include:
 - Harmful fume, dust, abrasive dust;
 - Humidity, vapor, bad weather, frost;
 - Explosive dust and gas mixtures;
 - Extreme temperature changes;
 - Poor ventilation;
 - Exposure to direct or radiated temperature from other sources;
 - Intensive electromagnetic fields and harmful radioactive levels;
 - Insects, pests, fungus, etc.



Change and Recycling of Batteries

- ! Battery poses electric shock hazard and short circuit risks.
- ! Replace only with batteries of same type, capacity, number and dimensions.
- ! Battery replacement must be carried out by trained service personnel only.
- ! Remove metal accessories such as wristwatch, ring, etc. and wear rubber shoes and gloves to prevent accidents and personal injury.
- ! Use tools with isolated handles.
- ! Make sure that battery connections are not grounded by mistake.
- ! Do not leave tools or metal pieces on batteries.
- ! **Batteries must be recycled.** Return mutilated batteries to any recycling facility or to company where you initially purchased them along with packaging material of new batteries.



UPS must be installed in strict adherence to following standards:

- ✓ HD 384.4.42 S1: Electrical Installation in Buildings, Chapter 4: Safety Protection Group 42: Protection Against Thermal Effects
- ✓ HD 384.4.482.S1: Electrical Installation in Buildings, Chapter 4: Safety Protection Group 48: Choosing Protective Measures Against External Effects – Section 482: Fire Protection in Places Bearing Special Risks or Dangers

1. Overview

1.1. L2 Series

UPS Cabin

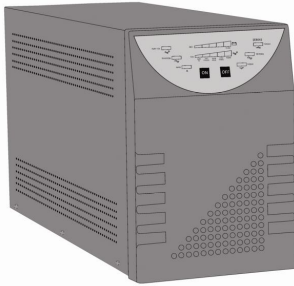


Figure 1.1 UPS Cabin

Dimensions	
UPS Power (WVA)	Width x Height x Depth (mm)
1400/2000	175 x 265 x 485
2100/3000	

Backup Time (min) (100% load/50% load)	Net Weight (kg)	
	2KVA	3KVA
0/0	15	17
1/2		23
2/4	21	25
3/7	23	27
4/11	25	

Table 1.1 UPS Cabin Dimensions and Weights

External Battery Cabin (optional)

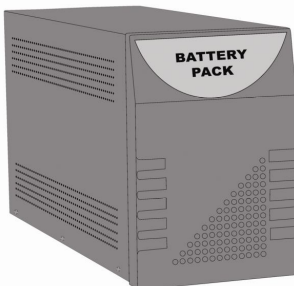


Figure 1.2 External Battery Cabin

Dimensions	
Width x Height x Depth (mm)	
175 x 265 x 485	

Backup Time (min) (100% load/50% load)	Net Weight (kg) (UPS Cabin/External Battery Cabin)	
	2KVA	3KVA
0/0	15/9	17/9
4/11		17/26
7/21	15/26	17/29
12/34	15/29	17/39
18/53		27/39
22/63	15/39	
34/94	25/39	

Table 1.2 External Battery Cabin Dimensions and Weights

1.2. Front Panel

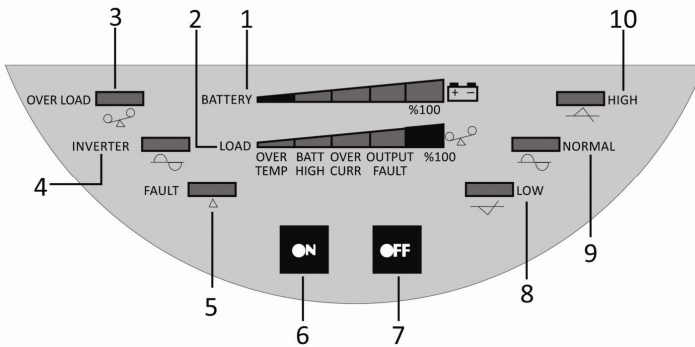


Figure 1.3 Front Panel

No.	INDICATOR	Explanation
1	BATTERY	This shows the remaining battery life in percentage.
2	LOAD	This shows the percentage of power utilized by loads connected to output in comparison to total UPS output capacity.

No.	LED	On	Off
3	OVERLOAD	See: '3.6 Overload'	UPS is loaded 0% to 100%.
4	INVERTER	UPS is operating on battery.	UPS is not operating on battery.
5	FAULT	See: '3.7 Audible Warnings'	No malfunction or warning.
8	LOW	Mains voltage is at least 10% lower than normal voltage.	Mains voltage is within the tolerance limits.
9	NORMAL	Mains voltage is within the tolerance limits.	Mains voltage is out of tolerance limits.
10	HIGH	Mains voltage is at least 10% greater than normal voltage.	Mains voltage is within the tolerance limits.

No.	BUTTON	>3 seconds (Press and hold longer than 3 seconds)	<3 seconds (Press less than 3 seconds)
6	ON	✓ Switch On (when fully switched off)	✓ On (if output is off) ✓ Turn on/off audible warning
7	OFF	✓ Switch off fully	✓ Turn off output

Table 1.3 Front Panel Operation

2. Installation

2.1. Placement

UPS Placement

- ! Do not install the UPS on an uneven ground or in outdoors.
- ! Note that ventilation holes on side covers must not be clogged.
- ! Do not install the UPS in places with liquid installation or places subject to fire risks.
- ! Do not install the UPS in places where it will be exposed to direct sunlight or affected of heat sources.
- ! Heed to minimum distance requirement between the UPS and nearby walls and/or devices.
- ! Do not install the UPS in places where it may be subject to vibration or impacts.
- ! Do not install the UPS in environments with excessive (too high or too low) humidity levels.
- ! Do not operate the UPS in dusty or filthy environments.



Do not leave any materials on or around the UPS to facilitate and expedite maintenance and repair operations.



The UPS may overheat if distance requirements are not met. Moreover, this may complicate maintenance and repair operations.



The UPS must be installed in a room with restricted access (Authorized Personnel Only).

External Battery Cabin Placement



Heed to UPS placement instructions when placing the external battery cabin.

2.2. Back Panel

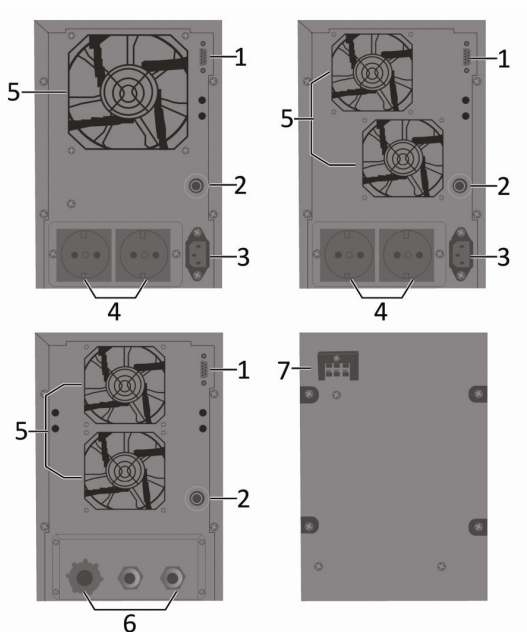
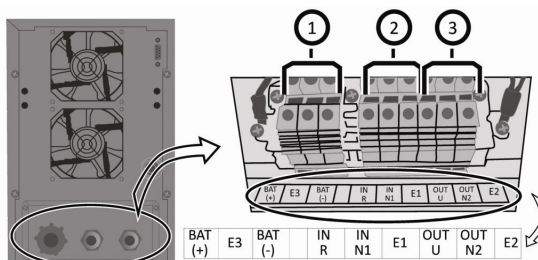


Figure 2.1 Back Panel (Check back panel that corresponds to model you have chosen)

No.	Part	Function
1	RS232 Port	This ensures that the UPS can be monitored using a computer software.
2	Input Fuse	This is used to protect UPS against overload and short-circuit.
3	Input Socket	This is the socket for mains connection.
4	Output Sockets	These are the sockets for load connections.
5	Fan(s)	These are used for cooling the UPS.
6	Contact Cover	This is used to prevent the contact with live contacts.
7	External Battery Cabin Contacts (on the cabin)	This is where cable connections are made if (optional) external battery cabin is used.

Table 2.1 Back Panel Operation

2.3. Connection (for the model with connection terminal)



No.	Connection Terminal	BAT (+)	E3	BAT (-)
1	BATTERY (External Battery Cabin)	(+) pole	Earth	(-) pole
2	INPUT	IN R	IN N1	E1
		R-phase	Neutral	Earth
3	OUTPUT	OUT U	OUT N2	E2
		U-phase	Neutral	Earth

Table 2.2 Connection Terminal Operation

2.4. Communication with PC

You can monitor the UPS over RS232 port using *UPSilon2000* software that you will install on your computer (this is optional and therefore UPS software and RS232 cable must be ordered prior to use of this option). Using this software, you can monitor real-time UPS voltage and current information, battery information, malfunctioning warnings, etc. and save long term logs with graphics. In addition, software shuts down your computer and/or server safely in case of any electrical power outage.

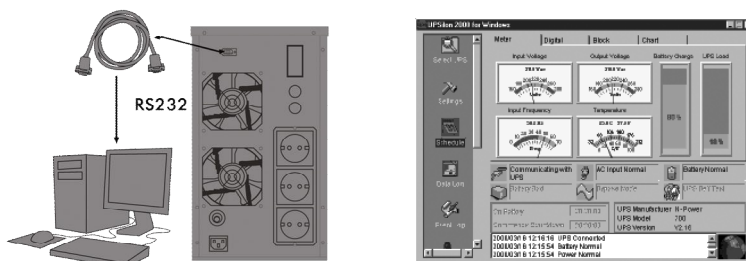


Figure 2.3 RS232 Communication

3. Operation

3.1. Switching On

1. Switching on mains voltage:

- a. For models with patch cable: Firstly, plug in the patch cable to mains socket (Figure 3.1), later plug it in to input socket (Figure 3.2).
For models with terminals: Make sure that cable connections were provided appropriately.

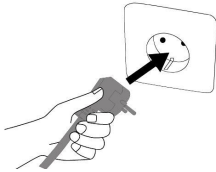


Figure 3.1

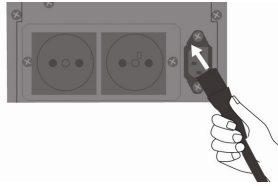


Figure 3.2

- b. Press ON button until an audible warning is heard, meanwhile observe that NORMAL LED is turned on (Figure 3.3). Along with audible warning, all LED lights flash and UPS starts up. Observe that battery indicator LED lights are on and briefly press ON button (Figure 3.4).

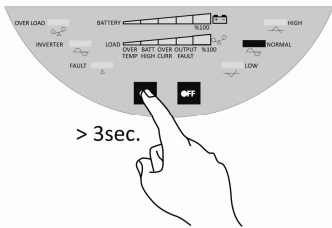


Figure 3.3

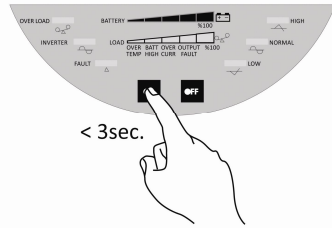


Figure 3.4

- c. If mains voltage and mains frequency are within the limits, NORMAL LED will be on constantly (Figure 3.5), if they are out of limits, NORMAL LED will not turn on (See: Starting on Battery). At this stage, you can connect your loads to output sockets (for models with patch cable) (Figure 3.6) or turn on your loads connected to UPS output (for models with contact).

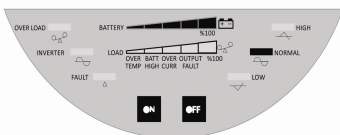


Figure 3.5

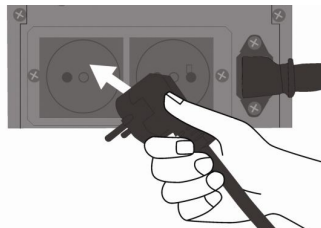


Figure 3.6

2. Cold Start:

- a. The UPS has *Cold Start* feature. It means that the UPS can be started on battery without mains connection. Press **ON** button until an audible warning is heard, meanwhile observe that **NORMAL** LED is turned on (Figure 3.7). Along with audible warning, all LED lights will flash and UPS will start up. Observe that battery indicators LED lights are on and press **ON** button briefly (Figure 3.8).

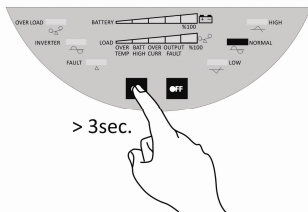


Figure 3.7

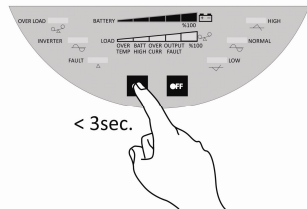


Figure 3.8

- b. Following 2 consecutive audible warnings, **INVERTER** LED will turn on (Figure 3.9). At this stage, you can connect your loads to output sockets (for models with patch cable) (Figure 3.10) or turn on your loads connected to UPS output (for models with contact).

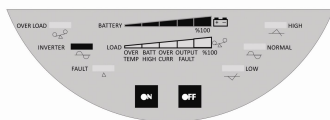


Figure 3.9

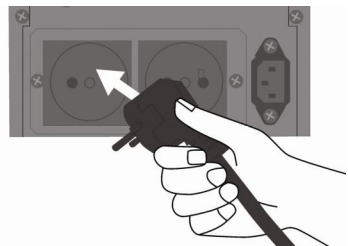


Figure 3.10



The UPS will also start up on battery in cases where –although a mains connection is available, mains voltage and/or mains frequency is out of tolerance limits.

3.2. Switching Off

1. **If UPS is in Normal Operation Mode:** Turn off your loads safely. Briefly press **OFF** button (Figure 3.11) and observe that **NORMAL** LED turns off. Press and hold **OFF** button until audible warning silences (Figure 3.12) and observe that battery indicator LED lights turn off.

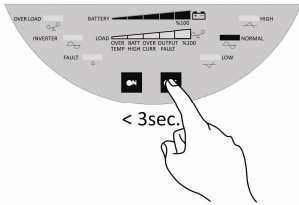


Figure 3.11

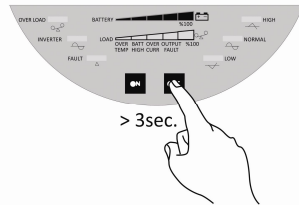


Figure 3.12



Before fully switching off the UPS operating in normal mode, switch off the output by briefly pressing OFF button.



When disconnecting cable connection of models with patch cable, remove input socket first and later the mains socket (Figure 3.13).

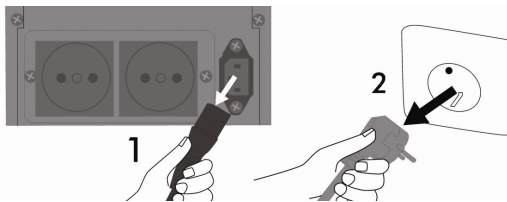


Figure 3.13

2. **If UPS is in Battery Operation Mode:** Turn off your loads safely. Briefly press **OFF** button and observe that **INVERTER** LED turns off (Figure 3.14). Press and hold **OFF** button until audible warning silences and observe that battery indicator LED lights turn off (Figure 3.15).

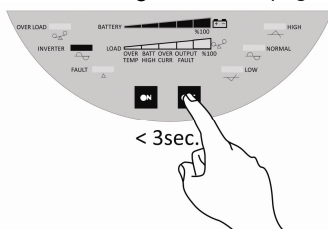


Figure 3.14

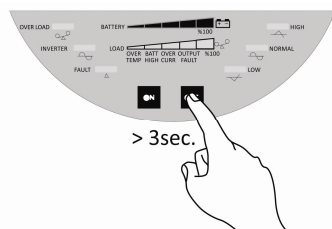


Figure 3.15



Before fully switching off the UPS operating in battery mode, switch off the output by briefly pressing OFF button

3.3. Operation Modes

L2 Series has *Line-Interactive UPS* technology. When mains voltage and mains frequency are within the tolerance limits, UPS performs *Automatic Voltage Regulation (AVR)* and over current protection, transfers the mains voltage to loads and meanwhile charges the batteries. When mains voltage and/or mains frequency are out of tolerance limits, UPS begins supplying loads with battery power (*discharge*). Switching to battery operation will not be sensed by the loads.

Thanks to its *Automatic Voltage Regulation (AVR)* feature, L2 Series is able to reduce/increase voltage transferred to output by 15% when mains voltage increased/decreased at percentages between 10% to 25%. If mains voltage is greater or less than normal voltage by more than 25%, UPS begins supplying loads from battery. L2 Series UPS has following operation modes.

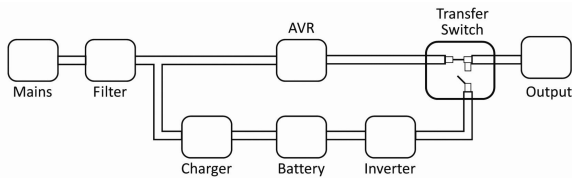


Figure 3.16 Mains Interactive UPS Operation Principle

Normal Mode

Mains voltage is fed through filter and *Automatic Voltage Regulation (AVR)* units and transferred to output via transfer switch. Meanwhile, battery charger unit charges batteries with voltage supplied from input unit.

Battery Mode

Battery charger and *Automatic Voltage Regulation (AVR)* units does not operate. Inverter unit generates appropriate voltage by discharging battery power. Generated voltage is transferred to output via output switch.

Sleep Mode

This operation mode ensures that battery capacity is used efficiently and battery life is maintained. UPS operates on *Sleep* mode in following cases:

- a. When the UPS is connected to mains, it begins operating in *Sleep* mode. Batteries are charged even if the UPS is not switched on.
- b. When the load percentage is less than 5% during battery mode, the UPS will switch off the output and switch to *Sleep* mode.



Output switch off when load percentage is less than 5% during battery operation can be cancelled (See: '3.8 Settings').

- c. When the battery capacity is 0%, the UPS will switch off the output and switch to *Sleep* mode. Once mains voltage and mains frequency are within the tolerance limits again, UPS will begin running in normal mode automatically.

3.4. Indicators

Battery Indicator






Remaining Battery Capacity	LED Display
Between 0% and 25%	BATTERY  %100
Between 26% and 50%	BATTERY  %100
Between 51% and 75%	BATTERY  %100
Between 76% and 90%	BATTERY  %100
More than 91%	BATTERY  %100

Figure 3.1 Battery Indicator Table

Load Indicator


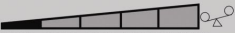
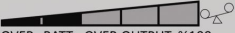
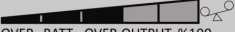
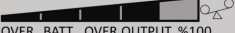
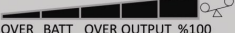
Loading Ratio	LED Display
Between 0% and 9%	LOAD  OVER BATT OVER OUTPUT %100 TEMP HIGH CURR FAULT
Between 10% and 25%	LOAD  OVER BATT OVER OUTPUT %100 TEMP HIGH CURR FAULT
Between 26% and 50%	LOAD  OVER BATT OVER OUTPUT %100 TEMP HIGH CURR FAULT
Between 51% and 75%	LOAD  OVER BATT OVER OUTPUT %100 TEMP HIGH CURR FAULT
Between 76% and 95%	LOAD  OVER BATT OVER OUTPUT %100 TEMP HIGH CURR FAULT
More than 96%	LOAD  OVER BATT OVER OUTPUT %100 TEMP HIGH CURR FAULT

Figure 3.2 Load Indicator Table



Battery indicator's 0%-25% LED and capacity used indicator's more than 96% LED are red and indicate that the device is at dangerous operation limits.

3.5. Automatic Battery Test

The UPS self diagnoses the batteries by running on battery automatically at every 30 days. The testing process is run when UPS is in normal operation mode. At the end of the test, the condition of the batteries (*usable or not*) is provided. When the Battery Test is negative, please contact with the *Technical Service*.



'The 'Automatic Battery Test' may also be run after long power outages. In this case the 'Battery Failure' test result should be disregarded.



An 'Automatic Battery Test' on batteries charged for at least 10 hours should be regarded.

3.6. Overload

During overload; UPS may run in normal operating conditions for below defined-periods. UPS shuts the output when the below defined periods are exceeded.

Loading Ratio (%)	Power (VA)		Running Time
	2000	3000	
100-110	2000-2200	3000-3300	30 minute
110-125	2200-2500	3300-3750	60 seconds
125-150	2500-3000	3750-4500	10 seconds
>150	>3000	>4500	3 seconds

Table 3.3 Overload Table

3.7. Audible Warnings

Subject	Audible Warning	Warning Info
Battery	2 times consecutively in 60 seconds	Operation on Battery
	Constant	Battery Low
	Constant	Battery Malfunction
Overload	Constant	Overload (<i>See: '3.4 Overload'</i>)
Error/Failure	Constant	Over temperature, Battery High, Over Current, Output Fault

Table 3.4 Audible Warnings Table

3.8. Settings Menu

The UPS has a settings menu where *Mains Frequency*, *Mains Voltage*, *Sleep Mode* and *Battery Charging Current* settings can be changed. This menu consists of the following:

Mains Frequency: Mains frequency options are 50Hz and 60Hz.

Mains Voltage: Mains voltage options are 220VAC, 230VAC and 240VAC.

Sleep Mode: *Sleep Mode* options are On and Off.

Battery Charging Current: Battery charging current options are 0.7A, 2A, 4A, 6A and 10A.

The UPS must be connected to mains and must be fully switched off before entering to *Settings Menu*. Press and hold OFF button until an audible warning is heard, meanwhile observe that *NORMAL* led turns on (Figure 3.17). Along with the audible warning, *INVERTER* led, load and battery indicators first step led lights will turn on (Figure 3.18) (if the mains frequency is 50Hz) and UPS will start up. Load indicator led can be progressed by pressing ON button and battery indicator LED can be progressed by pressing OFF button until desired settings achieved.

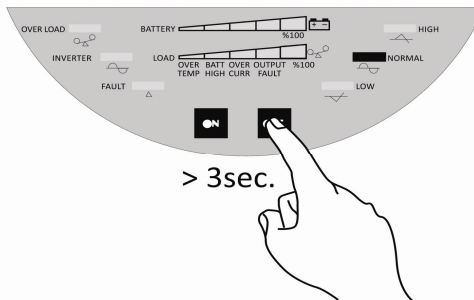


Figure 3.17

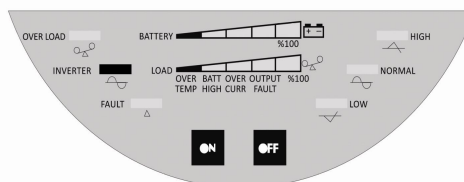


Figure 3.18

SETTINGS MENU		LED DISPLAY	
		LOAD INDICATOR	BATTERY INDICATOR
FREQUENCY	50Hz		
	60Hz		
VOLTAGE	220VAC		
	230VAC		
	240VAC		
SLEEP MODE	ON		
	OFF		
BATTERY CHARGING CURRENT	0.7A		
	2A		
	4A		
	6A		
	10A		

Table 3.3 Settings Table



Settings menu must be used by authorized personnel only. Please contact our Technical Support Center for detailed information.

4. Troubleshooting



Make sure you go through the table below before contacting the Technical Service.



Cable connections and fuse checks must be performed by authorized personnel only.

	Possible Failure	Solution
UPS is not turned on and the lights are not lit	ON button is pressed too shortly.	Press and hold ON button for at least 3 seconds.
	Batteries run out fully.	UPS must be connected to mains.
	Mains voltage and/or frequency is out of limits.	Mains voltage and frequency must be checked.
	Fuse blown.	Press the fuse inwards (Figure 4.1).
	Problem with patch cord connections.	Battery connections must be checked.
	Contact the Technical Service.	
UPS operates on battery constantly	Mains voltage and/or frequency is out of limits .	Mains voltage and frequency must be checked.
	Fuse blown.	Press the fuse inwards (Figure 4.1).
	Problem with mains connection.	Mains connection must be checked.
	Contact the Technical Service .	
Error LED is on and UPS is constantly emitting audible warning	'Battery Failure' warning	See: '3.5 Automatic Battery Test'.
	'Overheat' warning.	Check UPS loading ratio and environment temperature. Switch off UPS and wait for a while.
	'Over-current' warning	Switch UPS off and on again.
	'Output Fault' warning	Switch UPS off and on again.
	'Battery High' warning	Contact the Technical Service .
Overload LED is on and UPS is constantly emitting audible warning	'Overload' warning	Check loading ratio. Reduce loads connected to UPS output.
Battery operation time is too short	Batteries are not fully charged	Try again once batteries are charged for at least 8 hours.
	Battery charger or batteries are malfunctioned.	Contact the Technical Service.

Table 4.1 Troubleshooting Table

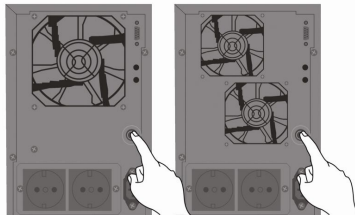


Figure 4.1 (See the one that corresponds to model you have chosen)

5. Maintenance



The UPS should only be opened by authorized personnel.



The UPS must be completely off during maintenance. Mains and battery connections must be disconnected and batteries must be moved away from the UPS.



Follow the 'Important Safety Information' and 'Installation' instructions during the maintenance.

- ! The electronic boards and the fans should be cleaned regularly.
- ! The ventilation holes on the lid should be cleaned regularly.
- ! The UPS body should be cleaned with a soft and moist cloth.
- ! The sturdiness of cable connections, screws and sockets should be checked.
- ! The board supply voltages should be measured and checked.
- ! The components on the boards and the other hardware should be checked.
- ! The voltages of the batteries should be checked by measuring the voltages separately.
- ! The accuracy of the calibration and the adjustments should be checked.
- ! The dust, the heat and the temperature in the UPS room should be checked.
- ! The instructions in the '*Important Safety Information and Installation*' should be complied.

6. Technical Specifications

TECHNICAL SPECIFICATIONS		
L2 SERIES		
Power (KVA)	2	3
INPUT		
Voltage	220 / 230 / 240 Vac	
Voltage tolerances	-25% / +20%	
Frequency	50 / 60 Hz (Auto detect)	
Frequency tolerances	± 10%	
OUTPUT (on mains)		
Voltage	220 / 230 / 240 Vac	
Voltage tolerances	± 10%	
Frequency	50 / 60 Hz	
Frequency tolerances	± 10%	
OUTPUT (on battery)		
Voltage	220 / 230 / 240 Vac (sine wave)	
Voltage tolerances	± 2%	
Frequency	50 / 60 Hz (selectable)	
Frequency tolerances	± 0.1%	
Power factor	0.7	
THDv	≤ 3% (linear load)	
Crest factor	3:1	
OVERLOAD CAPACITY		
110%	30 min.	
125%	60 sec.	
150%	10 sec.	
> 150%	3 sec.	
GENERAL		
Technology	Line-interactive	
Control	Microprocessor	
Communication	SNMP(Optional), RS232	
Transfer time	< 5ms	
Remote monitoring	SNMPView, UPSilon	
Cold start	Standard	
ENVIRONMENT		
Operating temperature	from 0 °C up to +40 °C (from 20 °C to 25 °C for maximum battery life)	
Relative humidity	0% - 85% (without condensation)	
Maximum altitude	≤ 2000 m	
Noise level	< 45 dB (A)	
UPS CABINET		
Dimensions (W x D x H) (mm)	175 x 485 x 265	
Weight (kg)	15	17
Degree of protection	IP20	
Colour	RAL7012	
BATTERY CABINET		
Internal battery quantity	4	
Internal battery capacity (Ah)	7-9	
External battery cabinet socket	Standard	
STANDARDS		
Safety	EN 62040-1	
EMC	EN 62040-2	
UPS LIFETIME	10 years	
ELEN reserve the right of changing information in this without report.		

AUTHORIZED TECHNICAL SERVICE

