LINDE Li-ION 90 V
BATTERY AND CHARGER

Safety
Linde Li-ION 90 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 braking-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 90 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 90 V 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 intermediately. 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
→ No need of extraction unit
→ 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

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

Faster 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 90 V Li-ION BATTERIES

<table>
<thead>
<tr>
<th>Nominal</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</th>
<th>Full-charging time with charger</th>
<th>Full-charging time with charger</th>
<th>Chemical system</th>
<th>Charging temperature</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 V</td>
<td>E20, E25, E30, E20R, E25R, E30R</td>
<td>24.1 kWh</td>
<td>268 Ah</td>
<td>1210 kg</td>
<td>1026 x 708 x 627</td>
<td>IP69</td>
<td>3h</td>
<td>1h</td>
<td>1h</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>E20/600H, E25/600H, E30/600H, E20/600R, E25/600R, E30/600R</td>
<td>68.3 kWh</td>
<td>167 Ah</td>
<td>1558 kg</td>
<td>1028 x 999 x 784</td>
<td>Protection class 1</td>
<td>3h</td>
<td>1h</td>
<td>1h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E40/600L, E45/600L, E50/600L, E50/500L</td>
<td>60.3 kWh</td>
<td>402 Ah</td>
<td>2178 kg</td>
<td>3h</td>
<td>1h</td>
<td>1h</td>
<td>1h</td>
<td>1h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E25/600RH, E30/600RH</td>
<td>268 Ah</td>
<td>1210 kg</td>
<td>1026 x 708 x 627</td>
<td>IP69</td>
<td>3h</td>
<td>1h</td>
<td>1h</td>
<td>1h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TECHNICAL DATA 80 V CHARGERS*

<table>
<thead>
<tr>
<th>Mains voltage (-10% / +10%)</th>
<th>Optional</th>
<th>Mains fuse protection</th>
<th>Minimum mains lead cross section</th>
<th>Daily cycle</th>
<th>EMC device class</th>
<th>Max. permitted mains impedance Zmax at PPC</th>
<th>Protection class</th>
<th>Degree of protection</th>
<th>Overvoltage category</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>16 A</td>
<td>2.5 mm² (0.003875 in²)</td>
<td>100%</td>
<td>B</td>
<td>none</td>
<td>Protection class 1</td>
<td>IP 20</td>
<td>III</td>
<td>-20°C to +40°C</td>
<td>-25°C to +80°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32 A</td>
<td>6 mm² (0.009337 in²)</td>
<td>100%</td>
<td>B</td>
<td>8</td>
<td>Protection class 1</td>
<td>IP 20</td>
<td>III</td>
<td>-20°C to +40°C</td>
<td>-25°C to +80°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63 A</td>
<td>10 mm² (0.0155 in²)</td>
<td>100%</td>
<td>B</td>
<td>16 mohm</td>
<td>Protection class 1</td>
<td>IP 20</td>
<td>III</td>
<td>-20°C to +40°C</td>
<td>-25°C to +80°C</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
  - Red LED: An error occurred
  - Blue LED: The maximum charging current is reached

**Charging module large**
- The 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
  - Weight: ca. 40 kg
  - The wall bracket is always linked to the charger.

**Charging module small**
- The charging module “small” is a robust and simple solution to place the battery charger to the desired position, especially when space is limited.
  - Dimensions W/H/D: 585/617/272
  - Weight: 18 kg

**Wall bracket**
- 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.

**Charging housing rental**
- The rental charger housing provides optimum protection when transporting battery charging systems and is therefore ideal for use with rental fleets. The housing can be carefully and safely brought to its destination using the forklift, without the need for a pallet.
  - 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.