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USER MANUALS FOR POWER SUPPLY ZUP-230V

The document contains:

USER MANUAL

Power supply for fire alarm devices, heat and smoke control systems, fire protection and fire automation systems.

ZUP-230V-400, ZUP-230V-700, ZUP-230V-1000, ZUP-230V-1500

and

USER MANUAL

Power supply for fire alarm devices, heat and smoke control systems, fire protection devices and fire automation

ZSP121N-DR

designed to operate with the power supply ZUP-230V

17.03.2020

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USER MANUAL

Power supply for fire alarm devices, heat and smoke control systems, fire protection and fire automation systems.

ZUP-230V-400, ZUP-230V-700, ZUP-230V-1000, ZUP-230V-1500

Meeting the EN 54-4:1997 + AC:1999 + A1:2002 + A2:2006

and EN 12101-10:2005 + AC:2007 standards

Certificate of constancy of performance CNBOP-PIB No. 1438-CPR-0593

Declaration of performance No. DWU-MX-15

Certificate of admittance CNBOP-PIB No. 3183/2018

17.03.2020

Warnings

- **Before using the device, carefully read this User Manual.**
- **Do not touch the internal components of the operating device - risk of electric shock or burns.**
- **Protect the device against any objects or liquids entering it - risk of electric shock and damage to the device.**
- **Do not obscure the ventilation openings - it can damage the device.**
- **Provide at least free space of at least 10cm on the sides of the device allowing proper ventilation.**
- **It is forbidden to transport the device with mounted and connected batteries.**
- **The device must be powered from the mains with a protective earth terminal.**
- **The device may affect the operation of sensitive radio and television equipment located nearby**
- **The device may be operated only by authorized and trained personnel.**
- **The device must be serviced by servicemen of the manufacturer or specialized service companies authorized by the manufacturer.**

1. Technical description.

1.1. Application.

The ZUP-230V battery backup power supply provides the 230 V uninterruptible voltage from the mains or after its failure, from the DC/AC 230 Vac inverter powered from the internal 24 V battery bank. During power failure, the total power is taken from the battery, its presence and efficiency is an essential element of the power supply's operation.

The power supply is not an UPS. Most fire protection devices supplied with 230 V voltage during supervision stay in standby mode - no power is consumed. The organization of the power supply's work takes into account this fact by setting specific time periods of the inverter's activity, while it takes energy from the battery. Apart from those time periods the battery is relieved while waiting for a fire alarm. This allows to extend the supervision time to 72 h while maintaining the readiness to operate powered devices with full power of up to 1500 W.

The power supply enables 230 V voltage distribution among 4 various types of receivers requiring taking, switching or disconnection of power at a given time, depending on a function being performed, after receiving a signal from outside (e.g. fire alarm). Response times for individual types of outputs can be set by a user in a wide range by using slide switches. The main application of the ZUP-230V power supplies includes:

- aeration gates;
- shunt trips of fire protection circuit breakers;
- self-locking, two-way actuators of shutting off dampers of fire ventilation;
- drives of the fire zone separating gates;
- spring actuators of fire protection shutting off dampers;
- blinds of ceiling smoke tanks;
- smoke exhaust fans running after a shutting off damper goes to the opening position;
- self-locking, two-way actuators of fire protection shutting off dampers, closed when a fan stops;
- devices started in a cascade sequence to reduce the inrush current.

In addition, the 24Vdc uninterruptible voltage of 100W is available to supply other fire protection devices.

The power supply meets the requirements of the EN 54-4:1997 + AC:1999 + A1:2002 + A2:2006 and EN 12101-10:2005 + AC:2007.

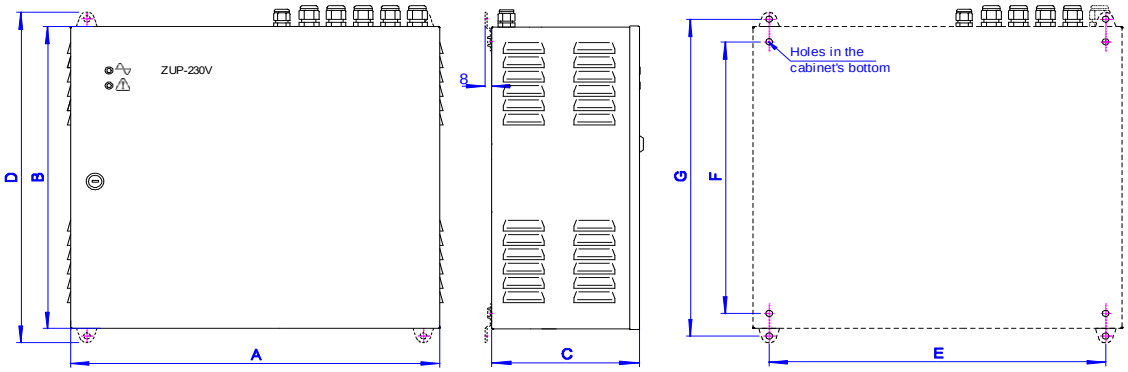
In addition, the power supply meets the requirements of the Regulation of the European Parliament and the Council of Europe (EU) No. 305/2011 of the 9 March 2011. (CPR - Construction Product Regulation).

1.2. Technical data.

Basic operating parameters of power supplies.

EN 54-4	Max. battery capacity	Imax_a			Imax_b	
		230Vac	24Vdc		230Vac	24Vdc
ZUP-230V-400	45Ah	400 W	2.0 A		400 W	3.5 A
ZUP-230V-700	45Ah	700 W	1.9 A		700 W	3.3 A
ZUP-230V-1000	45Ah	1000 W	1.7 A		1000 W	3.2 A
ZUP-230V-1500	75Ah	1500 W	0.4 A		1500 W	3.0 A

EN 12101-10	Max. battery capacity	Imax_a			Imax_b	
		230Vac	24Vdc		230Vac	24Vdc
ZUP-230V-400	45Ah	0 W	0.33 A		400 W	3.5 A
ZUP-230V-700	45Ah	0 W	0.26 A		700 W	3.3 A
ZUP-230V-1000	45Ah	0 W	0.15 A		1000 W	3.2 A
ZUP-230V-1500	75Ah	0 W	0.41 A		1500 W	3.0 A



Dimensions and weight	A	B	C	D	E	F	G	Weight with battery
ZUP-230V-400 -700 -1000	**455**	**406**	**207**	438	310	360	410	42 kg 45Ah
ZUP-230V-1500	**555**	**456**	**207**	488	410	410	470	65 kg 75Ah

Fig.1. Dimensions and placement of mounting holes of ZUP-230V power supplies.

Basic electrical and environmental parameters.

Power	
Mains voltage	230V - 25% +10% 50Hz
Outputs 230Vac *1)	
Output voltage 230Vac - when mains present *2) - when mains absent *2)	 equals to mains voltage 230V ±3% 50Hz *3)
Fuses on each output - on AC-1 output - on AC-2, AC-3 and AC-4 outputs	 20 mm 10AF 20 mm 6.3AF
Output 24Vdc	
Rated voltage of output 24Vdc *4)	27.1V
Range of voltage changes 24Vdc *5)	21…28.8V
Battery bank	
Maximum battery charging current - battery of 45Ah - battery of 47Ah	 1.7A 2.8A
Quiescent current consumption from battery - when inverter is operating	

- when inverter is off - after disconnection of discharged battery	0.78A/400W, 0.93A/700W, 1.08A/1000W, 1.33A/1500W 26mA 0.33mA
Maximum, additional resistance in battery circuit Ri max. *6)	25mΩ/45Ah; 19mΩ/75Ah
Environment	
Operating temperature	-5…+40°C
Ingress protection acc. to EN 60529:1999 + A1:2000	IP 42

**1) The power and output circuits of 230Vac have the common conductor N.*

**2) The presence of the mains voltage is recognized for the voltage of above 184V ±11V.*

**3) The voltage is not synchronized with the mains voltage.*

**4) With a battery charged at 25℃.*

**5) The specified range includes the voltage between the voltage of the discharged battery bank (at the end of the battery cycle) and the voltage of the bulk charging.*
The detailed description of the ZSP121N-DR power supply operation is included in a separate User Manual.

**6) The markings according to the EN 54-4 + AC + A1 + A2 standard*

Standards compatibility

Electrical safety	EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 class I
Functionality	EN 54-4:1997 + AC:1999 + A1:2002 + A2:2006
Functionality class	EN 12101-10:2005 + AC:2007 class A
Environmental class	EN 12101-10:2005 + AC:2007 class 1
EMC immunity	EN 50130-4:2011 + A1:2014
EMC emission	EN 61000-3-2:2019 EN 61000-3-3:2013 EN 61000-6-3:2007

2. Construction.

Power supply assembly

Equipment	Quantity	Notes
Power supply ZUP-230V	1	
Battery bank 12V	2	Capacity depends on type of power supply
Temperature sensor	1	For power supply ZSP121N-DR
Cable (connector) of battery bank	1	Equipped with 2 ring cable lugs Ø6
Glands M16×1.5	2	Quantity can be changed when ordering
Glands M20×1.5	3	Quantity can be changed when ordering

Note

The power supply casing has holes protected with glands prepared for mechanical removal during assembly:

- in the upper part for 5 M16 × 1.5 glands and 7 M20 × 1.5 glands;
- in the lower part for 3 M16 × 1.5 glands and 5 M20 × 1.5 glands.

The possible location of all glands on the power supply casing is shown in Fig.1.

The simplified diagram of the power supply is shown in Fig.2. The power supply includes:

- main 230Vac power distribution block (ZUP);
- 24Vdc/230Vac inverter;
- 24V battery bank;
- ZSP121N-DR power supply, basic function of which is charging and supervision of the battery bank and powering 230V power distribution block.

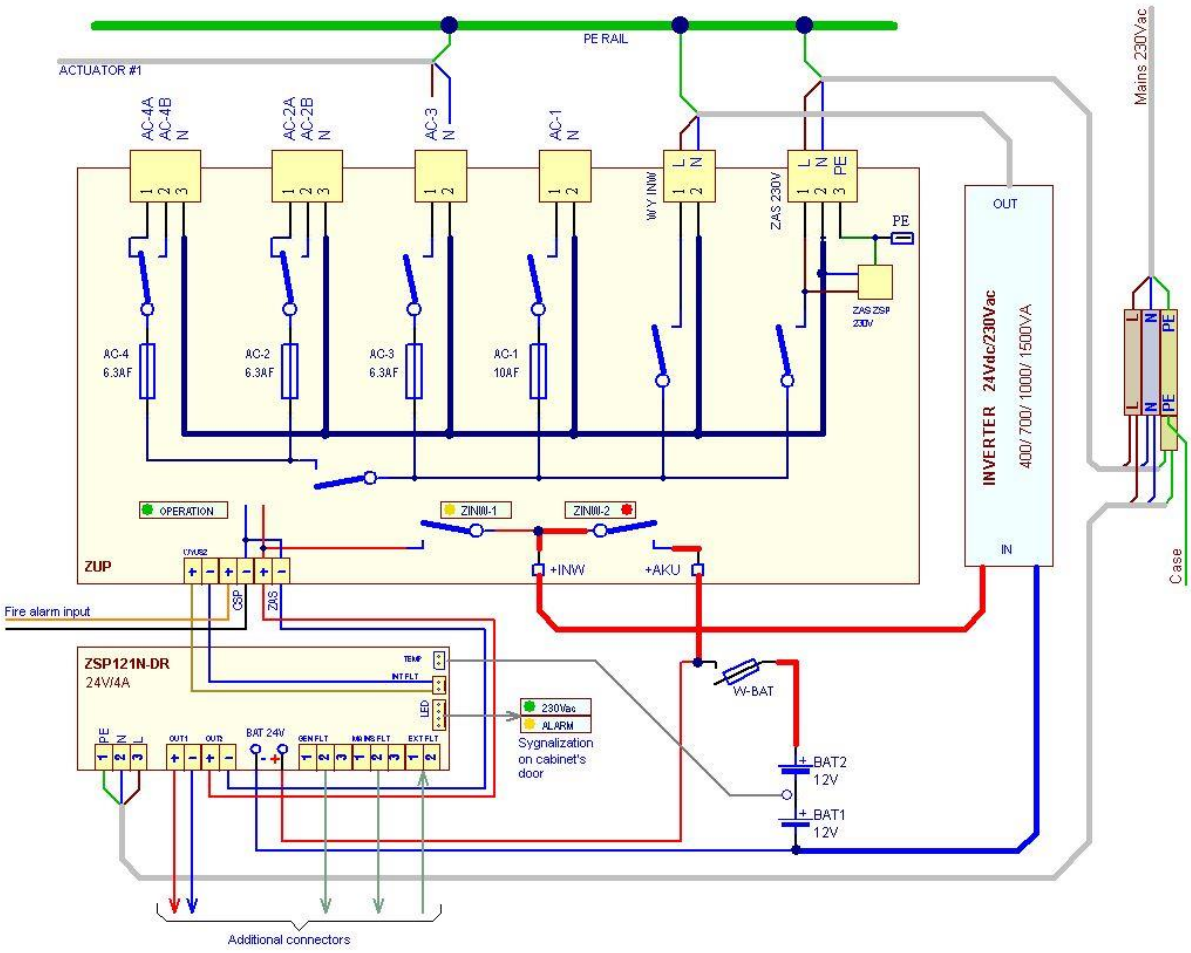


Fig.2. Simplified diagram of ZUP-230V power supplies.

The 230V power distribution block (ZUP) switches the power outputs of the AC-1, AC 2, AC-3 and AC-4 external devices in accordance with their functions, while supplying the voltage from mains (230Vac power) or from the inverter in the event of power failure. Each output is equipped with its own fuse.

The diagram shows exemplary connection of the external device (ACTUATOR # 1) from the AC-3 output.

The suitable action of switching outputs and power is initiated independently when power failure or it can be forced by a fire alarm signal (control panel input). The input can be operated from multiple locations after setting the line control mode. You can also disable the line control mode, forcing a simple two-state operation.

The correct supply of the whole packet is indicated by the green LED OPERATION.

The power supply inverter operates continuously, which reduces the time it takes to switch from the mains to the battery operation mode. Its starting and backup operation takes place from the ZSP121N-DR power supply output. Then the ZINW-1 connector and the corresponding yellow LED on the ZUP's power supply packet are on.

In case of necessity of loading the inverter (e.g., when power failure), its power is switched directly onto the battery bank. The ZINW-2 connector is connected and the corresponding red LED on the power supply packet are on.

Such the way of operation allows for independent supervision of the battery bank; its charging, voltage and current measurement, resistance measurement and battery circuit continuity monitoring. The inverter is connected directly to the battery only when significant current is required. It is also possible to completely disconnect it after discharging the battery, which prevents it from damage.

The ZSP121N-DR power supply, in addition to the functions related to supervision of the battery and powering the electronic circuits, allows for connecting additional external devices powered with 24V (OUT1 output) and for output of the binary signal (relay outputs), general fault (GEN FLT) and

mains power failure indication (MAINS FLT). In addition, the power supply can take one external fault signal (EXT FLT).

In standard, the power supply also take a signal on its INT FLT input on a fault from the ZUP power supply packet (outbound output) by transferring it to the general fault indication output (GEN FLT). The power supply also triggers the LED indication on the box door. The green LED MAINS indicates the presence of the mains power and the yellow LED FAULT is on simultaneously with the GEN FLT signal indication.

The detailed description of the ZSP121N-DR power supply operation is included in its separate User Manual.

Note

On the cabinet doors instead of the MAINS and FAULT descriptions, the following pictograms can be used, respectively: and

3. Functioning of outputs.

Output AC-1

The AC-1 output is intended for devices that after a power failure and during a fire alarm require maintaining the 230V voltage for some time, e.g.:

- aeration gate drive (activated by a separate fire alarm signal, but it requires 230V power to operate);
- shunt trips of fire protection circuit breaker (it is activated manually with a button, but requires the 230V power to operate).

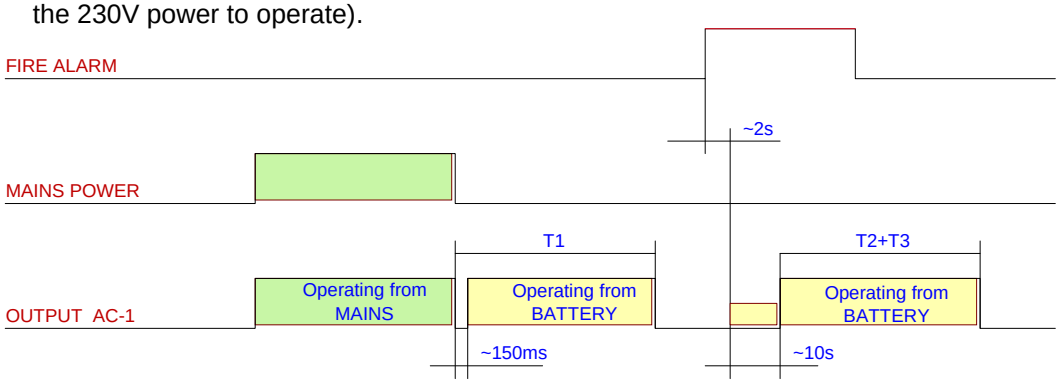


Fig.3. Voltage timings for AC-1 output.

The voltage at the AC-1 output is always present when the mains voltage is present and for a preset T1 time after its disappearance and additionally during a fire alarm in the absence of the mains power for the T2+T3 time. When switching from the mains power to the inverter operation and vice versa, the output has a temporary voltage drop (about 150ms).

If the fire alarm occurred already after the inverter turned off (the T1 time counted down), the inverter restart takes place with some delay: 2s is the time to recognize the alarm occurrence and the next 10s is the time needed to start the inverter

Description of times that can be set by a user.
A detailed way of setting times is provided in point 5.7.3.

The time T1 can be set from 1 minute up to 8 hours, which also determines the maximum time of battery operation after power failure

The time T2 can be set from 1 up to 6 minutes and from 1 up to 6 hours, which also determines the maximum time of activity of the power supply after a fire alarm. If a fire alarm occurred during the countdown of the T1 time, i.e. after the mains power failure, the countdown of the T1 time is interrupted and the countdown of the T2 time begins.

The time T3 results from the operation of the AC-4 output and it can range from 5 up to 65s.
Warning. Separate use of T2 and T3 times is included in the AC-4 output description.

Outputs AC-2A and AC-2B

The AC-2 output is intended for devices whose state is switched by a fire alarm signal, e.g.:

- self-locking, two-way actuator of shutting off damper of fire ventilation;
- drive of the fire zone separating gate;

or that can be activated during the fire alarm, e.g.:

- aeration or smoke exhaust fan switched on during a fire

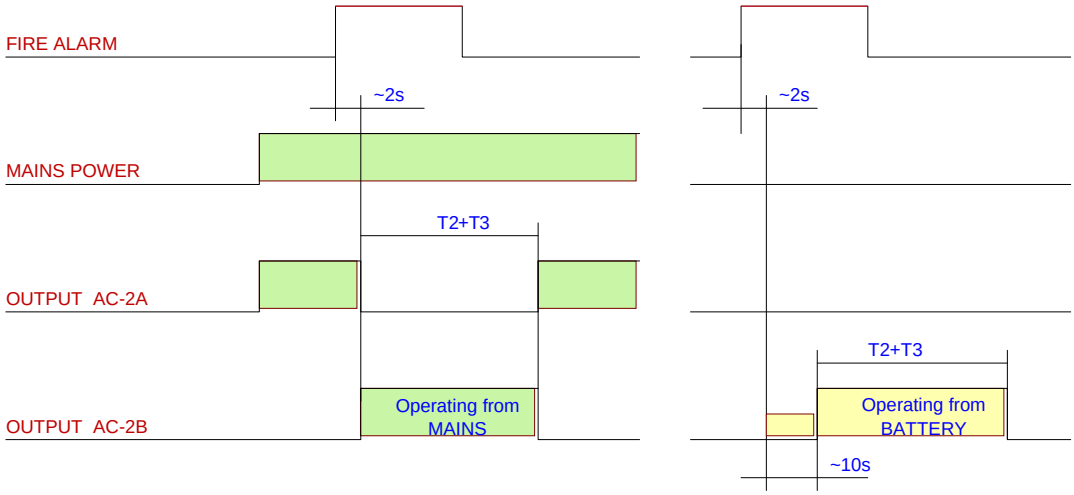


Fig.4. Voltage timings for AC-2 output.

A fire alarm causes voltage loss at the AC-2A output (if present, i.e. when the mains present) and the appearance of voltage at the AC-2B output (regardless of whether the mains is present). The voltage on this output is maintained for a certain period of time T2+T3 (see the description of the times of the AC-1 output), so that the actuator can change its state.

The response to a fire alarm always takes place with a delay of ~2s required for its correct recognition. If a fire alarm occurred with the inverter turned off, it will be restarted with an additional delay of about 10s.

Return to the safe position, i.e. the correct position before the fire alarm occurs (voltage present at the AC-2A output and no voltage at the AC2-B output), is possible when the mains power present and when is no fire alarm.

Output AC-3

The AC-3 output is intended for devices whose condition is backed-up by means of the external power source and, which after a fire alarm appears, independently switch in a safe position by switching it off, e.g.:

- spring actuator of fire damper;
- blind of ceiling smoke tank.

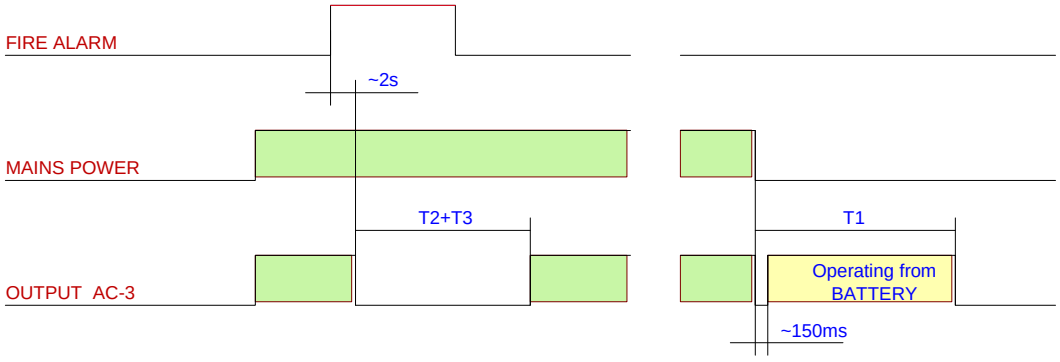


Fig.5. Voltage timing for AC-3 output.

If the voltage was present at the AC-3 output, it disappears after a fire alarm occurred for its duration, but not shorter than T2+T3 (see the description of the times of the AC-1 output). The response to a fire alarm always takes place with a delay of ~2s required for its correct recognition. The voltage recovery at the AC-3 output is possible when the mains present and when is no fire alarm. The voltage on this output is additionally maintained also after the mains power failure in the absence of a fire alarm, so as not to unnecessarily move the devices to the position appropriate for the fire alarm only due to the power failure. The voltage maintenance in this state is limited by the maximum battery life T1.

When switching from the mains to the inverter operation, there is a temporary voltage drop on the output (about 150ms).

Outputs AC-4A and AC-4B

The AC-4 output is intended for devices that should start operating with some delay after a fire alarm, e.g.

- smoke exhaust fan, which can be activated only after passing the shut-off valve to the fully open position;
- self-braking, two-way actuator of fire ventilation shutting-off damper, which should close the damper only after stopping the fan.
- cascade-operated devices to reduce the inrush current.

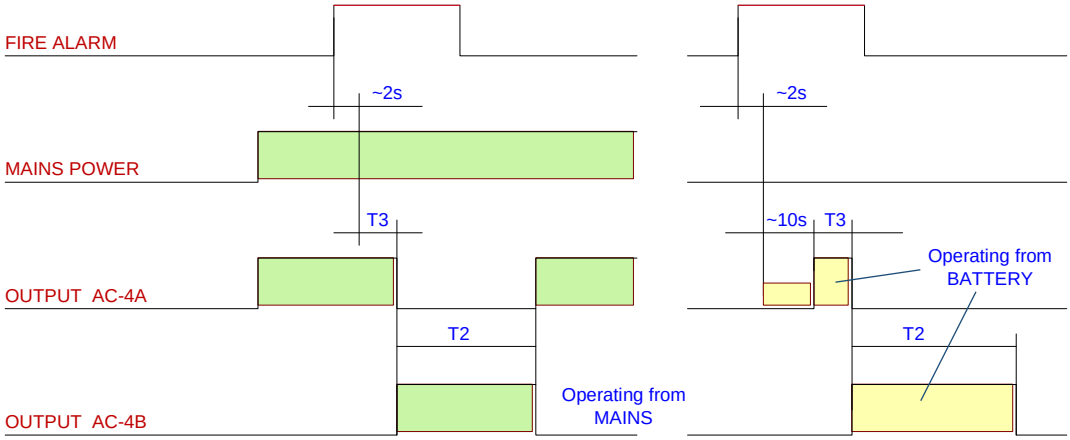


Fig.6. Time waveforms for AC-4 output.

The AC-4 output has the AC-2 output functionality. The only difference is the additional delay in switching after the fire alarm is recognized by the T3 time (see the description of the times for the AC-1 output).

The response to a fire alarm always takes place with a delay of ~2s required for its correct recognition. If the fire alarm occurred with the inverter turned off, it will be restarted with an additional delay of about 10s.

4. Description of 230Vac distribution packet of ZUP power supply.

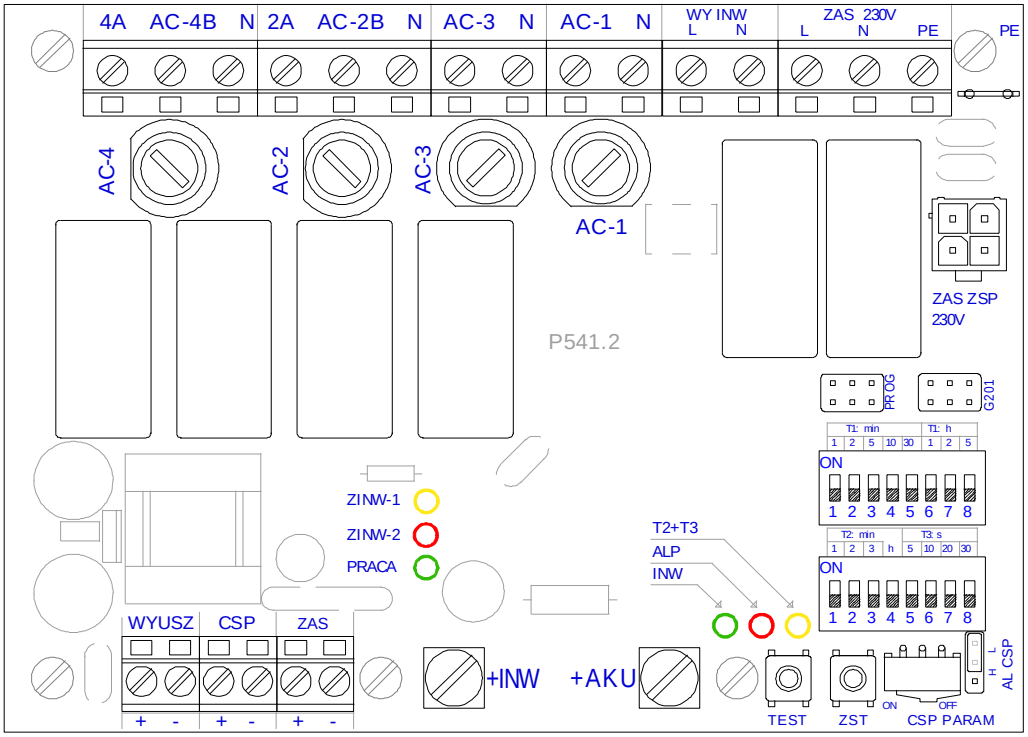


Fig.7. View of 230Vac distribution packet of ZUP-230V power supplies.

Description of 230Vac distribution packet components.

Designation	Description
Connectors	
ZAS 230V	230Vac mains power input (*)
WY INW	230Vac inverter output (*)
AC-1, AC-2 AC-3 AC-4	Outputs for powering external devices and their corresponding fuses.
PE	Additional contact (connector) of the PE mains (unused).
ZAS ZSP 230V	Additional 230Vac mains output (unused).
PROG	UP programming connector (do not connect!)
G201	Digital communication connector (do not connect!).
WYUSZ	Fault output signal - isolated OC output (connection with the INT FLT input of the ZSP121N-DR power supply) (*) - control panel line fault after 90s; - battery voltage below 24V; - no voltage at the inverter output after 8s.
CSP	Fire alarm signal input from the Fire Alarm Control Panel: - alarm state must last longer than 2s; - see CSP PARAM and AL CSP.
ZAS	External 24Vdc power (*)
+INW	Positive power bus of inverter. (*)
+AKU	Positive pole of battery bank. (*)
Buttons	
TEST	Button for testing power supply (simulating a fire alarm): - power supply reacts when button is pressed for longer than 2s; - the button allows to shorten T2+T3 (see LED T2+T3), but only after fire alarm.
ZST	The button allows you to start power supply from battery ("cold start"): - see point 5.7.1
Switches	
CSP PARAM	Switch enabling parameterization of control panel input:

	- ON parameterization is required (10kΩ||1kΩ); - OFF parameterization is not required (ordinary binary input); - factory setting: OFF
AL CSP	Jumper setting active state of control panel alarm: - jumper in L position or its absence: fire alarm active in low state; - jumper in H position: fire alarm active in high state; - factory setting: L
T1 min, T1 h	Slide switch setting T1 time: - sum of individual settings: 1, 2, 5, 10, 30min and 1, 2, 5h; - factory setting: see section 5.7.3
T2 min/h	Slide switch setting T2 time: - sum of individual settings: 1, 2, 3 and unit selection: min or h; - factory setting: see section 5.7.3
T3 s	Slide switch setting T3 time: - sum of individual settings: 5, 10, 20, 30s; - factory setting: see section 5.7.3
LED signalization	
ZINW-1	Signalization of connection of inverter to ZSP121N-DR power supply (yellow LED).
ZINW-2	Signalization of connection of inverter directly to battery (red LED).
PRACA	Mains power signalization (green LED).
INW	Inverter operation signalization (green LED): - off: inverter is not working (no voltage at its 230Vac output); - flashing: inverter power voltage too low (below 24V), inverter operating; - on: mains voltage correct, inverter operating; - blinking: no battery or mains voltage too low (below 22V)
ALP	Signalization of fire alarm (red LED): - off: no alarm; - on: fire alarm has occurred (also when TEST button was used); - flashing: line fault of fire alarm input from the control panel detected .
T2+T3	T2 and T3 countdown start signalization (yellow LED): - it is possible to finish countdown of these times faster by means of TEST button.

(*) *Connections made by the power supply manufacturer.*

5. Installation.

5.1. General notes.

The place where the power supply should be installed should be chosen so as not to expose it to the mechanical damage, and to not exceed the permissible parameters of temperature and air humidity. If possible, the power supplies should be installed in fire-partitioned areas (e.g. electrical switchboards, technical rooms, cable shafts, etc.).

The power supply cabinet can be attached directly to the wall through the four holes in its rear wall or with four spacers. The location of the fixing holes is shown in Fig.1. Use metal bushings and steel screws for mounting. PVC dowels should not be used. In the case of direct hole mounting in the rear wall of the cabinet, it is advisable to remove the inverter first by loosening the two nuts at its bottom, slightly deflecting it and sliding it downwards.

The accumulator bank, due to its weight and dimensions, should be placed in the cabinet as the last element; after all cable connections have been made.

Note.

Selection of wires in power and control systems of fire protection equipment can be subject of local law and regulations, e.g. civil engineering code and derived ordinances.

5.2. Connecting mains

The mains power cable with a minimum cross-section of 3×1.5 mm2, after passing through one of the glands in the casing of the power supply, should be connected to single-track connectors, as

shown in the Fig.2.

Note.

The mains connection must be made as a permanent installation with the continuity of the neutral line (N). The installation switch described below must be in the active line (L).

The power supply is not equipped with its own mains switch, therefore it is required to use a special installation switch outside the power supply. The switch should also be used as an overload and short-circuit protection device and allow to power the devices of high inrush current. We recommend using the S301 C16A installation switch. This switch should be clearly marked as being used in the fire system and cannot be used simultaneously in other circuits.

Warning.

Switching on the mains with a switch located outside the power supply can only be performed with the fully assembled internal cabling of the power supply unit, including the connected and correctly installed inverter. It is unacceptable to leave the 230Vac power plug disconnected from the inverter output.

5.3. Connection of external AC output circuits

The external connections cables should be run through the selected holes in the cabinet's body (after removing the jumpers) and fastened by twisting the appropriate glands. The cables to be connected to the AC-1, AC-2, AC-3 and AC-4 outputs, after fixing them in the glands, should be led in a large arc in the inverter plane before they are fixed by cable holders and connected to appropriate terminals of the ZUP power supply . The external cable insulation should be removed directly behind the cable holder. To make the connections of 230Vac power in the fire protection systems, 3-wire cable of the HDGs type 1.5mm2 is recommended. For devices made in the 2nd class of insulation, it is possible to use 2-wire cables, without using the connection with the PE bus bar.

Several loads can be connected to the power supply at the same time. The sum of their power cannot, however, exceed the maximum power indicated for a given execution device. Attention should be paid to the nature of the load provided by some loads. For example, induction motors can take significant current when starting, which can lead to a blown fuse placed on a given output or prevent proper start of the inverter. In this case, it is possible to use a soft starter system (so called soft-starter), for example, the ZUP-MS type of the MERAWEX. However, a user is asked to consult the manufacturer, due to different nature of loads, which may require setting individual device operation parameters.

5.4. Connection of additional outputs

These connections concern the outputs of the ZSP121N-DR power supply shown in Fig.2. It should be noted that the EXT FLT signaling input is referenced to the negative output terminal of the power supply. The signaling outputs GEN FLT and MAINS FLT are relay outputs, galvanically separated from other circuits. A detailed description of the outputs of this power supply is included in a separate User Manual.

From the output **OUT1** of the ZSP121N-DR power supply, only current of the values described in the table **Basic operating parameters of power supplies** can be taken (point 1.2 Technical data).

5.5. Connection of battery bank

The battery bank, placed with its terminals from the side of the casing door, should be connected with two cables that are already led out of the power supply, paying particular attention to the polarity: red cable to the positive pole of one battery, blue to the negative of the second one. Finally, connect the both batteries with each other, by means of the cable (connector) provided by the manufacturer. Incorrect connection can lead to destruction of the power supply.

The battery should be connected with the battery disconnector switched off and its fuse removed. Although each of the component devices (the ZSP121N DR power supply, ZUP and inverter) has its own fuse, the common disconnector enables reliable disconnection of the battery from the entire power supply.

All connections should be made carefully, remembering that during the battery operation (when no mains power) the current consumed by the inverter can reach up to 80A.

In order to properly compensate for the temperature of battery floating voltage, the temperature sensor of the ZSP121N-DR power supply should be placed between the side walls of the both batteries.

5.6. Connection of alarm input from fire alarm control panel.

The fire alarm input from the control panel can be set both in the operating mode with parameterization in which the resistance of the signal line is monitored during both the supervision and alarm time as well as in the normal binary input operation mode. In both cases, however, it is required that the parameters of the control circuit be within certain specified limits:

- for the input with parameterization of the resistance value, taking into account the resistance of connections and leakage resistance (between the lines) cannot differ by more than 10%;
- for the binary input, the short-circuit resistance cannot be higher than 1kΩ and the leakage resistance (between lines) must not be lower than 100kΩ.

If these values are exceeded, the power supply signalizes the WYUSZ fault.

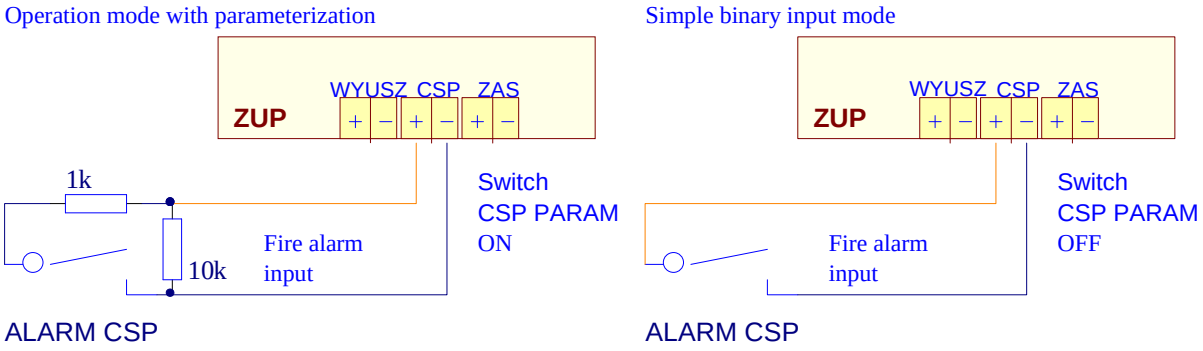


Fig.8. Ways to connect control panel fire alarm input.

5.7. First start.

The designations used in the description come from Fig.2. and Fig.7.:

MAINS	- green LED on the door of the power supply box
FAULT	- yellow LED on the door of the power supply box
PRACA	- green LED on the 230Vac voltage distribution packet
ZINW-1	- yellow LED on the 230Vac voltage distribution packet
ZINW-2	- red LED on the 230Vac voltage distribution packet
AC-1	- 230Vac voltage on the AC-1 output terminals
ALP	- red LED on the 230Vac voltage distribution packet
INW	- green LED on the 230Vac voltage distribution packet
AC-2A	- 230Vac voltage on the AC-2A output terminals

Symbols used in the tables:

+	- LED on, voltage present at AC-1 output
-	- LED off, no voltage at the AC-1 output
+/-	- LED flashing
+/—	- LED blinking

5.7.1. Starting power supply.

Notes:

- connect voltage indicator or load (bulb, motor, etc.) to the AC-1 output;
- in the initial state, the mains should be disconnected (with the installation switch outside the power supply) as well as the battery bank (W-BAT switch);
- each activation of the power supply causes the LEDs to switch on for a moment: INW, ALP, T2+T3;
- LED OPERATION is on continuously during operation of the power supply;
- signalization states have been indicated in the tables below.

Checking 230Vac voltage backup capacity

	LED diodes on box door		LED diodes on 230Vac voltage distribution packet				Output
	MAINS	FAULT	OPERATION	ZINW-1	ZINW-2	INW	AC-1
W-BAT battery switch switched on (*no reaction required*)	–	–	–	–	–	–	–
W-BAT battery switch switched off	–	–	–	–	–	–	–
Mains switched on	+	+	+	–	–	+/––	+
W-BAT battery switch switched on	+	–	+	+	–	+	+
Mains switched off	+/–	+	+	+	+	+	+
after time T1	+/–	+	+	–	–	–	–

Switching on the battery switch (without mains) should not cause a permanent reaction of the power supply. The correct starting (with the battery connected and the mains on) should result in appearing the voltage on the AC-1 output. After power failure, the voltage should be maintained for the time T1.

Starting the PSU from the battery, without mains power ("cold start")

	LED diodes on box door		LED diodes on 230Vac voltage distribution packet				Output
	MAINS	FAULT	PRACA	ZINW-1	ZINW-2	INW	AC-1
W-BAT battery switch switched on	–	–	–	–	–	–	–
ZST button press	–	–	+	+	+	–	–
after a dozen or so seconds	+/–	+	+	–	–	–	–

The ZST button allows you to start the power supply from the battery, without the power supply. After such the start, the power supply switches into the state corresponding to the end of the T1 countdown in which the power supply during the battery operation waits for a fire alarm signal.

5.7.2. Checking basic functions.

Initial status: power supply switched on, mains on, battery connected.
Initial settings for the control panel fire alarm input:
- CSP PARAM switch: **ON**
- AL CSP jumper: **L**

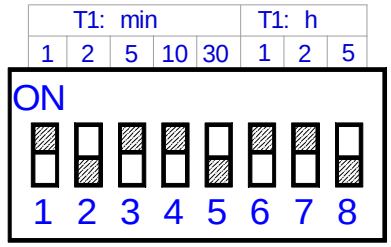
Checking operation of control panel fire alarm input.

	LED diodes on 230Vac voltage distribution packet				Output
	ALP	ZINW-1	ZINW-2	INW	AC-2A
Control panel input not connected	+/–	+	–	+	+
Connecting 10kΩ resistor to control panel input	–	+	–	+	+
Connecting additional 1kΩ resistor to control panel input	+	+	–	+	–
Disconnection of additional 1kΩ resistor from control panel	–	+	–	+	–
after time T2+T3	–	+	–	+	+

With the parameterization of the fire alarm input set, its failure activates fault signalization, which should disappear after connecting a 10kΩ resistor. In this state, connection of a 1kΩ resistor is recognized as occurrence of a fire alarm, which results in switching off the voltage from the AC-2A output. The subsequent disconnection of the 1kΩ resistor (disabling the fire alarm) should result in the output on the AC-2A output, but only after the countdown of the time T2+T3.

5.7.3. Setting time

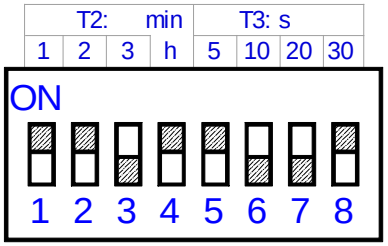
There are two slide switches on the 230Vac voltage distribution packet that allow you to set all three times to organizing the activation of the AC-1, AC-2, AC-3 and AC-4 outputs of the power supply.



Time T1:
- maximum battery life after power failure (from 1min up to 8h)

Setting:
- sum of individual settings: 1, 2, 5, 10, 30min and 1, 2, 5h.

Example in picture: (1+5+10)min + (1+2)h = 3h and 16min



Time T2:
- maximum time of power supply activity after a fire alarm (from 1min to 6min and from 1 up to 6h)

Setting:
- sum of individual settings: 1, 2, 3 and unit selection: min. or h.

Example in picture: (1+2)min = 3min

Time T3:
- delay of AC-4 output operation (from 5s up to 65s)

Setting:
- sum of individual settings: 5, 10, 20, 30s

Example in picture: (5+30)s = 35s

The absolute values of the set times depend on the construction and the required way of powering a specific object.

Factory settings: **T1**: 5min **T2**: 5min **T3**: 5s

6. Additional information

6.1. Manufacturer's notes

The producer reserves the right to introduce construction and technological changes that do not impair the quality of the product .

6.2. Proceeding with packaging, used products and batteries

The product packaging is made of materials that can be recycled (wood, paper, cardboard, plastics). Unnecessary packaging should be distributed to the recipient of the waste.

This marking on the product indicates that the product should not be disposed of with municipal waste at the end of its usage time, but must be returned to the collection point for waste electronics. **Waste batteries are hazardous waste and must be disposed of**. This will contribute to avoiding harmful effects on human health and the environment as a result of uncontrolled waste disposal.

CE

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MERAWEX Sp. z o.o. - Toruńska 8, 44-122 Gliwice, Poland

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1438-CPR-0593

EN 54-4:1997 + AC:1999 + A1:2002 + A2:2006, EN 12101-10:2005 + AC:2007

Power supply for fire detection and fire alarm systems, smoke and heat control systems, and other fire protection systems

ZUP-230V-400, ZUP-230V-700, ZUP-230V-1000, ZUP-230V-1500

DoP **:** DWU-MX-15

Other technical data: see operational manual

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USER MANUAL

Power supply for fire alarm devices, heat and smoke control systems, fire protection devices and fire automation

ZSP121N-DR
designed to operate with the power supply ZUP-230V

17.03.2020

Warnings

Read all the tips and recommendations below. Failure to observe them can cause damage to the device, electric shock, fire or serious injury.

- **It is forbidden to transport the device with mounted and connected batteries.** It may result in serious internal damage and the loss of safety of use.
- **Installation and connections may be carried out only when the batteries are removed.**
- **When connecting batteries, pay special attention to the polarity compatibility with the description near the connector.**
- **Do not obstruct the ventilation.** Provide at least free space of at least 10cm on the sides of the device allowing the proper ventilation. Otherwise, the device may be damaged or battery bank can be prematurely used out.
- **Mount the device in a place where it will not be exposed to direct sunlight..**
- **The device must be powered from the mains with a protective earth terminal.**
- **Before connecting the device, check the quality of all connections made**.
- **The device may affect the operation of sensitive radio and television equipment located nearby.**
- **The device may only be serviced by the manufacturer's service department or specialized companies authorized by the manufacturer.**

Technical description

The power supplies have been designed for uninterruptible powering of 24V fire protection devices and meet the requirements of the EN 54-4:1997 + AC:1999 + A1:2002 + A2:2006 and EN 12101-10:2005 + AC:2007 standards. The source of backup power are two, 12V lead-acid batteries of the VRLA type. The power supplies are designed for mounting on the TS-35 rail, inside cabinets or inside the other IP42 devices.

Electrical parameters.

Power		
Mains	165…230…253V 50Hz	
Power factor	0.66	
Leakage current in the protective conductor	0.6mA	
Efficiency in nominal conditions	87%	
Output		
Number of outputs	2	
Protection of outputs	fuses 5x20mm	
Output voltage - with battery connected - without batteries	 21.0…28.8V (depending on battery condition and ambient temperature) 26.4…28.8V (depending on ambient temperature)	
Max. output current	4.5A (total from both outputs)	
Hiccup type overload protection	after overloading of up to 10V (at current of 5.5A)	
Ripple voltage	max. 150mVpp	
Output current Imax. b *1)	4A	
Output current Imax. a *1) - with batteries of 45Ah - with batteries of 75Ah	acc. to EN 54-4 2.35A 1.25A	acc. to EN 12101-10 0.46A/72h; 1.13A/30h 0.78A/72h
Battery bank control		
Output protection	fuse 5x20mm 8AF	
Battery charging current limitation *2) - for batteries of 45Ah - for batteries of 75Ah	 1.7A (**CL** plugs open – jumper removed) 2.8A (**CL** shorted – jumper on)	
Bulk charging start	5 min after exceeding 25% level of charging current limitation	
Correct end of bulk charging	- 2h from moment when charging current drops to 90% - Immediately after current drops below 25% of charging current	
Bulk charging emergency termination	- battery temperature has exceeded 40°C - temperature sensor fault detected - total charging time exceeded 20h when limitation of 2.8A and 18h at 1.7A	
Floating operation voltage at 25°C	27.1V (2.26V/cell)	
Bulk charging voltage at 25°C	27.8V (2.32V/cell)	
Temperature compensation of floating operation voltage and bulk charging	-48mV/°C (-4.0mV/cell/°C)	
Overriding battery voltage limits - minimum voltage - maximum voltage	 26.4V (2.2V/cell) 28.8V (2.4V/cell)	
LVDD at	21V	
Battery connection - recognition of battery connection - automatic battery connection	 >10V (signalization only) >21.6V (1.8V/cell)	
Quiescent current consumption from batteries - battery connected - battery disconnected	 16mA (without external LED signalization 7mA) 160uA	
Measurement of battery circuit resistance - Ri max * 1) - measurement repetition period	only during floating operation 45mΩ/45Ah; 34mΩ/75Ah *2) 10min	
Relay signalization outputs		
Output characteristics - number of relays - maximum loadability of contacts - type of contacts available - active signalization state	 2 30Vdc/1A three switchable contacts (NO and NC) relay de-energized	

Binary inputs of external indications	
External signal input protection	3.3V/0.7mA, protection ±30V/50mA
Input for connecting tamper switch (tamper)	3.3V/0.7mA

**1) Markings acc. to EN 54-4 + AC + A1 + A2*

**2) Possibility of switching by a user. The limitation of the charging current and the threshold of the maximum resistance of the battery circuit are switched simultaneously.*

Operating conditions

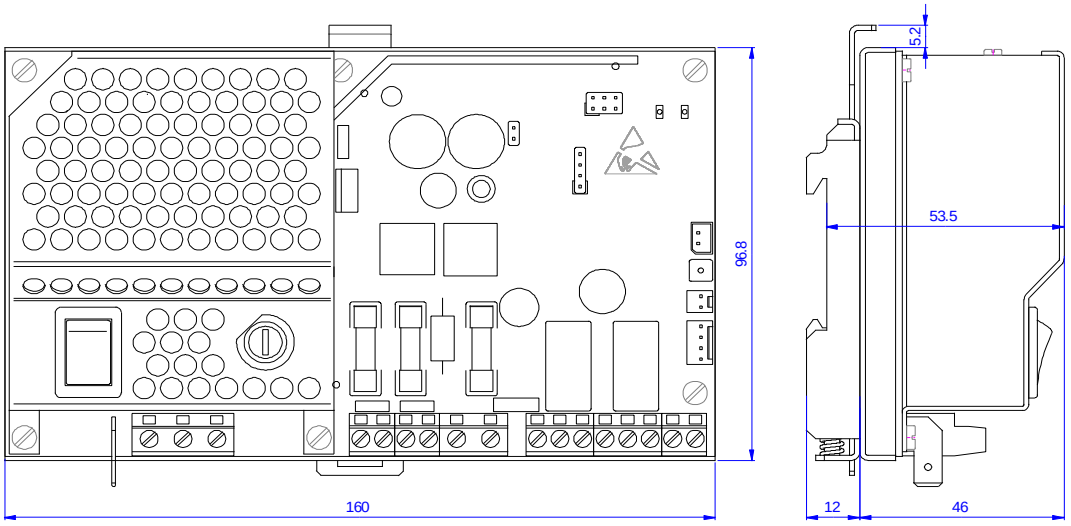
Ambient temperature during operation	-25…+55°C
Storage temperature range	-25…+85°C
Relative humidity (non-condensing)	30…80%
Direct sun exposure	unacceptable
Surges during operation	unacceptable

Compliance with standards

Basic requirements, functionality	EN 54-4 + AC + A1 + A2, EN 12101-10 + AC, ISO 7240-4
Electromagnetic compatibility	EN 50130-4 + A1
Electrical safety	Class I acc. to EN 60950-1 + A11 + A1 + A12 + A2

Mechanical parameters

Dimensions - body - maximum dimension over the TS-35 rail	 160 × 97 × 46 mm 54 mm



Power supply assembly:
- temperature sensor (attached permanently or fitted with a plug);
- jumper on the **INT FLT** signalization input connector;
- of the maximum **CL** charging current selection jumper

Optional equipment:
- tamper with the cables

Installation and connection.

The power supply has been designed for mounting on a TS-35 rail and for use with battery banks. Releasing the latch on the rail is possible by pressing the lever over the power supply with your fingers or by pulling it down using a screwdriver inserted into a rectangular hole under the power supply. Removing the power supply is possible by its slight deviation from the rail towards yourself and

upwards. Mounting can be done in the reverse order, also without the use of a lever, by snapping the bracket on the rail.

The power supply must be connected to a permanent installation by using a protective conductor and taking into account the **L**, **N** and **PE** markings. It is recommended to equip the installation with a surge protection system. The power supply voltage should not be disconnected with the main fire protection switch. It is required to install in the power circuits, outside of the power supply, an installation switch with a nominal current of at least 3A. The power box and the circuit breaker should be marked with red color and the power supply number. One switch should protect one power supply. The switch mounted on the casing of the power supply can be used for testing purposes – to check the voltage supply during power failure.

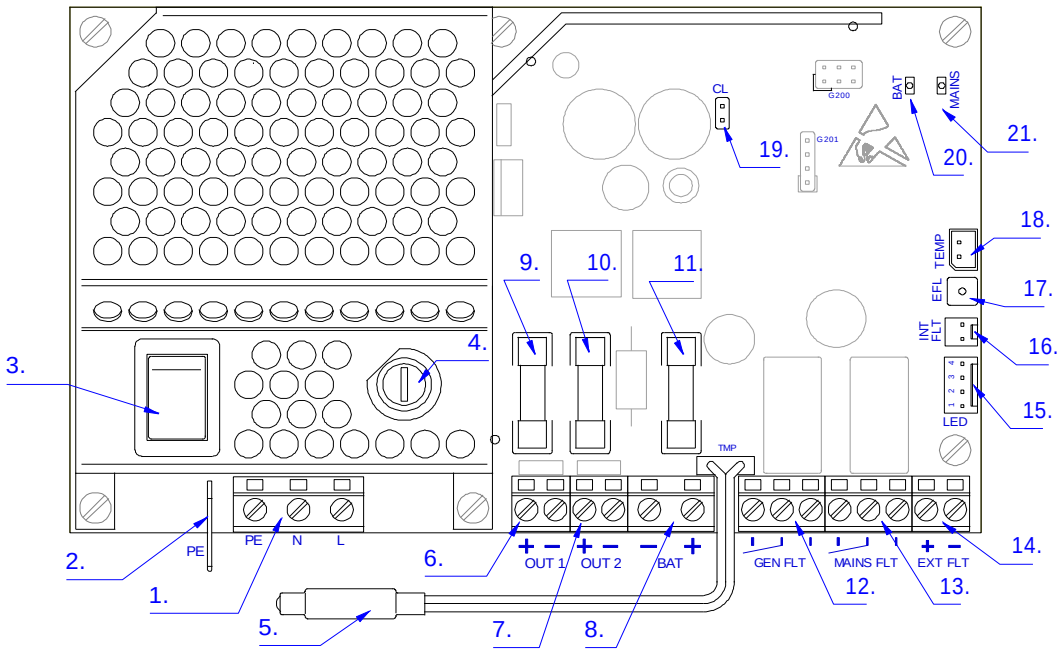
After making the remaining connections (24V voltage outputs and signalization circuits) and after connecting the external LED signalization harness and possibly the tamper, the batteries should be connected as the last item.

The power supply has been designed for cooperation with two maintenance-free batteries, which should be placed in its immediate vicinity. The end of the temperature sensor of the power supply should be inserted between the two batteries, which afterwards should be maximally pushed together. Pay special attention to the polarity of the power supply and battery connections. If the connection is wrong, the battery circuit fuse will be damaged. The following figure shows the polarity of the connected **BAT** battery. Firstly, the batteries should be connected to the power supply packet and then connected to each other.

The power supply is adapted to connect an external **LED** signalization located, for example, on the cabinet in which the power supply and batteries have been installed.

It is possible to select between two levels of charging current limitation, battery banks depending on their capacity. The details are included in the **Electrical parameters** table. Simultaneously with switching the level of the charging current limitation, the threshold of the permissible resistance of the battery circuit Ri max is switched over.

By default, a jumper is mounted on the **CL** connector, which sets the higher charging current and the lower value of the resistance Ri max.



Description of ZSP121N-DR power supply elements

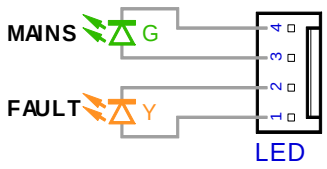
Item	Description	Marking	Recommended type and cross-section of wire
1.	Connector of 230V 50Hz mains	L, N, PE	3-wire cable of HDGs type 0.75 ... 1.5mm^2
2.	Additional protective terminal	PE	
3.	Mains switch		
4.	Mains fuse		
5.	Temperature sensor	TMP	If it is connected permanently
6.	Load connector 1	OUT 1	2-wire cable 1.5 or 2.5mm^2
7.	Load connector 2	OUT 2	
8.	Battery connector	BAT	
9.	Output fuse 1		
10.	Output fuse 2		
11.	Battery fuse		
12.	General fault signal output	GEN FLT	2-wire cable of YnTKSY type 1x2x0.8mm^2
13.	Mains fault signal output	MAINS FLT	
14.	External fault signalization input	EXT FLT	
15.	Connector for connecting LED signalization diodes	LED	
16.	Tamper connector	INT FLT	
17.	Signaling input from the additional output packet	EFL	
18.	Temperature sensor connector	TEMP	If the sensor is not connected permanently
19.	Charging current limitation level switch	CL	
20.	LED diode of internal signalization – yellow	BAT	
21.	LED diode of internal signalization - green	MAINS	

Notes

- Use the HDGs type cable to connect the OUT 1 and OUT 2 outputs if it is routed outside the powered device.
- For each fault signal outputs, there are 3 relay contacts available. The description of the relay connector indicates the contact position in the event of power failure (de-energized relay).
- The external fault signal input is connected by its terminal (-) to the negative battery terminal (**BAT -**). Generation of the fault signalization requires 0V (short-circuit). In this state, the current of approximately 0.25mA flows between the terminals (**+**) and (**-**) of the signalization input.
- If tamper or another device is intended to be connected to the power supply, the sensor harness plug must be inserted instead of the pre-installed **INT FLT** jumper.
- The only elements that can be replaced by the user are the fuses described in the table below. It is permissible to replace the fuses only while maintaining their value and speed.

Position in table	Fuse description	Value
4.	Mains circuit (delayed T)	1.6 AT
9.	Output circuits (fast F)	6.3 AF
10.	Output circuits (fast F)	10 AF
11.	Battery circuit (fast F)	8.0 AF

- The following figure shows the way (polarity) of connecting the external LED signalization system.



First start

If all connections have been made correctly after connecting the power supply to the mains, the green **MAINS** signalization diode on the power supply packet and the **MAINS** diode of the eternal indication should be on.

Two checks must be performed when starting the device.

Checking capacity of maintaining output voltage.

Disconnect the mains with the switch mounted on the power supply casing. The power supply should go into the battery operation mode, maintaining the voltage on its both outputs. You can use any voltage tester for the purpose, e.g. a voltmeter or a light bulb.

Note.
Connecting the battery to operate inside the power supply occurs only when the battery voltage is higher than 21.6V.

After disconnecting the mains, the green **MAINS** LED on the power supply packet should go out and its counterpart of external signalization should be flashing. At the same time, the **MAINS FLT** relay should go into the standby mode (the position of contacts in accordance with the drawing near the connector).
The transition into the battery operation is also signaled by the **FAULT** LED of the external signalization and the **GEN FLT** relay should go into the standby mode with delay of 5s.

Battery circuit test

Break the battery circuit by disconnecting one of the cables when the power supply is in the mains operation mode. This state will be detected by the power supply at the nearest test within 90s and signaled by flashing of the **BAT** diode.
In this state, the external **LED FAULT** signalization should be activated and the **GEN FLT** relay should go into the standby mode (the position of contacts in accordance with the drawing near the connector). However, the **MAINS FLT** relay should remain in the energized state. The state of the relay can be tested, for example, with an ohmmeter applied between the appropriate outputs of its contacts.
After removing the interruption in the battery circuit, the generated fault signalization will be removed automatically. This can happen immediately when the battery status starts the battery charging or only after 90 seconds, at the next, correctly performed test.

Notes on operation and servicing

Output voltage values as well as signalization thresholds are pre-set. The power supplies after their installation require supervision related only to faults that may occur during the operation of the device.
The battery bank is connected by the power supply when only the mains is on and if the battery voltage is higher than 21.6V. If the battery is faulty (with less than 10V), its installation will not be recognized by the power supply in any way. For average voltages, the warning signalization is activated in the form of short flashes of the external **FAULT** LED signalization, but the battery itself will not be connected.

In the battery mode, when the mains is out, after discharging the battery down to 21V, the batteries are disconnected, so their complete discharge does not influence the battery lifetime.

Note 1.
Disconnecting the batteries from the load after their discharge protects the batteries against deterioration, but only under the condition that the power supply failure will not last too long (e.g. several days). Lack of recharging the batteries for longer time can lead to the battery voltage self-limitation, which will prevent the batteries from automatic connection after the mains returns.

Note 2.
It should be noted that the power supply itself receives a certain current for its own needs, which in the absence of mains power, can lead to discharging the batteries even in the case when the load has been completely disconnected. Such the situation can take place, for example, when installing power

supplies in new facilities. In this case, it is advisable to disconnect the batteries from the power supply for that time.

External fault signalization input - terminals on EXT FLT connector

The power supply can receive one external binary signal. It can be an active signal of 0V/5V or potential-free relay contacts. Generation of the fault signalization requires 0V (short-circuit). In this state, the current of about 0.25mA is taken from the power supply.

Note.
The **EXT FLT** *terminal (-) is galvanically connected to the output voltage of* **OUT 1** *and* **OUT 2** *negative*.

The occurrence of the fault is signaled by flashing of the external **FAULT** LED signalization diode and the activation of the **GEN FLT** relay fault signalization. Simultaneous occurrence of any internal faults of the power supply and the **EXT FLT** signal causes the permanent activation of the **FAULT** diode (the internal fault signal is superior).

Tamper system INT FLT

The power supply can be equipped with the protection against unauthorized access to the interior of the cabinet. Opening the cabinet door (after opening the lock) causes opening the sensor contacts and generating a fault signal – flashing of the **FAULT** LED of the external signalization and changing the **GEN FLT** relay status. The event signalization stops after closing the cabinet. Simultaneous occurrence of any internal fault to the power supply causes the permanent activation of the **ALARM** diode (the signal of the internal fault is superior).
The power supply is equipped with a jumper placed in the **INT FLT** alarm socket. The connection of an external sensor is possible after removing this jumper.

Proceeding with packaging, used products and batteries

The product packaging is made of materials that can be recycled (wood, paper, cardboard, plastics). Unnecessary packaging should be distributed to the recipient of the waste.
This marking on the product indicates that the product should not be disposed of with municipal waste at the end of its usage time, but must be returned to the collection point for waste electronics. Waste batteries are hazardous waste and must be disposed of. This will contribute to avoiding harmful effects on human health and the environment as a result of uncontrolled waste disposal.

Appendix

LED signalization, outside the power supply.

MAINS	*green LEDdiode*	*Reaction time*
0	- no mains, battery disconnected (no-voltage condition)	*x*
1	- mains on, rectifier operational	*0*
0/1 pulsowanie	- battery operation (no mains or rectifier faulty)	*0*
FAULT	*yellow LED diode*	
0	- no faults	
1	- battery operation (no mains power supply or rectifier faulty) - no battery, or the battery has voltage lower than 10V - LVDD remains off - battery disconnected or battery fuse blown out [**] - decrease of output voltage of power supply down to level lower than 90% of floating voltage. **) - battery voltage below 22V **) - mains voltage below 175V - battery circuit resistance too high [*] - output fuse blown - fuse in additional outputs module (if attached) blown	*0* *x* *90s* *1min* *0* *0* *12min* *0* *0*
0/1 flashing	- external alarm or internal alarm (open cabinet doors, tamper) *)	*0*
0/1 blinking	- recognized battery (U> 10V) but has too low voltage (U <21.6V) - RGR remains switched off	*x*

**) Alarms are not distinguished*

***) Fast voltage drop when overloading the power supply activates the 22V signalization. Slow lowering starts the 90% signalization (after 1 minute from exceeding the threshold). When the battery is being charged, the alarm is cleared after exceeding the 22V threshold.*

Reaction time:

0 – immediate reaction;

x – the selected rows describe permanent states of operation preceding the start of the power supply.

LED signalization inside power supply (PCB packet)

MAINS	*green LED*	*Reaction time*
0	- no mains	*0*
1	- mains on, rectifier operational	*0*
0/1 blinks	- mains on, damaged rectifier	*0*
BAT	*yellow LED*	
0	- battery correct [**]	*0*
1	- high resistance of battery circuit [*]	*12min*
0/1 pulsowanie	- no battery or battery fuse blown	*90s*

[*] The measurement is performed every 10 minutes. The first detected overrun activates the signalization on the **BAT** PCB packet and reduces this time down to 1m. After detection of the next two exceedances, the **FAULT** external signalization is activated. Thus, the maximum detection time of the exceedance is 12 minutes. The first correct measurement cancels the signal.

[**] When the battery fuse is faulty or the battery has been disconnected, the LVDD is automatically switched off due to the voltage drop below its level. Reconnecting the battery or replacing the fuse results in the LVDD being switched on without delay.

Relay signalization

MAINS FLT	*Mains fault*	*Reaction time *)*
0	- no mains (only mains, does not react to rectifier fault)	
1	- mains on	
GEN FLT	*General fault*	
0	- whenever **FAULT** LED is on, flashes or blinks	
1	- no faults	

0 – *de-energized relay* 1 – *energized relay*

*) The **MAINS FLT** and **GEN FLT** relays react to the power failure and its return with delay of 6s. The **GEN FLT** relay immediately follows the **FAULT** signalization.