AWZ 230

v.2.4

AWZ 13,8V/2A/7Ah/LM

Linear buffer power supply unit Grade 2.

EN**

Edition: 10 from 20.09.2019

Supercedes the edition: 9 from 02.11.2017

GREY POWER plus

Features:

- EN50131-6 compliance, 1÷2 grades and II environmental class
- mains supply ~230 V
- 13,8 V uninterrupted supply
- fitting battery: 7 Ah/12 V
- PSU current efficiency:
  - 0,58 A – for grades 1, 2 *
  - 2 A – for general use **

  (see: chapter 1.1)
- linear voltage regulator
- microprocessor-based automation system
- output voltage control
- dynamic battery test
- battery electrical continuity control
- battery voltage control
- battery fuse status control
- battery charge and maintenance control
- deep discharge battery protection (UVP)
- battery output protection against short-circuit and reverse polarity connection
- battery charging current 0,4 A/0,9 A jumper selectable
- START function of manual switch to battery power
- STOP facility for manual disconnection during battery-assisted operation
- LED indication
- acoustic indication
- EPS technical output of power failure – OC type
- PSU technical output indicating PSU and battery failure - OC type
- APS technical output indicating battery failure – OC type
- Optional installation of the MPSBS relay module changing technical outputs of the OC type to relay type
- adjustable times indicating AC power failure
- protections:
  - SCP short-circuit protection
  - OLP overload protection
  - over voltage protection
  - surge protection
  - against sabotage
- warranty – 5 years from the production date

CONTENTS:

1. Technical description.

1.1. General description.

The buffer power supply is designed in accordance with the requirements of the EN 50131-6 standard, grade 1÷2 and II environmental class. It is intended for an uninterrupted supply of alarm system devices requiring stabilized voltage of **12 V 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.

Depending on a required protection level of the alarm system in the installation place, the PSU efficiency and the battery charging current should be set as follows:

* Grade 1, 2 - standby time 12h

Output current 0,58 A + battery charging current 0,9 A

** General use – if the PSU is not mounted in an installation complaint with the EN-50131 standard, the acceptable current efficiency amounts to:

1. Output current 2 A (without a battery)
2. Output current 1,6 A + 0,4 A battery charging current
3. Output current 1,1 A + 0,9 A battery charging current

Total current of the receivers + battery charging current is max. 2 A.

In case of power decay, a battery back-up is activated immediately. The PSU is housed in a metal enclosure with battery space for a 7 Ah/12 V battery. It is fitted with micro switches indicating unwanted door opening (front panel).

The power supply is pre-configured for use in alarm systems (stage 1 and 2) in accordance with the PN-EN 50131-6 standard.

Changes to parameter settings (jumper configuration, output voltage adjustment, etc.) may cause the power supply unit to be no longer compliant with the PN-EN 50131-6 standard for alarm systems.

1.2. Block diagram (Fig. 1).

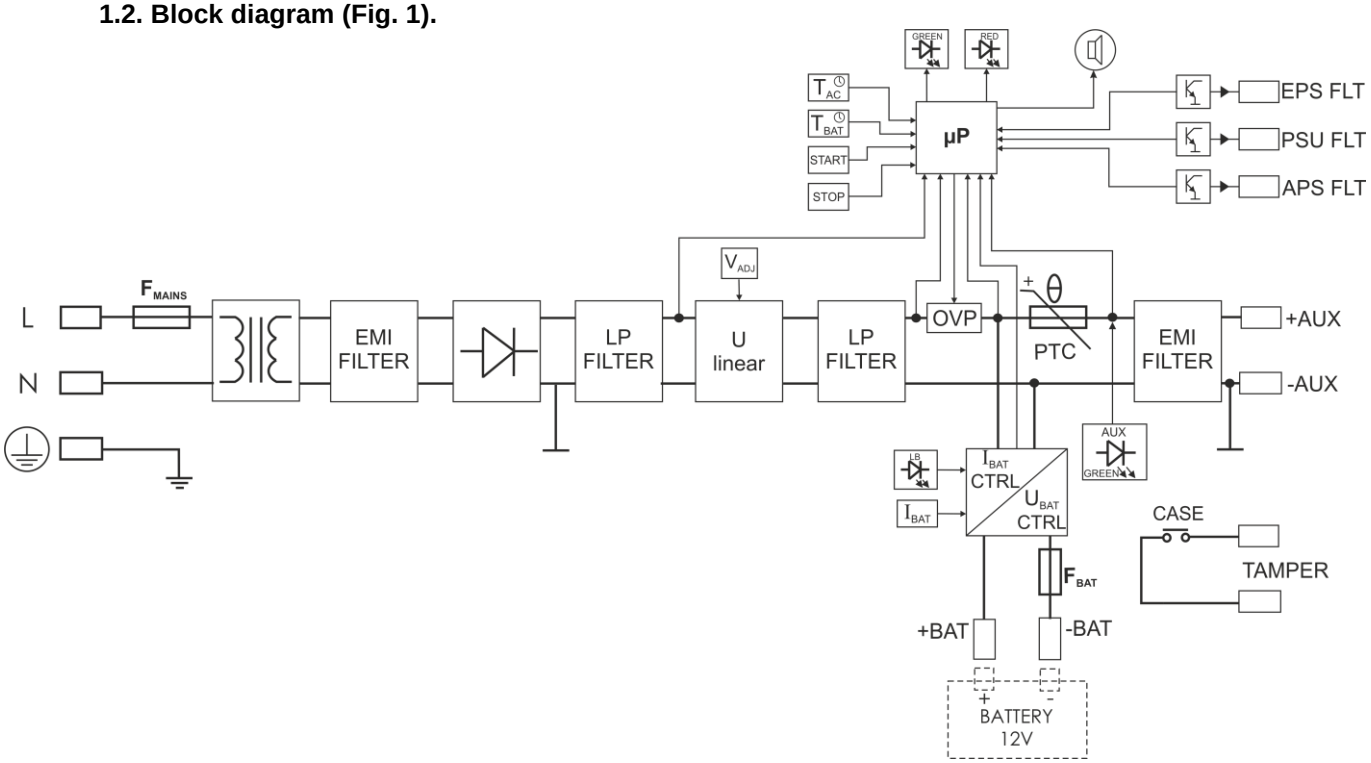


Fig. 1. Block diagram of the PSU.

1.3. Description of PSU components and connectors.

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

Element no.	Description
①	**T_{AC}; pins J1, J2** - configuration of time lag for AC failure indication • J1= ▪▪, J2= ▪▪ time lag T= 0s • J1= ▬, J2= ▪▪ time lag T= 10s • J1= ▪▪, J2= ▬ time lag T= 5min • J1= ▬, J2= ▬ time lag T= 1h **T_{BAT}; pins J1, J2** - time configuration of discharged battery disconnection • J1= ▪▪, J2= ▪▪ time lag T= 20s • J1= ▬, J2= ▪▪ time lag T= 15min • J1= ▪▪, J2= ▬ time lag T= 1h • J1= ▬, J2= ▬ no battery disconnection =no UVP battery protection Caption: ▬ jumper on, ▪▪ jumper off
②	**STOP** button (disconnects the power supply from the battery or enables / disables the battery test)

3	**Connectors ~AC~** – AC power input
4	**START** button (launching the PSU from a battery)
5	•)) – pin; activation of the acoustic indication ▬ - indication on ▪▪ - indication off Caption: ▬ jumper on, ▪▪ jumper off
6	**V_{ADJ}** - potentiometer, DC voltage adjustment DC 13 ÷ 14 V
7	**BUZZER** – acoustic indicator
8	**LB** – LED battery charging indication
9	**RED DIODE** LED indication
10	**GREEN DIODE** LED indication
11	**OVP** – optical indication for activating the over voltage system
12	**F_{BAT}** – fuse in the battery circuit, F3,15 A / 250 V
13	**Terminals:** **TAMPER** – antisabotage protection microswitch connector **APS** – technical output indicating battery failure hi-Z state = battery failure 0V state = battery O.K. **EPS** – technical output of AC power failure indication hi-Z state = AC power failure 0V state = AC power - O.K. **PSU** – technical output of PSU failure indication hi-Z state = failure 0V state = PSU status O.K. **+BAT-** – battery output **+AUX-** – DC power output, (+AUX= +U, -AUX=GND) Description: hi-Z – high impedance, 0V – connection to the ground GND
14	**I_{BAT} Jumper;** - battery charging current configuration • **I_{BAT}** = ▬, Ibat =0,4 A • **I_{BAT}** = ▪▪, Ibat =0,9 A Description: ▬ jumper on, ▪▪ jumper off

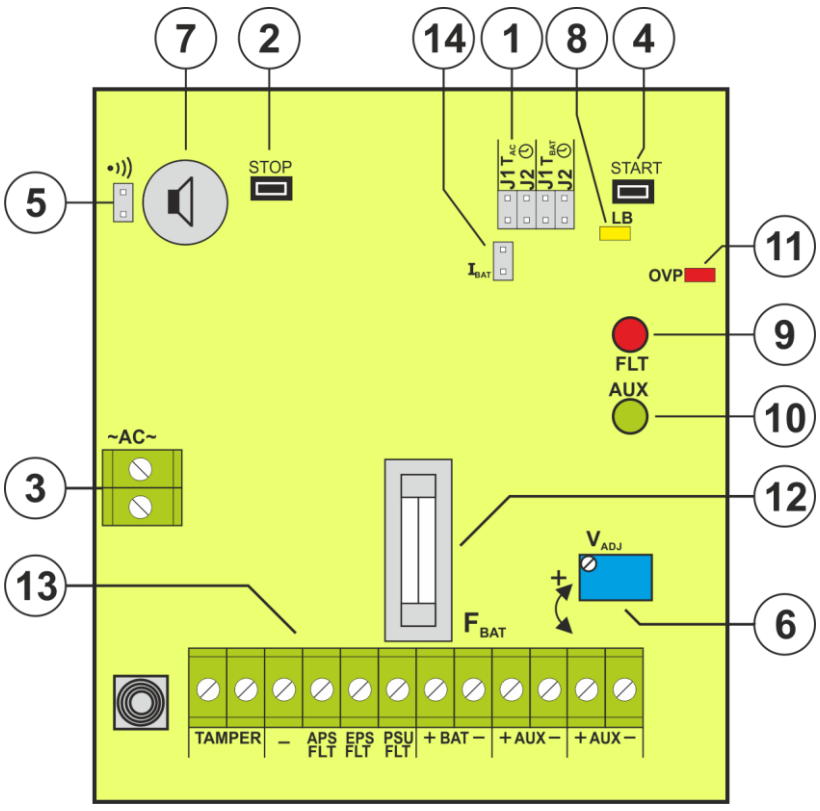


Fig. 2. The view of the PSU pcb.

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	**TAMPER;** micro switch of tamper protection (NC)
4	**L-N** 230 V power supply connector, ⏚ protection connector
5	$\mathbf{F_{MAIN}}$ fuse in the battery circuit 230 V, T500mA / 250 V
6	Battery connectors +BAT = red, - BAT = black

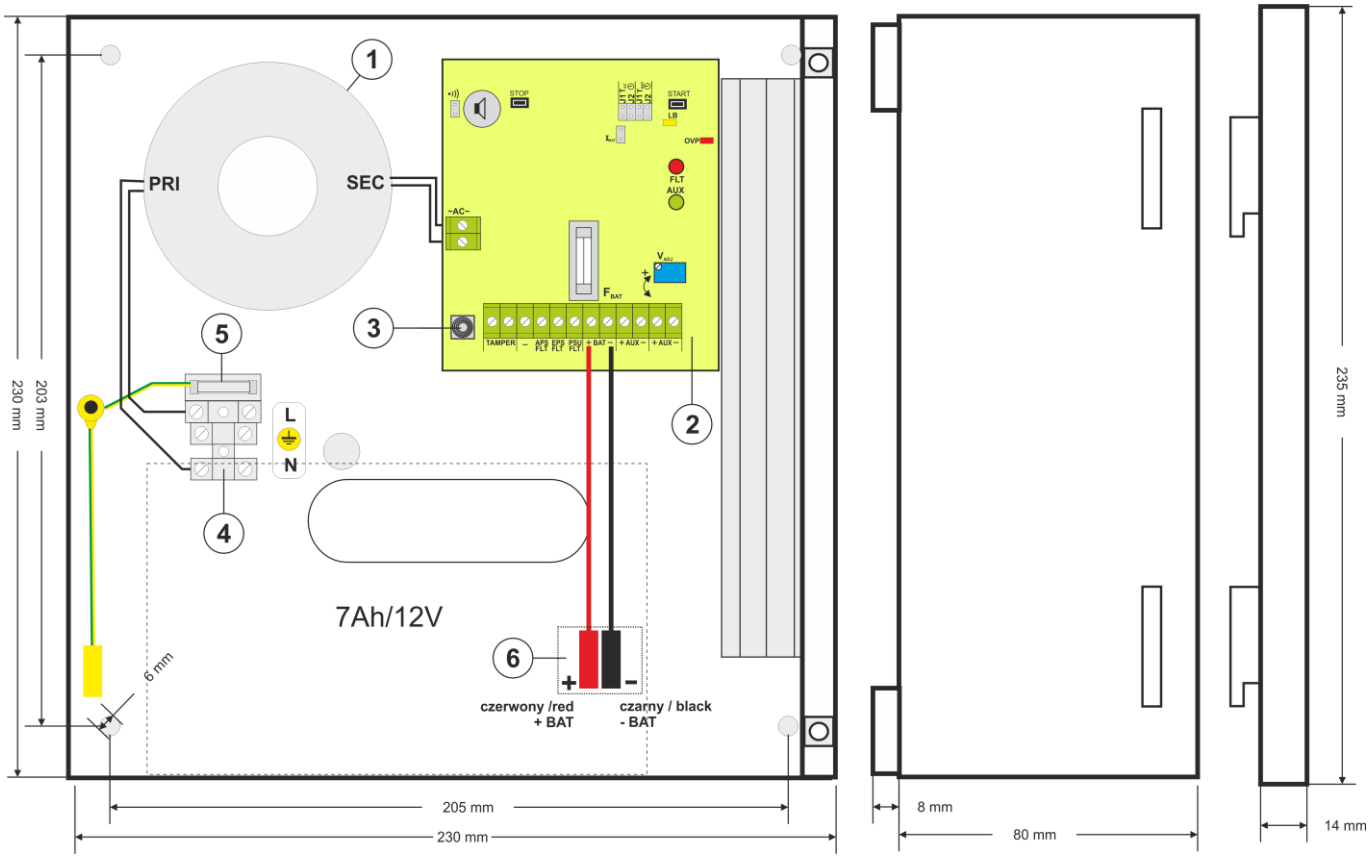
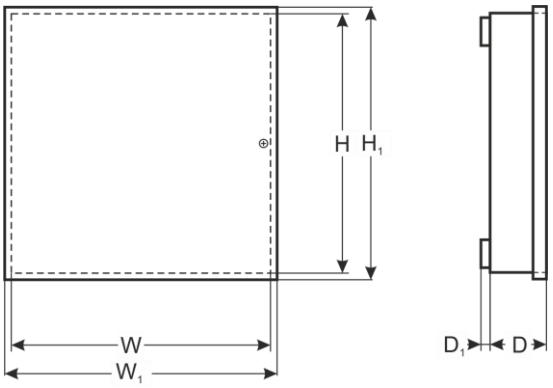


Fig. 3. The view of the PSU.



1.4. Specifications:

- **electrical specifications (tab.3)**
- **mechanical specifications (tab.4)**
- **operation safety (tab.5)**
- **operating specifications (tab. 6)**

Table 3. Electrical specifications.

PSU type	A (EPS - External Power Source), protection class 1÷2, II environmental class
Mains supply	~230 V; 50 Hz
Current consumption	0,29 A
PSU power	28 W
Output voltage	11 - 13,8V DC – buffer operation 10 - 13,8V DC – battery-assisted operation

Output current	**- for grades 1, 2:** **Io = 0,58 A + 0,9 A battery charging current** **- for general use:** **Io = 2 A (without a battery)** **Io = 1,6 A + 0,4 A battery charging current** **Io = 1,1 A + 0,9 A battery charging current**
Output voltage adjustment range	13 – 14 V DC
Ripple voltage	20mV p-p
Current consumption by PSU systems	15 mA max.
Battery charging current	0,4 A/0,9 A jumper selectable
Short-circuit protection SCP	200% ÷ 250% of PSU power - current limitation and/or fuse F_{BAT} damage in the battery circuit (fuse-element replacement required) Automatic return
Overload protection OLP	110% ÷ 150% (@25ºC÷65ºC) of PSU power - limitation by the PTC resettable fuse, manual restart (disconnection of the DC output circuit)
Battery circuit protection SCP and reverse polarity connection	F3,15 A- current limitation, F_{BAT} fuse (in case of a failure, fuse-element replacement required)
Surge protection	varistors
Overvoltage protection OVP	U>16,5 V disconnection of the output voltage (AUX+ disconnection), automatic return U> 14,5 V fault indication
Deep discharge battery protection UVP	U<10 V (± 0,5 V) – disconnection of battery terminal
Tamper protection: - TAMPER - indicates unwanted opening of the enclosure	- microswitch, NC contacts (enclosure closed), 0,5 A@50 V DC (max.)
Technical outputs: - EPS; output indicating AC power failure	- OC type: 50mA max. Normal operation: L state (0 V), failure: hi-Z state, - delay time 0s÷1h (+/-20%) – jumper selectable **T_{AC}**
- PSU; output indicating no DC power/PSU failure	- OC type: 50mA max. Normal operation: L state (0 V), failure: hi-Z state,
- APS; output indicating battery failure	- OC type, 50mA max. Normal operation: L state (0 V), failure: hi-Z state
LED indication	LEDs: AC/DC power status, failure
Acoustic indication	piezoelectric indicator 75dB/0,3m, switchable via jumper
Fuses: - F_{MAINS} - F_{BAT}	T 500mA / 250 V F 3,15 A / 250 V

Table 4. Mechanical specifications.

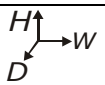
Dimensions	W=230 H=230 D+D_1=82+8 mm [+/- 2 mm] W_1=235, H_1=235 [+/- 2 mm]
Fixing	See Fig., 3
Fitting battery	7 Ah/12 V (SLA) max. 175x105x78mm (WxHxD) max 
Net/gross weight	2,7 / 2,8 kg
Enclosure	Steel plate DC01, thickness: 0,7mm, colour: RAL 9003
Closing	2x cheese head screw (at the front)
Terminals	Mains supply 230 V: Φ0,51÷2,05 (AWG 24-12), 0,5÷1,5mm^2 Outputs: Φ0,51÷2,05 (AWG 24-12), 0,5÷1,5mm^2 BAT battery outputs: 6,3F-0,5, 19cm
Notes	The enclosure does not adjoin the assembly surface so that cables can be led.

Table 5. Operation safety.

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

Table 6. Operating specifications.

Environmental class	II
Operating temperature	-10ºC...+40ºC
Storage temperature	-20ºC...+60ºC
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

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 230 V 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 -10°C do +40°C. The PSU shall work in a vertical position that guarantees sufficient convectional air-flow through ventilating holes of the enclosure.

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.

Caution!
Before installation, make sure that the voltage in the 230 V power-supply circuit is cut off.
To switch off power use an external switch in which the distance between the contacts of all poles in the disconnection state is not less than 3mm.

It is required to install an installation switch with a nominal current of min. 3 A in the power supply circuits outside the power supply unit.

1. Mount the PSU in a selected location and connect the wires.
2. Connect the power cables (~230 V) to AC 230 V clips of the transformer. Connect the ground wire to the clip marked by the earth symbol ⏚. Use a three-core cable (with a yellow and green ⏚ 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 '⏚' 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.

3. Connect the receivers' cables to the +AUX, -AUX connectors of the terminal block on the PSU board.
4. If needed, connect the device cables to the technical outputs:
   - EPS; technical output indicating AC power failure
   - PSU; technical output indicating PSU failure.
   - APS; technical output indicating of the battery failure
   - Optional installation of the MPSBS relay module changing technical outputs of the OC type to relay type (page. 11, section. 3.4)
5. Use the $\mathbf{I_{BAT}}$ jumper to set the maximum battery charging current, taking into account the battery parameters.
6. Use the $\mathbf{T_{AC}}$ jumper to determine the time of 230 V power failure indication.

7. Use the $\mathbf{T_{BAT}}$ to determine the time of disconnecting the battery during battery operation once the UVP protection is activated.
8. Mount the battery in the battery compartment of the enclosure (Fig. 3). Connect the batteries with the PSU paying special attention to the correct polarity.
9. Switch on the 230 V supply. The green AUX and yellow LB LEDs on the power supply PCB should be ON while charging the battery.

Output voltage of the PSU, without load U = 13,8 V DC.
During battery charge, voltage can amount to U = 11 - 13,8 V DC

10. With the **STOP** button, initiate or finish a dynamic battery test.

Deactivating the test turns out the PSU failure indication at the APS FLT, 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), technical output; through:

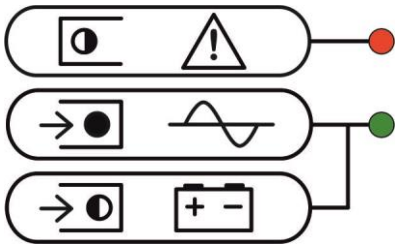
- **cutting off the 230 V current:** LED and acoustic indications – immediately; the EPS FLT technical output - after some time, determined by $\mathbf{T_{AC}}$ pins.
- **battery disconnection:** LED indication, acoustic indication and the APS FLT – technical output – after a battery test have been completed (~10min).

12. Use the •)) jumper to enable or disable acoustic indication.
13. Once the tests and operation control have been completed, the enclosure can be locked.

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 230 V power, correct operation**
- **twinkling – no 230 V power, battery-assisted operation**

Table 7.

Number of LED flashes (red)	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		during battery-assisted operation disconnection
3	too low output voltage U <10 V	output overload	remove the cause, disconnect the load and connect after 30-60 s
4	too high output voltage Uout > 14,5 V	damaged voltage regulator, wrong setting of the P1 potentiometer	
5	over voltage protection Uout > 16,5 V	damaged voltage regulator	diode is illuminated **OVP**

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 jumper marked with the •)) symbol.

Table 8.

Nr	Description	Situation
1	1 signal per 8s	battery-assisted operation, no 230 V supply
2	2 signal per 16s	undercharged battery, no battery during mains operation, burnt battery fuse
3	quick signals lasting for 1,5s	PSU restart
4	12 signals	finishing the battery test
5	3 signals	initiating the battery test
6	continuous indication	failure, red LED on

3.3 Technical outputs.

The PSU indication outputs:

- **EPS FLT - technical output indicating 230 V power failure**.
  The output indicates 230 V power failure. Under normal status – with the 230 V supply on, the output is shorted to ground GND. In case of power failure, the PSU will switch the output into hi-Z high impedance state after a time set by the T_{AC} jumper (J1, J2).

  J1= ▪▪, J2= ▪▪ time lag T= 0s
  J1= ▬, J2= ▪▪ time lag T= 10s
  J1= ▪▪, J2= ▬ time lag T= 15min
  J1= ▬, J2= ▬ time lag T= 1h

- **PSU FLT - output indicating PSU failure**.
  The output indicates PSU failure. Under normal status (correct operation) the output is shorted to ground GND. If there is no DC voltage at the output (e.g. short circuit), the output is switched into hi-Z high impedance state.
  PSU failure can be caused by the following events:
  - Short circuit at the output
  - low Uaux output voltage, less than 10 V
  - high Uaux output voltage, higher than 14,5 V
  - the PTC output fuse activation
  - exceeding the rated current of the PSU
  - activation of overvoltage protection OVP
  - internal damage of the PSU

- **APS FLT - output indicating battery failure.**
  Output indicating failure in the battery circuit. Under normal status (correct operation), the output is shorted to ground GND. In case of power failure, the output is switched into hi-Z high impedance state. Any failures can be triggered by the following events:
  - defective or low battery
  - battery fuse failure
  - no continuity in the battery circuit
  - battery voltage below 11,5 V during battery-assisted operation

After switching from battery operation to electrical network operation, battery failure indication is inactive until full recharge battery, or for 24 hours after power returns.

The power supply technical outputs are open collector (OC) type, as shown schematically below.

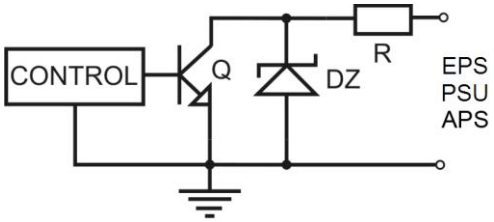


Fig. 4. Electrical diagram of OC outputs.

3.4. Relay technical outputs.

If the OC type outputs are not sufficient to control the unit, it is possible to use the MPSBS relay module changing technical outputs of the OC type to relay type.

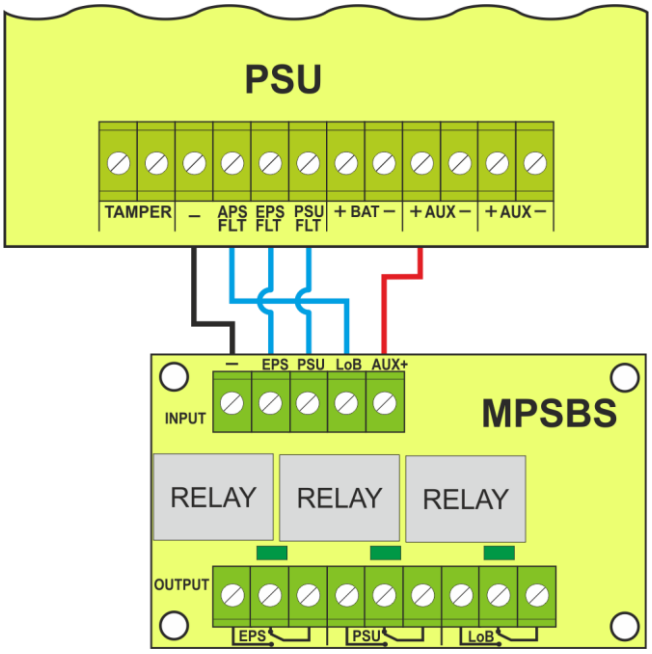


Fig. 5. The diagram of connecting the MPSBS module.

4. Battery-assisted operation.

4.1. Running the PSU from the battery.

The PSU has been equipped with two buttons on the PCB board which enable running or disconnecting the PSU during battery-assisted operation.

- **Running the PSU from the battery**: press the **START** button on the main board and hold for 3s.
- **Disconnecting the PSU from the battery**: press the **STOP** button on the main board and hold for 3s.

4.2. Deep discharge battery protection UVP.

The PSU is equipped with the disconnection system and the discharged battery indication. If the voltage at the battery terminals drops below 10 V±0.5 V, the battery will be disconnected after the specified t time delay, depending on the $\mathbf{T_{BAT}}$ jumper settings.

When the J1 and J2 jumpers are on, the battery protection is disabled.

J1= ▪▪, J2= ▪▪ time lag T= 20s
J1= ▬, J2= ▪▪ time lag T= 15min
J1= ▪▪, J2= ▬ time lag T= 1h
J1= ▬, J2= ▬ no battery disconnection = no UVP battery protection

Caution.
It is not recommended to disable UVP since deep discharge of the batteries reduces their ability to store energy, their capacity and lifetime.

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 approx.12,2 V. The battery test function can be turned off.

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. 8).

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

The battery test is performed immediately after switching on with the STOP button.

Caution:

- **test activation/deactivation is stored in the memory even after unplugging of the device**
- **test deactivation turns off the fault indication at the APS FLT, output. It does not affect the battery complete discharge system, though.**
- **after switching from battery operation to electrical network operation, battery failure indication is inactive until full recharge battery, or for 24 hours after power returns.**

4.4 Standby time.

Battery-assisted operating depends on battery capacity, charging level and load current. To maintain an appropriate standby time, current drawn from the PSU in battery mode should be limited. Characteristics for a 7 Ah/12 V SLA:

Grade 1, 2 - standby time 12h

Output current 0,58 A + 0,9 A battery charging current

4.5 Battery charging time.

The PSU has a battery circuit charged with direct current. The current selection is done with use of the I_{BAT} jumpers. The table below shows how long does it take to charge a (fully discharged) battery up to min. 80% of its nominal capacity.

Table 9. Battery charging time.

7 Ah battery charging time up to the capacity of 0,8*C	Charging current [A]	Configuration of I_{BAT} jumper
7h	0,9 A	I_{BAT} = ▪▪ (jumper off)
15h 45min	0,4 A	I_{BAT} = ▬ (jumper on)

5. Service and operation.

5.1 Overvoltage protection of the PSU output OVP.

In case of voltage exceeding 16,5 V at the switching regulator's output, the system cuts off the power at the outputs to protect the battery and the receivers from damage. The outputs will be battery-powered. The activation of the protection system is indicated by the OVP red LED on the PCB board, blinking red FAILURE led on the front panel of the PSU and alarm buzzer. The status of the PSU FLT technical output is changed.

5.2 Overload or short-circuit the power supply output (SCP activation).

The PSU is equipped with an output protection due to a PTC polymer fuse. If the load of the PSU exceeds Izn (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.

5.3 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.

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