



**AWZ 224**

v.2.1

**AWZ 27,6V/2A/2x7Ah/LM**

**Linear, Buffer Power Supply Unit**

EN

Edition: 3rd (24<sup>th</sup> Feb 2012)  
Supercedes the 2st (17<sup>th</sup> Mar 2009) edition



### Features:

- 27,6VDC/2A uninterrupted supply
- fitting battery: 2x7Ah/12V
- mains supply 230V/AC
- linear voltage regulator
- output voltage control
- dynamic battery test
- battery electrical continuity control
- battery voltage control
- battery fuse status control
- excessive discharging (UVP) protection
- battery output protection against short-circuit and reverse polarity connection
- battery charging current 0,4A
- START facility for manual battery connection
- STOP facility for manual disconnection during battery-assisted operation
- LED indication
- acoustic indication
- BS technical output of AC power collapse
- adjustable times indicating AC power failure
- AW technical output indicating PSU and battery failure
- protections:
  - SCP short-circuit protection
  - OLP overload protection
  - OHP overheat protection
  - over voltage protection
  - surge protection
  - against sabotage

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### 1. Technical description.

A buffer PSU is intended for an uninterrupted supply to alarm system devices requiring stabilized voltage of **24V/DC (+/-15%)**. A linear stabilizing system, which has been used in the unit, provides voltage with a lower level of noise and a quicker response to interference when compared to a switched-mode regulator. During buffer operation, the PSU provides voltage of **Uout = 22,0V ÷ 27,6V DC**, with current capacity:



1. Output current 2A (without a battery)
2. Output current 1,6A + 0,4A battery charge

**Total current of the receivers + battery: 2A max.**

### 1.2 Principle of operation.

AWZ 224 is a stabilized transformer PSU with high factor of voltage stabilization. Mains supply ~230V is reduced by a transformer and then rectified by the system of rectifiers and a low pass filter. DC output voltage is gained in the linear regulator and it is adjusted according to the PSU operation type (charging phase and battery maintenance). In case of power decay, a battery back-up is activated instantaneously. During battery-assisted operation the PSU controls the battery voltage when it reaches 10,0V. The electrical system disconnects the battery and protects it from damage. After restoration of the ~230V mains supply, the PSU automatically charges up and preserves the battery.

PSU operating status is indicated by LEDs on the faceplate.

- red LED – failure indication (additionally, failure state can be indicated by acoustic indicator)
- green LED – AC/DC supply indication

Remote control of the PSU is by means of three technical outputs:

- BS – main supply status control
- AW - failure status control
- TAMPER – unwanted enclosure opening control

### 1.3 Block diagram. (Fig. 1)

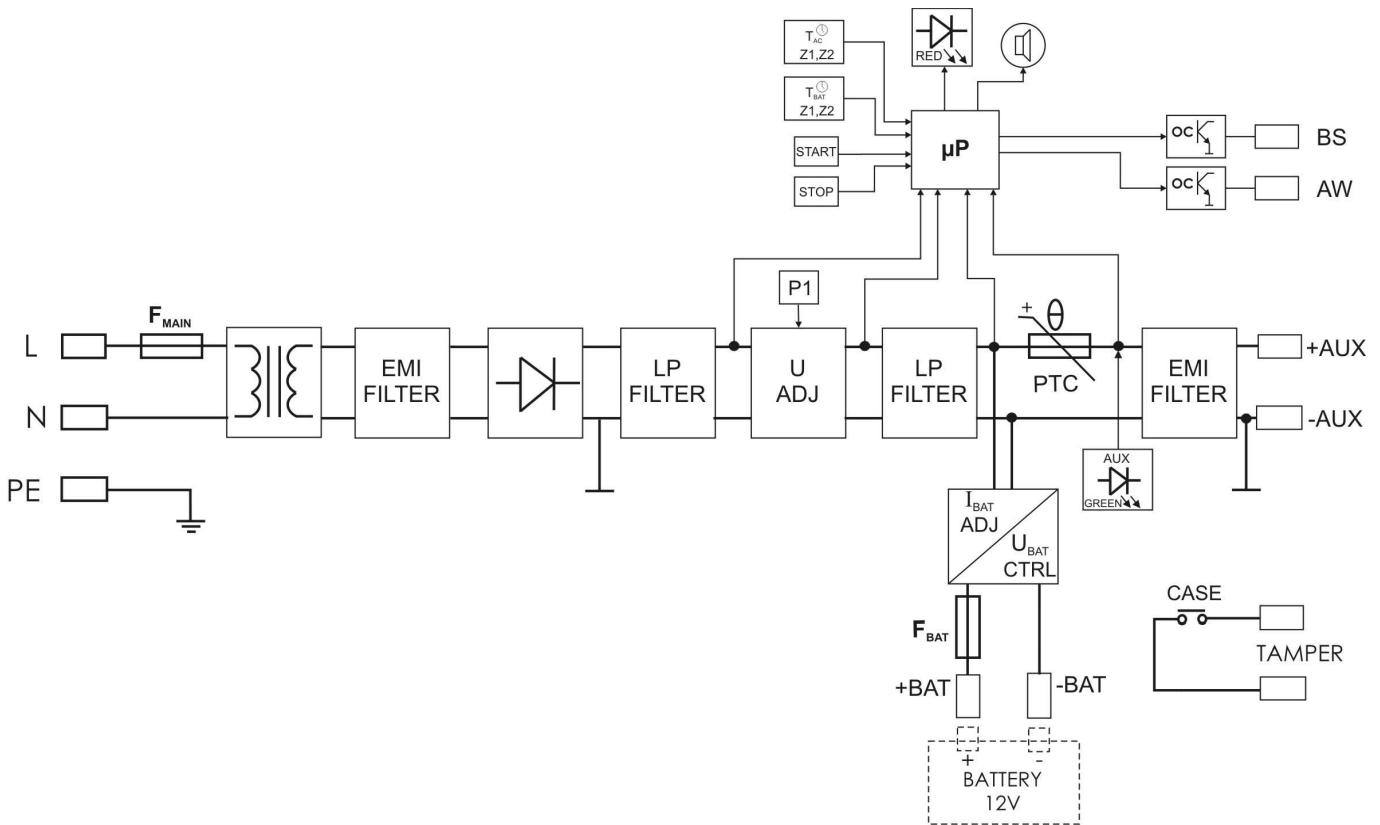
























Fig. 1. Block diagram of the PSU.

### 1.3 Description of PSU components and connectors.

Table 1. Elements of the PSU pcb (see Fig 2).

| Element nr | Description   |
|------------|---|
| [1]        | acoustic indication - BUZZER  |
| [2]        | ZB pin for acoustic indication <ul style="list-style-type: none"> <li>•  acoustic indication off</li> <li>•  acoustic indication on</li> </ul> Caption:  jumper on,  jumper off |
| [3]        | STOP button (PSU disconnection from the battery)  |

|      |   |
|------|---|
| [4]  | <b>START</b> button (launching the PSU from a battery)  |
| [5]  | <p><b>AC pins: Z1, Z2</b> - configuration of time lag for AC failure indication</p> <ul style="list-style-type: none"> <li>Z1= , Z2=  time lag T= 0s</li> <li>Z1= , Z2=  time lag T= 5min</li> <li>Z1= , Z2=  time lag T= 1h</li> <li>Z1= , Z2=  time lag T= 6h</li> </ul> <p><b>BAT pins: Z1, Z2</b> – time configuration of discharged battery disconnection</p> <ul style="list-style-type: none"> <li>Z1= , Z2=  time lag T= 20s</li> <li>Z1= , Z2=  time lag T= 15min</li> <li>Z1= , Z2=  time lag T= 1h</li> <li>Z1= , Z2=  no battery disconnection</li> </ul> <p>Caption:  jumper on,  jumper off</p> |
| [6]  | <b>+BAT</b> - DC supply output of the battery<br>(+BAT= red, -BAT = black)  |
| [7]  | <b>RED DIODE</b> LED indication   |
| [8]  | <b>GREEN DIODE</b> LED indication   |
| [9]  | <b>CHARGE</b> pin   |
| [10] | <b>~AC~</b> AC power connector  |
| [11] | <p><b>Connectors:</b></p> <p><b>TAMPER</b> - contacts of the sabotage protection switch (NC)</p> <p><b>BS</b> - AC absence technical output – OC type (open collector)<br/>hi-Z level = status: AC supply<br/>L level = status: AC power failure</p> <p><b>AW</b> - technical output of the PSU operation status – OC type (open collector)<br/>hi-Z level = status: failure<br/>L level = status: correct operation</p> <p><b>+AUX</b>- DC supply output<br/>(+AUX= +U, -AUX=GND)</p>  |
| [12] | <b>P1</b> voltage adjustment  |
| [13] | <b>F<sub>BAT</sub></b> fuse in the battery circuit  |

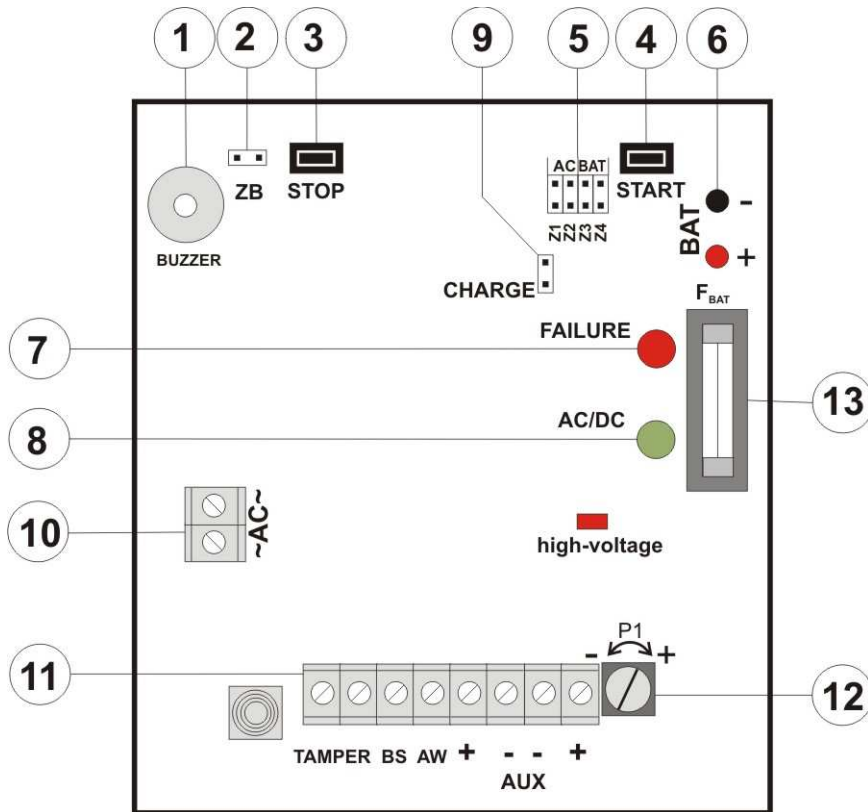


Fig. 2. The view of the PSU pcb.

**Table 2. Elements of the PSU (see Fig. 3.)**

| Element no. | Description   |
|-------------|---|
| [1]         | Isolation transformer                                       |
| [2]         | Pcb of the PSU (Tab. 1, Fig. 2)                             |
| [3]         | F <sub>MAIN</sub> fuse in the battery circuit (230V/AC)     |
| [4], [5]    | L-N 230V/AC power supply connector, PE protection connector |
| [6]         | Battery connectors +BAT = red, - BAT = black                |

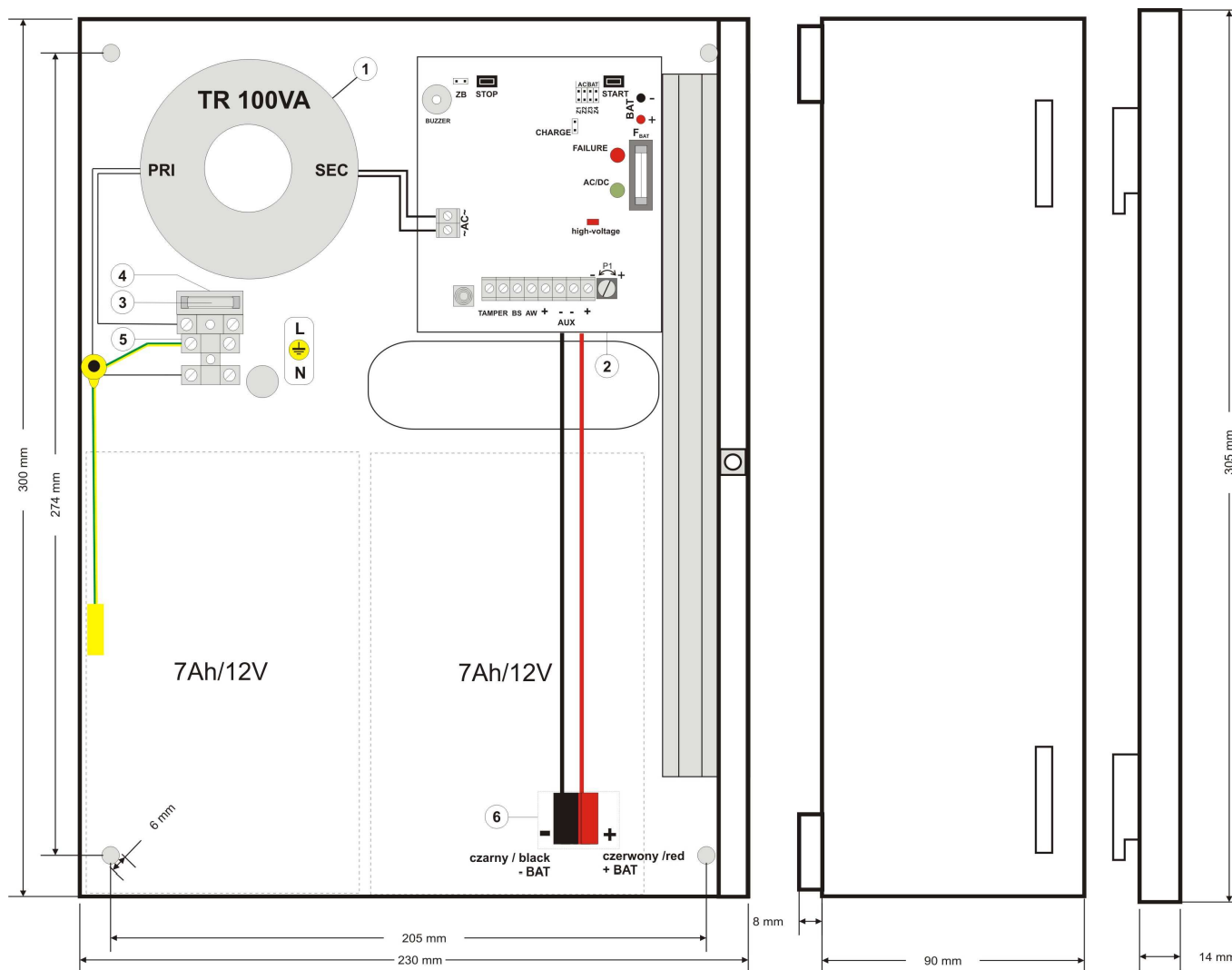


Fig. 3. The view of the PSU.

**1.3 Specifications:**

- electrical specifications (tab.3)
- mechanical specifications (tab.4)
- operation safety (tab.5)
- operating specifications (tab.6)
- U<sub>wy</sub>=f(I<sub>o</sub>) diagram (Fig. 4)

**Electrical specifications (tab. 3)**

|  |   |
|--|---|
| PSU type   | A, grade 1  |
| Mains supply   | 230V/AC (-15%/+10%)   |
| Power frequency  | 50Hz  |
| PSU power  | 55W max.  |
| Current consumption  | up to 0,4A  |
| Output voltage   | 22,0V÷27,6VDC – buffer operation<br>20,0V÷27,6VDC – battery-assisted operation  |
| Voltage adjustment range   | 26,0 V÷28,0 V   |
| Ripple voltage   | 20mV p-p  |
| Output current   | <b>2A (without a battery)</b><br><b>1,6A + 0,4A battery charge</b><br>(step 1 = 0,58A)  |
| Current consumption by PSU systems   | 15 mA max.  |
| Battery charging current   | 0,4A  |
| Short-circuit protection SCP   | 200% ÷ 250% of PSU power - current limitation and/or fuse damage in the battery circuit (fuse-element replacement required)   |
| Overload protection OLP  | 110% ÷ 150% (@25°C÷65°C) of PSU power - limitation by the PTC resettable fuse, manual restart (disconnection of the DC output circuit)  |
| Battery circuit protection SCP   | 4A- current limitation, F <sub>BAT</sub> fuse (in case of a failure, fuse-element replacement required)   |
| Over voltage protection OVP  | U>32,0 V disconnection of the output voltage, automatic return<br>U> 29,0 V fault indication  |
| Over-discharge battery protection UVP  | U<20,0 V (± 5%) – disconnection of the –BAT terminal  |
| Technical outputs:<br>- AW output indicates PSU fault: output (SCP, OCP, OVP status); battery (UVP, SCP status)<br>- BS output indicates mains power failure<br>- TAMPER - indicates unwanted opening of the enclosure | - OC type, 50mA max.<br>normal status: L level (0V), failure: hi-Z level<br><br>- OC type, 50mA max.<br>normal status: hi-Z level, failure: L level (0V),<br>- microswitch, NC contacts (enclosure closed),<br>0,5A@50V DC (max.) |
| LED indication   | LEDs: AC/DC power status, failure   |
| Acoustic indication  | piezoelectric indicator 75dB/0,3m, ON/OFF function  |
| F1 fuse  | F 4A  |
| F2 fuse  | T 1A/ 250V  |

**Mechanical specifications (tab. 4).**

|                      |   |
|----------------------|---|
| Enclosure dimensions | 235x 305 x 98 (Rys.3) WxHxD   |
| Fixing               | 205 x 275, Φ 6 (Rys.3) WxH  |
| Fitting battery      | 2 x 7Ah/12V (SLA)   |
| Net/gross weight     | 3,3/3,5 kg  |
| Enclosure            | Steel plate DC01, thickness: 0,8mm, colour: RAL 9003                          |
| Closing              | Cheese head screw (at the front)  |
| Notes                | The enclosure does not adjoin the assembly surface so that cables can be led. |

**Operation safety (tab.5).**

|   |   |
|---|---|
| Protection class PN-EN 60950-1:2007   | I (first)   |
| Degree of Protection PN-EN 60529: 2002 (U)  | IP20  |
| Electrical strength of insulation:<br>- between input and output circuits of the PSU (I/P-O/P)<br>- between input circuit and PE protection circuit (I/P-FG)<br>- between output circuit and PE protection circuit (O/P-FG) | 3000 V/AC min.<br>1500 V/AC min.<br>500 V/AC min. |
| Insulation resistance:<br>- between input circuit and output or protection circuit  | 100 MΩ, 500V/DC                                   |

**Operating specifications (tab.6).**

|   |                                 |
|---|---------------------------------|
| Operating temperature                         | 5°C...+40°C                     |
| Storage temperature                           | -20°C...+60°C                   |
| Relative humidity                             | 20%...90%, without condensation |
| Vibrations during operation                   | unacceptable                    |
| Impulse waves during operation                | unacceptable                    |
| Direct insolation                             | unacceptable                    |
| Vibrations and impulse waves during transport | PN-83/T-42106                   |

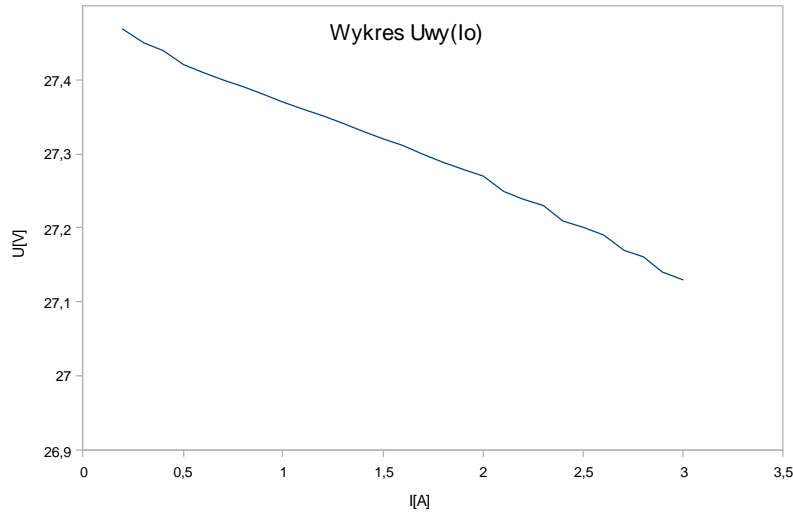


Fig. 4. Uwy=f(Io) diagram.

**2. Installation**

**2.1 Requirements**

The buffer PSU is to be mounted by a qualified installer, holding relevant permits and licenses (applicable and required for a given country) for 230V/AC interference and low-voltage installations. The unit should be mounted in confined spaces, in accordance with the 1st environmental class, with normal relative humidity (RH=90% maximum, without condensing) and temperature from +5°C to +40°C. The PSU shall work in a vertical position that guarantees sufficient convectional air-flow through ventilating holes of the enclosure.



- 1. Output current 2A (without a battery)**
- 2. Output current 1,6A + 0,4A battery charge**

**Total current of the receivers + battery: 2A max.**

As the PSU is designed for a continuous operation and is not equipped with a power-switch, therefore an appropriate overload protection shall be guaranteed in the power supply circuit. Moreover, the user shall be informed about the method of unplugging (usually through assigning an appropriate fuse in the fuse-box). The electrical system shall follow valid standards and regulations.

**2.2 Installation procedure**



**Before installation, make sure that the voltage in the 230V power-supply circuit is cut off.**

1. Mount the PSU in a selected location and connect the wires.
2. Remove the line fuse that protects the primal circuit of the transformer.
3. Connect the power cables (~230V) to AC 230V clips of the transformer. Connect the ground wire to the clip marked by the earth symbol PE. Use a three-core cable (with a yellow and green PE protection wire) to make the connection. Lead the cables to the appropriate clips of the subplate through the insulating bushing.



**The shock protection circuit shall be performed with a particular care, i.e. the yellow and green wire coat of the power cable shall stick to one side of the 'PE' terminal - in the PSU enclosure. Operation of the PSU without a properly made and fully operational shock protection circuit is UNACCEPTABLE! It can cause a device failure or an electric shock.**

4. Connect the receivers' cables to the +AUX, -AUX connectors of the terminal block on the PSU board.
5. If necessary, connect the device (alarm panel, controller, indicator, etc.) conductors to the technical outputs:
  - **BS** output - indicates 230V power failure
 During normal PSU operation, the BS technical output is cut from ground (-AUX). In case of 230V AC power outage, it is connected to ground (-AUX) after a time set by Z1, Z2 pins.
  - **AW** output indicating failure
 During normal PSU operation, the AW technical output is connected to ground. If a failure occurs, the output is cut from ground.
6. During battery-assisted operation, it is possible to determine time necessary for battery disconnection by the **Z3, Z4** pins when the voltage at its terminals drops below 20V.
7. On the **CHARGE** pins, determine the battery charging current:
  - I<sub>bat</sub> = 0,4A** max. – jumper on
  - I<sub>bat</sub> = 0,9 A** max. – jumper off (unacceptable for: **AWZ110, AWZ224**).
8. Restore the 230V AC power and plug the line fuse protecting the primal circuit of the transformer. Check the LED indication for PSU power status.
 

**Output voltage of the PSU, without load: U= 27,6V DC.**

**During battery charge, voltage can amount to U= 22,0V÷27,6V DC**
9. Connect the battery in accordance with the markings: "+" red, "-", black)
 

Mount the battery with a 700x 8mm clamp, following the procedure according to Fig. 5

  - put the battery into the enclosure
  - lead the clamp through the left A hole
  - lead the clamp over the up side of the battery
  - lead the clamp through the B hole
  - lead the end of the clamp into the terminal hole
  - pull the clamp with force of 150N-200N
  - cut the jutting piece of the tape
10. With the **STOP** button, initiate or finish a dynamic battery test. Deactivating the test turns out the PSU failure indication at the AW output, but it does not affect the protection system against complete battery discharge.
11. Run the PSU test: check the LED and acoustic indication (Tab. 7), AW technical output; through:
  - **cutting off the 230V AC current:** LED and acoustic indications – immediately; the BS technical output – after some time, determined by Z1, Z2 pins.
  - **battery disconnection:** LED indication, acoustic indication and the AW technical output – after a battery test have been completed (approx. 10 min.)
12. With the **STOP** button, initiate or finish a dynamic battery test.
13. With the **ZB** pins, decide whether the acoustic indication shall be on (jumper on), or off (jumper off)
14. Once the tests and operation control have been completed, the enclosure can be locked.



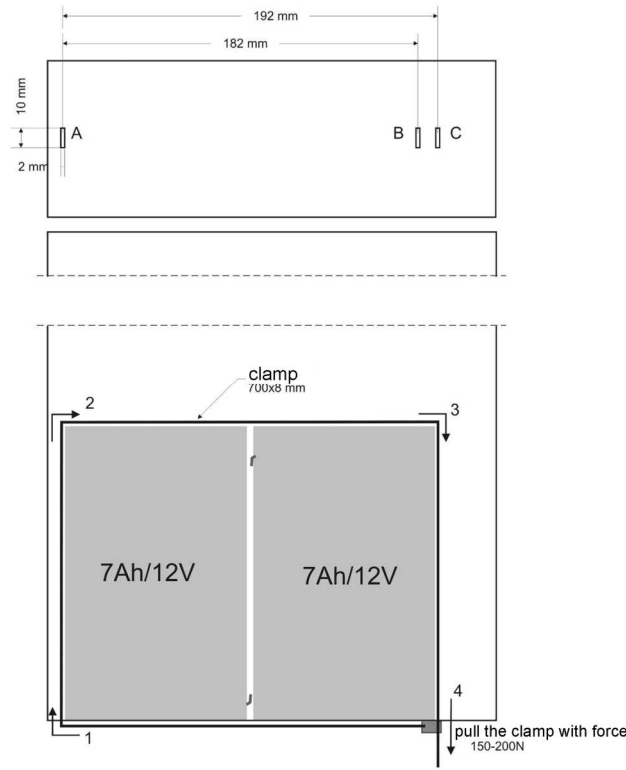
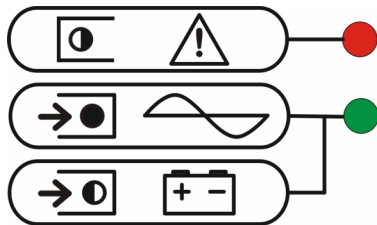


Fig. 5. Battery mounting procedure.

**3. Operating status indication.**

The power supply unit features LED and acoustic status indication. PSU status can be remote-controlled by two technical outputs.

**3.1 LED indication**



**RED LED:**

- **twinkling** – indicates failure status (Tab. 7)

**GREEN LED:**

- **illuminating** – the PSU is supplied with 230V AC power, correct operation
- **twinkling** – no 230V AC power, battery-assisted operation

| number of LED flashes<br><b>FAILURE</b> | Fault type                                | Fault cause  | Notes   |
|---|---|--|---|
| 1                                       | broken battery                            | the battery is not fully charged, the battery is not connected, burnt battery fuse | check the connections and the battery fuse                      |
| 2                                       | discharged battery                        | indicates battery voltage drop below 10V   | during battery-assisted operation disconnection                 |
| 3                                       | too low output voltage $U < 20V$          | output overload  | remove the cause, disconnect the load and connect after 30-60 s |
| 4                                       | too high output voltage $U_{out} > 29,0V$ | damaged voltage regulator, wrong setting of the P1 potentiometer                   | check the setting of the P1 potentiometer                       |

|   |                                     |                                     |  |
|---|-------------------------------------|-------------------------------------|--|
| 5 | PSU overheat                        | temperature of the PCB board >120°C | check the load balance, ensure the enclosure ventilation |
| 6 | over voltage protection Uout >32,0V | damaged voltage regulator           | <b>high-voltage</b> diode is illuminated                 |

Table 7

**3.2 Acoustic indication.**

Emergency situations are acoustically indicated by a buzzer. The frequency and the number of signals depend on a fault type (Tab.8). The acoustic indication is off after removing the **ZB** jumper.

| Nr | Description                  | Situation  |
|----|------------------------------|--|
| 1  | 1 signal per 8s              | battery-assisted operation, no 230V AC supply            |
| 2  | 1 signal per 16s             | undercharged battery, no battery during mains operation, |
| 3  | quick signals lasting for 3s | PSU restart  |
| 4  | 12 signals                   | finishing the battery test                               |
| 5  | 3 signals                    | initiating the battery test                              |
| 6  | continuous indication        | failure, indicated type: RED DIODE                       |

Table 8

**3.3 Technical outputs.**

The PSU is equipped with two independent indication outputs, OC type (open collector). They enable transmitting the information about no AC power status and system faults.

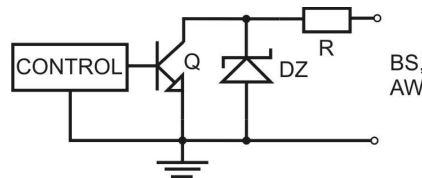


Fig. 6. Electrical diagram of OC outputs.

- **AW – failure output:** an OC type output indicating a PSU failure. In normal state (during correct operation) the output connected to the ground, in case of the failure – disconnected.
- **BS - absence of AC supply output:** - OC type output that indicates absence of 230V AC supply. In normal status, with 230V AC supply, the output is open. In case of power loss, the PSU will switch the output after a time period set by the Z1, Z2 jumpers (Fig. 7).

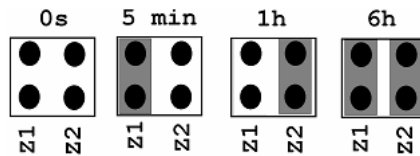


Fig. 7. Configuration of the jumpers.

## 4. Operation and use.

### 4.1 Launching the PSU from a battery

Battery-assisted operating time depends on: the battery capacity, charging level and load current. For instance, for a typical, fully-charged 7Ah battery and load current of 2A, the maximum safe working time amounts to approx. 2h 50 min.

- **Launching the PSU from a battery:** push the START button on the device's board and hold for 5 seconds
- **Finishing the battery-assisted operation:** push the STOP button on the device's board and hold for 2 seconds. The PSU will disconnect the output after 10 seconds.

### 4.2 Disconnection of a discharged battery.

The PSU is equipped with the discharged battery disconnection system and discharged battery indication. During the battery-assisted operation, reducing voltage below ~20V at the battery terminals will trigger a countdown to the battery disconnection. The disconnection time period is Z3, Z4 jumper selectable. (Fig.8)

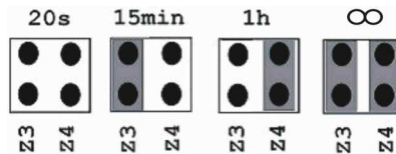


Fig. 8. Configuration of the jumpers.

### 4.3 Dynamic battery test

The PSU runs a battery test every 10 minutes. It is done by a momentary output voltage reduction and voltage measurement at the battery terminals. A failure is indicated when voltage drops below ~24V. The battery test facility can be switched off if, for instance, the battery is not connected to the PSU.

**Deactivating/activating the test:** while mains supply, press the STOP button on the main board and hold it for 3 seconds. The device will confirm the activation/deactivation in the following ways: (Tab.2.)

- **testing off – 12 sounds**
- **testing on – 3 sounds**

#### Caution:



- **test activation/deactivation is stored in the memory even after unplugging of the device**
- **test deactivation turns off the fault indication at the AW output. It does not affect the battery complete discharge system, though.**

### 4.4 Battery charging current limitation

The PSU has a system that automatically limits the battery charging current:

- **I<sub>bat</sub> = 0,4A max. - the CHARGE jumper on**

### 4.5 Battery-assisted operation – standby time

To keep the standby time, the current drawn from the PSU during batter-assisted operation should be limited.

Characteristics for a 2x7Ah/12V SLA  
**- for grade 1 (12h) current I<sub>d</sub>=0,58A**

### 4.6 PSU overload

The PSU is equipped with an output protection due to a PTC polymer fuse. If the load of the PSU exceeds I<sub>zn</sub> (110% ÷ 150%), the output voltage is automatically cut off and indicated by the FAILURE red diode (Tab. 7). The load shall be disconnected from the PSU output for approximately 1 minute.

## 5. Maintenance

Any and all maintenance operations may be performed following the disconnection of the PSU from the power supply network. The PSU does not require performing any specific maintenance measures, however, in the

case of significant dust rate, its interior is recommended to be cleaned with compressed air. In the case of a fuse replacement, use a replacement of the same parameters.



### WEEE MARK

**According to the EU WEE Directive – It is required not to dispose of electric or electronic waste as unsorted municipal waste and to collect such WEEE separately.**

The power supply unit is adapted for a sealed lead-acid battery (SLA). After the operation period it must not be disposed of but recycled according to the applicable law.

#### GENERAL WARRANTY CONDITIONS

1. Pulsar K. Bogusz Sp.j. (the manufacturer) grants a two-year warranty for the equipment, starting from the initial product date of purchase placed on the receipt.
2. If a purchase proof is missing, a three-year warranty period is counted from the device's production date.
3. The warranty includes free-of-charge repair or replacement with an appropriate equivalent (the selection is at the manufacturer's discretion) if the malfunction is due to the manufacturer, includes manufacturing or material defects, unless such defects have been reported within the warranty period (item 1 and 2).
4. The equipment subject to warranty is to be brought to the place where it was purchased, or directly to the main office of the manufacturer.
5. The warranty applies to complete equipment, accompanied by a properly filled warranty claim with a description of the defect.
6. Should the claim be accepted, the manufacturer is obliged to provide warranty repairs, at the earliest convenience, however not later than within 14 days from the delivery to the service centre of the manufacturer.
7. The repair period mentioned in item 6 may be prolonged, if there are no technical possibilities to carry out the repairs, or if the equipment has been conditionally accepted, due to the breaking warranty terms by the claimant.
8. All the services rendered by force of the warranty are carried out at the service centre of the manufacturer, exclusively.
9. The warranty does not cover the defects of the equipment, resulting from:
  - reasons beyond the manufacturer's control,
  - mechanical damage,
  - improper storage and transport,
  - use that violates the operation manual or equipment's intended use
  - fortuitous events, including lightning discharges, power failures, fire, flood, high temperatures and chemical agents,
  - improper installation and configuration (in defiance with the manual),
10. The warranty is void in any of the following circumstances:
  - construction changes
  - repairs carried out by any unauthorized service center
  - damage or removal of warranty labels
  - modifications of the serial number
11. The liability of the manufacturer towards the buyer is limited to the value of the equipment, determined according to the wholesale prices suggested by the manufacturer on the day of purchase.
12. The manufacturer takes no responsibility for the defects that result from:
  - the damaging, malfunctioning or inability to operate the equipment
  - defects that result from using the equipment outside its stated specifications and operating parameters failing to abide by the recommendations and requirements contained in the manual, or the use of the equipment.

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