



USER MANUAL

EN

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v1.0

Power supplies HPSB series

Buffer switched mode power supply.



Features:

- supply voltage ~200 – 240 V
- DC 13,8 V; 27,6 V or 54 V uninterruptible power supply
- available versions with space for **7 Ah – 65 Ah** batteries
- available versions with current efficiencies
13,8 V: 2A/3A/5A/7A/10A/15A/20A
27,6 V: 2A/3A/5A/7A/10A
54 V: 3A/5A
- high efficiency (up to 90%)
- battery charging and maintenance control
- battery charging current jumper selectable (models with charging current adjustment)
- LED optical indication
- deep discharge battery protection (UVP)
- battery output protection against short circuit and reverse connection
- protections:
 - SCP short-circuit protection
 - OLP overload protection
 - over voltage protection
 - surge protection
 - against sabotage: unwanted enclosure opening
- warranty – 2 years from production date

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1. Technical description.**1.1. General description.**

Switch mode buffer power supply units HPSB are intended for continuous power supply to devices that require stabilised voltage of 12, 24 or 48 V DC ($\pm 15\%$).

Displaying parameters of the power supply:

| PSU's name | Output voltage | Output current max. | Charging current |
|---------------|----------------|---------------------|------------------|
| HPSB-12V2A-B | 13,8 V | 2,5 A | 0,5 A |
| HPSB-12V3A-B | 13,8 V | 3,5 A | 0,5 A |
| HPSB-12V3A-C | 13,8 V | 3,5 A | 0,5 A |
| HPSB-12V5A-C | 13,8 V | 5,5 A | 0,5 / 1 A |
| HPSB-12V7A-C | 13,8 V | 7 A | 1 / 2 A |
| HPSB-12V7A-D | 13,8 V | 7 A | 1 / 2 A |
| HPSB-12V10A-C | 13,8 V | 10 A | 1 / 4 A |
| HPSB-12V10A-D | 13,8 V | 10 A | 1 / 4 A |
| HPSB-12V15A-D | 13,8 V | 15 A | 2 / 4 A |
| HPSB-12V20A-E | 13,8 V | 20 A | 2 / 4 / 8 A |
| HPSB-24V2A-B | 27,6 V | 2,2 A | 0,2 / 0,5 A |
| HPSB-24V3A-B | 27,6 V | 3,5 A | 0,5 / 1 A |
| HPSB-24V3A-C | 27,6 V | 3,5 A | 0,5 / 1 A |
| HPSB-24V5A-C | 27,6 V | 5 A | 0,5 / 2 A |
| HPSB-24V5A-D | 27,6 V | 5 A | 0,5 / 2 A |
| HPSB-24V7A-C | 27,6 V | 7 A | 1 / 2 A |
| HPSB-24V10A-C | 27,6 V | 10 A | 1 / 2 / 4 A |
| HPSB-24V10A-D | 27,6 V | 10 A | 1 / 2 / 4 A |
| HPSB-48V3A-B | 54 V | 3 A | 0,5 / 1 A |
| HPSB-48V5A-C | 54 V | 5 A | 0,5 / 1 / 2 A |

Total current of the receivers + battery charging current mustn't cross maximum current of power supply.

In case of power failure, a battery back-up is activated immediately. The PSU is constructed based on the switch mode PSU, with high energy efficiency. The PSU is housed in a metal enclosure (colour RAL 9003) which can accommodate a battery (batteries). A micro switch indicates door opening (front cover).

1.2. Block diagram (rys.1).

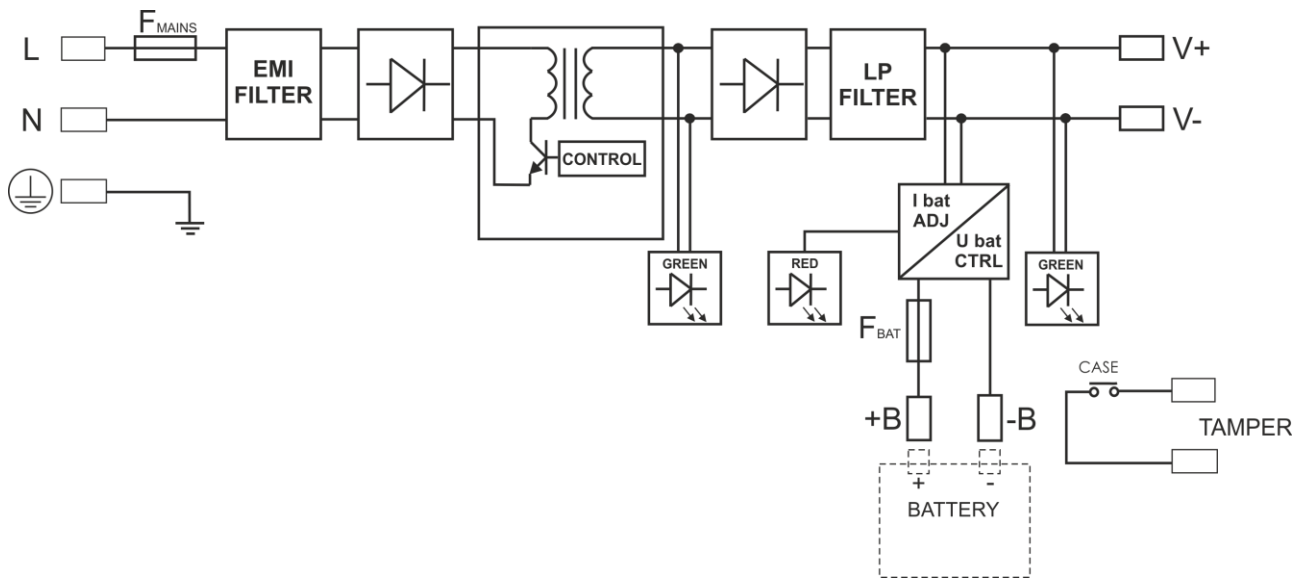


Fig.1. Block diagram of PSU.

1.3. Description of components and connectors.

Table 1. Description of PSU components and connectors (see Fig. 2a, 2b, 2c, 2d, 2e).

| Part no. | Description |
|----------|---|
| [1] | LED for DC output voltage |
| [2] | The potentiometer for output voltage adjustment |
| [3] | Connector to external LED indicators |
| [4] | The output of the PSU (V+, V-) |
| [5] | Battery terminals (B+, B-) |
| [6] | L-N power supply connector 230V AC, \perp - protection connector |
| [7] | Selection jumper for charging current: Power supply units: 12V5A; 12V7A; 12V10A; 12V15A; 24V2A; 24V3A; 24V5A; 24V7A; 48V3A: • I _{BAT} = , I _{BAT} = I1 • I _{BAT} = , I _{BAT} = I2 Power supply units: 12V20A; 24V10A; 48V5A: • I1 = I2 = I3 = I _{BAT} = I1 • I1 = I2 = I3 = I _{BAT} = I2 • I1 = I2 = I3 = I _{BAT} = I3 |
| [8] | Battery fuse |

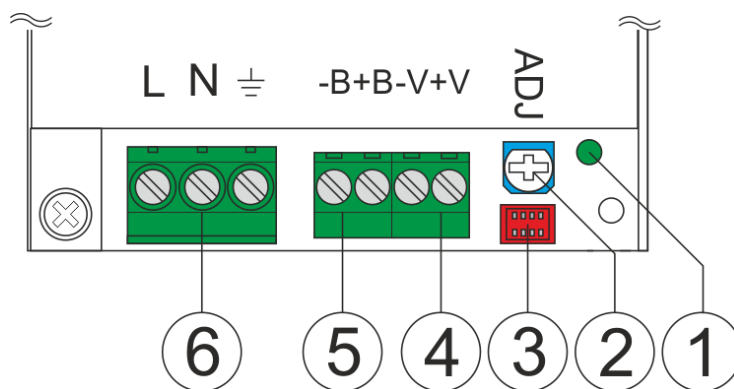


Fig. 2a. View of power supply module (models 12V2A, 12V3A)

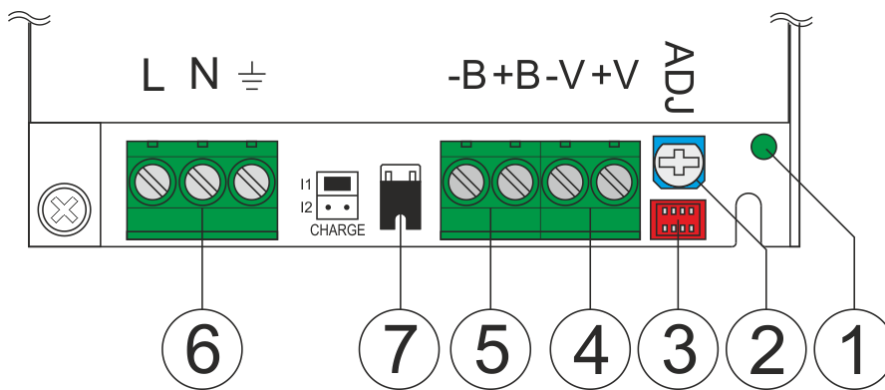


Fig. 2b. View of power supply module (models 12V5A, 12V7A, 24V2A, 24V3A)

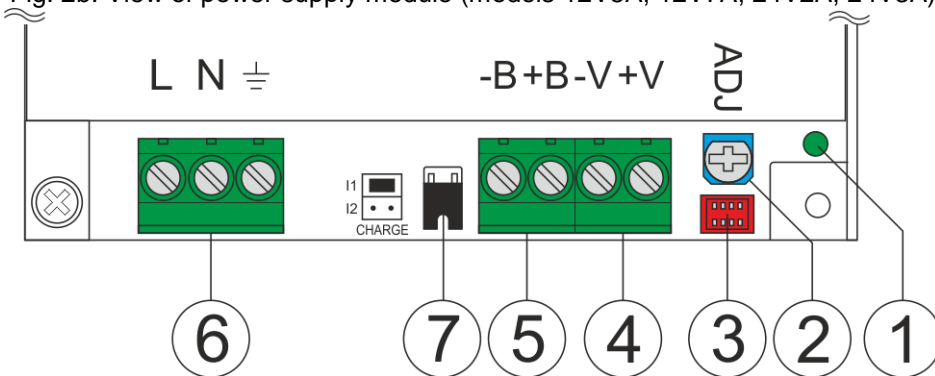


Fig. 2c. View of power supply module (models 12V10A, 24V5A, 48V3A)

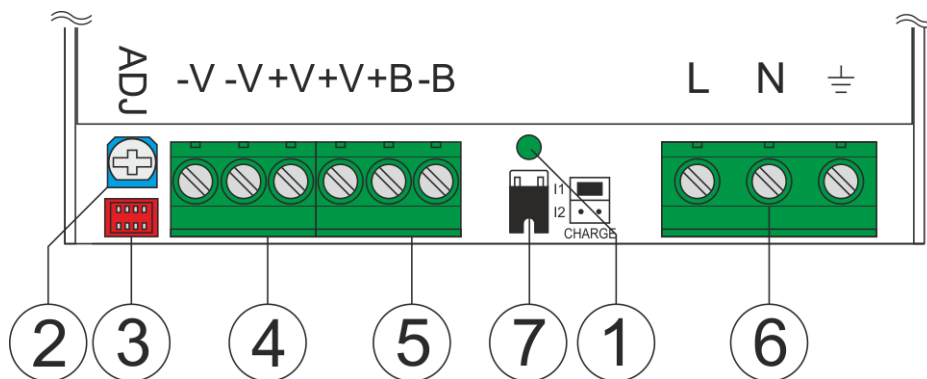


Fig. 2d. View of power supply module (models 12V15A, 24V7A)

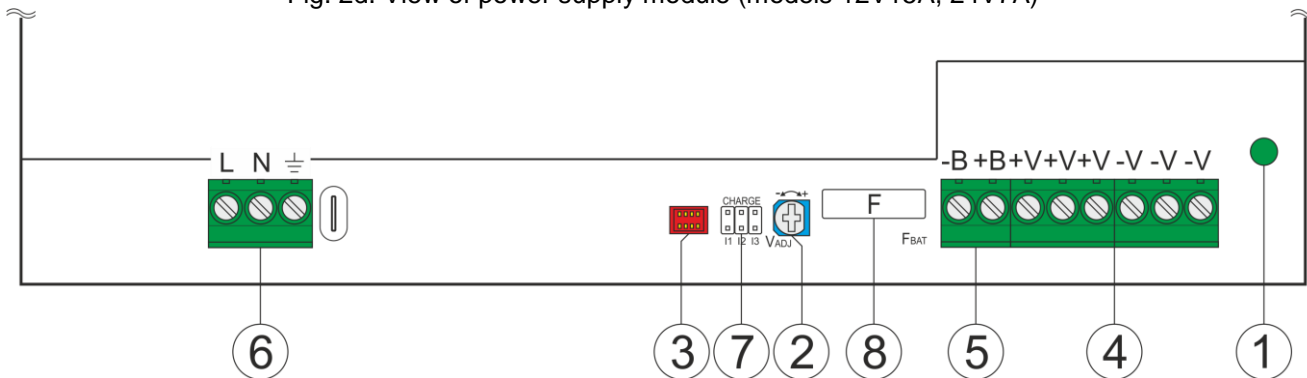


Fig. 2e. View of power supply module (models 12V20A, 24V10A, 48V5A)

Table 2. View of PSU (see Fig. 3).

| Element no. | Description |
|-------------|---|
| [1] | PSU module |
| [2] | Cable grommet |
| [3] | TAMPER; microswitch of antisabotage protection (NC) |
| [4] | Battery connectors: +BAT = red, - BAT = black |

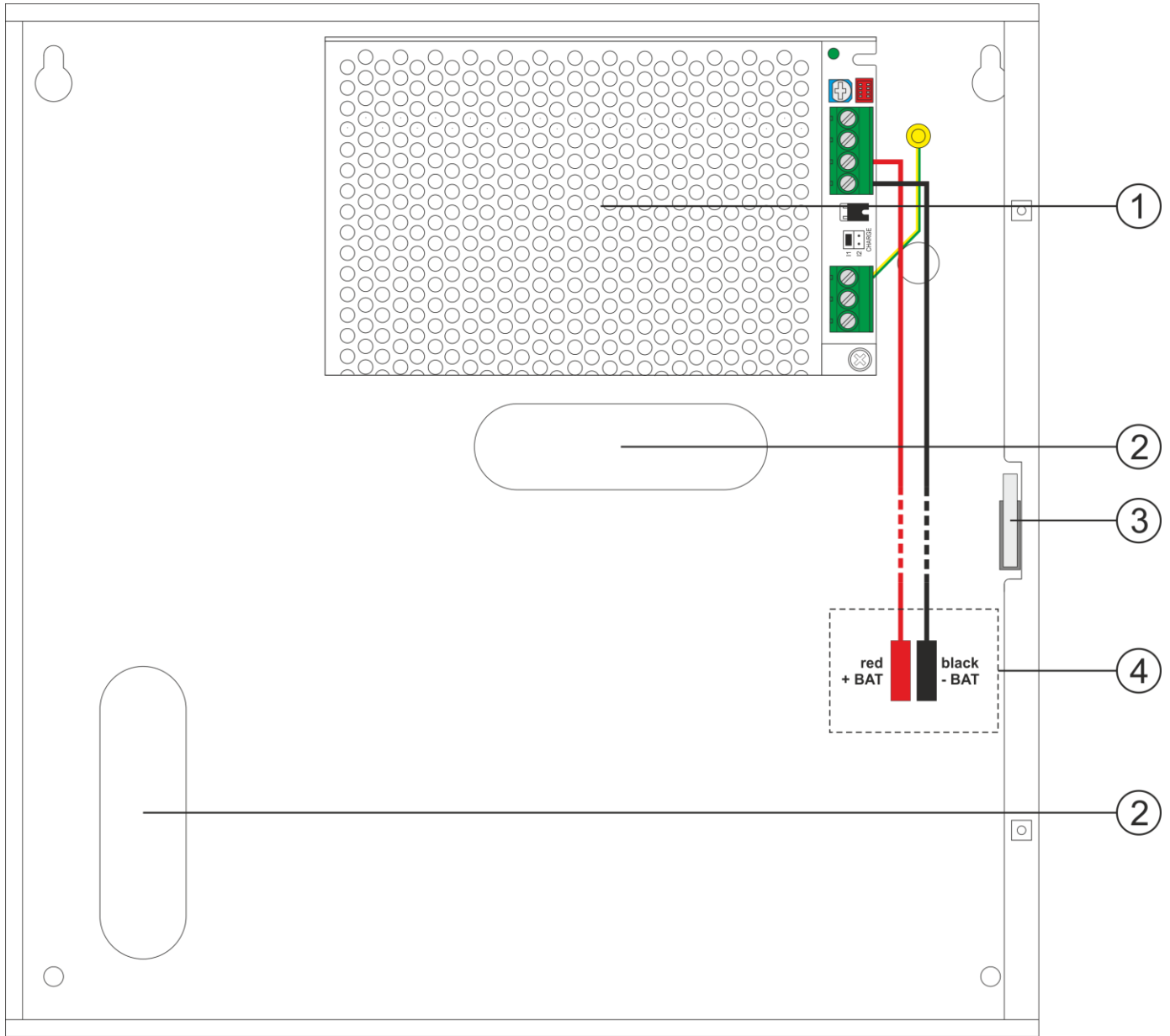


Fig.3. View of PSU.

1.4 Specifications:

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

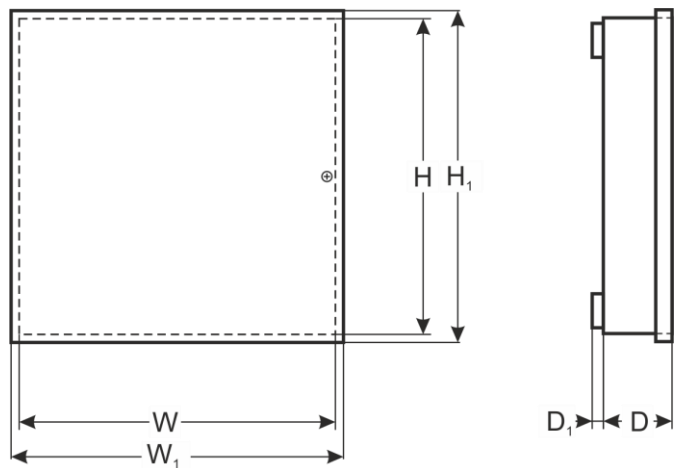


Table 3. Electrical parameters.

| Models | HPSB-12V2A-B | HPSB-12V3A-B | HPSB-12V3A-C | HPSB-12V5A-C | HPSB-12V7A-C | HPSB-12V7A-D | HPSB-12V10A-C | HPSB-12V10A-D | HPSB-12V15A-D | HPSB-12V20A-E |
|--|--|--------------|--------------|--|--------------------|--------------|---------------------------------|---------------|--------------------|---|
| Supply voltage | ~ 200 - 240 V | | | | | | | | | |
| Current consumption | 0,4 A | 0,5 A | 0,5 A | 0,8 A | 1 A | | 1,3 A | | 2 A | 1,5 A |
| Power frequency | 50/60 Hz | | | | | | | | | |
| Inrush current | 40 A | | | | | | 50 A | | 60 A | |
| PSU power | 35 W | 48 W | 48 W | 76 W | 97 W | | 138 W | | 207 W | 276 W |
| Output current max. | 2,5 A | 3,5 A | 3,5 A | 5,5 A | 7 A | | 10 A | | 15 A | 20 A |
| Efficiency | 87% | 87% | 87% | 87% | 87% | | 87% | | 87% | 86% |
| Output voltage | 11 - 13,8 V – buffer operation 10 - 13,8 V – battery-assisted operation | | | | | | | | | |
| Adjustment range U _{AUX} | 13,5 – 14,4 V | | | | | | | | | |
| Ripple voltage (max.) | 100 mV p-p | | | | | | | | 250 mV p-p | 150 mV p-p |
| Current consumption by the PSU systems during battery-assisted operation | 40 mA | 40 mA | 40 mA | 15 mA | 15 mA | | 30 mA | | 30 mA | 30 mA |
| Fitting battery | 7Ah | 7Ah | 17Ah | 17Ah | 17Ah | 40Ah | 17Ah | 40Ah | 40Ah | 65Ah |
| Jumper selectable battery charging current | 0,5 A | 0,5 A | 0,5 A | I1: 0,5 A I2: 1 A | I1: 1 A I2: 2 A | | I1: 1 A I2: 4 A | | I1: 2 A I2: 4 A | I1: 2 A I2: 4 A I3: 8 A |
| Net/gross weight | 1/1,1 kg | 1,3/1,4 kg | 1,7/1,8 kg | 1,8/1,9 kg | 2,3/2,4 kg | 4,7/5,3 kg | 2,6/2,7 kg | 5/5,6 kg | 5/5,6 kg | 7/7,8 kg |
| Battery circuit protection SCP and reverse polarity connection | - polymer fuse (returnable) | | | - glass fuse F _{BAT} (in case of a failure, fuse-element replacement required – under power supply cover) | | | | | | - glass fuse F _{BAT} (in case of a failure, fuse-element replacement required) |
| Overload protection OLP | 105-150% of the PSU power, automatic return | | | | | | | | | |
| Overvoltage protection OVP | >19V (activation of protection requires disconnection of main supply voltage for approx. 1 minute) | | | | | | | | | |
| Deep discharge battery protection UVP | U<9,5 V (± 5%) – disconnection of battery terminal | | | | | | | | | |
| Optical indication | - LEDs on PCB of power supply unit - LED indicators on power supply's cover (see section 3.1) | | | | | | | | | |
| Tamper protection: - TAMPER indicates enclosure opening | - microswitch, NC contacts (enclosure closed), 0,5 A@50 V DC (max.) | | | | | | | | | |
| Fuses: - F _{BAT} | - | - | - | T 6,3A/250V | F 8A/250V | | T 10A/250V | | T15A | T20A |
| Terminals: Mains supply: Outputs: Battery outputs: TAMPER: | 0,5 – 2,5 mm ² (AWG 26 – 12) | | | | | | | | | |
| | Battery wires 6,3F – 45cm, angle muffs ML062 | | | | | | Battery wires Φ6 (M6-2,5), 45cm | | | |
| | 40cm wires | | | | | | | | | |
| Notes | Convictional cooling | | | | | | | | Forced cooling | |

| Models | HPSB-24V2A-B | HPSB-24V3A-B | HPSB-24V3A-C | HPSB-24V5A-C | HPSB-24V5A-D | HPSB-24V7A-C | HPSB-24V10A-C | HPSB-24V10A-D | HPSB-48V3A-B | HPSB-48V5A-C | |
|--|---|----------------------|--------------|----------------------|--------------|---------------------|---|---------------|--|---------------------------------|---|
| Supply voltage | ~ 200-240 V | | | | | | | | | | |
| Current consumption | 0,8 A | 1 A | | 1,3 A | | 2 A | 1,5 A | | 1,5 A | 1,5 A | |
| Power frequency | 50/60 Hz | | | | | | | | | | |
| Inrush current | 40 A | | | 50 A | | | 60 A | | 50 A | 60 A | |
| PSU power | 61 W | 97 W | 138 W | | 194 W | 276 W | | 162 W | 270 W | | |
| Output current max. | 2,2 A | 3,5 A | 5 A | | 7 A | 10 A | | 3 A | 5 A | | |
| Efficiency | 90% | 87% | 90% | | 88% | 87% | | 90% | 87% | | |
| Output voltage | 22 – 27,6 V – buffer operation 20 - 27,6 V – battery-assisted operation | | | | | | | | 44 - 54 V – buffer operation 40 - 54 V – battery-assisted operation | | |
| Adjustment range U _{AUX} | 27 – 28,8 V | | | | | | | | | | |
| Ripple voltage (max.) | 100 mV p-p | | | | | | 150 mV p-p | | | | |
| Current consumption by the PSU systems during battery-assisted operation | 15 mA | 15 mA | | 30 mA | | 30 mA | 30 mA | | 30 mA | 30 mA | |
| Fitting battery | 2x 7Ah | 2x 7Ah | 2x 17Ah | 2x 17Ah | 2x 40Ah | 2x 17Ah | 2x 17Ah | 2x 40Ah | 4x 7Ah | 4x 17Ah | |
| Jumper selectable battery charging current | I1: 0,2 A I2: 0,5 A | I1: 0,5 A I2: 1 A | | I1: 0,5 A I2: 2 A | | I1: 1 A I2: 2 A | I1: 1 A I2: 2 A I3: 4 A | | I1: 0,5 A I2: 1 A | I1: 0,5 A I2: 1 A I3: 2 A | |
| Net/gross weight | 1,8/1,9 kg | 2,3/2,4 kg | 4,7/5,3 kg | 5/5,6 kg | 6,2/7 kg | 5/5,6 kg | 5,6/6,2 kg | 7/7,8 kg | 5/5,6 kg | 7/7,8 kg | |
| Battery circuit protection SCP and reverse polarity connection | - glass fuse F _{BAT} (in case of a failure, fuse-element replacement required – under power supply cover) | | | | | | - glass fuse F _{BAT} (in case of a failure, fuse-element replacement required) | | - glass fuse F _{BAT} (in case of a failure, fuse-element replacement required – under power supply cover) | | - glass fuse F _{BAT} (in case of a failure, fuse-element replacement required) |
| Overload protection OLP | 105-150% of the PSU power, automatic return | | | | | | | | | | |
| Overvoltage protection OVP | >37 V (activation of protection requires disconnection of main supply voltage for approx. 1 minute) | | | | | | | | >60 V (activation of protection requires disconnection of main supply voltage for approx. 1 minute) | | |
| Deep discharge battery protection UVP | U<19 V (± 5%) – disconnection of battery terminal | | | | | | | | U<38 V (± 5%) – disconnection of battery terminal | | |
| Optical indication | - LEDs on PCB of power supply unit - LED indicators on power supply's cover (see section 3.1) | | | | | | | | | | |
| Tamper protection: - TAMPER indicates enclosure opening | - microswitch, NC contacts (enclosure closed), 0,5 A@50 V DC (max.) | | | | | | | | | | |
| Fuses: - F _{BAT} | F 3,15A/250V | F 4A/250V | | T 6,3A/250V | | T7,5A | T10A | | F 3,15A/250V | T5A | |
| Terminals: Mains supply: Outputs: Battery outputs: TAMPER: | 0,5 – 2,5 mm ² (AWG 26 – 12) | | | | | | | | | | |
| | Battery wires 6,3F – 45cm, angle muffs ML062 | | | | | | Battery wires Φ6 (M6-2,5), 45cm | | Battery wires 6,3F – 45cm, angle muffs ML062 | | |
| | 40cm wires | | | | | | | | | | |
| Notes | Convexional cooling | | | | | Convexional cooling | | | Convexional cooling | Forced cooling | |

Table 4. Mechanical parameters.

| | HPSB-12V2A-B | HPSB-12V3A-B | HPSB-12V3A-C HPSB-12V5A-C HPSB-24V2A-B | HPSB-12V7A-C HPSB-12V10A-C HPSB-24V3A-B | HPSB-12V7A-D HPSB-12V10A-D HPSB-12V15A-D HPSB-24V3A-C HPSB-24V5A-C HPSB-24V7A-C HPSB-24V10A-C HPSB-48V3A-B | HPSB-12V20A-E HPSB-24V5A-D HPSB-24V10A-D HPSB-48V5A-C |
|---|---|--------------|--|---|---|--|
| Enclosure dimensions (WxH) [±2mm] | 170x180 | 200x230 | 230x300 | 300x300 | 330x380 | 460x390 |
| Enclosure dimensions (W ₁ xH ₁ xD ₁ +D) [±2mm] | 175x185x82+8 | 205x237x82+8 | 237x305x82+8 | 305x305x105+8 | 335x385x173+14 | 465x395x173+14 |
| Fixing (WxH) | 145x152 | 175x202 | 205x272 | 274x265 | 298x310 | 425x322 |
| Fitting battery (WxHxD) | 155x100x75 | 190x100x75 | 215x172x75 | 250x172x100 | 325x178x168 | 450x190x168 |
| Enclosure | Steel sheet DC01 0,7mm | | | | Steel sheet DC01 1mm | |
| Closing | Cheese head screw (at the front), lock assembly possible | | | | | |
| Notes | Enclosure does not adjoin assembly surface so that cables can be led. | | | | | |

Table 5. Operation safety.

| | |
|---|---|
| Protection class EN 62368-1 | I (first) |
| Degree of Protection EN 60529 | IP20 |
| Electrical strength of insulation: - between input input and output circuits of the PSU - between input circuit and PE protection circuit - between output circuit and PE 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 parameters.

| | |
|---|---------------------------------|
| Operating temperature | -10°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 insulation | unacceptable |
| Vibrations and impulse waves during transport | Wg 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, 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. 6 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 \oplus . Use a three-core cable (with a yellow and green \oplus 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 ' \oplus ' 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. Check output voltage and adjust if necessary using potentiometer (see table: displaying parameters of the power supply).
4. Connect equipment to the appropriate output terminals of power supply (positive connector +V, negative connector -V).
5. Use the I_{BAT} jumper to set the maximum battery charging current, taking into account the battery parameters.
6. 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 and type of connections (Fig.4):

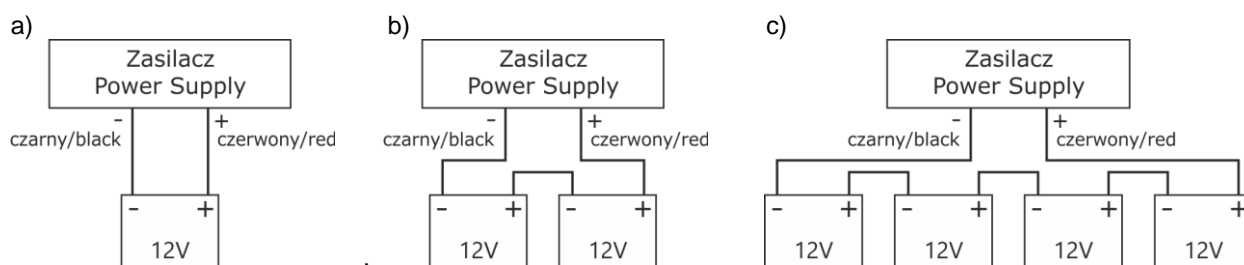


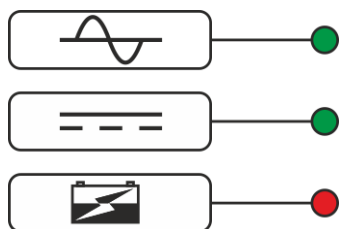
Fig. 4 Connecting batteries depending on voltage version of power supply:
a) version 12V, b) version 24V, c) version 48V

7. Switch on the 230 V supply. LEDs on cover of power supply should light (CHARGE diode only during charging).
8. After installing and checking proper working, the enclosure can be closed.

3. Operating status indication.

The power supply unit features LED and acoustic status indication

3.1 Optical indication.



Green LED AC:

- on – the PSU is supplied with 230V AC,
- off – no 230 V power, battery-assisted operation

Green LED DC:

- on – presence of DC voltage in the output of the PSU
- off – no voltage in the output of the PSU

Red LED CHARGE:

- off – no battery charge
- on - battery charging process

Moreover, PSU is equipped with LED indicating presence of voltage at PSU output, located on PCB of PSU module.

4. 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 LABEL

Waste electrical and electronic equipment must not be disposed of with normal household waste. According to the European Union WEEE Directive, waste electrical and electronic equipment should be disposed of separately from normal household waste.

CAUTION! *The power supply unit is adapted for cooperation with the sealed lead-acid batteries (SLA). After the operation period they must not be thrown but recycled according to the applicable law.*

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