



Linde Material Handling



# LINDE Li-ION 24V

## BATTERY AND CHARGER

### Safety

The Linde Li-ION 24V batteries are based on a multi-level safety concept. Beyond safety functions on cell- and battery level, the batteries are permanently observed by the integrated Battery Management System. In addition, the whole battery is protected >IP66.

### 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

Due to the Lithium-ion technology, no battery change is necessary for most applications. Operators can use the fast and easy charging possibility. In addition, the Linde Li-ION 24V system is 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 conformity 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.

## FEATURES

### Intermediate charging

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



### Longer battery life-time

- 2.500 full charging cycles with at least 75% residual capacity
- 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- and battery level
- Safe control of the truck in any battery status

### 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)



### 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

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.

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# TECHNICAL DATA Li-ION 24V BATTERIES

## PALLET TRUCKS & PALLET STACKERS

Nominal voltage	Available trucks	Energy content	Capacity	Weight (+- 5%)	Dimensions (l x w x h) in mm	IP protection class	Full-charging time with charger 24V/90A/2.9kW	Full-charging time with charger 24V/160A/4.3kW	Full-charging time with charger 24V/225A/7.2kW	Chemical system	Charging temperature <sup>1</sup>	Operating temperature	Storage temperature <sup>2</sup>
24V	T16-18, T16L, L10-12, D08	1.8 kWh	82Ah	51 kg	648x156x627	IP>66	1 h 30 min	1 h 30 min	1 h 30 min	Lithium-Ferro Phosphate (LiFePO <sub>4</sub> )	-15°C to +45°C	-20°C to +45°C	-20°C to +40°C
		3.6 kWh	164Ah	71 kg			2 h 10 min	1 h 40 min	1 h 40 min				
	T18-20, T16L, T30, T20-25AP, T20-25SP, T14-25S*, T20-25SF*, T20-25SR*, T20-25R*, L14-16*, L14-16R*, D12R*, D12-14/D12HP*, D12-14 AP/SP / D12 HP AP/SP*, D12S/SF*	4.5 kWh	205Ah	110 kg	718x210x633		2 h 40 min	1 h 50 min	1 h 40 min				
		9 kWh	410Ah	151 kg			5 h 10 min	3 h 00 min	2 h 20 min				

<sup>1</sup> battery housing required

## ORDER PICKING & TOW TRACTORS

Nominal voltage	Available trucks	Energy content	Capacity	Weight (+- 5%)	Dimensions (l x w x h) in mm	IP protection class	Full-charging time with charger 24V/90A/2.9kW	Full-charging time with charger 24V/160A/4.3kW	Full-charging time with charger 24V/225A/7.2kW	Chemical system	Charging temperature <sup>1</sup>	Operating temperature	Storage temperature <sup>2</sup>
24V	N20-24, N20-24 HP, N20 L/Li*	4.5 kWh	205Ah	110 kg	718x210x633	IP>66	2 h 40 min	1 h 50 min	1 h 40 min	Lithium-Ferro Phosphate (LiFePO <sub>4</sub> )	-15°C to +45°C	-20°C to +45°C	-20°C to +40°C
		9 kWh	410Ah	151 kg			5 h 10 min	3 h 00 min	2 h 20 min				
	P30-50C	9 kWh	410Ah	151 kg									

<sup>1</sup> At temperatures below -10°C the charging time will increase <sup>2</sup> Constant storage below -10°C / over 40°C will have negative effects on the lifetime of the battery  
<sup>1</sup> battery housing required

# TECHNICAL DATA Li-ION 24V CHARGERS

	24V/90A/2.9kW	24V/160A/4.3kW	24V/225A/7.2kW
Mains voltage (-10% / +10%)	1/N PE 230Vac / 50-60Hz	3-NPE 400Vac / 50-60Hz 3-PE 400Vac / 50-60Hz	3-NPE 400Vac / 50-60Hz 3-PE 400Vac / 50-60Hz
Mains fuse protection	16A (class CH, gG)	16A (class CH, gG)	16A (class CH, gG)
Minimum mains lead cross section	4 mm <sup>2</sup>	2,5 mm <sup>2</sup>	4 mm <sup>2</sup>
Duty cycle	100%	100%	100%
EMC device class	B	B	B
Max. permitted mains impedance Z <sub>max</sub> at PPC	none	none	none
Protection class	Protection class 1	Protection class 1	Protection class 1
Degree of protection	IP21	IP21	IP21
Overvoltage category	III	III	III
Operating temperature	+5°C to +45°C	+5°C to +45°C	+5°C to +45°C
Storage temperature	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C
Relative humidity	75%	75%	75%
Maximum altitude above the sea level	2000m	2000m	2000m
Marks of conformity	according to rating plate	according to rating plate	according to rating plate
Product standard	EN 61000/60335	EN 61000/60335	EN 61000/60335
Dimensions l x w x h	339x264x564 mm	339x264x564 mm	456x528x921 mm
Weight (with standard mains and charger leads)	22 kg	32 kg	109 kg
Pollution level	3	3	3
Max. AC current	14,0A	8,5A	12,0A
Max. AC power	3,0kW	5,5 kW	8,5 kW
Nominal voltage	24V	24V	24V
Max. charging current	90A	150A	225A

