

# Traction batteries

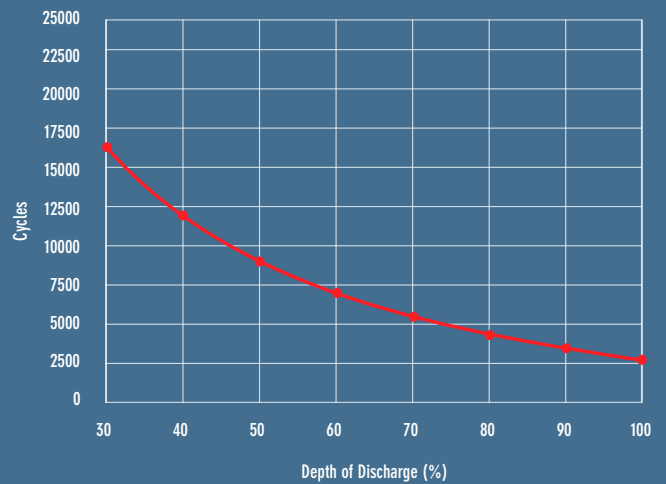
LITHIUM-ION - LIFEPO4



## BENEFITS

- Excellent low temperature performance
- High safety performance
- Longer lifespan: up to 4000 cycles
- High energy density
- Outstanding charging, discharging performance
- Lower self-discharging rate
- Maintenance-free
- Zero emission
- Customizations
- Fast & opportunity charging
- Can be mounted in every position

## SERVICE LIFE: 4000 CYCLES DOD 80%



Cycle life in relation to Depth of discharge

## APPLICATIONS



Forklift



Marine



Solar



Pallet jack



AGV



Access equipment



GSE



Custom made applications



Construction equipment



Agri

# AQ-LITH®

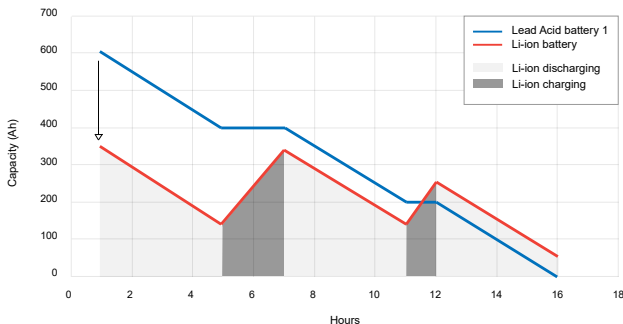


## QUICK & OPPORTUNITY CHARGING

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.

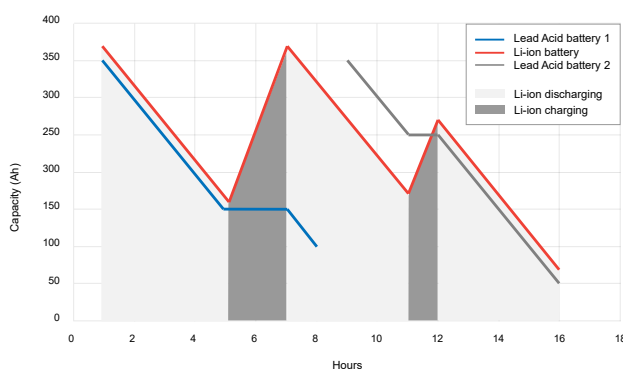
Especially for trucks used in two shifts, the autonomy of a battery is too low. In that case, you need to switch to a 2<sup>nd</sup> battery after a shift. It takes easily 15 minutes for an operator to replace an acid traction battery. With a Li-ion battery combined with opportunity charging, you can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

DISCHARGE DURING THE DAY



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 a Li-ion battery a perfect choice for opportunity charging and for transport systems in 24/24 hrs regime ( as AGV's ).

1 LI-ION BATTERY REPLACES 2 LEAD ACID BATTERIES



## MAINTENANCE FREE

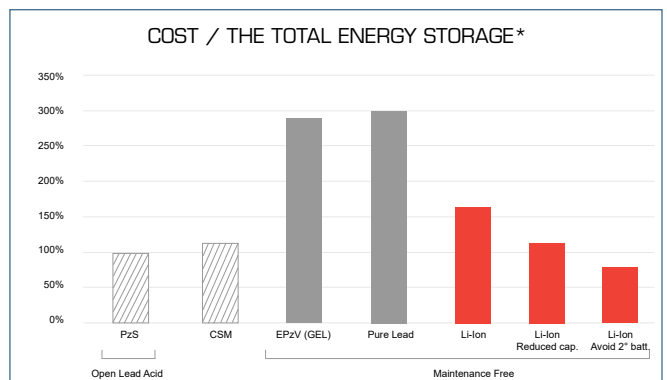
LiFePO4 batteries are fully maintenance-free and can cope with intermediate charging. Intermediate charging – or opportunity charging – leads to battery sulphation, the number one killer of batteries as the acid particles of the electrolyte will attach to the lead plates causing huge internal damage 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.



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

# Traction batteries

## LITHIUM-ION - LIFEPO4

For Li-ion batteries, the total energy capacity is much higher :  $20 \text{ kWh} \times 4000 \text{ cycles} \times 80 \% \text{DOD} = 64 \text{ MWh}$ . This makes a Li-ion traction battery the **cheapest maintenance-free battery**.

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 a standard CANbus-connection 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.



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: Up to 4000 cycles @ 80 %DOD

### WHY BUY AN 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 2 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.

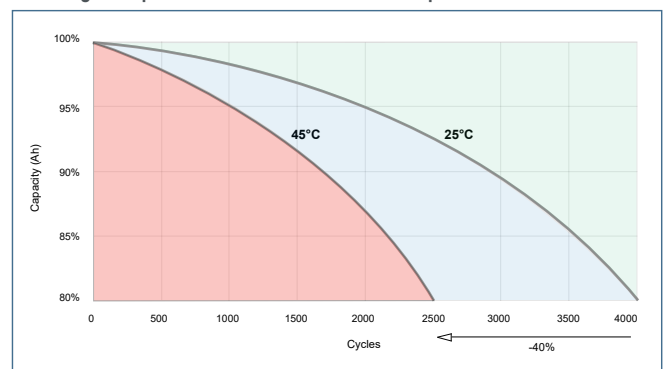
2. The heat dissipation in the cells have a big negative impact on the life time of the battery. Higher temperatures will reduce the lifetime drastically ( each °C extra reduces the life time with 2% ).

For most Li-ion batteries on the market, the cells and modules are placed together, which will lead to 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.



Optimal venting

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



# AQ-LITH®



## 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	Voltage (V)	Capacity (Ah)	Capacity (kWh)	Capacity (kWh net)	Charger: standard charging (4 to 8 hrs)	Charger: fast charging (2 to 3 hrs)
DYN24-210	24	210	5,04	4,032	NG1/24-45 RE-L	NG3/24-95RE-L
DYN24-315	24	315	7,56	6,048	NG1/24-45RE-L	NG9/24-145 RE-L
DYN24-420	24	420	10,08	8,064	NG3/24-60RE-L	NG9+/24-200 RE-L
DYN24-630	24	630	15,12	12,096	NG3/24-95RE-L	NG9+/24-200 RE-L
DYN48-210	48	210	10,08	8,064	NG3/48-45-RE-L	NG7/48-120RE-L
DYN48-315	48	315	15,12	12,096	NG3/48-60RE-L	NG9+/48-160RE-L
DYN48-420	48	420	20,16	16,128	NG5/48-95RE-L	NG9+/48-160RE-L
DYN48-630	48	630	30,24	24,192	NG7/48-120RE-L	MG18/48-320RE-L
DYN48-840	48	840	40,32	32,256	NG7/48-120RE-L	MG27/48-480RE-L
DYN80-210	80	210	16,8	13,44	NG3/80-30RE-L	NG9+/80-120RE-L
DYN80-315	80	315	25,2	20,16	NG5/80-60RE-L	NG9+/80-120RE-L
DYN80-420	80	420	33,6	26,88	NG7/80-75RE-L	MG18/80-200RE-L
DYN80-630	80	630	50,4	40,32	NG9/80-100RE-L	MG27/80-300RE-L
DYN80-840	80	840	67,2	53,76	NG9+/80-120RE-L	MG36/80-400RE-L



### Canbus indicator: [BAT/48769](#)

Ideal for all M+ and AQ-LITH® traction batteries. This indicator reads the CANBUS signals from the BMS and displays the SOC, voltage, current, temperature and all warnings. With potential-free contact for minimum State of Charge (adjustable)

For all models:  
 Discharge current nom 1C max  
 Discharge current peak (3s) 3C max  
 Charge current 0,5C max  
 Temperature for charging 0 to 40°C  
 Optional : with heating -20 to 40°C  
 Temperature for discharging - 20 to 50°C

## ! CUSTOM MADE AQ-LITH® LITHIUM BATTERIES

If the standard batteries don't fit for your application, then we can assemble 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 develop the right solution.

Please contact [info@batterysupplies.be](mailto:info@batterysupplies.be)

