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OPB-500 rectifier

1. Application:

The OPB-500 rectifier is intended for charging the series of types of flameproof lithium-ion batteries of the SBS-4Lion type. The OPB-500 rectifier can be used in workings classified as "a", "b" or "c" levels of methane explosion hazard and "A" or "B" levels of coal dust explosion risk in underground mines.

The OPB-500 rectifier consists of the following elements:

- Rectifier flameproof cover - 1 pc.,
- Elements of the passive and forced cooling system - 1 set,
- Connection plugs with wires - 2 pcs,
- Control plug with cable - 1 pc.,
- Rectifier insert - 1 set

2. Technical parameters:

Dimensions	850 x 910 x 1510 mm (width x depth x height)
Mass	550kg
Supply voltage	3x500V ±10% AC 50Hz
Nominal charging current	300A (for 3x500V supply voltage)
Ambient temperature:	-10°C to +40°C
Charging rated voltage	150V DC
Minimum charging voltage	110V DC
Maximum charging voltage	168V DC
Work location	perpendicularly
Maximum temperature of external surfaces	50°C
Noise level	50dB





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3. Construction of the OPB-500 rectifier:

The OPB-500 rectifier is made as an explosion-proof casing in a "d" flameproof casing. The rectifier cover has the shape of a cuboid. The rectifier has a passive and forced cooling system.

4. Basic functions of the OPB-500 rectifier

The rectifier has the following functions:

- Function detecting too low battery voltage,
- Protection against overcharging the battery,
- Charge current regulation.

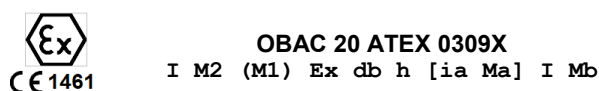
5. Basic internal protections of the OPB-500 rectifier

The rectifier is equipped with the following protections:

- Before the loss or reduction of the AC 500V supply voltage,
- Against excessive voltage increase of AC 500V or sudden voltage increase in both DC circuits,
- Before a short circuit on the rectifier output terminals,
- Before the rectifier overload,
- Before the battery is not connected or it is fully discharged below the permissible threshold,
- Before exceeding the maximum temperature of the charger,
- Before the lack of a ready signal (given as external intrinsically safe).

6. Certificate:

The OPB-500 rectifier has an EU-type examination certificate no. : **OBAC20ATEX0309X** of **27/08/2020** in accordance with the requirements of the ATEX Directive 2014/34 / EU of 26/02/2014, which was issued by the Center for Testing, Attestation and Certification OBAC Sp. z o. o. in Gliwice. The OPB-500 rectifier has the following marking:



The OPB-500 rectifier can be installed in rooms (zones) endangered with explosion, in accordance with the marking as given above.

7. Project co-financed by European Funds:

The OPB-500 rectifier was implemented in connection with the project from the European Funds under the name:

„Conducting research and development works to develop an innovative product - a series of flameproof Li-Ion batteries for powering locomotives in underground mines with stored energy of 105kWh and 150kWh”

The result of research and development works is a series of types of flameproof locomotive batteries in underground mining plants with stored energy of 105kWh and 150kWh.



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8. Additional benefits from the implemented project:

- 8.1. Avoidance of building battery holders at a given level of the mining plant:
- Avoidance of very large expenditures on the construction of the excavation for the battery holders,
- Avoiding the construction of battery compartment equipment.
- 8.2. Removal of very harmful workplaces - maintenance of cargo holds with classic cells (with electrolyte):
- No gas build-up when charging from the SBS-4Lion battery).
- 8.3. The SBS-4Lion battery installed on the locomotive does not require any maintenance, e.g. adding electrolyte or distilled water.
- 8.4. Charging the SBS-4Lion type battery on the locomotive takes:
- for 700Ah battery - 2h 20 minutes,
- for 1000Ah battery - 3h 30 minutes.
- 8.5. OPB-500 rectifiers can be installed in workings classified as grade "a", "b" or "c" of methane explosion hazard and "A" or "B" class of coal dust explosion hazard.
- 8.6. SBS-4Lion batteries are fully protected against:
-overheating,
-overcharging,
-too deep discharge.
- 8.7. SBS-4Lion batteries can be recharged in any state of charge.
- 8.8. The life of the SBS-4Lion type batteries is at least 5 times longer than that of classic or gel batteries working with an electrolyte.
- 8.9. The company P.H.P.U. "Izol-Plast" Sp. z o.o. has a technology for the disposal of used lithium-ion battery cells.



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