Upower

Unlimited power

OPzV Battery Installation and Operation Manual

OPzV-BATTERY

V1.6

1. INTRODUCTION

1.1 Tubular Gel Lead acid battery has a wide application in telecommunications, radio and cellular telephone relay stations, emergency lighting systems, power stations, conventional power stations, alternative power (solar wind), large UPS and computer back-up, railway signaling, maritime standby power on ships and ashore, process and engineering, standby power, buoy lighting.

1.2 The tubular battery mainly contains tubular positive plates, flat negative plates, gelled electrolyte, separators, container, cover, safety vent valve. And the containers and covers of the cells are sealed by heat sealing.

2. INSTALL AND OPERATION

Rating Data

Nominal capacity	
Nominal voltage	2.0V× number of cells in series
Rated temperature	20℃

Pay attention to the operation instructions and position them close to the battery.
All work carried out by skilled personnel only!

Use protective glasses, gloves and clothes when working on batteries. Pay attention to the accident prevention rules as well as EN 50272-2 and EN 501110-1

No smoking! Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode

Acid splashes into the eyes or on the skin must be washed with abundant water.In case of accident after flushing with plenty of water consult a doctor immediately! Clothing contaminated by acid should be washed in water without delay.

Risk of explosion and fire due to explosive gases (hydrogen-oxygen) escaping from the battery. Avoid short circuits!
CAUTION: Metal parts of the battery are always live,
therefore do not place tools or other metal objects on the battery!

Dangerous electrical voltage! Metal parts of the battery are always live.

Pay attention to the hazards due to the batteries.

Installing and using the battery not in compliance with the instructions, repairing with non-original parts, using improper electrolyte, using additions in the electrolyte or topping-up with improper distilled water can invalidate any claim for warranty. All failures, malfunctions or defaults of the battery, the charger or any other accessories, must be notified to our Customer Care at info@masterbattery.es and the defect battery should be sent to Master Battery or any of our representative.

2.1. INSTALLATION

2.11 Unpacking and inspection of delivered goods

Unpack batteries and inspect for possible damage in shipment. Make sure that small packages are not thrown out together with the packing material. Check that all material has been received and inform Master Battery in case of any damage or shortages in the consignment. Shipping can be done in two ways:

2.12. Battery room

Battery room must conform to EN 50272-2. Please pay attention to:

– Floor load capacity and nature

– Resistance of floor coating against electrolyte corrosion

– Any source of sparks or flame (lamps, switches, etc)

– Ventilation conditions (forced or natural) and room temperature

2.1.3 Rack installation

Align the rack according to installation drawing EN 50272-2 specifications. Rack should be horizontally aligned, using leveling parts or adjustable insulators. Check rack stability and ensure all screw connections.

2.1.4 Connection of cells

Place each cell vertically onto the rack respecting the polarity: the positive pole [+, red color] should be connected to the negative pole [-, blue color] of the adjacent cell. Position cells leaving a distance of approx.10 mm between them. For large cells we recommend you to start from the middle of the rack. If needed, clean the contact surface of poles and connectors with damp cloth. Do not use any kind of cleaning chemicals.

Fit the connectors, adjusting if needed, the distance between cells, so that poles are not stressed at all. Put in place connection accessories (first the washer, then the grower and finally the bolt) and tighten them with an insulated torque wrench at 24±1Nm. Avoid mechanical stresses on poles.

Fit the insulating pieces or caps on all connectors and end-poles.

Affix nameplate, end-terminals polarity labels and safety markings.

When battery sets are connected in parallel special care should be taken so that the same thermal environment and the same electrical connections resistance are applied in all parallel string. Max. No. of parallel strings is 4.

2.2. COMMISSIONING

2.2.1. Verification of installation quality

Before starting the commissioning charge make the following controls:

Measure individual cell Open Circuit Voltage (O.C.V.). Nominal values are given at 20℃. For other temperatures Du/dt=-0,0005V/℃ applies.

Nominal OCV is approx. 2.08±0.01V/c.

In case the cell voltages are below the indicated values and deviations, then the battery commissioning charge should be done acc. to par.2.3.B. In case of cells having OCV with deviation of more than ±0,02 V from average cell voltage, please inform Master Battery.

Measure the total battery OCV, this is a very important control. It should be equal to individual cell OCV x no. of cells in series. In case a cell has been installed with reverse polarity then the total battery OCV will be approximately 4V less.

3. OPERATION

3.1. Standby systems(float/buffer applications) parallel operation mode

In these systems the DC supply provides power to load and the battery is under float voltage. Battery delivers power to load only at AC net breakdown, when DC supply fails or when the load exceeds DC supply max current-so in this case the battery acts as a “buffer”.

Charging with IU_OU or IU characteristics acc. to DIN 41772-3, where $I_{max}=2*I_{10}$,U_o （boost)=2,35-2,40V/c(current–limited duration) and U(float)=2,23V/C±1%(float). Using this method, 95% of battery capacity will be attained later on.

Discharging should be done according to the installation specifications. Recommended max depth of discharge is 80% of battery nominal capacity. Proper sizing of the installation should safeguard that the battery is not discharged more than 80% (known as deep discharge). This means that the battery cut-off voltage should be set according to the load and in comparison with the battery performance tables in different discharge rates. The battery should never be discharged at a voltage below the specified voltage for the appropriate discharge rate.

Recharging should be done immediately after full or partial discharge acc. to par. 2.3A. Recharge time depends on previous discharge depth, initial charging current and recharge voltage. In case fast recharge is required, the IUoU characteristic with $I=2*I_{10}$ at U=2.40 V/c can recharge more than 95% of capacity between 3~15 hours depending on previous discharge.

Equalizing charge is required only after a deep discharge or after prolonged period of battery being in a partial state of charge (in “buffer” operation).
Equalizing charge should be done according to par. 2.3.B.

4. PERIODICAL INSPECTION & MAINTENANCE

Keep the battery dry and clean to avoid creeping currents and the associated risk of surface corrosion, decarburization and/or fire.
Use only damp cloth, wetted only with water-without solvents.
During inspection & maintenance avoid any electrostatic discharges, as they can produce sparks-risk of explosion! Use proper clothes and shoes!
Use “pilot cells” for measurements (see below), the number of which can be specified from 10% to 20% of total no. of cells.

4.1. Standby systems (float / buffer applications)

-Every 6 months inspect, measure and register.

● Total battery voltage and room temperature. If float voltage deviates more than ±1% from 2.23* no. of cells value then adjust it or inform Master Battery
● Voltage, electrolyte density and temperature of pilot cells
● Battery room ventilation (see par.5)
● Condition of vent plugs

- Every 12 months inspect, measure and register:

● Voltage, electrolyte density and temperature of all battery cells. If a cell deviates in voltage more than ±0.1 V from mean battery value, in density more than ±0.05 kg/l from nominal or in electrolyte temperature more than ±5℃ from mean battery value, please inform Master Battery.
● Condition of racks or cabinets and general condition of battery
Condition of battery connectors and end-terminals. Check & tighten them with an insulated torque wrench at 24±1 Nm

5. VENTILATION REQUIREMENTS

The battery installer should follow EN 50272-2 standard specification recommendations regarding ventilation of battery room.

5.1 Gas generation

During float or boost charge gases are emitted from all secondary cells, vented or valve regulated. This is a result of water electrolysis by the overcharging current. Gases generated are hydrogen and oxygen. When emitted into the surrounding atmosphere, an explosive mixture may be created if the hydrogen concentration exceeds 4% in volume.
The purpose of ventilating a battery room is to maintain the hydrogen concentration below the a.m. limit.

5.2 Ventilation requirements

The minimum airflow rate for ventilation of a battery room should be calculated by the formula given in EN 50272-2, which takes into consideration all

installation parameters.

5.3 Natural ventilation

Battery rooms require an air inlet and an air outlet with a minimum free area of openings, calculated by the formula given in EN 50272-2.

The air inlet and outlet openings should create the best possible conditions for exchange of air.

5.4. Forced ventilation

When the adequate airflow cannot be obtained by natural ventilation, then forced ventilation should be applied. In such case the battery charger should be interlocked with the ventilation system or an alarm shall be actuated to secure the required airflow.

The air extracted from the battery room shall be exhausted to the atmosphere outside the building.

6. BATTERY LIFE

In addition to proper operation (charging and discharging) and maintenance, the lifetime of the battery depends on the following operating conditions.

6.1. Temperature

All technical data apply for the rated (nominal) temperature of 20℃. The optimum operational temperature range for the battery is 20±5℃. Temperatures higher than 25℃ reduce working life and lower temperatures than 15℃ reduce available capacity (see also technical report IEC 1431).

The maximum recommended temperature range is 20±10℃.

The operational limits of OPzV series are -20℃ to +55℃,but the battery installer should take into consideration that exceeding the limit of 40℃ up to 55℃ is violating EN 50272-2 ventilation calculation formula, so it should be acceptable only for short periods of time.

6.2. Quality of charge current

The superimposed ripple current interaction between charger, battery and load shall be taken into account

The maximum recommended alternating component of the charger current leff (rms) should be limited to the following values, according to EN 50272-2 standard;

leff in float =5 A per 100 Ah rated battery capacity

leff in boost =10A per 100 Ah rated battery capacity

Higher values of the ripple current will effect the gas generation and the battery life of any secondary lead acid battery, vented or valve-regulated.

7. STORAGE

If batteries are taken out of operation for an extended period they should be stored in a fully charged condition in a dry, frost-free room. To ensure the battery is not deeply self-discharged we recommend you to do an equalizing charge as per par.2.3.B. , according to storage room mean temperature;

Every 3 months if storage room temperature is up to 25℃

Every 2 months if storage room temperature is up to 35℃

Every month if storage room temperature is up to 45℃

The storage time should be taken into account when considering operational life of the battery.

8. TESTS

All tests should be performed in accordance with test standard EN 60896-1(IEC 896-1) and manufacturing standards DIN 40736 and 40737.

9. MALFUNCTIONS

If malfunctions are found on the battery or the charge, Master Battery service department should be called in without delay.