LITHIUM BATTERIES FOR MATERIAL HANDLING INDUSTRY
OneCharge is the developer and manufacturer of energy-efficient solutions based on lithium batteries. Our technology allows you to save on battery operation. In 2012, our company developed an active Battery Management System (BMS) that transfers energy between cells, thus significantly increasing lifetime and available power of the battery.

**LITHIUM BATTERY ADVANTAGES**

- **MAINTENANCE**
  - In-house or outsourced maintenance personnel: ✔️
  - No maintenance cost: ❌

- **CHARGE DURATION**
  - 2 or more batteries per truck: 8-10 hours
  - 1 battery per truck: 2 hours

- **MEMORY EFFECT**
  - Lower fleet availability due to work interruptions for charging: ✔️
  - 100% fleet availability due to opportunity charging: ❌

- **SERVICE LIFE**
  - Periodic battery replacement: 1500 cycles
  - No need to buy replacement batteries: 3000 cycles

- **DANGEROUS SUBSTANCES**
  - Build-up of an expensive battery room: ✔️
  - No need to build a battery room: ❌

- **POWER SAVINGS**
  - Power loss: ✔️
  - Energy savings by 15%: ❌
INTRODUCTION OF LITHIUM BATTERIES REDUCES TOTAL COST OF OWNERSHIP (TCO) IN HALF

For a fleet of 30 lift trucks, the total savings are $430,000 over 4 years compared to lead-acid batteries, given identical capital expenditures.

Savings potential for the total cost of ownership, based on one forklift:

- Lead acid battery TCO* = 30.4
- Maintainence and swapping = 7.2
- Electricity savings = 3.5
- Lithium battery TCO = 19.7

35% saving
OneCharge lithium battery lifetime is 3000 charging/discharging cycles that is 2 times more than the lead-acid battery.

Trucks with OneCharge batteries are always available for work due to fast charge and opportunity charge.

Lead-acid batteries always run out during work and the truck becomes unavailable for the time required to swap the batteries.
OneCharge Active Battery Management System embodies **A NUMBER OF UNIQUE TECHNICAL SOLUTIONS**

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<tr>
<th>Solution</th>
<th>Function</th>
<th>Effect</th>
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| Battery Equalizer system  | Actively transfers power between cells, equalizes voltage               | • Increases available capacity without increasing battery cost  
                              |                                                                          | • Reduces full charge time to 1.5 hours                                              |
| Virtual cell effect       | Supports weak or fully discharged cell using other cells                 | • Assure battery function even if some cells have malfunctioned                          |
| Energy-saving mode        | Minimizes power consumption of all electric systems during battery down time | • Battery does not run down during storage (for several months)  
                              |                                                                          | • Self-discharge of no more than 3% per month                                          |
| Solid State Contractor    | Disconnects current flow from charger and to truck under maximum load up to 1 million times | • Ability to use existing chargers  
                              |                                                                          | • Complete battery protection                                                           |

**HOW THE BATTERY EQUALIZER WORKS**

**Regular li-ion battery**

- **Equipment downtime**
  - **Cell voltage**
  - **Charging not possible**
  - **Battery is run down**

**OneCharge Active**

- **With the Battery Equalizer system, the cells are always balanced**
- **All battery capacity is available for charging**
- **All battery power is available for equipment operation**
Lead-acid batteries emit explosive hydrogen when charging; sulfuric acid spills during replacement, lead-acid battery operation requires battery room equipment.

OneCharge lithium batteries can be charged in any part of the warehouse and do not need a battery room or special equipment for replacement.
OneCharge lithium battery requires much less capacity to do the same work.

LAB capacity that is unavailable because of:
- Voltage drop at high current
- Capacity reduction in Ah at high current
- Battery aging
- Impossible to discharge to 0%

LAB excess capacity that can be reduced when switching to LB:
- LAB maximum (current is limited by 1/3 of its capacity LB maximum current is 9 times higher*)
- Trucks are equipped with large LABs to enable lifting
- Fast charge and opportunity charge make much smaller LB suffice

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<tr>
<th>Motor-hours per shift</th>
<th>LB recommended capacity, % of LAB capacity</th>
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<tr>
<td>&gt;6</td>
<td>50%</td>
</tr>
<tr>
<td>4-6</td>
<td>40%</td>
</tr>
<tr>
<td>4</td>
<td>35%</td>
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Battery example, (Ah) 775 480 270-400

CHARGERS

OneCharge batteries may be charged using a wide range of chargers by Ecotec, Stanbury and others.

The chargers support 24V, 36V, 48V and 80V batteries.
OneCharge Batteries

SPECIFICALLY DESIGNED FOR

WAREHOUSES

Compliance

All OneCharge batteries are equipped with a ballast, the weight exceeds the minimum weight requirements.

Complete battery line for all truck types

Battery voltage range, (V) - 24-80
Battery capacity range, (Ah) - 100-1200

Protection

- Automatic truck shut-off while connected to charger
- Completely maintenance-free
- Protection from:
  - Over voltage
  - Under voltage
  - Over limit current
  - Overheating
  - Freezing

Convenience

- One motion charging
- Charger automatically switches on when the charger plug is plugged
- Charger automatically switches off when the charger plug is unplugged
OneCharge engineers developed the Frost battery designed specifically for work in cold storage warehouses. The distinguishing feature of this battery is its insulated enclosure, which protects the lithium cells from the effects of low temperatures. OneCharge Frost is a safe and environmentally friendly solution for food products.

**OPERATING TEMPERATURES**

- **Battery** may be used at ambient air temperatures ranging from \(-31^\circ F\) to \(+104^\circ F\).
- **Battery** may be charged at temperatures ranging from \(-31^\circ F\) to \(+104^\circ F\).
- **Battery** must be stored within a temperature range of \(0^\circ F\) to \(+104^\circ F\).

OneCharge Frost is designed specifically for cold storage.

Ambient temperature lower limit of battery operation, F \(-31^\circ\)