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 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

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)

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 waterrefilling, battery cleanup etc.
- → No battery control necessary
- → No need of electrolyte circulation

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TECHNICAL DATA Li-ION 48 V BATTERIES

E-TRUCKS

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 48 V / 185 A / 9 kW	Full-charging time with charger 48 V / 375 A / 18 kW	Chemical system	Charging temperature [1]	Operating temperature	Storage temperature [2]
48,75 V	E14, E16C	13.1 kWh	268 Ah	708 kg	830 x 522 x 627	IP69	1 h 45 min	50 min	Nickel-Mangan-Cobalt-Oxide	-20° C to +45° C	-35° C to +60° C	-30° C to +40° C
		39.2 kWh	804 Ah				5 h 15 min	2 h 40 min				
	E16, E16P, E18	16.3 kWh	335 Ah	856 kg	830 x 630 x 627		2 h 15 min	1 h 05 min				
		45.7 kWh	938 Ah				6 h 10 min	3 h				
	E16L, E18L, E20L, E20PL	16.3 kWh	335 Ah	1013 kg	830 x 738 x 627		2 h 15 min	1 h 05 min				
		49 kWh	1005 Ah				6 h 30 min	3 h 15 min				

REACH TRUCKS

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 48 V / 185 A / 9 kW	Full-charging time with charger 48 V / 375 A / 18 kW	Chemical system	Charging temperature [1]	Operating temperature	Storage temperature [2]
48,75 V	R14, R16	9.8 kWh	201 Ah	750 kg	1223 x 283 x 784	IP69	1 h 20 min	0 h 40 min	Nickel-Mangan-Cobalt-Oxide	-20° C to +45° C	-35° C to +60° C	-30° C to +40° C
	R14, R16, R20, R14HD, R16HD	39.2 kWh	804 Ah	939 kg	1223 x 355 x 784		5 h 15 min	2 h 40 min				
	R14, R16, R20, R25, R14HD, R16HD, R20HD	39.2 kWh	804 Ah	1133 kg	1223 x 427 x 784		5 h 15 min	2 h 40 min				

[1] At temperatures below -15° C the charging time will increase [2] Constant storage below -10° C / over 40° C will have negative effects on the lifetime of the battery

TECHNICAL DATA Li-ION 48 V CHARGERS

	48 V / 185 A / 9 kW	48 V / 375 A / 18 kW
Mains voltage (-10 % / +10 %) [1] Optional:	3~ NPE 400 V / 50 / 60 Hz 3~ PE 400 V / 50 / 60 Hz	3~ NPE 400 V / 50 / 60 Hz 3~ PE 400 V / 50 / 60 Hz
Mains fuse protection [2]	16 A	32 A
Minimum mains lead cross section	2,5 mm² (0.003875 in²)	6 mm²
Duty cycle	100 %	100 %
EMC device class	B	B
Max. permitted mains impedance Z_{max} at PPC [3]	none	73 mOhm
Protection class	Protection class 1	Protection class 1
Degree of protection [4]	IP 20	IP 20
Overvoltage category	III	III
Operating temperature [5]	-20° C to +40° C (-4° F to 104° F)	-20° C to +40° C (-4° F to 104° F)
Storage temperature	-25° C to +80° C (-13° F to 176° F)	-25° C to +80° C (-13° F to 176° F)
Relative humidity	maximum 85 %	maximum 85 %
Maximum altitude above the sea level	2000 m (6561 ft.)	2000 m (6561 ft.)
Marks of conformity	according to rating plate	according to rating plate
Product standard	EN62477-1	EN62477-1
Dimensions l x w x h	633 x 180 x 344 mm	785 x 247 x 392 mm
Weight (with standard mains and charger leads)	25 kg (55.12 lb)	45 kg (99.21 lb)
Pollution level	3	3
Max. AC current	15,7 A	31,5 A
Max. AC power	9940 W	20340 W
Nominal voltage	48 V	48 V
Max. charging current	185 A	375 A

1) The device is approved for operation on neutral-earthed mains networks with a maximum outer conductor nominal voltage of 400 V.
2) The earth leakage currents is less than 3.5 mA.
3) Interface to a 230 / 400 V, 50 Hz public grid
4) For indoor use only, do not expose to rain or snow
5) A high ambient temperature may result in power degradation (derating)

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

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
- Color: RAL 7016 anthracite
- Weight: ca. 40 kg

The wall bracket is always linked to the charger.

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 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
- 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.
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.

TOTAL WAREHOUSE