

10 Maintenance tips

for your batteries



The correct use and care of your batteries is a factor that can bring great benefits to your operation.

However, we know that during daily operation the guidance of an expert may sometimes be lacking in order to take optimal care of your batteries.

That is why in this ebook we want to share with you our best advice, based on extensive experience in the industrial battery industry to help you improve your operational performance.

1. Variables to avoid during the operation of your batteries

During battery operation, many factors can affect its ability and performance in terms of capacity and expected life span. Many chemical reactions are affected by temperature and this is reflected in the capacity delivered.

Electrolyte temperature °C (°F)	Capacity Percentage @ 6 hr
25 (77)	100
16 (60)	95
10 (60)	91
4 (40)	87
- 1 (30)	81
- 7 (20)	74

Excessive heat: This accelerates corrosion on the positive grill and there is excessive gasification, the active material softens and loses adherence to the grill, especially on the positive one.

Constant low charges: When applied to the battery, charge retention gradually decreases. Equalization charges are necessary as part of routine maintenance.

Nuestras Soluciones

Para las constantes cargas bajas: Un sensor que permite ver cuando se encuentran con los niveles adecuados de hidratación.

BMU: Monitor del estado actual de las baterías.



Monitor BMU

2. Optimize your maintenance routine

The maintenance routine is an important factor to extend the life of the battery, for this we recommend doing the following:

1. Maintain the proper electrolyte level.
2. Recharge properly.
3. Repair immediately when necessary.
4. Do not discharge below 20%, avoid deep discharges.
5. Perform Equalization Charges (equalization)
6. Do not overload (overload).
7. Keep the battery data updated.
8. Keep it clean and dry.
9. Always use the appropriate charger for each battery.

Our Solutions

BFS: System that facilitates the daily hydration of the batteries.

Micropower Access Chargers: For programmed and precise equalization charges.

BMU: Provides reports on battery handling, temperature alarms, battery imbalance and charge, with temperature control during charging.

Remote monitoring “GET SYSTEM”: Timely and up-to-date information on the status of the batteries.



BFS System



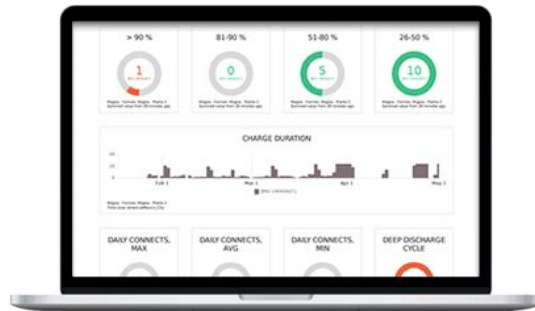
Micropower Access
Charger



BMU Monitor

Remote
monitoring "GET
SYSTEM"

GET ON-LINE^{PD}
MICROPOWER GROUP



GET ON-SITE^{PD}
MICROPOWER GROUP



NFC TAG



3. Cycle charging and equalization

The capacity removed from the battery during discharge must be returned before starting another working day. Two charging processes are used for this work:

Cycle charge (*Cycle charge*) (Normal 6-8 hours 20-100% recharge)

- In this type of load the current is high, as long as it does not cause excessive gassing or heating, above 46 ° C (115 ° F).
- This type of charge is easier to apply with automatic chargers, which regulate and modify the current according to the battery voltage, resulting in a full recharge at the end of the estimated time.

Our Solutions: It is done with the Micropower Acces charger and BMU.

Equalizing charge

Also called weekend charging, this type of charging is used when there are differences in voltage or density between cells.

- The equalization charge is an extension of the normal charge (3 more hours) without exceeding the final charge rate, and is normally applied once a week to a battery with daily cycles.
- Equalizing charges provided unnecessarily can cause battery damage, shorten battery life, and lead to unnecessary electricity consumption.

Our Solutions: It is made with Micropower Acces and BMU chargers.

Types of Charges:

Carga Rápida

- 1 Battery working all the time.
- The battery room and battery changes are eliminated.
- Charger with a capacity of 40% of the total Ah of the battery to be charged.

Opportunity Charge

- 2 Batteries working extended shifts of 10-12 hrs.
- Full Daily Recharge.
- Charger with a capacity of 25% of the Total Ah of the battery to be charged.

Our Solutions:

It is made with Micropower Acces and BMU chargers.



Micropower Access
Charger



BMU Monitor

4. Adding water in batteries

During normal work, water is lost, in small proportions, so it must be replaced at regular intervals with "acceptable", demineralized or deionized water.

- The water used may contain small amounts of impurities such as iron, manganese, copper, chlorine, nitrates, etc. These materials are harmful and affect the life of the battery, that is why there is a limit of impurities, shown in table 3.
- If any material in table 3 exceeds the acceptable limits, the cell will have performance problems. Water addition should be 1/4 "below the lower limit of the breather plug on the cover.
- **Under normal conditions the battery should never have sulphuric acid added.**
- This is only done when the battery falls and spills electrolyte, or when it is removed for any reason. It is there where acid is added but of the same value, if any of the 2 conditions should happen, we recommend calling your service center to verify and advise.

Allowed impurities in battery water

Compound	Maximum limit allowed in PPM
Total solids	350.0
Fixed solids	200.0
Organic volatiles	250.0
Iron	4.0
Chlorine	25.0
Ammonium	5.0
Nitrites (NO ₂)	10.0
Nitrites (NO ₃)	10.0
Magnesium	0.07
Calcium and magnesium	40.0

5. Maintain the proper electrolyte level

Adding water before recharging can cause electrolyte leakage at the end of recharging. This represents losses of sulfuric acid (diluted with water).

At this point more water is added to recover that loss and what is done is to further dilute the sulfuric acid inside the cell, giving low specific gravity readings. With this, the battery loses capacity and shortens its working life.

The following factors affect the water fill schedule:

- a) The age and poor condition of the batteries
- b) Depending on the battery model, some have more space between the plates and cover
- c) The charging frequency, deep discharges and characteristics of the charger

We advise the following:

- It is advisable to have a weekly program to check the level of the batteries and adequate water filling. With this we can avoid the loss of level, and therefore capacity and irreversible damage, and extend the life of the battery with maintenance.

- The adequate time to add water and adjust the level is at the end of the charge since when the battery is discharged the electrolyte level is low.
- The electrolyte level before charging must be above the separator and visible on the protector to avoid spillage. Before finishing the load add water to the edge of the filling hole (lower part).

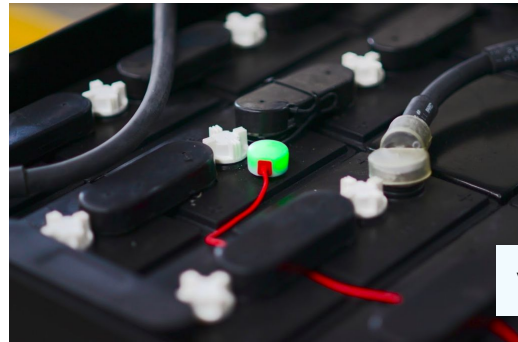
Our Solutions:

BFS hydration system: Equal liquid level in all cells, easy, fast and efficient.

LED visual monitoring CLS: Indicates with red light when the battery should be hydrated, included in all Prime Power batteries.



BFS System



Visual Monitoring

6. Efficient cleaning of your batteries

When the battery is working, the electrolyte tends to splash either from high level or high temperature. This effect causes it to accumulate on the top of the cover, so if these are not removed they could cause corrosion on the tray, electrical grounds and deterioration of the battery.

The battery must be subjected to cleaning depending on the frequency with which it happens, as well as the environment. Some basic rules for a good cleaning are:

1. Remove the battery from the forklift compartment.
2. Make sure that the caps are in place in all cells.
3. Neutralize any amount of acid found in the covers. With 1 pound of sodium bicarbonate in 1 gallon of demineralized water, brush or plastic brush clean thoroughly on all connectors (without connector cover) and terminals until the “hiss” action stops.
4. Clean the excess of the mixture with water at low pressure.
5. Dry the excess water before placing it in the forklift compartment.



Sackett Washers

Our Solutions:

Sackett Washers: They facilitate the task of keeping your batteries free of sulfation.

7. Keep the batteries charged when they are not working

The following procedure should be used when the battery will be stored or will be left for a period of time (no more than two months).

- a) Clean and neutralize the battery. A mixture of 500 g of sodium bicarbonate in 4 liters of water, apply with a soft brush to the entire battery and cell covers (with caps in place) and wash at the end with clean water.
- b) Equalizing charge to the battery, before taking it to its place of stay.
- c) Keep in a cool and dry place.
- d) Check density in all cells weekly. Recharge if the specific gravity is less than 1,240 or less. (A refresh charge of 3 hours to final charge of the battery model must be granted for each month of storage).

For times greater than 2 months we must store the batteries fully charged, and never partially discharged, this in order to avoid major problems.

When a cell or battery is stored for a long time, as we already know, the electrolyte decreases and that can be harmful if the weather is cold. Since at different values the electrolyte can freeze, for example, a value of 1,200 freezes at -31 ° C; 1,175 freezes at -20 ° C and 1,150 freezes at -15 ° C.

Our Solutions:

Micropower It allows to program recharges in the batteries and use a special charging mode.



8. Correct way to recharge your batteries

Incomplete charges not only reduce the capacity of the battery in daily activities, but also cause abnormal sulfation in the cells, increasing internal failure.

- Overloads are the cause of high temperatures, excessive gassing, positive grill corrosion, resulting in premature failure of the battery cells.
- Regular tests must be carried out on the battery and charger to detect if there is a lack or overload of the battery.
- High temperatures generate detachments of the active material in the positive plates, accelerating the softening of the active material and its fall to the bottom of the jar.

Nuestras Soluciones

Micropower: Allows you to use different programs or charging modes.

BMU: Communicate from battery to charger on how much charge will be applied, analyzing the use of the battery.

9. Keep your batteries clean and dry

When the electrolyte mixture develops at the top of the cells, either from overfilling or excessive gassing, the water will evaporate or splash with a quantity of sulfuric acid. This concentration on the cover of the battery cells can cause corrosion to the tray and generate earth between the tray and the cells or metal parts of the forklift, self-discharge in cells, and / or damage to the electrical parts of the forklift.

Foreign materials in the battery such as dust, dirt, grease, tow, paper and sometimes small metal parts, can contribute to the generation of fire.

- **The frequency of cleaning** depends on how quickly dirt is present on the battery, and / or electrolyte splashes appear on the covers. The above will depend on the environment surrounding the battery and the treatment given in maintenance. On average cleaning is recommended once a month.
- **During cleaning**, and especially when neutralizing or detergent solutions are used, we must make sure that the caps are correctly positioned to prevent leakage into the cells.

- **To neutralize the electrolyte** and any other impurities in the covers, it is necessary to make a mixture of caustic soda or sodium bicarbonate, as follows: in 3.8 liters (1 gal) of water mix 450 gr (1 lb) of any compound already mentioned.
- **Add some detergent or cleaning liquid**, cleaning should be done with a brush or brush with plastic bristles, thoroughly clean all the covers, between the intercell connectors, the junctions between the tray and the cell cover.
- **Ensure the water discharge**, so as not to affect the drainage of your area, or retain the liquid in containers and deliver it for disposal to the corresponding authorities and / or to the company that attends the battery service.



Sackett Washers

Our Solutions: SACKETT Washers

10. Battery monitoring with data for analysis

It is unusual for a battery or cell to fail unexpectedly. Cell deficiencies, inadequate charging routines create gradual changes in the health and capacity of cells and battery.

Only periodic tests, data collection and data analysis or comparison can detect problems before they are irreparable. Comparison of results is beneficial in determining the health of the battery, thereby obtaining a history and avoiding costly repairs.

- It is advisable to have a file of the battery (s) that have data taken from pilot cells, voltage, density, initial temperatures and final discharge and charge, as well as tests performed to verify the health of the battery.

- The above also helps in case of a more in-depth review by the manufacturer, and is considered an important point in making a warranty claim.
- When taking data, always consider cell # 1, the one that will be found in the positive battery output and thus follow the series of connectors. The last cell is the one on the negative output.

There are electronic battery monitoring options that we can offer you at Prime Power Omega.



Micropower Access
Charger

Our Solutions:

- Monitoring of operation with the Access System (charger and BMU).
- Analysis of files and data with BMU.



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More than 50 years standing out from the rest

Our mission is to be the most agile and constant organization, offering reliable products for energy storage, excellent service and competitive prices.

We are located in Monterrey, Mexico, with more than 50 years in the lead transformation industry and with a high level of integration.

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