

POWER SUPPLY UNIT BPS-114, BPS-114-24

Operating manual

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INTRODUCTION

This operating manual (hereinafter referred to as OM) is intended to describe the structure, operating principles, technical specifications and service of Uninterruptible power supply units BPS-114, BPS-114-24 (hereinafter referred to as the Product, the BPS).

In addition to the instructions given in this document, the safety regulations and rules applicable in the field shall be observed.

Only those who have read and understood this document and those who have had special training shall be permitted to operate with the BPS according to the applicable regulations.

Terms and abbreviations:

| | |
|------|---------------------------------------|
| BPS | Power supply unit BPS-114, BPS-114-24 |
| OM | Operating manual |
| RM | Routine maintenance |
| TS | Technical service |
| SC | Short circuit |
| CL | Check list |
| SB | Storage battery |
| LFSG | Large fine-pored silica gel granular |

1 DESCRIPTION AND OPERATION OF THE PRODUCT

1.1 DESCRIPTION

Power Supply Unit BPS-114, BPS-114-24 convert input voltage of 110 V or 220 V AC, 50 Hz frequency, into output voltage of 12 V or 24 V DC.

1.2 MAIN TECHNICAL SPECIFICATIONS

Technical specifications of the Product are represented in Table 1. Overall and installation dimensions of the Product are represented in Annex A and in engineering documentation of the Product.

Table 1 – Technical specifications of the Product

| Parameter | BPS-114 | BPS-114-24 |
|---|-----------------------|-----------------------|
| | Value | |
| Input voltage, frequency 50 Hz, V | 110; 220 | |
| Output voltage, DC operation, V | 14.5 | 28.4 |
| Output voltage, DC battery operation, V | 9.5 to 14.0 | 19.2 to 28.0 |
| Rated output power, W | 160 | 320 |
| Operation time, battery operation under 11 A load, mins | min 60 | |
| Power consumption, W | 210 | 450 |
| Overall dimensions of the Product, mm | 470.5 x 305.0 x 132.3 | 412.5 x 295.0 x 215.6 |
| Weight, kg | 13.4 | 21.7 |
| Operating temperature, °C | -15 to +55 | |
| Limiting temperature, °C | -60 to +70 | |
| IP rating | IP22 | |
| Mounting | wall | |

1.3 OPERATION OF THE PRODUCT

The BPS ensures the following additional functions:

- while running from the main power system The BPS ensures automatic charge of the built-in storage battery (hereinafter – the SB), the charge level is represented on the four-segment LED charge indicator, see Figure 3;

- in case of main power system's voltage failure the BPS automatically switches the load to the SB power supply;

- when the SB charge level decreases to 1 % to 2 % (19.2 V for BPS-114-24 and 9.5 V for BPS-114), the Product disconnects the SB from the output terminal (load terminal), and disconnects all inner circuits from the SB in order to avoid its damage.

The BPS can be switched on using options, see Table 2.

Table 2 – Switching the BPS on

| Power mains | The SB | Operations |
|--|--------------------------|---|
| 50 Hz, 110; 220 V | Not meaningful | Press ON (OFF) button |
| Absent | The SB is charged | Press On (OFF) button, press Start button |
| Absent | Full discharge of the SB | Press On (OFF) button, press and hold Start button* |
| *Caution: holding a Start button for a long time when the SB is deeply discharged may lead to the SB damage. | | |

The following controls and LEDs are located on the front panels of the BPS-114 and BPS-114-24, see Figures 1–2.

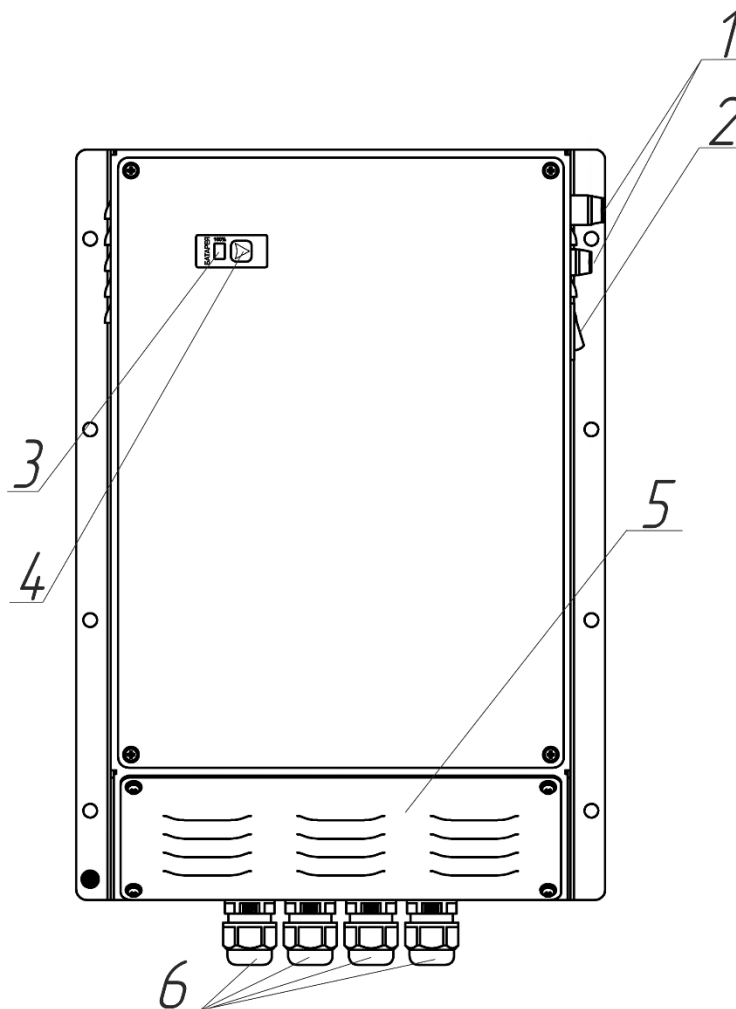


Figure 1 – Functional elements, controls and LEDs of the BPS-114

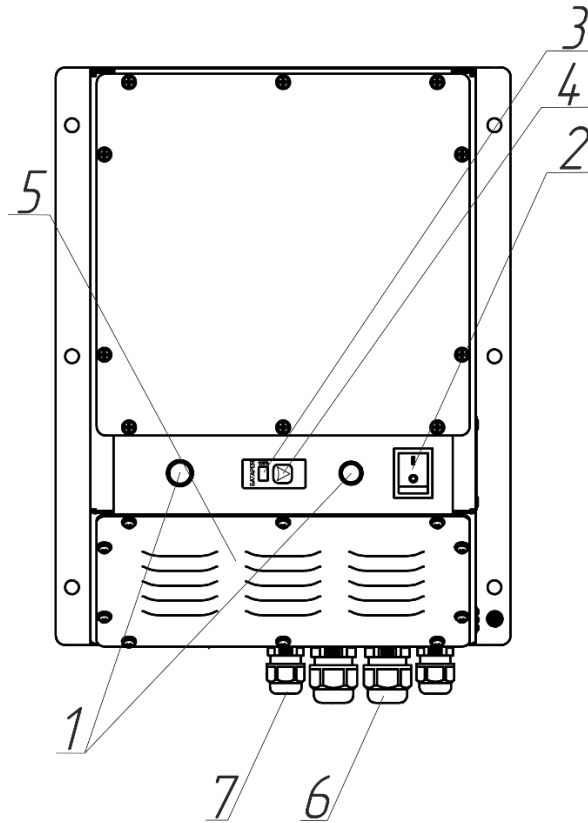


Figure 2 – Functional elements, controls and LEDs of the BPS-114-24

Description of the functional elements, controls and LEDs is represented in Table 3.

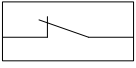
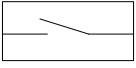
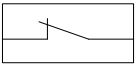
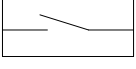
Table 3 – Description of the functional elements, controls and LEDs of the BPS-114 and BPS-114-24

| Nº | Element | Type | Description |
|----|-------------------|-------|--|
| 1 | Fuse holder | --- | To install a fuse |
| 2 | Piano type switch | --- | Power ON (OFF) |
| 3 | Display | --- | 4-segment LED charge indicator. For more details see Figure 3 |
| 4 | Button | Start | Ensures start of the BPS-114-24 when the input power mains is absent |
| 5 | Service panel | --- | To ensure convenient access to the Product elements. |
| 6 | Cable gland | MG-20 | To connect input power, load and external alarm unit |
| 7 | Cable gland | MG-16 | |

Note – Numbers (Nº) are shown in Figures 1–2.

Three types of the Product’s status display are available: by LEDs, and sound and relay alarms, see Table 4.

Table 4 – Conditions for LED and alarm actuation/operation.

| Actuation/operation conditions | Indication | | | Relay alarm |
|---|---------------|----------|---|---|
| | Colour of LED | | Built-in buzzer | |
| | Red | Green | | |
| Input voltage frequency 50 Hz, 220 V | | + | |  |
| Absence of input voltage frequency 50 Hz, 220 V | + | | Actuates when charge level decreases to 2 % |  |
| The SB charge | | + | |  |
| The SB discharge | + | | Actuates when charge level decreases to 2 % | |
| Load is powered from power mains | | + | | |
| The BPS's switch off | | | |  |
| Battery charge level is 2 % and less | Flashing | | + | |
| Malfunction, failure or rupture of the SB circuit while input voltage frequency 50 Hz, 220 V | | Flashing | | |
| Malfunction, failure or rupture of the SB circuit while absence of input voltage frequency 50 Hz, 220 V | | | | |
| Absence of battery charge while input voltage frequency 50 Hz, 220 V | | Flashing | + | |
| Notes: | | | | |
| 1 «+» means indication is present. | | | | |
| 2 Once the relay alarm actuates, relay contacts are closed, once it is deactivated – opened. | | | | |

Built-in 4-segment LED charge indicator is located on the upper panel of the Product. Number of segments represents the battery charge level, see Figure 3 and Table 5.

The indicator's colour shows an operation mode of the BPS (charge, discharge and other conditions which may affect the Product operation).

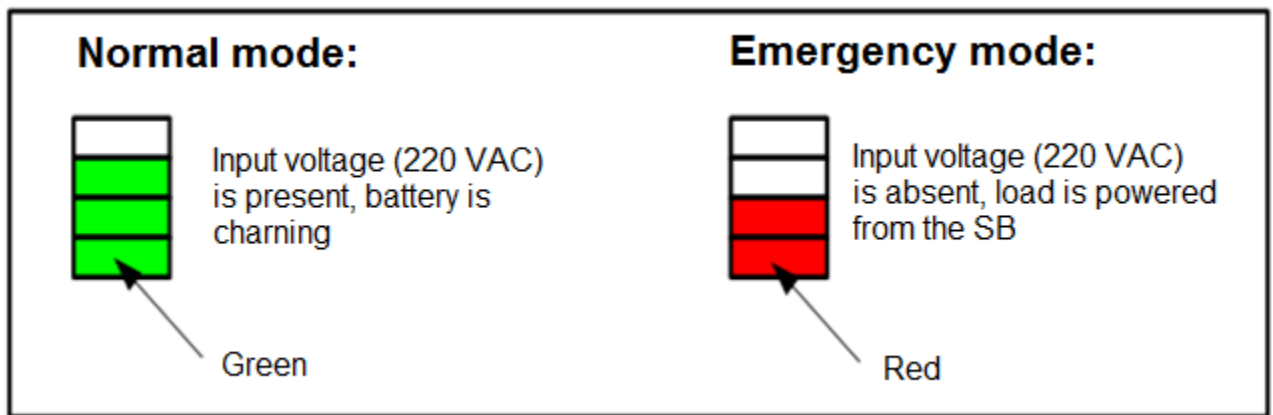


Figure 3 – Modes and colours of the BPS’s LED charge indicator

Table 5 – The SB charge level in charge and discharge modes

| Number of charge level segments (illuminated) | Charge mode (green) | Discharge mode (red) |
|---|---|----------------------|
| | Charge level relative to full charge, % | |
| 4 | 75 to 100 | 100 to 75 |
| 3 | 50 to 75 | 75 to 50 |
| 2 | 25 to 50 | 50 to 25 |
| 1 | 0 to 25 | 25 to 0 |

External connections are carried out according to Figures 4–5. Description of the connector terminals of the BPS are represented in Tables 6–7.

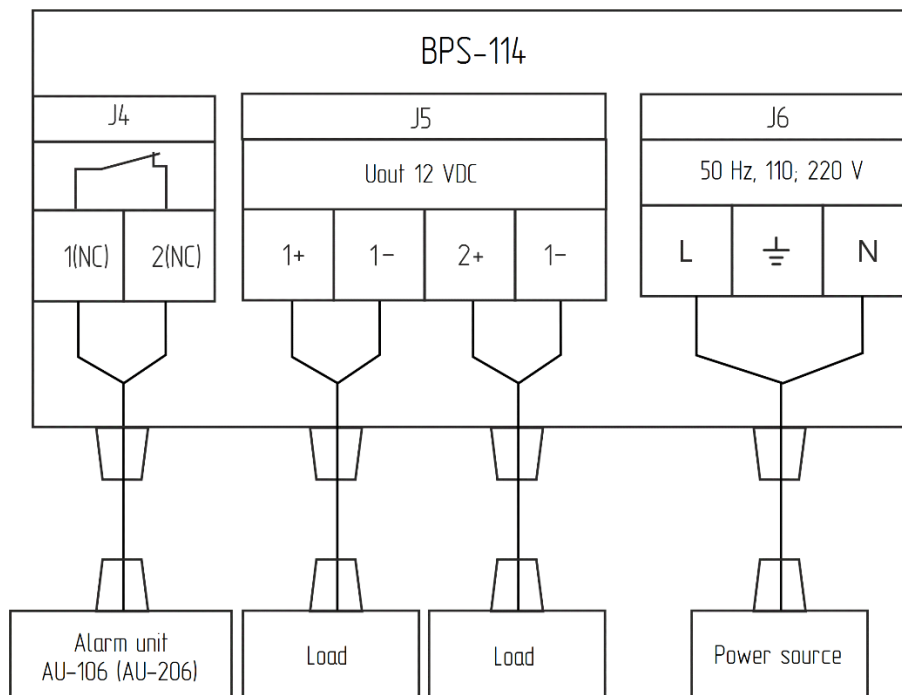


Figure 4 – The BPS-114 connection diagram

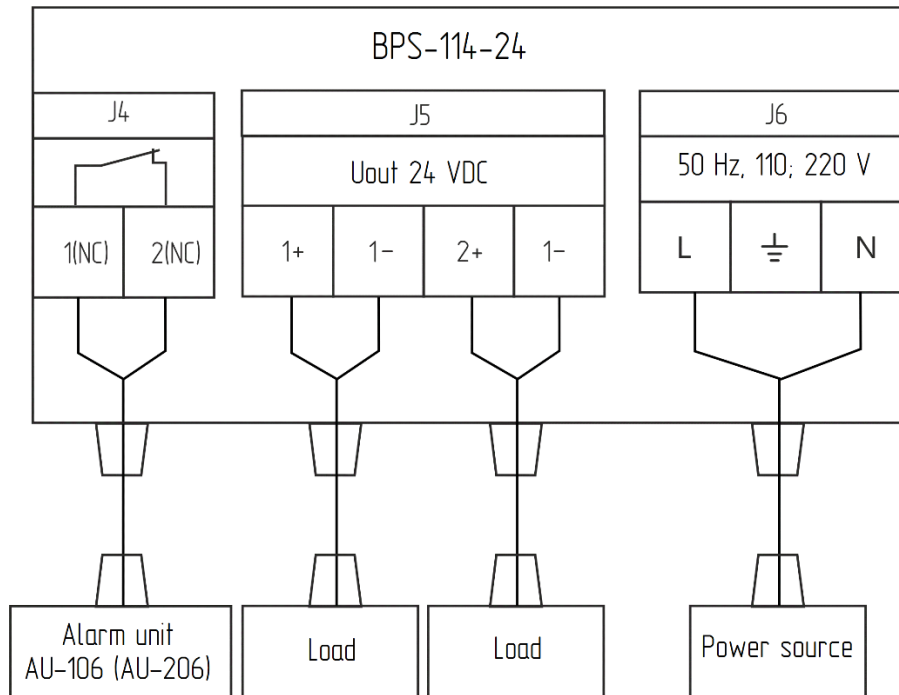


Figure 5 – The BPS-114-24 connection diagram

Table 6 – Description of the BPS-114 connector terminals



| Connector | Terminal № | Description |
|-----------|---|--------------------------------|
| J4 | 1(NC) | To connect external alarm unit |
| | 2(NC) | |
| J5 | 1+ | + 12 V DC (to connect load) |
| | 1- | 0 V |
| | 2+ | + 12 V DC (to connect load) |
| | 2- | 0 V |
| J6 | L | 50 Hz, 110; 220 V |
| |  | To connect grounding |
| | N | To connect neutral wire |

Table 7 – Description of the BPS-114-24 connector terminals

| Connector | Terminal № | Description |
|-----------|---|--------------------------------|
| J4 | 1(NC) | To connect external alarm unit |
| | 2(NC) | |
| J5 | 1+ | + 24 V DC (to connect load) |
| | 1- | 0 V |
| | 2+ | + 24 V DC (to connect load) |
| | 2- | 0 V |
| J6 | L | 50 Hz, 110; 220 V |
| |  | To connect grounding |
| | N | To connect neutral wire |

1.4 MEASUREMENT INSTRUMENTS, TOOLS AND APPLIANCES

Consumables required for the TS are represented in Table 8.

Table 8 – Consumables required for the TS

| Name and identifier of consumables | | Amount of consumables | Note |
|--|---------------------------------|-----------------------|---|
| Main | Replacement | | |
| Cleaning cloth | Cleaning cloth | 0.10 kg | To clean contamination from the surfaces |
| Rectified hydrolytic technical ethyl alcohol | Technical ethyl alcohol class A | 0.01 l | 1 To clean severe contamination from the surfaces 2 To clean surfaces of the Product in case of paint coating damage |
| Varnish | Varnish | 0.05 kg | To cover surfaces of the Product in case of paint coating damage |
| Abrasive cloth | Abrasive cloth | 0.06 x 0.06 m | To polish surfaces of the Product in case of paint coating damage |

1.5 MARKING AND SEALING

The nameplates displaying a serial number, date of manufacturing, weight, protection degree, power supply voltage and power consumption are located on the Product.

The sealing of the Product and package is not provided.

1.6 PACKAGING

The Product is packed in a corrugated board box and inner packaging ensuring its transportation and storage at the warehouse.

Transport packaging is also used as a returnable packaging for transportation of the Product to the repair location and back.

The sealing of the package is not provided.

2 USAGE OF THE PRODUCT

2.1 OPERATIONAL CONSTRAINTS

The Product's installation shall be provided in accordance with overall and installation dimensions.

Select the installation site in compliance with operational constraints (operating temperature and protection code – IP).

| |
|---|
| <p>Caution! Distance between the installation site and magnetic compass shall not be less than 1 m</p> |
|---|

Perform full charge and discharge cycle of the storage battery at least once a month to ensure long life and correct operation of the battery.

2.2 USAGE PREPARATIONS OF THE PRODUCT

2.2.1 Safety features

While preparing the Product for usage observe it visually and check the absence of mechanical damage.

Connection to power mains shall be provided only in compliance with input power requirements.

Before connecting the Product shall be switched off and have a proper grounding.

While using the Product the staff shall follow “The technical rules for operation of electric installation” and “Safety rules for operation of electric installation” while testing electrical circuits and insulation resistance.

2.2.2 Visual check procedure

Before switching the Product on a user shall:

- observe visually the cable integrity and initial position of the controls on the front panels;
- check the absence of dust and dirt on the Product casing; clean with a soft cloth if necessary;
- check reliability of cable connections to the Product.

2.2.3 Switching the Product on

While connecting the BPS and preparing it for operation follow the steps below:

- switch on a circuit breaker on the power mains switchboard;
- switch on a power button on the BPS.

Transfer a piano type switch to “OFF” position to switch the Product off.

Caution! The Product has an integrated short circuit (hereinafter referred to as the SC) and overload protection. Once the SC or overload occurs, the Product automatically switches off and actuates the relay alarm. Provide the following steps to restart the operation:

- a) if the SC occurred in the BPS itself, switch the BPS off and replace the fuse;
- b) if the SC occurred in the input or output circuits (load circuits), follow the steps below:
 - switch the Product off using piano type switch;
 - remove the cause of the SC or overload;
 - wait for at least 30 sec (until the protective thermal fuses cool down);
 - switch the Product on again using the piano type switch;
 - if the piano type switch’s backlight on the BPS casing works, the Product is operating normally.

2.3 USAGE OF THE PRODUCT

To switch the BPS on:

- switch on a circuit breaker on the power mains switchboard;
- switch on a power button on the BPS.

Once an indicator is glowing green, the BPS is operating normally.

3 TECHNICAL SERVICE

3.1 GENERAL DESCRIPTION

The technical service (hereinafter – the TS) shall be provided by the staff acquainted with the Product’s composition, structure and operation features.

In order to provide safe and reliable operation for the Product, the staff shall maintain a schedule of the technical service:

- technical service № 1 (hereinafter - TS-1) – semi-annual TS;
- technical service № 2 (hereinafter - TS-2) – annual TS.

TS-1 and TS-2 shall be provided by the staff on the running equipment.

3.2 SAFETY FEATURES

While carrying out the TS follow the instructions given in 4.2 of the present OM.

3.3 MAINTENANCE PROCEDURE

The list of works for all types of the Technical service is given in Table 9. Maintenance routine procedure is given in the checklists (hereinafter - CL), represented in Tables 10–11.

Table 9 – The list of the TS works

| CL № | Work | TS type | |
|------|----------------------------------|---------|------|
| | | TS-1 | TS-2 |
| 1 | Visual check of the Product | + | + |
| 2 | Test for the Product operability | + | + |

Notes: «+» – work is obligatory.

Table 10 – Check list № 1. Visual check of the Product

| To be done | Routine | Man-hours per 1 Product |
|--|---|-------------------------|
| Visually examine the Product | 1 check completeness and appearance of the Product; mechanical damage, paint defects must be absent; marking plates shall be present; legends are to be read easily; 2 clean up the Product surfaces with clean cloth; 3 remove severe contamination, parts of corrosion, oil spots from the metal surfaces – using ethyl alcohol, avoiding its penetration inside the Product; all surfaces clean dry by clean cloth and dry up; 4 if varnish paint coating is damaged, polish it with sand paper, then clean with alcohol-soaked cloth, cover with varnish AK-113 and dry up | 1 person 5 mins |
| Check reliability of cable and bus connection to the Product | 1 check that connectors and attaching screws are fastened tight; provide further fastening if needed; 2 check the cable integrity (mechanical damage shall be absent) within visibility | 1 person 5 mins |

Table 11 – Check list № 2. Check of the Product's operability

| To be done | Routine | Man-hours per 1 Product |
|----------------------------------|---|-------------------------|
| Check operability of the Product | 1 power the Product on; 2 transfer a switch to ON position; 3 check that the LED is glowing green | 1 person 5 mins |

3.4 ROUTINE MAINTENANCE

RM includes SB charge (in dry rooms under the temperature + 20°C) and is carried out one time a six month during the time of storage. RM is not carried out during operation. If the room air temperature is above + 20° C, SB shall be charged more often than provided by RM. Information on performed RM shall be recorded in a product's certificate, section 7.

To carry out RM, act as follows:

a) take the Product out of long-term storage. Unscrew the screws that are fixing the service panel (position 5, figures 1 and 2) by means of cross screwdriver (not included in the scope of delivery);

b) connect de-energized cable to the Product, see figures 4 and 5;

c) provide external power supply to the Product and transfer the piano type switch (position 2, figures 1 and 2) to On position.

Once the power is on, the indicator (position 3, figures 1 and 2) will light up with green, which means that the built-in batteries are being charged. Control the voltage on the output contacts during charge by means of a voltmeter (multimeter). The batteries shall be charged to the maximum, specified in table 1;

d) once the charge is completed, transfer the piano type switch (position 2, figures 1 and 2) to Off position;

e) switch off external power supply and disconnect the de-energized cable from the Product;

f) close the service panel (position 5, figures 1 and 2) and perform preservation (long-term storage) activities according to 3.5.

3.5 PRESERVATION

The Product and set of operational documents are stored in preserved condition in Manufacturer's packaging boxes.

The time of represervation – 2 years from the Manufacturer's commissioning.

The preservation is done in full terms, for 2 years, applying protection and packaging.

The represervation is done in heated rooms in the same order as the preservation.

The represerved Product and documents are placed in package.

4 CURRENT REPAIR OF THE PRODUCT

4.1 GENERAL DESCRIPTION

The Product's operability is controlled by the backlight of the relevant indicators.

To provide diagnostics of the problems and defects, use information in Table 12.

Please contact the Manufacturer's service centre in case of other defects, which cannot be traced.

4.2 SAFETY FEATURES

Any repair works shall be provided by personnel examined and received proper qualifications in the area of the occupational safety.

Check grounding of the BPS before providing any repair works.

It is **PROHIBITED** to put a poster "DO NOT switch on! Under Operation!", when power supply switch is in OFF position.

Replacing damaged parts, boards, modules is **PROHIBITED** if power supply of the repaired unit is on.

Installation, aligning and repair works are **PROHIBITED** in the room, where less than 2 people are present.

Before performing any works with a damaged SB, staff must put on protective gloves, mask and glasses to avoid contact with skin, eyes and breathing organs. SB must be placed in airtight container made of fire proof material and filled up with dry sand. This will absorb released chemical substances. The remaining electrolyte may be cleaned with absorbent paper towel.

Attention!

If the built-in battery casing is damaged, electrolyte leakage may occur.

4.3 CURRENT REPAIR OF THE PRODUCT

The list of malfunctions that can be eliminated by own employees is represented in Table 12.

The repair of other malfunctions can be done only by Manufacturer's specialists or Manufacturer's authorized representatives.

Table 12 – The list of possible malfunctions and troubleshooting

| Malfunction | Possible reasons | To be done |
|------------------------------|--------------------------------|--|
| Orange LED glowing is absent | No voltage on output terminals | Check the power cable connection |
| | | Supply power (a circuit breaker on the power mains switchboard might be probably switched off) |
| | Fuse malfunction | Replace the fuse |

5 STORAGE

The units must be stored in packaging inside areas complying with the required storage conditions (+5°C to +40°C) with the concentration of dust, oil, moisture and aggressive impurities in the air within the required limits for the working areas of production facilities.

After storage or transportation of the device below +10°C, it must be unpacked only in heated premises and left packed in normal climate conditions for 12 hours beforehand.

The Product shall be stored with fully charged batteries, and RM shall be carried out as specified in section 3.

6 TRANSPORTATION

The Product must be transported in the Manufacturer's transportation package in closed means of transport.

Types of shipment:

- motor vehicle and railroad transportation in closed means of transport (covered cars, multipurpose containers);
- air transportation (in sealed and heated compartments);
- sea transportation (in dry service premises).

The units must be transported in compliance with transportation rules applicable for each means of transport.

During loading/unloading operations and transportation, the requirements indicated on warning labels on the boxes/packaging must be observed, and no impacts are permitted since they can affect the safety and performance of the Product.

Inside the means of transport, the packed device must be firmly secured/fastened.

7 DISPOSAL

New equipment, the parts of the Product damaged during operation, and any overage equipment must not be disposed as standard household wastes, since they contain the materials suitable for re-use.

Decommissioned and non-used components of the Product must be delivered to a special waste disposal center licensed by local authorities. You can also send an overage equipment/unit to the manufacturer for its further disposal.

Proper disposal of Product components allows avoiding possible negative environmental and health impacts, and it also allows for proper restoration of components with substantial energy and resources saving.

The built-in batteries and their waste products consist of the materials that belong to the waste of hazard class II according to Federal Classificatory Catalogue of Wastes and shall be disposed by the organizations licensed to carry out the corresponding activities.

This Product must be disposed according to the laws of the Russian Federation in the field of environmental protection, as in effect when the disposal takes place, and in compliance with the rules applied to electronic devices.

During operation and upon completion of its service life, the equipment is not hazardous for health and environment

This unit must be disposed according to the rules for electronic devices in the country of the buyer



Any products marked with a crossed trash bin must be disposed separately from standard house-hold wastes

**ANNEX A
(MANDATORY)
OVERALL AND INSTALLATION DIMENSIONS OF THE PRODUCT**

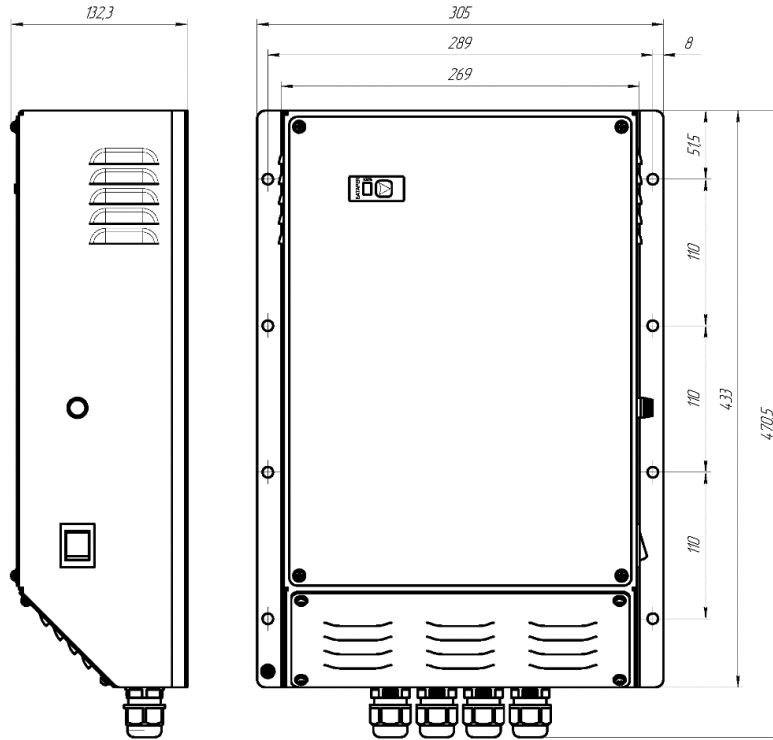


Figure A.1 – Overall and installation dimensions of the BPS-114

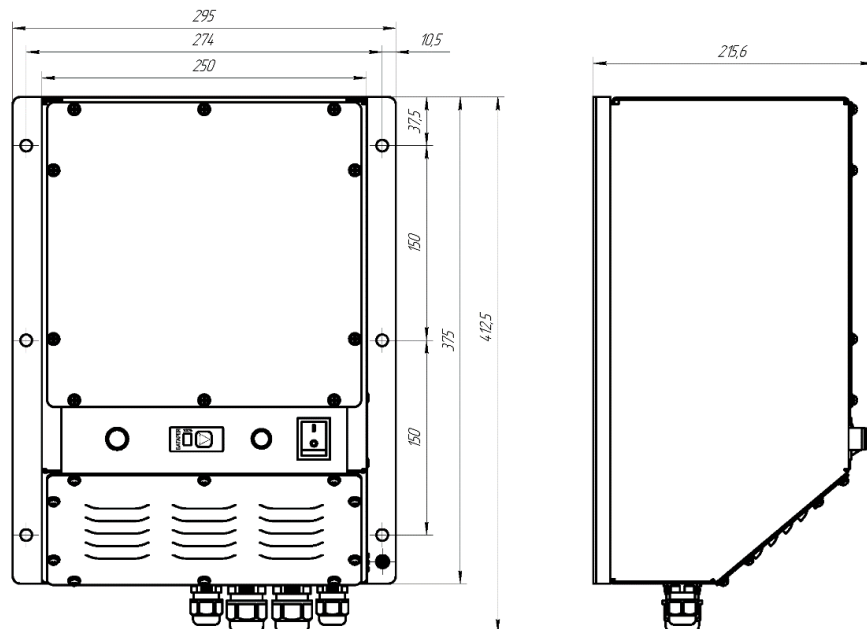


Figure A.2 – Overall and installation dimensions of the BPS-114-24