
User manual for Solar.bloc lead-acid valve-regulated batteries



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Installation and assembly may only be carried out by a fully competent and suitably qualified person. A suitably qualified person is defined as someone who, on the basis of training, experience and instruction, together with knowledge of relevant standards, guidelines governing occupational accidents and operating conditions, has been authorised by the person responsible for the safety of the individual components/installation to carry out the necessary work and who is also fully capable of recognising and avoiding potential risks.

No warranty claims may be made if the instructions in the operating manual are not followed, if spare parts other than the original ones are used during repairs, or in the event of unauthorised interventions.

1 Safety instructions

The following safety precautions relate to the handling of batteries and form part of all instructions contained in this user manual.



It is essential to follow the instructions in the manual and to display the manual in a visible location near the battery! Work on batteries must only be carried out under the supervision of qualified personnel! Personnel working with batteries must always have access to the operating instructions!



When working on the battery, safety goggles and protective clothing must be worn! Observe the safety regulations in accordance with ČSN 33 2000-4-41 ed 2.



No smoking! The battery must not come into contact with open flames, heat or sparks, as there is a risk of fire or explosion!



If acid comes into contact with the eyes or skin, rinse and wash the affected areas under running water. Then seek medical attention immediately. Wash clothing contaminated with acid in water!



Prevent the risk of fire, explosion and short circuits! Warning! The metal parts of the battery are live at all times; therefore, do not place any foreign objects or tools on the battery! It is important to ensure adequate ventilation of the battery compartment to allow the escape of explosive gases produced by the battery during charging (DIN EN 50 272-2).



The electrolyte is highly corrosive! During normal operation, contact with the electrolyte is prevented. If the container is damaged, there is a risk of contact with the electrolyte and chemical burns.



Block batteries/cells are very heavy! Ensure they are placed securely!
Use only suitable handling equipment when handling!



Warning: high voltage!

2 First aid

Eye contact with electrolyte

- Rinse eyes with water for at least 10 minutes!
- Seek immediate medical attention

from an ophthalmologist Contact of electrolyte

with the skin

- Immediately remove clothing contaminated with electrolyte and rinse the affected area with plenty of water. Seek medical attention if symptoms persist.

Ingestion of electrolyte

- Rinse the mouth with plenty of water and drink small amounts of water repeatedly.

Do not induce vomiting! Call for medical assistance immediately.

3

Before commissioning, check all cells/blocks for mechanical damage, verify correct polarity connections and check that the connectors are securely tightened.

The tightening torque for screw-type cell connectors is:

M8: 20 Nm $\pm$ 1 Nm

If necessary, pole caps must be fitted.

Connect the battery to a DC power source with the charger switched off and all loads disconnected. Ensure correct polarity connection (positive terminal to positive terminal).

Switch on the charger and charge in accordance with section 4.2.

4 Operation

The installation and operation of stationary batteries are governed by DIN VDE 0510 Part 1 and DIN VDE 0510 Part 2. The battery must be positioned so that a temperature difference of >3 K cannot occur between individual cells/blocks.

4.1 Discharging

The final discharge voltage of the battery must not fall below the value corresponding to the discharge current. Unless otherwise specified by the manufacturer, no capacity greater than the nominal capacity may be drawn. After discharge, even partial discharge, charging must be carried out immediately.

4.2 Charging

A charging characteristic with its limit values in accordance with DIN 41 773 (IU characteristic) may be used. Depending on the type of charger and the charging characteristic, alternating currents flow through the battery during charging, which overlap the charging direct current.

These alternating currents and the feedback from the loads lead to additional heating of the battery and place a strain on the electrodes, potentially causing subsequent faults. Depending on the equipment, charging is permitted in the following operating modes (in accordance with DIN/VDE 0510 Part 1).

4.3 Parallel standby operation and equalisation operation

The loads, DC power source and battery are constantly connected in parallel. The charging voltage is the battery operating voltage and, at the same time, the system voltage.

4.3.1 Parallel standby e operation

In parallel standby operation, the DC power supplies are constantly in a state of supplying the maximum current to the load and the charging current to the battery. The battery supplies current only in the event of a DC power supply failure. The adjustable charging voltage is $2.25 \text{ V} \times \text{number of cells} + 1\%$, measured at the battery terminals. To reduce the recharge time, a charging stage can be used where the charging voltage is $2.35 \times \text{number of cells}$ (parallel standby operation with recharge stage). This is followed by an automatic switch to a charging voltage of $2.25 \text{ V} + 1\% \times \text{number of cells}$.

4.3.2 Equalisation

In equalisation mode, the DC source is not always able to supply the maximum current. The load current temporarily exceeds the rated current of the DC source. During this time, the battery supplies the current. It is not always fully charged. It is therefore necessary to consult the battery manufacturer regarding the charging voltage, depending on the load, to approximately $2.27 \text{ to } 2.30 \text{ V} \times \text{number of cells}$.

4.3.3 Switching- e operation

The battery must be disconnected from the appliance during charging. The battery charging voltage is max. 2.35 V/cell . Charging must be monitored. If the charging current drops to 1.5 A/100 Ah of rated capacity at 2.35 V/cell , the system switches to trickle charging as per section 4.3.5; alternatively, the switch occurs once 2.35 V/cell is reached.

4.3.4 Battery operation (charging/discharging operation)

The appliance is powered solely by the battery. The charging process depends on the type of use and must be discussed with the battery manufacturer.

4.3.5 Maintenance charging

To maintain the battery at full charge (trickle charging), chargers complying with DIN 41 773 must be used. The chargers must be set so that the cell voltage averages $2.25 \text{ V} \pm 1\%$.

4.3.6 Equalisation charging

Due to the possibility of exceeding the permissible voltages of the load, appropriate measures must be taken, e.g. disconnecting the load. Equalisation charging must be carried out after deep discharge or after insufficient charging of the battery. It can be carried out at a constant voltage of max. 2.35 V/cell for a period of 48 hours. The charging current should not exceed 10 A per 100 Ah of rated capacity. At

If the maximum temperature of 45°C is exceeded, charging must be interrupted or temporarily switched to trickle charging to allow the temperature to drop.

4.3.7

During charging to 2.35 V/cell, depending on the type of operation (see section 4.3), the AC current may occasionally reach a maximum of 20 A per 100 Ah of rated capacity. After recharging and continuation of charging (maintenance charging) in parallel standby mode or equalisation mode, the value of the alternating current must not exceed 5 A per 100 Ah of rated capacity.

4.3.8 Charging currents

In parallel standby operation and in equalisation operation without a recharge stage, the charging currents are not limited. The charging current should be 10 A to 20 A per 100 Ah of rated capacity (standard value).

4.4 Temperature

The recommended temperature range for lead-acid batteries is 10 °C to 30 °C. The ideal operating temperature is 20 °C ± 5 K.

Higher temperatures reduce service life. Technical data apply to a nominal temperature of 20 °C. Lower temperatures reduce usable capacity. Exceeding the limit temperature of 55 °C is not permitted. Operating temperatures higher than 45 °C must be avoided.

Temperature-dependent charging voltage

Within the temperature range of 15 °C to 25 °C, it is not necessary to adjust the charging voltage according to temperature. If the operating temperature is consistently outside this specified range, the voltage should be adjusted. The temperature correction factor is approximately –0.005 V/cell per K.

Temperature /°C/	-10	0	10	20	30	40
Charging voltage /V per cell/	2.40	2.35	2.30	2.25	2.20	2.15

4.5 Electrolyte

The electrolyte is diluted sulphuric acid and is stored in the fibre (AGM).

4.6 Maintenance and inspection of batteries

The battery must be kept clean and dry to prevent the build-up of stray currents. Plastic parts of the battery, particularly the cell casings, must only be cleaned with water without additives. Do not use synthetic fabrics for cleaning; only use materials that do not generate an electrostatic charge! The battery must not be cleaned with dusters or dry cloths. Otherwise, there is a risk of electrostatic charging (risk of explosion).

It is recommended to measure and record the following at least every 6 months:

- battery voltage
- the voltage of certain cells/batteries
- surface temperature of certain cells/batteries
- battery room temperature

If the cell voltage deviates from the average float charging voltage by +0.2 V/cell or –0.1 V/cell, and/or if the surface temperature of various cells/blocks deviates by more than 5 K, please contact the customer service department.

The following must be measured and recorded once a year:

- the battery voltage
- the voltage of all cells/batteries
- surface temperature of all cells/batteries

Check the following once a year:

- the tightness of the cell screw connections
- battery mounting/positioning
- ventilation

5 Tests

Tests are carried out in accordance with IEC 60896-2. Special instructions for carrying out tests in accordance with DIN VDE 0107 and DIN VDE 0108 must be observed.

6 Faults

If faults are detected in the battery or charger, please contact customer service immediately. The measurement data specified in section 3 facilitate fault diagnosis and rectification. A service contract with Hoppecke facilitates the early detection of any faults.

7 Storage and removal from operation

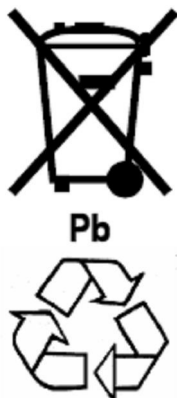
If the cells/batteries are to be stored for a prolonged period or taken out of service, they must be stored fully charged in a dry room where temperatures do not fall below freezing. To prevent potential faults, we recommend the following charging procedures: After the battery has been dispatched, care must be taken to ensure that the cells/batteries are put into operation no later than 8 weeks after delivery. When storing batteries, they must be recharged after 6 months (hermetically sealed). When putting the batteries into service, even after storage periods of less than 6 months, the batteries must be fully charged.

8 Transport

Batteries that are undamaged are transported as standard goods, provided they are protected against short circuits, movement, overturning or damage, and are stored appropriately on pallets and sufficiently secured. There must be no traces of acid on the consignment. Special Regulation No. 69 applies to all hermetically sealed batteries and cells whose casings are leaking or damaged.

Technical data

The nominal voltage, number of cells/blocks, nominal capacity $C_N = C_{10}$ and battery type are stated on the type plate.



At the end of its service life, this product becomes a product intended for take-back. As such, you can return it to the point of purchase or to any shop where this brand of batteries is sold. If you wish to dispose of the product as waste after use, place it in a location designated by the local authority or hand it over to an authorised person in accordance with the Waste Act.

The product contains lead. Exposure to lead causes damage to internal organs (kidneys, liver, nervous system, etc.); high levels of exposure can lead to blindness, brain damage and even death. Lead affects foetal development and viability, and can lead to low birth weight, premature birth, developmental delays, etc. Lead is a probable human carcinogen affecting the lungs and kidneys. In men, it causes a decrease in sperm count. In the environment, it accumulates in sediments, from where it enters plants and animals. The product also contains sulphuric acid, which is corrosive; contact with the eyes or skin may cause serious damage.