UNINTERRUPTIBLE POWER SOURCE

UPS-1000

UPS-1000L

UPS-1000LP

OPERATING MANUAL

Quality control system on the development and production complies with requirements ISO 9001:2015

Thank you for the purchase of uninterruptible power source

This Operating Manual is meant for familiarization with the device, the safety requirements, and the order of operation and maintenance of Uninterruptible Power Source (UPS) (hereinafter: device; UPS; UPS-1000; UPS-1000L; UPS-1000LP).

Note - UPS-1000; UPS-1000L; UPS-1000LP abbreviations are used when characteristics of devices types are different.

ATTENTION! ALL THE REQUIREMENTS OF THIS OPERATING MANUAL ARE COMPULSORY!

The device complies with the requirements of:

- EN 62040-1;
- EN 62040-2;
- EN 55011;
- EN 61000-4-2.

Harmful substances in concentration more than allowed are absent.

Quantity of hazardous substances does not exceed maximum allowable concentration.

Connecting, control and maintenance of the product must be carried out by qualified experts, familiar with this Operating Manual.

On condition of compliance with all the requirements of this Operating Manual and regulations the product is safe for use.

Terms and abbreviations:

Automatic voltage regulator (AVR)
Accumulator battery (ACB)
Uninterruptible Power Source (UPS)
ACB capacity, AHr (C)

1 RECOMMENDATIONS FOR PURCHASER

• Carefully unpack the device, make sure that no details are left inside the box. Check the device for damage. If the device is damaged during transport, please contact the firm carrying out the delivery; if the device does not operate, contact the seller immediately.

• Check the package contents.

• Do not turn the device on immediately after bringing it into the room from the environment with negative temperatures! The extracted device should be kept at room temperature for at least 4 hours.

• Before installing and using the device, carefully read this manual and retain it for future reference during all period of use

2 SAFETY MEASURES AND PRECAUTIONS

Before using this device, be sure to read the safety rules:

• Before the operation, accumulator battery charging should be carried out (ACB not included) for a minimum of 12 hours. To do this, refer to items 5.3 - 5.6 of this Manual.

• If the battery is completely discharged or the UPS is not used for three months or more, you must also perform a full battery charge. Failure to comply with the rules of the storage batteries will reduce their lifetime.

• Power of the switched load should not exceed the rated wattage specified in Table 3 of technical characteristics of the UPS.

• Install the UPS in rooms with controlled temperature and good ventilation. During operation, casing temperature may rise, which is a normal phenomenon.

• Do not open the battery: released electrolyte is harmful to skin and eyes.

• Unplug the UPS from the mains before connecting / disconnecting the load cables to the UPS to reduce the risk of electric shock.

• In the event of an emergency, turn off the UPS and disconnect the power cord.

• Never open the device casing – there is high voltage inside.

• Only qualified specialists should perform maintenance of the device.

• **IT IS STRICTLY FORBIDDEN** TO USE THE UPS IN THE FOLLOWING CONDITIONS:
  - **IN THE DUSTED AND CONTAINING FLAMMABLE GAS PREMISES;**
  - **AT THE TEMPERATURE HIGHER THAN 40°C AND LOWER THAN 0° C;**
  - **AT RELATIVY HUMIDITY LEVEL HIGHER THAN 80%**
  - **IN DIRECT SUNLIGHT OR IN CLOSE PROXIMITY TO HEATING ELEMENTS;**
  - **IN PLACES WITH HIGH VIBRATION LEVEL;**
  - **OUTDOORS.**

• In case of fire, use only powder fire extinguisher, use of water can lead to electric shock.

• Try to install the UPS near the power outlet, and then it will be easier to turn off the device if necessary.

***Note*. It is recommended to carry out periodic maintenance of the device, as well as periodic monitoring of battery status to ensure an adequate device performance.**

Caution! The elements without insulation located inside the case have a high voltage which can cause electric shock.

3 PACKAGE CONTENTS

• Uninterruptible Power Supply (UPS) with power cords for connecting an external ACB — 1.
• Operating Manual — 1.

4 TECHNICAL DESCRIPTION

4.1 Operating Principle

• UPS-1000 series models belong to linear interactive uninterruptible power supply sources with a continuous backup time. Their operating principle is based on the conversion of stored energy of the external battery into alternate voltage of industrial frequency. The shape of the output voltage - correct sine wave.

• The main purpose - the power supply for domestic and industrial equipment critical to the shape of the input voltage (boiler equipment, automation systems, etc...).

• The device is equipped with an automatic voltage regulator (AVR). Built-in regulator allows providing the correct power supply load at an elevated / low voltage of network without switching to battery operation.

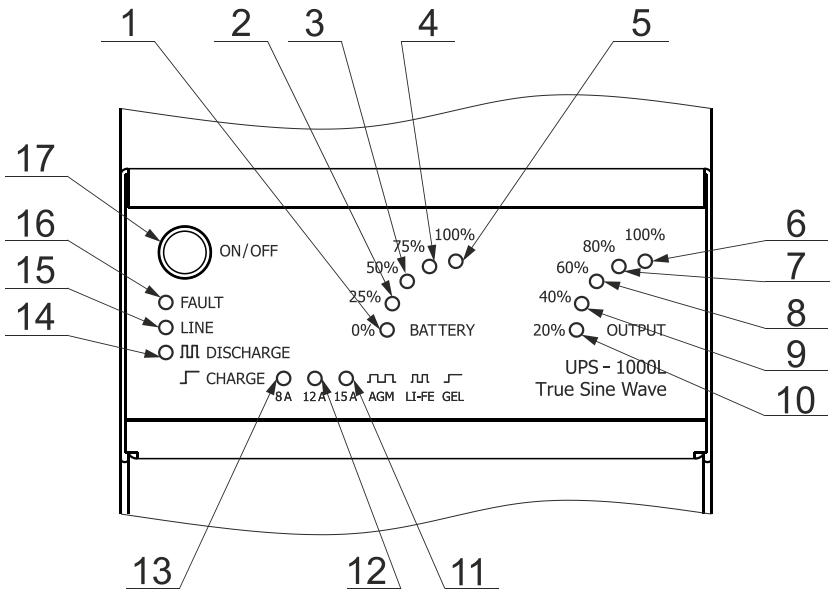
• The device uses a multi-stage intelligent battery charging scheme automatically adjusting the battery charge mode.

• The "Autostart" option provides automatic switching on when power is applied. When the input voltage is 150 V or less, and 280 and above, the "Autostart" option is not activated.

4.2 Features

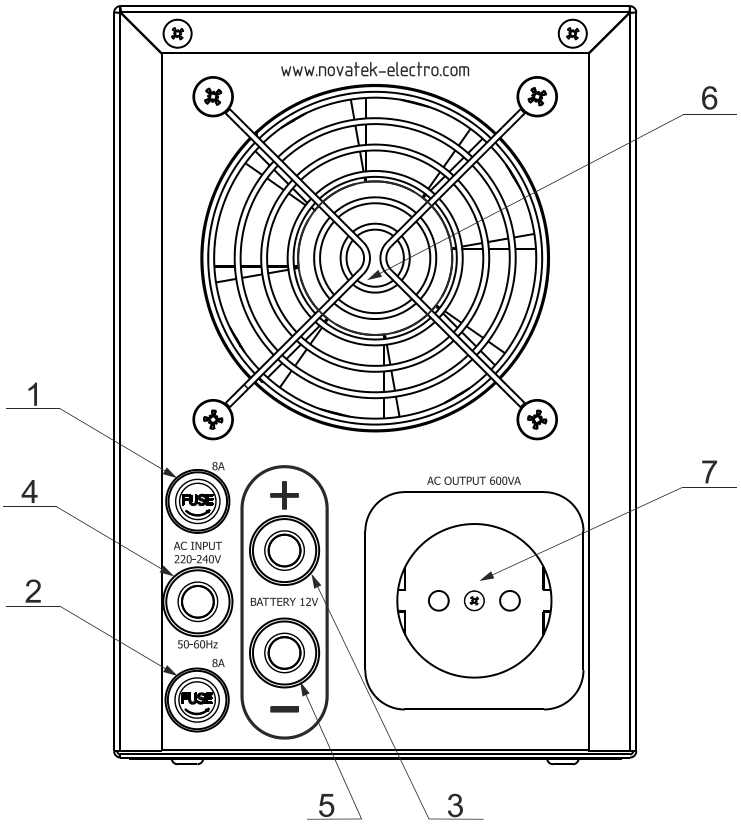
• Continuous operation with long battery life.
• Built-in regulator of AC network voltage.
• Output voltage – **the correct sine wave** (when operating from ACB).
• Microprocessor control.
• Galvanic isolation of the ACB from AC network.
• Protection against polarity reversal when connecting the ACB.
• Protection of ACB against short circuit (90A battery fuse).
• Intelligent multi-stage charger for connected external ACBs.
• Choice of ACB type (lithium $LiFePO_4$, acid AGM or GEL).
• Adaptation of the charger to the ACB type.
• Selection of the ACB charging current of three fixed values, according to the ACB manufacturer's recommendations.
• A fully charged battery disconnects from the UPS, which eliminates battery overcharging.
• Periodic analysis (once every 12 hours) of the ACB status.
• Preventive discharge for acid ACBs (once per month) for desulfation of the ACB.
• Protection against short-circuit and overload in the load connected to the UPS.
• Protection against overvoltage or undervoltage of AC network.
• Degree of protection IP20 from external influences.
• Self-test at startup.
• Indication of operating modes on the LED-display.
• Time of switching modes ≤ 5 ms.
• “Autostart” option.
• “Cold start” mode.
• Low noise level (adaptive cooling fan speed control).

4.3 Description



• 1-5 BATTERY: ACB charge level indicators;
• 6-10 OUTPUT: UPS load indicators;
• 11: charging rate indicator (15A) and ACB type indicator;
• 12: charging rate indicator (12A) and ACB type indicator;
• 13: charging rate indicator (8A) and ACB type indicator;
• 14: UPS state indicator (glowing constantly (CHARGE) – ACB charge, glowing erratically (DISCHARGE) – ACB discharge);
• 15 LINE: indicator of AC mains supply network state (glowing constantly - network is normal, glowing erratically - network is out of range of 150 – 280W, not glowing – AC supply network is absent);
• 16 FAULT: UPS fault indicator, and an indicator of output short circuit;
• 17 ON/OFF: UPS power on/off button, and settings of ACB and charging rate type.

***Figure 1** - UPS Front Panel*



- 1-2: 8A fuses for AC network;
- 3: wire (color red) for connecting the ACB positive terminal;
- 4: cable for connecting to AC mains supply network;
- 5: wire (color black or blue) for connecting the ACB negative terminal;
- 6: cooling fan;
- 7: UPS output socket (UPS 1000, UPS-1000L German standard, UPS-1000 LP French standard).

Figure 2 *- UPS Back Panel*

The intelligent multi-stage battery charger is applicable in the UPS. Charge stages are shown in Fig. 3 and Fig. 4.

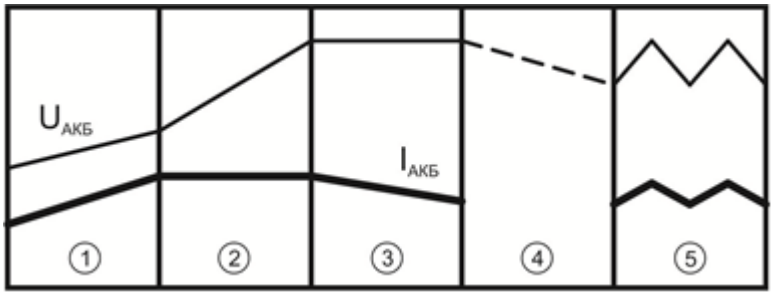


Figure 3 *- Charge stages for ACB of AGM and GEL types*

Charge stages for ACB of AGM and GEL types:

- Stage 1: soft-start - slow steady process of charging during which the charging rate is provided as long as the battery voltage does not exceed the value of 11.8 V.
- Stage 2: Bulk charge - a major part of the charging process during which the battery charges up to 80%.
- Stage 3: absorption - milking to full charge with a steady decrease of the current, enabling ACB to stock more energy.
- Stage 4: ACB test - charger performs an automatic test for ACB self-discharge. If ACB requires further charging, the of charge recovery is automatically selected. If ACB is fully charged, the product goes into a floating mode.
- Step 5: floating mode - is used for ACB that have a 100% charge. It allows to avoid overcharging or damaging the ACB. At the end of step 5 the ACB is disconnected from the charger.

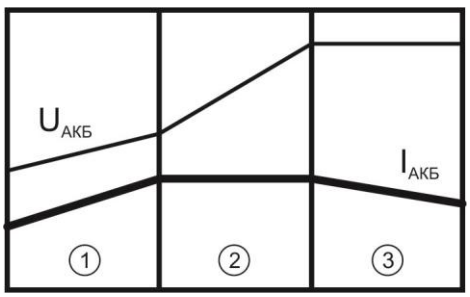


Figure 4 *- Charge stages for ACB of $LiFePO_4$ type*

Charge stages for ACB of $LiFePO_4$ type:

• Stage 1: soft-start - slow steady process of charging during which the charging rate is provided as long as the battery voltage does not exceed the value of 11.8 V.

• Stage 2: charge - a major part of the charging process during which the battery charges up to 80%

• Stage 3: milking to a full charge with a steady decrease of the charge current to 0,02C while limiting the voltage to 14.5 V, which allows ACB to stock more energy.

5 CONNECTING AND OPERATION

5.1 Safety measures

During operation and maintenance, always observe the requirements of the following regulatory documents:

"Regulations for Operation of Consumer Electrical Installations"

"Safety Rules for Operation of Consumer Electrical Installations"

"Rules on labor safety in operation of electricity generating equipment".

TO ENSURE SAFE OPERATION OF THE DEVICE IT IS STRICTLY PROHIBITED TO:

– PERFORM INSTALLATION AND MAINTENANCE **WITHOUT DISCONNECTING THE DEVICE FROM THE POWER LINE;**

– TAMPER INTO INTERNAL COMPONENTS OF THE DEVICE;

– OPERATE THE DEVICE WITH MECHANICAL DAMAGE TO THE CASE;

– EXPOSE THIS DEVICE TO WATER.

5.2 Recommendations on the choice of ACB

USING AUTOMOTIVE ACB DRASTICALLY REDUCES THE USEFUL LIFE OF ACB AND THE BATTERY LIFE OF UPS.

USE ONLY TRACTION HERMETIC BATTERIES.

RECOMMENDED CAPACITY OF ACB - FROM 60 AHr TO 500 AHr.

There are no ideal batteries for UPS. We can only talk about better or worse suitability of various types of batteries for the specific operating conditions. The best option by its characteristics for uninterruptible power source are lead-acid type batteries (AGM). These are sealed maintenance-free batteries of valve-recombination type (marked as VRLA). These ACBs are characterized by the following advantages:

• long service life;

• a large number of charge-discharge cycles (up to several hundred);

• acceptable level of security, because almost do not need intervention into the battery operation;

• insensitivity to the charging mode;

• lack of "memory effect";

• low self-discharge;

• relatively low cost.

The disadvantages of lead-acid batteries are small specific capacitance (ratio of capacitance to weight / volume of the product) compared to other types of analogues.

GEL batteries (electrolyte - gel) - the kind of lead-acid maintenance-free sealed battery with electrolyte suspended to a gel state.

The main advantages of GEL ACB:

• operation in any position (except position - terminals at the bottom);

• they do not require water refilling and electrolyte replacement;

• they do not emit harmful gases into the atmosphere;

• resistant to negative temperatures down to -45 °C;

• quite resistant to deep discharge;

• the life of the various models is from 8 to 16 years.

The gel battery is very sensitive to the charging regime. The voltage and amperage should be clearly matched to each individual battery.

A special place among the batteries belongs to lithium-iron-phosphate ACBs (LiFePO4). The use of these ACBs is more profitable and advisable compared to lead ACBs.

Advantages of lithium-iron-phosphate ACBs ($LiFePO_4$):

• possible high charge and discharge rates;

• no memory effect;

• a large number of the charge - discharge cycles (up to 2000);

• high power consumption;

• a wide range of operating temperatures (from -20 to +65 °C);

• high security level: absence of fires and explosions.

Disadvantages of lithium-iron-phosphate ACBs – high price, you need BMS (balancer - ACB protection and control system).

We strongly recommend you to:

• buy new batteries only when necessary, as they have a limited shelf life;

• acquire batteries of famous brands from reliable and trusted vendors.

• strictly adhere to the rules of transportation of the battery (to avoid falling, shaking, mechanical damage, transportation upside down, etc.), in order to avoid leakage, deformation of plates and disconnection of contacts;

• timely replace the failed battery. Otherwise, there is a possibility of failure in the calibration the UPS electronics, whereby the product will not be able to keep the load.

• maintain the temperature range of +(20…25) °C, the optimum temperature for batteries, in the room where the UPS is installed. If you use ACB at temperatures above 30 °C, battery would quickly wear out.

Also it is not recommended to overcool ACB. In the case of the storage of ACB at low temperatures (below 0 °C) before connecting to the UPS battery should be kept in the room for a few hours.

5.3 Connecting ACB

ATTENTION!!!

• It is forbidden to lengthen or shorten the UPS wire to connect ACB.

• For reliable contact you should perform tightening of bolts (M8) of ACB connection according to the battery manufacturer's recommendations.

• During connection of the UPS to the ACB a small spark may appear when you touch the power terminals.

• Before the first use of the UPS it is necessary to carry out the battery recharging.

• In case of using multiple batteries, connect the batteries in parallel (see. Fig. 5). Connecting additional batteries requires additional wires that you need to purchase separately. When connecting two or more batteries, positive terminal of one battery is connected to the positive terminal of the other, and negative terminal - with the negative terminal of the other ACB.

• Install the set (UPS + battery) in your selected location with good ventilation (there must be at least 25 cm of space around the UPS).

• Connect the UPS to the power terminals of the battery (ACB is purchased separately) using wires (3 and 5, see Fig 2.) with the correct polarity: red wire to the positive terminal, the black (blue) wire to the negative terminal.

5.4 Setting ACB type

Determine the battery type by the inscription on the case or by data sheet details of the applied battery.

• To turn on the UPS, press and hold the button 17 ON / OFF (see. Fig. 1); a beep will sound, which will end after 1 sec.

• To access the battery type setting mode, continue to hold button 17 ON / OFF for 4 sec.

• If you hold the button 17 ON/OFF, the ACB type indicator (11-13) switches to the next type every 2 seconds.

• Release the button 17 ON/OFF, in if the state of one of the ACB type indicators (LEDs 11-13, see Figure 1.) matches the data sheet details of the connected ACB (flashing - AGM, frequent blinking - LiFePO4, steady light - GEL).

• UPS will start work (the voltage will appear on the output socket 7 (see. Fig. 2).

5.5 Setting the charging rate of ACB

To select the charging rate value, use the following rule: Charging rate (A) should be at least 0.1 C, where C - capacity of ACB in AHr - is not more than the maximum value, specified in the data sheet of the applied ACB.

• The UPS must be turned on (to turn on the UPS briefly press the button 17 ON / OFF for 1 second (see. Fig. 1)).

• Press and hold the button 17 ON/OFF (see. Fig. 1); a beep will sound, which will end after 1 sec.

• To access the charging rate setting mode, continue to hold button 17 ON / OFF for 4 sec.

• If you hold the button 17 ON/OFF, the charging rate indicator (11-13) switches to the next type every 2 seconds.

• Release the button 17 ON/OFF, in if the state of one of the charging rate indicators (LEDs 11-13, see Fig. 1) matches the necessary value of charging rate for the applied ACB (8 A, 12 A, 15 A).

• UPS will save the settings and turn off.

5.6 Connecting the load and AC mains supply network, description of indicators

• Connect the consumer devices to the turned-off UPS. To do this, insert the load plug into the socket 7 (see. Fig. 2) of the UPS.

• Connect the UPS to a single-phase network via grounded cable connection 4 (see para. 2).

• Press and hold the button 17 ON/OFF (see. Fig. 1); a beep will sound, which will end after 1 sec.

• UPS will begin to work. Indicator 15 LINE (see. Fig. 1) will light up, showing that there is a mains power supply.

• Turn on the connected devices using their switches.

• Observe the five LED OUTPUT indicator, so as not to overload the UPS. 100% load is acceptable. At an overload of 110% the audible signal will turn on and 6 OUTPUT 100% indicator will glow intermittently (see. Fig. 1). After 1 minute, the UPS load will be switched off, the audio signal will go silent, 16 FAULT indicator will turn on, OUTPUT 100% indicator 6 will continue to glow intermittently. At more than 120% overload, the load of the UPS will shut down immediately. To restore the work, it will be necessary to eliminate the overload and press the button 17 ON / OFF for 1 sec.

• It is necessary to charge ACB. To do this, leave the UPS switched till the battery’s discharge. The charge level of the battery is indicated by five LED BATTERY indicator (see. Fig. 1). After a full battery charge, BATTERY 100% indicator 5 should start glowing, CHARGE LED indicator 14 (see. Figure 1) should not glow.

• At the time of transition to power supply from the battery (at loss of mains voltage or fluctuation of mains voltage below 150 V or above 280 V) UPS emits three short beeps.

• In case of mains voltage failure LINE indicator 15 (see. Fig. 1) does not glow.

• In case of mains voltage fluctuation below 150 V and above 280 V, LINE indicator 15 (see. Fig. 1) is intermittently glowing.

• At the residual battery voltage of 10.7 V - short beeps with brief pauses. After 1 minute, the load is disconnected from the UPS. At residual battery voltage of 10 V, the load of the UPS will shut down immediately. BATTERY 0% indicator 1 glows intermittently (see. Fig. 1), after the appearance of mains voltage UPS switches the load on and goes into ACB charging mode (CHARGE indicator 14 is glowing continuously).

Notes:

• In case of necessary forced shutdown of the UPS, switch off consumer devices, and then turn off the UPS, briefly pressing 17 ON/OFF button for 1 sec.

• This UPS has an autostart function, the UPS will autorun after mains voltage failure.

• If the UPS is not used for a long time, you should charge the battery every three months. We recommend you review the manufacturer's instructions for ACB care.

• If the UPS is not used for a long time, unplug it from the mains and remove the ACB, it is necessary to take measures to avoid a short-circuit of ACB terminals.

• When using a battery of two or more accumulators, they must be of the same type and capacity (if capacity is different the batteries would have different internal resistance, whereby the charge level will be uneven). See an example of parallel connection of two ACBs in Fig. 5.

• You can turn the UPS on without connecting to the network using the "Cold Start" function. To turn on the UPS, press 17 ON/OFF button briefly for 1 second. A beep will sound, and the consuming devices will be powered.

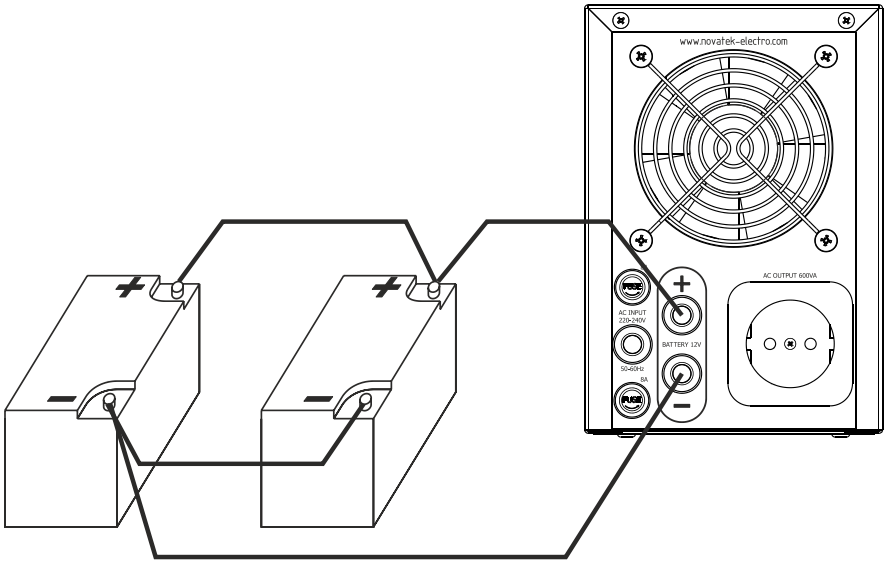


Figure 5 *- Example of parallel ACB connection and diagonal UPS connection*

• “Cold Start” function. It is not recommended to use the "Cold Start" function if a big load is connected (100%).

• When the residual battery voltage is below 10.5 V, UPS turns off.

• Temperature and humidity of the room, where the device is planned to be installed, must comply with the standards set forth in the table "Specifications".

• ACB storage conditions must comply with the requirements of battery’s manufacturer.

Estimated battery/batteries life of the uninterruptible power sources of UPS-1000 series, depending on the load and capacity of the battery / batteries are given in Table 1.

Table 1

Capacity of the battery	Load 100 W	Load 200 W	Load 300 W	Load 400 W	Load 500 W	Load 600 W
12V/60 AHr	3,5 h	1,8 h	1,2 h	0,95 h	0,75 h	0,65 h
12V/75 Ahr	5,11 h	2,55 h	1,70 h	1,28 h	1,02 h	0,85 h
12V/100 Ahr	6,82 h	3,41 h	2,27 h	1,71 h	1,36 h	1,14 h
12V /150 Ahr	10,23 h	5,11 h	3,41 h	2,56 h	2,05 h	1,71 h
12V/200 AHr	13,65 h	6,82 h	4,55 h	3,41 h	2,73 h	2,28 h

ATTENTION! The UPS is not intended for use:
- in conditions of high vibration and impacts;
- in conditions of high humidity;
- in corrosive environments where the air contains acids, bases, etc., and heavy dirt (grease, oil, dust, etc.).

If the temperature of the unit after transportation or storage is different from the temperature of the environment in which it is supposed to operate, before connecting to the mains keep the unit in operational environment for 4 hours (as moisture may condensate on the elements of the unit).

6 TROUBLESHOOTING

Table 2

Problem	Reason	Ways of elimination
UPS is connected to the mains, but indicators are not glowing.	UPS is not turned on. Input fuses were triggered. ACB is not connected.	Turn the UPS on with ON/OFF button. Disconnected UPS from the mains. Disconnect the load. Replace fuses. Connect ACB.
Mains supply is available, but UPS went to ACB mode (no sound signals)	UPS started a prophylactic monthly discharge of ACB.	This is normal. After discharging ACB to 11 V voltage (but no longer than 3 hours), UPS will go to mains mode.
UPS emits sound signals and operates autonomously even if mains voltage is normal.	1. The UPS detects the input voltage dips and emissions and switched to standby mode 2. An input fuse was triggered. 3. Poor contact in chains connecting UPS to mains network.	1. This is normal. UPS protects equipment from voltage failures in the power supply network. 2. Disconnect UPS from the network. Disconnect the load. Replace fuses. In case of normal operation check the load voltage. 3. Check the quality of UPS connection to mains network
UPS operates from network and does not operate autonomously.	1. Batteries failed. 2. The UPS repairing is necessary.	1. Replace batteries. 2. Contact the manufacturer of UPS.
UPS emits sound signal when operating from network.	Overload	Decrease voltage of a switched load.
UPS does not provide expected time of operation in autonomous mode or disconnects.	1. Batteries are discharged. 2. Batteries failed. 3. Circuit of the battery connection wires is broken.	1. Fully charge the batteries. 2. Replace the batteries. 3. Check the connection of wires leading to the battery.

If none of the following methods do not solve the problem, seek professional advice from the manufacturer.
Do not try to repair the unit by yourself!

7 TECHNICAL CHARACTERISTICS

Table 3

Characteristic / Model	UPS-1000, UPS-1000L UPS-1000LP
Full capacity (nominal value), VA	1000
Active capacity (nominal value), W	600
Acceptable overload from nominal capacity, %	≤110
Protection triggering at overload, %	120
Input voltage, V	from 150 to 280
Output voltage (mains operation), V	230 ± 10 %
Output voltage (running on ACB), V	230 (-15/+5) %
Frequency, Hz (input/output) (autodetecting)	50/50 or 60/60
Number of AVR stages	4
Number of phases	1
Efficiency factor (when running on batteries), %	75
Operating mode	constant, long-lasting

Characteristic / Model		UPS-1000, UPS-1000L UPS-1000LP
Output shape	Normal conditions and AVR	correct sine wave
	Battery mode	
Protection	AVR operating mode	from over / under-voltage, overload, short circuit, overvoltage
	Battery mode	from discharge, overload, short circuit
Type of cooling		convective; with a help of a fan
Sound signals		low battery charge, overload
Switching time, ms		<5
Battery: Connected external (purchased separately)	Type	maintenance-free sealed accumulators: lead-acid (AGM, GEL), lithium $LiFePO_4$
	Voltage, V	12 (AGM, GEL) or 13 (LiFePO4)
	Charging rate, A	8/12/15
Temperature regime, °C		from -5 to +40
Storage temperature, °C		from -15 to +55
Protection class		IP 20
Humidity, %		no more 80
Noise level, dB		no more 45
Size (width × height × depth), mm		130 × 195 × 335
Weight, kg		11.4

8 SERVICE LIFE AND MANUFACTURER'S WARRANTY

The service life of unit is 10 years. At the end of the service life contact the manufacturer.

• Shelf life – 3 years.

• The warranty period of the unit is 36 months from the date of sale.

During the warranty period the manufacturer will repair the product free of charge if the user meets the requirements of the Operating Manual.

ATTENTION! IF THE UNIT HAS BEEN OPERATED WITH VIOLATION OF THE REQUIREMENTS OF THIS OPERATING MANUAL, THE MANUFACTURER HAS THE RIGHT TO REFUSE WARRANTY SERVICE.

• Warranty service is performed at the place of purchase or by manufacturer of the unit.

• Post-warranty service is performed by the manufacturer according to the current tariffs.

• Before sending for repair, the product must be packed in its original packaging, eliminating mechanical damage.

9 TRANSPORTATION AND STORAGE

The unit in the original container should be transported and stored at temperatures from -15 to +55 ° C, relative humidity less than 80%, not in a hostile environment.

10 ACCEPTANCE CERTIFICATE

The Uninterruptible Power Source (UPS) is manufactured and made in accordance with the requirements of the current technical documentation and found fit for service.

Chief of Quality Department _____

Date of manufacture _____

Stamp

11 CLAIMS DATA

Earnest request: when returning items or transferring them for warranty (post-warranty) service, specify in detail the reason for return in the field for reclamation details.

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The Company is grateful to you for the information about the quality of the device and suggestions for its operation.

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For all questions, please, contact the manufacturer:

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Date of sale _____ **VN210909**