

# Operating instruction for valve-regulated lead-acid batteries Type OGiV: SB / SBV / SBLV



Nominal data:

• Nominal voltage $U_N$ :	2,0 V x number of cells (12V / 6V)
• Nominal capacity $C_{20}$ :	20h discharge
• Nominal temperature $T_N$ :	20°C
• Factors of reduction:	as per EN 50 272-2 paragraph 8= 0,5 f2 = 0,5
• Nominal discharge current	$C_N/20h$

Battery type:	
Assembly by:	date:
Introduction by:	date:
Security signs attached by:	date:

	<ul style="list-style-type: none"> <li>Observe instructions and keep them located near by the battery for future reference!</li> <li>Work on the battery should only be carried out by qualified personnel!</li> </ul>
	<ul style="list-style-type: none"> <li>Do not smoke! Do not use any naked flame or other sources of ignition. Explosion and fire hazards are present!</li> </ul>
	<ul style="list-style-type: none"> <li>While working on batteries wear protective goggles and clothing! Observe the accident prevention rules as well as DIN VDE 0510, VDE 0105 part 1!</li> </ul>
	<ul style="list-style-type: none"> <li>Any acid splashes on the skin or in the eyes must be rinsed with plenty of water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water!</li> </ul>
	<ul style="list-style-type: none"> <li>Explosion and fire hazard, avoid short circuits! Caution! Metal parts of the battery are always under voltage, do not place items or tools on top of the battery!</li> </ul>
	<ul style="list-style-type: none"> <li>Electrolyte is highly corrosive and acidic. In normal working conditions, contact with electrolyte is nearly impossible; electrolyte can only leak from the vent valves in case of over charging the battery or in case of mechanical damage to the container. In case of any contact with electrolyte please rinse with plenty of water and contact a medical professional immediately.</li> </ul>
	<ul style="list-style-type: none"> <li>Batteries/cells are heavy! Ensure adequate mounting security and always use suitable handling equipment for transportation.</li> </ul>
	<ul style="list-style-type: none"> <li>Recyclable goods must not be disposed of with domestic or industrial waste.</li> </ul>
	<ul style="list-style-type: none"> <li><b>Disposal of batteries</b> Batteries marked with the recycling symbol should be processed by a recognised recycling agency. By agreement, they might be returned to the manufacturer. <b>Register no. 21000144</b></li> </ul>

Sealed lead acid batteries consist of cells which do not require water topping during the operation. Pressure relief valves are used as plugs which can not be opened without destruction.

## 1. Start up

Check all cells/blocks for mechanical damage, correct polarity and firmly seated connectors. The following torques apply for screw connectors:

M5	M6	M8	M10
2-3 Nm	4 - 5,5 Nm	5-6 Nm	14-22 Nm

If necessary the terminal cover are to be raised. Connect the battery with the correct polarity to the charger. The charger should not be switched on during this process, the load should not be connected (pos. pole to pos. terminal). Switch on charger and start charging following instruction no 2.2.

## 2. Operation

For the installation and operation of the batteries EN 50272-2 applies. Battery installation should be made such that temperature difference between individual units does not exceed 3 degrees Celsius/Kelvin.

### 2.1 Discharge

Discharge must not be continued beyond the level specified for the specific discharge current. Deeper discharges must not occur unless specifically agreed with the manufacturer. Recharge immediately following complete or partial discharge.

### 2.2 Charging

Applicable are all charging procedures with their limit values according to DIN 41773 (IUUO-characteristic). According to the charging equipment specification and characteristics, alternating currents ( $< 0,1C(A)$ ) flow through the battery super-imposing into the direct current during charging operation. These alternating current and the reaction from the loads lead to an additional temperature increase of the battery and strain the electrodes with possible damages (see 2.5). Depending on the installation, charging (acc. to DIN VDE 0510 part 1, draft) may be carried out in the following operations.

#### a) Standby Parallel Operation and Buffer Operation

Here the load, direct current source and battery are continuously in parallel. Thereby the charging voltage is the operation voltage and at the same times the battery installation voltage. With the standby parallel operation, the direct current source is at any time capable of supplying the maximum load current. The battery only supplies current when the direct current source fails. The charging voltage should be set at  $2,275V \pm 0,005V$  (20°C) x number of cells in series measured at the terminals of the battery.

With buffer operation, the direct current source is not able to supply the maximum load-current at all times. The load current intermittently exceeds the nominal current of the direct source. During this period the battery supplies power. The battery is not fully charged at all times but the float-charge of 2,275 V/cell

$\pm 0,005V$  (20°C) x number of cells in series provides a reasonable recharge under normal conditions. Dependent on load and number of cells in series, it is recommended to consult the battery manufacturer in case of any doubt.

#### b) Switchmode-Operation

When charging, the battery is separated from the load. To reduce the charging time, a three phase boost charge mode can be applied by charging the battery at 2,45 - 2,5 V/cell until the charging current drops to 0,07 C(A) (trip point for the first phase of charging  $t_1$ ). The duration of charging of the first phase is measured by a timer so that the second phase should be half of the first phase ( $t_2 = 0,5 h$ ) when the batteries are kept on charger at 2,45-2,5V/cell. If  $t_2 = 0,5t_1$  is exceeded, the voltage is reduced to the float voltage of 2.275 V/cell ( $\pm 0.005V$ ).

#### c) Battery operation (charge/discharge operation)

The load is only supplied by the battery. The charging process depends on the application and must be carried out in accordance with the recommendations of the battery manufacturer.

### 2.3 Maintaining the full charge (float charge)

Devices complying with the stipulations under DIN 41773 must be used. They should be set to the average cell voltage is 2.275V $\pm$ 0,005V.

### 2.4 Supplementary and equalizing charge at 2,4 VZ

Before initial operation, the batteries must be recharged and recorded. Equalising charges are necessary after deep discharge and insufficient charging. The battery surface temperature must not exceed 45°C; if necessary the charging process must be interrupted or switched over to conservation of charge. The end of the supplementary/equalisation charge is reached when the charge voltage and charge current show no change within 2 hours. Batteries that are subsequently installed in a battery bank as a replacement must be fully charged before installation.

### 2.5 Alternating currents

On recharging up to 2,4 V/cell under operation modes 2.2 the actual value of the alternating current is for a very short time permitted to reach 0,1C(A) nominal capacity. In a fully charged state during float charge or standby parallel operation the actual value of the alternating current must not exceed 5 A/100 Ah nominal capacity.

### 2.6 Charging currents

The charging current should not exceed 0,1CA (in relation to the nominal capacity of the battery).

### 2.7 Temperature

The nominal operation temperature range for lead-batteries is 10°C to 30°C (best 20°C  $\pm$  5 K). Higher temperatures will seriously reduce service life. All technical data are produced for a nominal temperature of 20°C. Lower temperatures reduce the available capacity. The absolute maximum temperature is 50°C and should not permanently exceed 40°C in service.

### 2.8 Temperature-related float charge voltage and boost charge

The float charge voltage of 2,275 V/cell  $\pm 0,005 V$ /cell refers to a battery temperature of 20°C. Temperature compensated charging is required in order to avoid overcharge at high temperatures and undercharge at low temperatures. The recommended temperature compensation factor is -3m V/cell/°C for float charge operation. In order to avoid thermal run-

way, it is mandatory to temperature-compensate the float-charge voltage for temperatures above 30°C.

The boost charge mode can be applied if a quick recharge is required on condition that the charging current does not exceed 0,25 C(A) and constantly drops to 0,01 C from where normal float charge voltage should be applied.

Temperature (°C)	Boost charging voltage (V/c)	Maintenance charge voltage (V/c)
- 10	2,58	2,36
0	2,53	2,33
10	2,48	2,30
20	2,45	2,275
30	2,40	2,24
40	2,34	2,21

### 2.9 Electrolyte

The electrolyte is diluted sulphuric acid and is absorbed in glass-matt separator.

### 3. Battery maintenance and control

Keep the battery clean and dry to avoid leakage currents. The cleaning of the battery should be carried out according to the ZVEI-leaflet "Cleaning of batteries". Plastic parts of the battery must be cleaned with pure water without additives, any organic solvents are prohibited.

At least every 6 months measure and record:

- battery voltage
- voltage of several cells/blocks
- surface temperature of several cells/blocks
- battery-room temperature

If the difference of the average float-charge-voltage/cell is exceeding  $\pm 0,1$  C/cell within a string or if the surface temperature-difference between cells/blocks is exceeding 5 K, the service-agent should be contacted.

Annual measurement and recording:

- voltage of all cells/blocks
- surface temperature of all cells/blocks
- battery-room temperature
- insulation-resistance according to DIN 43539 part 1

Annual visual check:

- screw connections, any screw connections without locking devices have to be checked for tightness
- the battery installation or storage
- the ventilation according to EN 50272-2

### 4. examinations

For tests, proceed according to EN 60896 T1 / T 2, special test instructions, e.g. according to DIN VDE 0107 and DIN VDE 0108 must also be observed. To ensure a reliable power supply, the entire battery should be replaced after the expected service life, taking into account the operating conditions and temperatures.

### 5. Faults

Call the service agents immediately in case of faults in the battery or the charging unit. The availability of the recorded data described in point 3, will be very helpful to find the cause of failure. A service contract simplifies trouble shooting.

### 6. Storage and taking out of operation

To store or decommission cells/batteries for a longer period of time, they should be fully charged and stored in a dry frost-free room. To avoid damage, batteries should be regularly subjected to supplementary charge cycles in accordance with 2.4.

### 7. Transport

VRLA batteries, which by no means show any kind of damage, are classified as non-hazardous goods for transportation by rail, lorry or air (according to GGVS GGVE and IATA Regulations) if they are safeguarded during transportation against short-circuiting, falling, slipping or any damage. There must be no dangerous traces of acid on the outside of the packages. For all sealed batteries and cells whose receptacles are leaking or damaged, the relevant exemption regulations apply.

### 8. Specifications SB+ SBLV

Typ	10 Min.	30 Min.	1h	3h	5h	10h	20h
	C1/6 (Ah) 1,80 V/Z	C1/2 (Ah) 1,80 V/Z	C1 (Ah) 1,80 V/Z	C3 (Ah) 1,80 V/Z	C5 (Ah) 1,80 V/Z	C10 (Ah) 1,80 V/Z	C20 (Ah) 1,80 V/Z
SB 1.2-12	0,58	0,65	0,73	0,96	1,05	1,20	1,23
SB 2.3-12	0,79	1,01	1,08	1,35	1,70	1,81	2,06
SB 7-12	2,47	3,52	3,84	5,04	5,75	6,60	7,00
SB 7-12L	2,47	3,52	3,84	5,04	5,75	6,60	7,00
SB 12-12	4,71	6,35	7,75	9,18	10,1	11,2	12,0
SB 12-12L	4,71	6,35	7,75	9,18	10,1	11,2	12,0
SBLV 17-12i	6,78	9,21	11,1	12,9	14,5	16,1	17,0
SBLV 24-12i	7,2	12,9	14,3	19,6	21,7	23,8	24,9
SBLV 40-12i	13,5	20,6	24,2	29,5	33,1	40,0	40,6
SBLV 65-12i	20,7	35,9	40,3	50,1	58,4	66,3	68,2

All mentioned values are average values.

Non-observance of the instructions for use, repair with non-original spare parts or unauthorised intervention invalidates all warranty claims!

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