



USER MANUAL

EN

Edition: 1 from 24.11.2020

Supersedes the edition:

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 the 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-12V10A-C	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-24V5A-C	27,6 V	5 A	0,5 / 2 A
HPSB-24V7A-C	27,6 V	7 A	1 / 2 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).

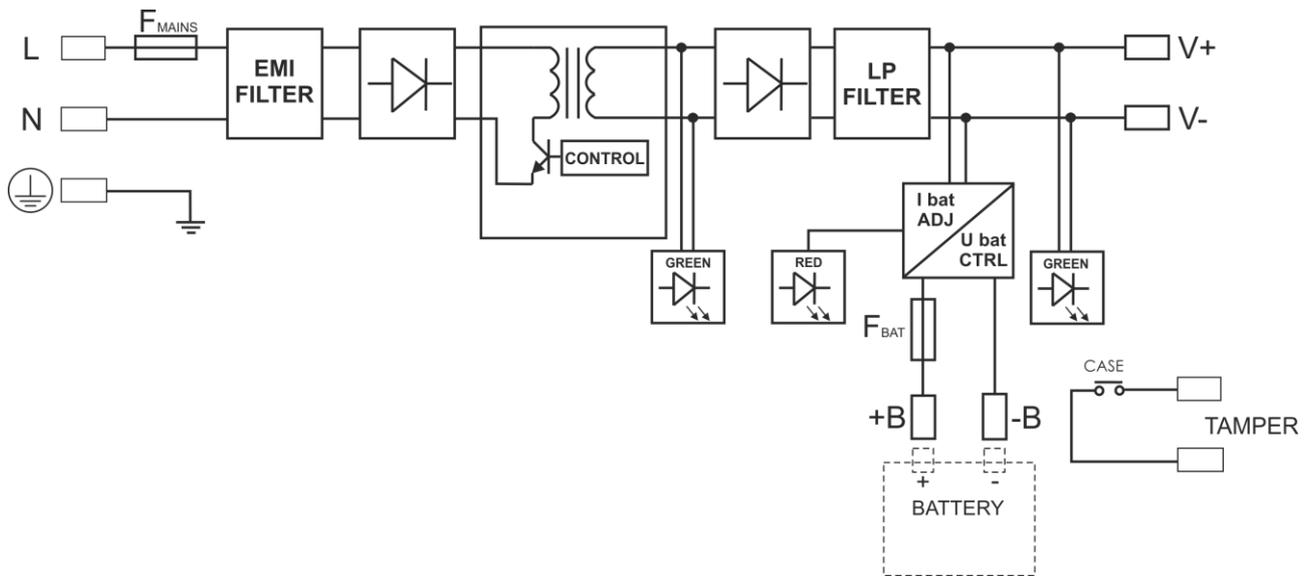


Fig.1. Block diagram of PSU.

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

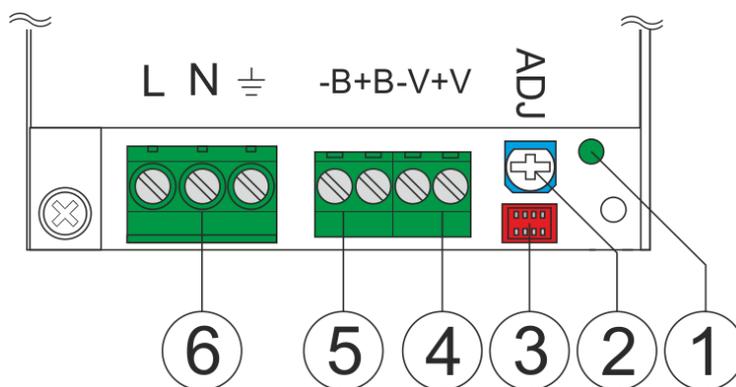


Fig. 2a. View of power supply module (models 12V2A, 12V3A)

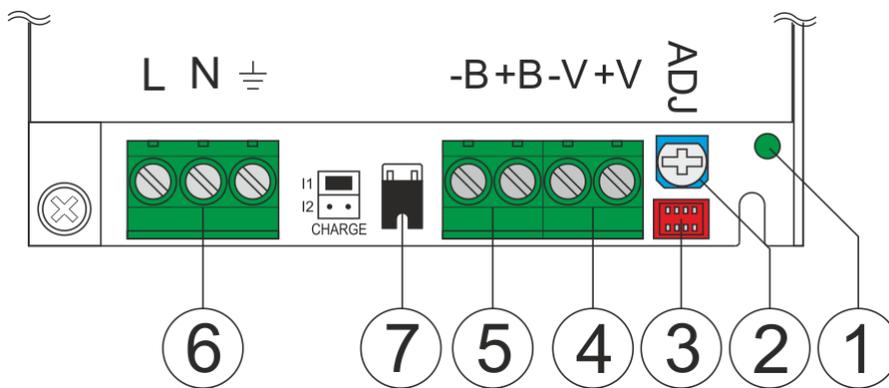


Fig. 2b. View of power supply module (models 12V5A, 12V7A, 24V2A, 24V3A)

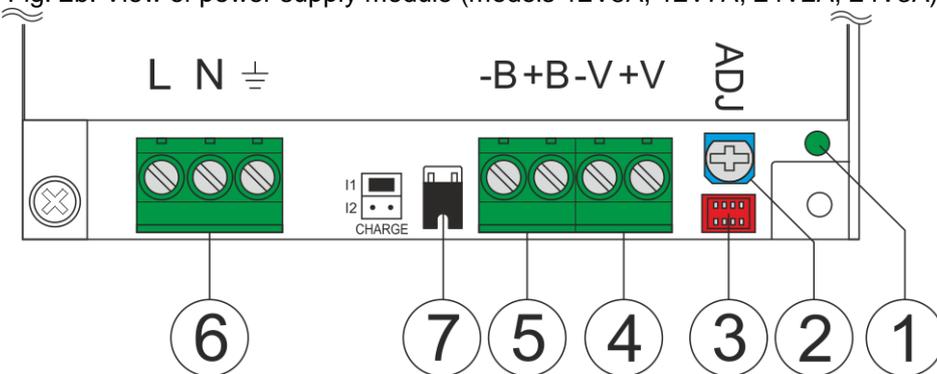


Fig. 2c. View of power supply module (models 12V10A, 24V5A, 48V3A)

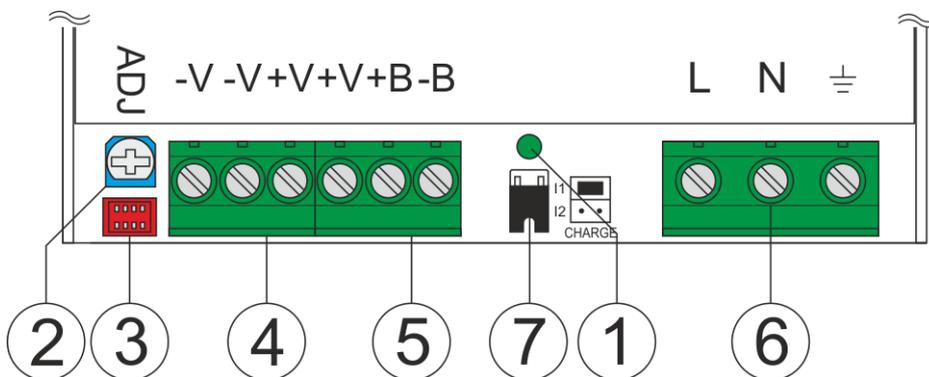


Fig. 2d. View of power supply module (models 12V15A, 24V7A)

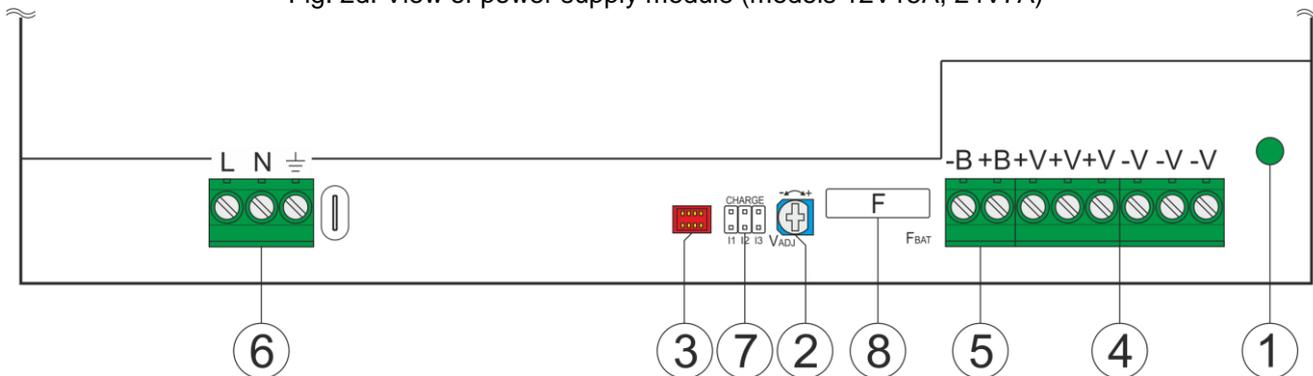


Fig. 2e. View of power supply module (models 12V20A, 24V10A, 48V5A)

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

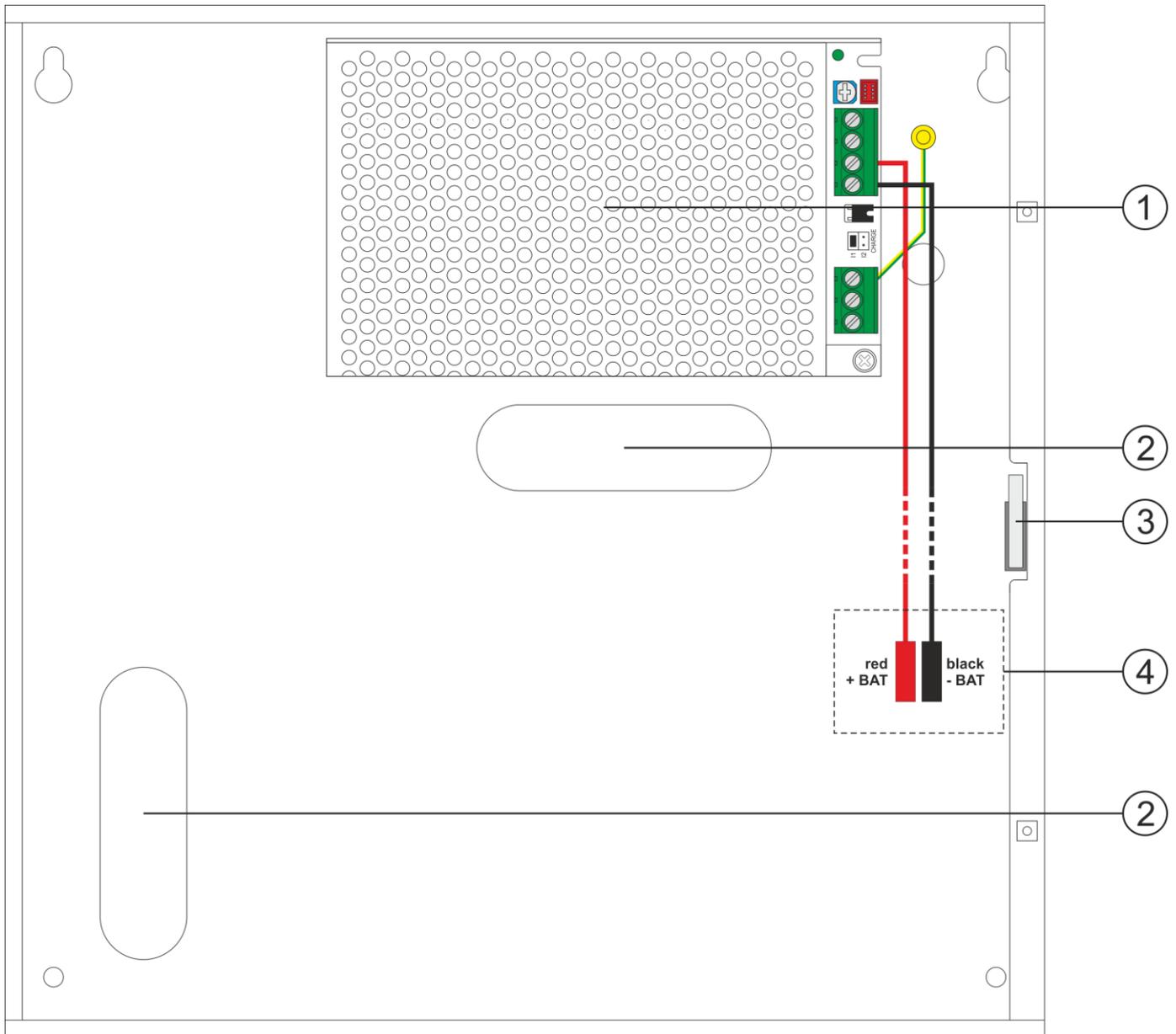


Fig.3. View of PSU.

1.4 Specifications:

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

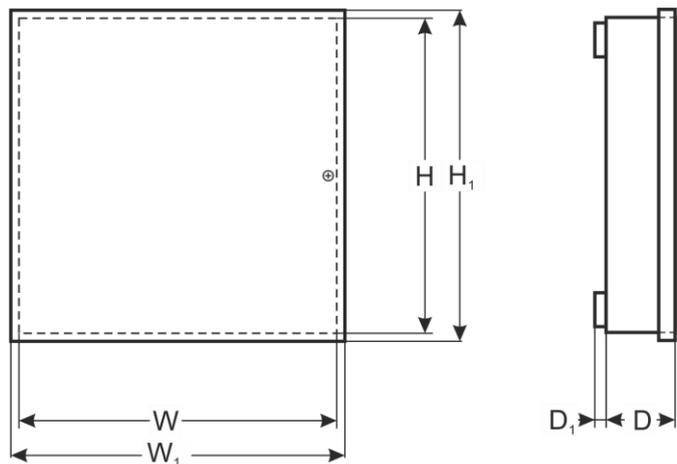


Table 3. Electrical parameters.

Models	HPSB-12V2A-B	HPSB-12V3A-B	HPSB-12V3A-C	HPSB-12V5A-C	HPSB-12V7A-C	HPSB-12V10A-C	HPSB-12V15A-D	HPSB-12V20A-E
PSU type	A (EPS - External Power Source), II environmental class							
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	17Ah	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	2,6/2,7 kg	5/5,6 kg	7/7,8 kg
Battery circuit protection SCP and reverse polarity connection	- polymer fuse (returnable)	- polymer fuse (returnable)	- polymer fuse (returnable)	- F _{BAT} fuse (in case of a failure, fuse-element replacement required)				
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	convexional cooling						Forced cooling	

Models	HPSB-24V2A-B	HPSB-24V3A-B	HPSB-24V5A-C	HPSB-24V7A-C	HPSB-24V10A-D	HPSB-48V3A-B	HPSB-48V5A-C
PSU type	A (EPS - External Power Source), II environmental class						
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					53 – 56 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	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	5/5,6 kg	5/5,6 kg	7/7,8 kg	5/5,6 kg	7/7,8 kg
Battery circuit protection SCP and reverse polarity connection	- F _{BAT} fuse (in case of a failure, fuse-element replacement required)						
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:	0,5 – 2,5 mm ² (AWG 26 – 12)						
Mains supply:							
Outputs:							
Battery outputs:	Battery wires 6,3F – 45cm, angle muffs ML062				Battery wires Φ6 (M6-2,5), 45cm		Battery wires 6,3F – 45cm, angle muffs ML062
TAMPER:	Wires 40cm						
Notes	convectonal cooling			Forced cooling		convectonal 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-12V15A-D HPSB-24V5A-C HPSB-24V7A-C HPSB-48V3A-B	HPSB-12V20A-E HPSB-24V10A-D HPSB-48V5A-C
Enclosure dimensions (WxH) [± 2 mm]	170x180	200x230	230x300	300x300	330x380	460x390
Enclosure dimensions (W ₁ xH ₁ xD ₁ +D) [± 2 mm]	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 M Ω , 500 V DC

Table 6. Operating parameters.

Environmental Class	II
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, in accordance with the II-nd 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 \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):

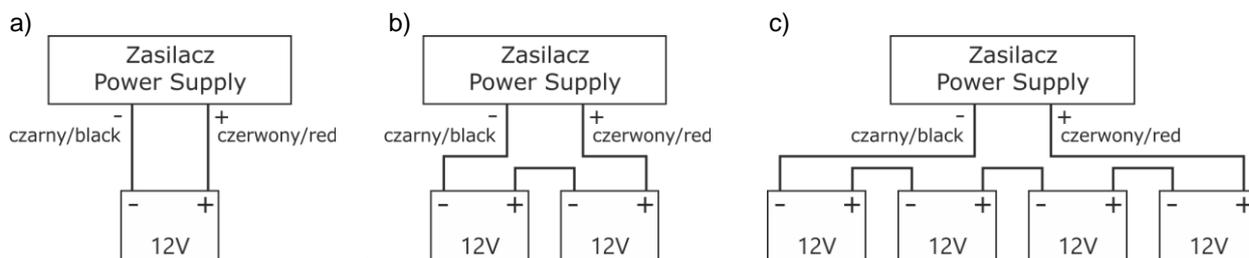


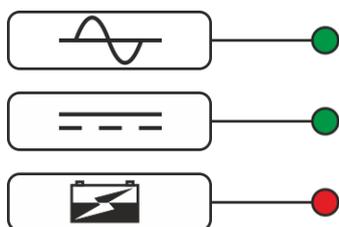
Fig. 4 Connecting batteries depending on voltage version of power supply:
a) version 12V, b) version 24V, c) version 48V

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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