BATTERY SUPPLIES

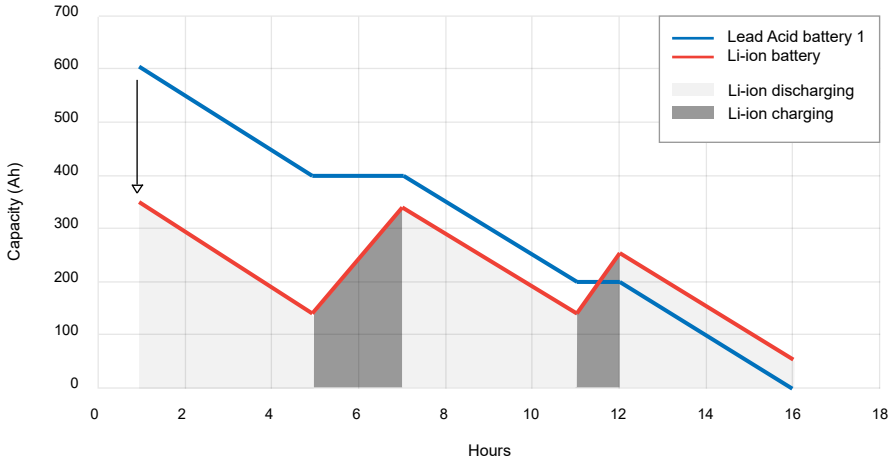
LITHIUM-ION TECHNOLOGY

www.batterysupplies.be

QUICK & OPPORTUNITY CHARGING

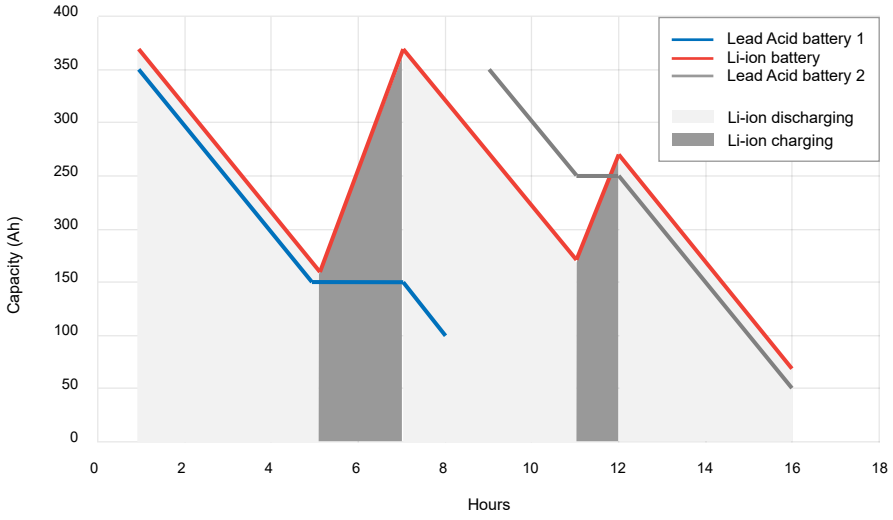
A Li-ion battery can be charged whenever you want : during each lunch break, between two operations, etc. A quick charger can charge the battery up to 25% in 30 minutes. A saving of 30% capacity (and thus cost) can be found easily .

DISCHARGE DURING THE DAY



Especially for trucks used in two shifts, the autonomy of a battery is too low. In that case, you need to switch to a 2° battery after a shift. It takes easily 15 minutes for an operator to replace an acid traction battery. With a Li-ion battery combined with opportunity charging, you can increase the capacity and autonomy for the whole day. **This will avoid the investment and maintenance of a 2° battery and save the time to switch the batteries.**

1 LI-ION BATTERY REPLACES 2 LEAD ACID BATTERIES



Compared to traditional lead-acid batteries, a Li-ion battery can be charged very fast. **It takes only 2 to 3 hrs for a total charge.** Opportunity charging can be done relatively faster. This makes that a Li-ion battery is a perfect choice for opportunity charging and for transport systems in 24/24 hrs regime (as AGV's) .

MAINTENANCE FREE

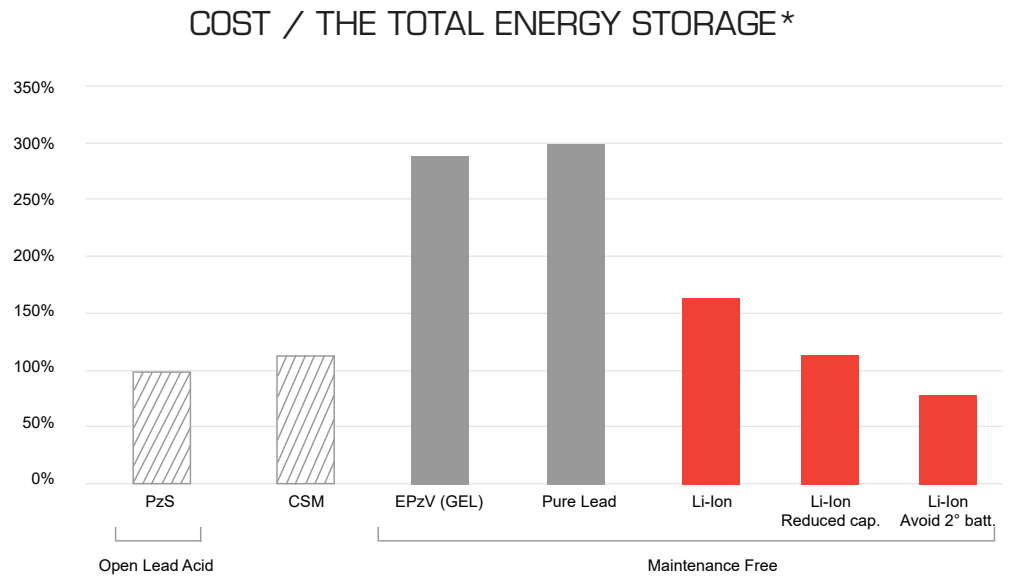
LifePO4 batteries are fully maintenance-free and can cope with intermediate charging. Intermediate charging – or opportunity charging – leads to battery sulphation, the number one killer of batteries as the acid particles of the electrolyte will attach to the lead plates causing huge internal damage and loss of capacity. However, opportunity charging does not harm lithium-ion batteries.

99% of the early fall-out of acid traction batteries are not due to production faults, but to bad battery handling or bad maintenance: mistakes during watering, intermediate charging, not fully charging the battery after use or leaving the battery in a discharged state, incidents when replacing batteries, etc. The lithium cells inside the LFP battery pack are protected, supervised and balanced by a Battery Management System (BMS). The BMS is basically the heart of the lithium battery system. The BMS prevents all kinds of abuse of the operator.

COST-EFFECTIVENESS

No doubt about it that the purchase of a lead-acid battery is the cheapest solution. The investment of a maintenance-free traction battery of 20 kWh (as gel or pure lead) will be more than double compared to the standard lead-acid battery. The cost of a Li-ion battery can be 4 times more expensive.

However, if you take into account the total energy stored in the battery over its life time, the comparison is totally different. The total storage of energy in a gel and pure-lead battery is limited to the low lifetime expectations (1200 cycles) and the proposed useful capacity (60% DOD) and is about 14 MWh. For Li-ion batteries, the total energy capacity is much higher : 20 kWh x 4000 cycles x 80 %DOD = 64 MWh. This makes **a Li-ion traction battery the cheapest maintenance-free battery**.



* The total energy stored in the battery during its life time = capacity (20 kWh) x expected cycles x DOD%

This price will drop if you take into account the possible reduction of capacity (almost no effect of high discharge currents and low temperatures) and the possibility to avoid a 2° battery (saving in labour).

ZERO EMISSION

Lithium-ion batteries have no emissions during charging. They can be used easily in the food industry. The battery can be charged in a standard room without venting. You don't need to invest in a separate charging room.

EXTRA ADVANTAGES

Lithium-ion batteries have no memory effect.

The energy efficiency (discharged energy/charged energy) for Li-ion batteries is much higher than conventional lead-acid batteries.

Used in low-temperature circumstances, Lead-acid batteries lose a lot of capacity. The reduction of capacity for Li-ion batteries is much smaller what makes them very useful for low temperature operations. If you need to charge the battery in freezing conditions, we can install an extra heater into the tray. This heater will be fed by the charger, thus the battery will keep its autonomy.

The AQ-LITH® Lithium BMS has standard 2 CANbus-connections to allow a perfect control and supervision. The battery will be delivered with a standard CANbus indicator displaying the SOC% (State of Charge) , but also the current, voltage, temperature and warning messages. If needed, a CANbus datalogger will store all necessary data and tranfer it via WIFI or UMTS.

The energy density of Li-ion is very high. You can replace a lead-acid battery with a Li-ion battery with the double capacity and the same dimensions.

The Li-ion battery is much lighter than the conventional lead-acid battery, this can give an important saving in the construction and reduces the energy consumption for mobile systems.

High discharge currents reduce seriously the capacity of a lead-acid battery (see Peukert's law). However, the capacity of a Li-ion battery is almost not influenced by high discharge currents.

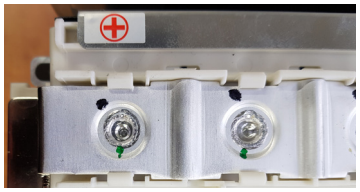
The internal resistance of a Li-ion battery is very low.

Long cycle life: 4000 cycles @ 80 %DOD

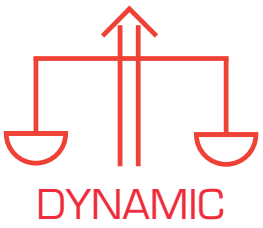
WHY BUY A AQ-LITH® LI-ION BATTERY?

Based on the long experience with Li-ion, Battery Supplies developed a new generation of Li-ion traction batteries with 3 important advantages:

1. The AQ-LITH® Lithium batteries use prismatic cells based on the superior LiFePO4 (lithium ferrophosphate) technology. This cell offers long cycle life with an excellent energy density. Compared to the NMC technology (lithium nickel manganese cobalt), the LiFePO4 is a lot safer.

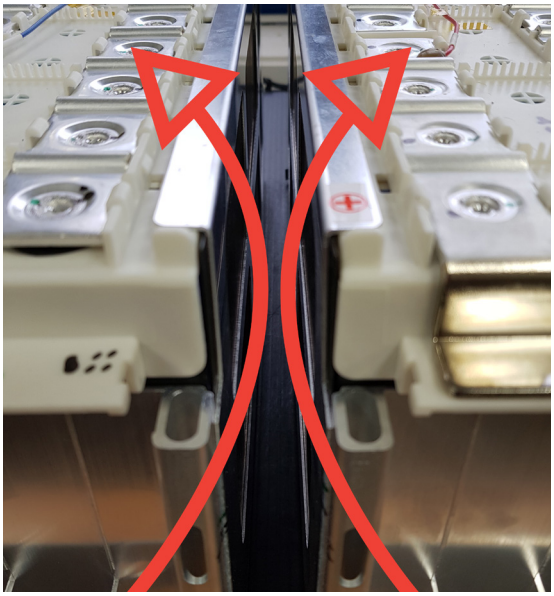


In industrial and logistics applications only LiFePO4 is used. It is important to understand that this technology does not ignite or explode, even if the battery breaks down. It is fully protected. The cells are assembled in modules with laserwelded busbars. This connection reduces the internal resistance and reduces the risk of poor connections.



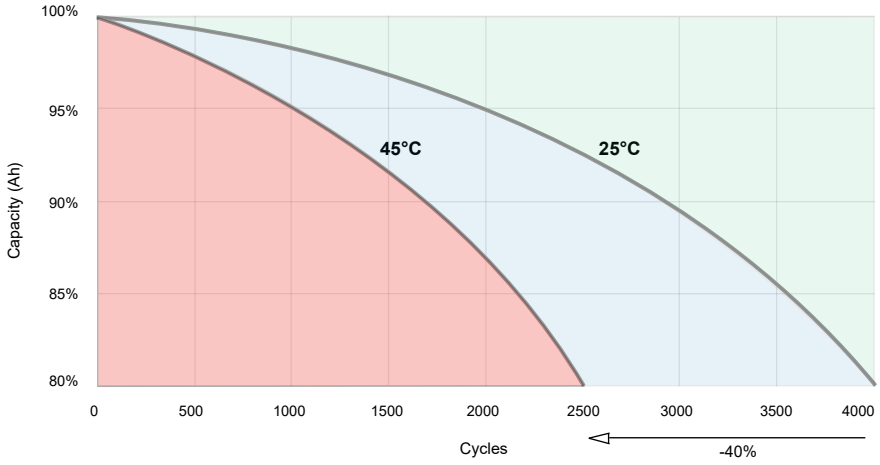
2. The core of the AQ-LITH® Lithium battery is our own innovative BMS (Battery Management System). This BMS has been developed in cooperation with a renowned Belgian university and will protect the cells for overcurrent, undervoltage, overvoltage and temperatures.

The unique and patented dynamic balancing system uses a clever algorithm with active and passive balancing methods. This will guarantee an optimal balanced battery with redistribution of the energy during discharge. The BMS has 2 CANbus outputs for an optimal communication with load and charger.



OPTIMAL VENTING

3. The heat dissipation in the cells have a big negative impact on the life time of the battery. Higher temperatures will reduce the lifetime drastically (each °C extra reduces the life time with 2%).



For the most Li-ion batteries on the market, the cells and modules are placed together, what will effect an unstable heat dissipation and local hotspots of the cells. The AQ-LITH® Lithium batteries have an optimal heat balance : the modules are placed to allow an excellent natural venting. This venting will transfer the heat towards the tray and will balance the overall temperature.

Optionally, the battery can be installed with a forced coolling (airco) for high temperatures or heaters for low temperatures.

STANDARD RANGE OF AQ-LITH® LITHIUM BATTERIES

The AQ-LITH® Lithium batteries are delivered ready-to-use in a tray. In the tray all necessary safety and control components are present as the AQ-LITH® BMS with dynamic balancing.

The standard AQ-LITH® Lithium batteries can be built in the most standard dimensions of lift truck trays. For lift trucks, the weight of the batteries are quite important as contra-weight. In that case extra ballast will be placed in the tray as option to match the same weight as a standard lead-acid battery.

Standard models	DYN24-210	DYN24-315	DYN24-420
Voltage (V)	24	24	24
Capacity (Ah)	210	315	420
Capacity (kWh)	5,04	7,56	10,08
Discharge current (nom) (A)	200	300	400
Discharge current (peak) (A)	600	900	1200
Charge current (A)	100	150	200
Temperature charging (°C)	0->40°C	0->40°C	0->40°C
Option heating (°C)	-20°C->40°C	-20°C->40°C	-20°C->40°C
Temperature discharging (°C)	-20->50°C	-20->50°C	-20->50°C
Charger for standard charging (5 to 6 hrs)	NG1/24-45 RE	NG1/24-45 RE	NG3/24-60 RE
Charger for fast charging (2 to 3 hrs)	NG3/24-95 RE	NG9/24-145	NG9+/24-200

Standard models	DYN48-315	DYN48-420	DYN48-630	DYN80-420
Voltage (V)	48	48	48	80
Capacity (Ah)	315	420	630	420
Capacity (kWh)	15,12	20,16	30,24	33,6
Discharge current (nom) (A)	300	400	600	400
Discharge current (peak) (A)	900	1200	1800	1200
Charge current (A)	150	200	300	200
Temperature charging (°C)	0->40°C	0->40°C	0->40°C	0->40°C
Option heating (°C)	-20°C->40°C	-20°C->40°C	-20°C->40°C	-20°C->40°C
Temperature discharging (°C)	-20->50°C	-20->50°C	-20->50°C	-20->50°C
Charger for standard charging (5 to 6 hrs)	NG3/48-60RE	NG5/48-95 RE	NG7/48-120RE	NG9/80-100 RE
Charger for fast charging (2 to 3 hrs)	NG9+/48-160 RE	NG9+/48-160 RE	2x NG9+/48-160 RE	2x NG9/80-100RE

! CUSTOM MADE AQ-LITH® LITHIUM BATTERIES

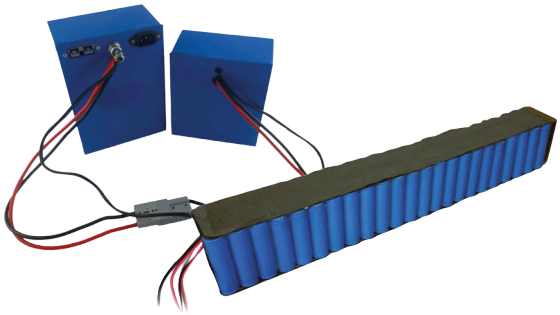
If the standard batteries don't fit for your application, then we can assembly a custom made AQ-LITH® Lithium battery based on your specifications. Please send us your parameters as dimensions, voltage, capacity and required current and we will search together with you for a solution. Please contact info@batterysupplies.be

FULL RANGE OF LITHIUM PRODUCTS

CELLS / PACKS

We can also offer you special customized battery packs according to your specifications:

- Li-NMC-O2 or LiFePO4
- Cylindrical or pouch cells
- Voltage <48V
- Different C-rates (for storage of energy or power applications)
- Built-in protective PCB, cell balancing
- Dimensions according to request
- Soft PVC or aluminum housing
- Capacity up to 40Ah



DROP-IN REPLACEMENT

Our Lithium Ion drop-in replacement batteries can directly replace your current SLA batteries in many applications. They have an excellent lifespan of up to 2000 cycles. These maintenance-free batteries have the same dimensions as SLA batteries but are much lighter (up to 70% lighter) and have much better performance and economic life. The drop-in replacement batteries are extremely safe: they can charge quickly without overheating and gasification, they are also protected against overload and full discharge thanks to the built-in BMS.

Also from an ecological point of view, there are only advantages: these batteries contain no acid, no lead and no other toxic substances.

M+ MODULES

- LIFEPO4
- MODULAR
- SERIAL & PARALLEL CONNECTION
- EASY INSTALLATION
- FLEXIBLE BATTERY SYSTEM

With our M-series serial circuits can be made and the M + series can be made both serial and parallel circuits. Each block is separately controlled by a built-in BMS, the entire group is also controlled by an external BMU.

LI-ION TRACTION & CUSTOM MADE BATTERIES

If the standard batteries don't fit for your application, then we can assembly a custom made AQ-LITH® Lithium battery based on your specifications with an innovative BMS. Please send us your parameters as dimensions, voltage, capacity and required current and we will search together with you for a solution.
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