LINDE Li-ION 48 V
BATTERY AND CHARGER

Safety
Linde Li-ION 48 V batteries are based on a multi-level safety concept. Beyond safety functions on cell-, module- and battery level, the batteries have unique safety highlights like a breaking-resistor, which avoids cell-overcharging and a 25 mm thick battery tray which is worst-case crash-tested.

Performance
The Linde Li-ION battery has a constant and state-of-charge independent performance level. The whole system consisting of battery, truck and charger is harmonized among each other. This leads to an unique application tailored system performance.

Comfort
Permanent battery information on the driver display of the truck, no battery activation required as well as a fast and easy charging possibility via rear are just some comfort highlights of the 48 V Linde Li-ION solution. In addition, the batteries are maintenance-free.

Reliability
The Linde Li-ION system as a whole, consisting of truck and battery, is CE conform. One major part to get the aligned CE is the Battery Management System, which serves as reliable connector unit between all three parts of the systems and regulates for example the charging currents to prevent cell-overcharging.

Productivity
Using the Li-ION technology of Linde, operators increase their productivity gradually. Due to easy charging solutions, idle times of the trucks can be used effectively by charging immediately. In addition, operators have cost savings through less energy losses compared to current lead acid applications.

Emission-free battery
→ No evolving battery gases (hydrogen) and acid
→ Does not contain toxic substances like Cd, Pb or Hg

No battery change necessary for most 2-shift applications
→ No second battery necessary
→ Higher truck availability
→ Cost & time savings
→ No need for battery change- and charging room

No battery-maintenance needed
→ No water-refilling, battery cleanup etc.
→ No battery control necessary
→ No need of electrolyte circulation

Features

Intermediate charging
→ Constant truck uptime
→ Multi-shift availability
→ No place-specific charging
→ No charging room needed

Fast charging
→ Shorter charging times
→ “Lunch & Charge” possible
→ Economic use of each break
→ Use of latest charger technology

Longer battery life-time
→ 2,500 full charging cycles with at least 80% residual capacity
→ Afterwards: Several thousand full charging cycles still possible
→ Combined with higher battery efficiency an altogether higher usable battery capacity

Safe battery technology
→ Self-monitoring via autonomous battery management system
→ Safety functions on cell-, module- and battery level
→ Safe control of the truck in any battery status
→ Integrated shock sensor

Higher efficiency compared to lead acid
→ Up to 30% higher electrical efficiency
→ Less energy losses
→ Less heat development inside battery
→ Full usability down to 5% State of Charge (SoC)

Subject to modification in the interest of progress. Illustrations and technical details could include options and not binding for actual constructions.
All dimensions subject to usual tolerances.
**TECHNICAL DATA Li-ION 48 V BATTERIES**

### E-TRUCKS

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>Available trucks</th>
<th>Energy content</th>
<th>Capacity</th>
<th>Weight (± 5%)</th>
<th>Dimensions (l x w x h) in mm</th>
<th>IP protection class</th>
<th>Full-charging time with charger 48V / 185A / 9kW</th>
<th>Full-charging time with charger 48V / 375A / 18kW</th>
<th>Chemical system</th>
<th>Charging temperature</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>48,75V</td>
<td>E14, E16C</td>
<td>13.1 kWh</td>
<td>268 Ah</td>
<td>708g</td>
<td>830 x 522 x 627</td>
<td>IP69</td>
<td>1h: 45min</td>
<td>2h: 40min</td>
<td>Nickel-Manganese-Cobalt-Oxide</td>
<td>-20°C to +45°C</td>
<td>-35°C to +60°C</td>
<td>-30°C to +40°C</td>
</tr>
<tr>
<td></td>
<td>E16, E16P, E18</td>
<td>39.2 kWh</td>
<td>824 Ah</td>
<td>856g</td>
<td>830 x 630 x 627</td>
<td>IP69</td>
<td>1h: 15min</td>
<td>2h: 10min</td>
<td>Nickel-Manganese-Cobalt-Oxide</td>
<td>-20°C to +45°C</td>
<td>-35°C to +60°C</td>
<td>-30°C to +40°C</td>
</tr>
<tr>
<td></td>
<td>E16L, E18L, E20L, E20PL</td>
<td>45.7 kWh</td>
<td>939g</td>
<td>1013g</td>
<td>830 x 738 x 627</td>
<td>IP69</td>
<td>1h: 30min</td>
<td>2h: 15min</td>
<td>Nickel-Manganese-Cobalt-Oxide</td>
<td>-20°C to +45°C</td>
<td>-35°C to +60°C</td>
<td>-30°C to +40°C</td>
</tr>
</tbody>
</table>

### REACH TRUCKS

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>Available trucks</th>
<th>Energy content</th>
<th>Capacity</th>
<th>Weight (± 5%)</th>
<th>Dimensions (l x w x h) in mm</th>
<th>IP protection class</th>
<th>Full-charging time with charger 48V / 185A / 9kW</th>
<th>Full-charging time with charger 48V / 375A / 18kW</th>
<th>Chemical system</th>
<th>Charging temperature</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>48,75V</td>
<td>R14, R16</td>
<td>9.8 kWh</td>
<td>201Ah</td>
<td>750g</td>
<td>1223 x 283 x 784</td>
<td>IP69</td>
<td>1h: 20min</td>
<td>2h: 10min</td>
<td>Nickel-Manganese-Cobalt-Oxide</td>
<td>-20°C to +45°C</td>
<td>-35°C to +60°C</td>
<td>-30°C to +40°C</td>
</tr>
<tr>
<td></td>
<td>R14, R16, R20, R14HD, R16HD</td>
<td>39.2 kWh</td>
<td>804 Ah</td>
<td>939g</td>
<td>1223 x 355 x 784</td>
<td>IP69</td>
<td>1h: 45min</td>
<td>2h: 40min</td>
<td>Nickel-Manganese-Cobalt-Oxide</td>
<td>-20°C to +45°C</td>
<td>-35°C to +60°C</td>
<td>-30°C to +40°C</td>
</tr>
<tr>
<td></td>
<td>R14, R16, R20, R25, R14HD, R16HD, R20HD</td>
<td>268 Ah</td>
<td>708g</td>
<td>1133g</td>
<td>1223 x 427 x 784</td>
<td>IP69</td>
<td>1h: 30min</td>
<td>2h: 15min</td>
<td>Nickel-Manganese-Cobalt-Oxide</td>
<td>-20°C to +45°C</td>
<td>-35°C to +60°C</td>
<td>-30°C to +40°C</td>
</tr>
</tbody>
</table>

### TECHNICAL DATA Li-ION 48 V CHARGERS

<table>
<thead>
<tr>
<th>Mains voltage (±10% / +10%)[1]</th>
<th>48V / 185A / 9kW</th>
<th>48V / 375A / 18kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional</td>
<td>3 - NPE 400 V / 50 / 60 Hz</td>
<td>3 - PE 400 V / 50 / 60 Hz</td>
</tr>
<tr>
<td>Mains fuse protection [2]</td>
<td>16A</td>
<td>32A</td>
</tr>
<tr>
<td>Minimum mains lead cross section [3]</td>
<td>2,5 mm² (0,003875 in²)</td>
<td>6 mm²</td>
</tr>
<tr>
<td>Duty cycle</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>EMC device class</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Max. permitted mains impedance [max. at PPC][4]</td>
<td>none</td>
<td>73 mOhm</td>
</tr>
<tr>
<td>Protection class</td>
<td>Protection class 1</td>
<td>Protection class 1</td>
</tr>
<tr>
<td>Degree of protection [5]</td>
<td>IP 20</td>
<td>IP 20</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III</td>
<td>III</td>
</tr>
<tr>
<td>Operating temperature [6]</td>
<td>-20°C to +40°C</td>
<td>-20°C to +40°C</td>
</tr>
<tr>
<td></td>
<td>(4°F to 104°F)</td>
<td>(4°F to 104°F)</td>
</tr>
<tr>
<td></td>
<td>-25°C to +80°C</td>
<td>-25°C to +80°C</td>
</tr>
<tr>
<td></td>
<td>(-13°F to 176°F)</td>
<td>(-13°F to 176°F)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-25°C to +80°C</td>
<td>-25°C to +80°C</td>
</tr>
<tr>
<td></td>
<td>(-13°F to 176°F)</td>
<td>(-13°F to 176°F)</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>maximum 85%</td>
<td>maximum 85%</td>
</tr>
<tr>
<td>Maximum altitude above the sea level</td>
<td>2000 m (6561 ft.)</td>
<td>2000 m (6561 ft.)</td>
</tr>
<tr>
<td>Marks of conformity</td>
<td>according to rating plate</td>
<td>according to rating plate</td>
</tr>
<tr>
<td>Product standard</td>
<td>EN62477-1</td>
<td>EN62477-1</td>
</tr>
<tr>
<td>Dimensions l x w x h</td>
<td>633 x 180 x 344 mm</td>
<td>785 x 247 x 392 mm</td>
</tr>
<tr>
<td>Weight (with standard mains and charger leads)</td>
<td>25kg (55.12lb)</td>
<td>45kg (99.21lb)</td>
</tr>
</tbody>
</table>

### OPTIONAL CHARGER EQUIPMENT

**LED stripes**
- The optional LED stripes allow to determine the charging status, even from far away:
  - Green LED: The battery is completely charged
  - Yellow LED: The battery is being charged
  - Yellow flashing LED: The charging process has been interrupted
  - Red LED: An error occurred
  - Blue LED: The maximum charging current is reached

**Charging module large**
- Offers the possibility to mount the battery charger on a comfortable height, fitted on the preferred position. For a secure positioning, the module can be mounted to the floor.
  - Dimensions W/H/D: 800 / 1500 / 600
  - Color: RAL 7016 anthracite
  - Weight: ca. 40 kg
- The wall bracket is always linked to the charger.

**Charging module small**
- The robust wall bracket ensures easy and safe fitting on site.
  - The integrated cable holder ensures that the charger leads are stored safely. Damage to loose cables is therefore prevented.
  - Dimensions W/H/D: 585 / 617 / 272
  - Color: RAL 7016 anthracite
  - Weight: 18 kg

**Charging housing rental**
- The rental charger housing provides optimum protection when transporting battery charging systems and is therefore ideal for use with rental fleets.
  - Dimensions W/H/D: 800 / 550 / 400
  - Weight: 27 kg

**Air-pre-filter**
- An air filter provides effective protection for the battery charging system's internal components against contaminants and prevents short-circuits caused by dust particles, increasing the reliability and service life of your battery charging system dramatically.

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1. The device is approved for operation on neutral-earthed mains networks with a maximum outer conductor nominal voltage of 400V.
2. The earth leakage currents is less than 3.5 mA.
3. Interface to a 230V / 400V, 50Hz public grid.
4. The device is approved for operation on neutral-earthed mains networks with a maximum outer conductor nominal voltage of 400V.
5. The high ambient temperature may result in power degradation (derating).
6. A high ambient temperature may result in power degradation (derating).
7. Constant storage below -15°C will increase the charging time.
8. At temperatures below -15°C the charging time will increase. The battery is brought to its destination using the forklift, therefore prevented.