



Energy solutions

LI-ION BATTERIES AND CHARGERS

48 V

Ideal for all kind of applications

- State of the art technology to reduce energy costs (up to 30 %)
- Multilevel safety concept on cell, module and battery level
- Emission and maintenance free battery technology
- Intermediate and fast charging for increased truck availability
- Constant CAN bus communication that guarantees a fully harmonized overall system

TECHNICAL DATA Li-ION 48 V BATTERIES

E-TRUCKS

Nominal voltage	Available trucks	Energy content	Capacity	Weight (± 5 %)	Dimensions (l × w × h) in mm	IP protection class	Full-charging time with on-board charger 48 V/170 A/ 8 kW ³⁾
48 V	E14, E16 C	13.1 kWh	268 Ah	708 kg	830 × 522 × 632	IP 6k9k	1 h 18 min
		26.1 kWh	536 Ah				2 h 42 min
		39.2 kWh	804 Ah				4 h 06 min
	E16, E16 P, E18, E16 H*, E16 PH*, E18 PH*, E20 PH*	16.3 kWh	335 Ah	856 kg	830 × 630 × 632		1 h 42 min
		26.1 kWh	536 Ah				2 h 42 min
		45.7 kWh	938 Ah				4 h 42 min
	E16 L, E18 L, E20 L, E20 PL, E20 PHL	16.3 kWh	335 Ah	1013 kg	830 × 738 × 632		1 h 42 min
		26.1 kWh	536 Ah				2 h 42 min
		49 kWh	1005 Ah				5 h 06 min

Nominal voltage	Available trucks	Full-charging time with charger 48 V/185 A/9 kW ³⁾	Full-charging time with charger 48 V/375 A/18 kW ³⁾	Chemical system	Charging temperature ¹⁾	Operating temperature	Storage temperature ²⁾
48 V	E14, E16 C	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
		3 h 30 min	1 h 40 min				
		5 h 15 min	2 h 40 min				
	E16, E16 P, E18, E16 H*, E16 PH*, E18 PH*, E20 PH*	2 h 15 min	1 h 05 min				
		3 h 30 min	1 h 40 min				
		6 h 10 min	3 h 00 min				
	E16 L, E18 L, E20 L, E20 PL, E20 PHL	2 h 15 min	1 h 05 min				
		3 h 30 min	1 h 40 min				
		6 h 30 min	3 h 15 min				

REACH TRUCKS

Nominal voltage	Available trucks	Energy content	Capacity	Weight (± 5 %)	Dimensions (l × w × h) in mm	IP protection class	Full-charging time with on-board charger 48 V/170 A/8 kW ³⁾
48 V	R14, R16, R20, R25, R14 HD, R16 HD, R20 HD, R10 B, R12 B, R14 B, R16 B	9.8 kWh	201 Ah	750 kg	1223 × 283 × 747	IP 6k9k	1 h 20 min
	R14, R16, R20, R25, R14 HD, R16 HD, R20 HD, R10 B, R12 B, R14 B, R16 B, R14 G, R15 G, R20 G	39.2 kWh	804 Ah	939 kg	1223 × 355 × 747		5 h 15 min
	R14, R16, R20, R25, R14 HD, R16 HD, R20 HD, R14 G, R15 G, R20 G	26.1 kWh	536 Ah	1119 kg	1223 × 385 × 747		3 h 35 min
		39.2 kWh	804 Ah	1119 kg	1223 × 385 × 747		5 h 15 min

Nominal voltage	Available trucks	Full-charging time with charger 48 V/375 A/18 kW ³⁾	Chemical system	Charging temperature ¹⁾	Operating temperature	Storage temperature ²⁾
48 V	R14, R16, R20, R25, R14 HD, R16 HD, R20 HD, R10 B, R12 B, R14 B, R16 B	40 min	Nickel-Mangan-Cobalt-Oxide	-20 °C to +45 °C	-35 °C to +60 °C	-30 °C to +40 °C
	R14, R16, R20, R25, R14 HD, R16 HD, R20 HD, R10 B, R12 B, R14 B, R16 B, R14 G, R15 G, R20 G	2 h 40 min				
	R14, R16, R20, R25, R14 HD, R16 HD, R20 HD, R14 G, R15 G, R20 G	1 h 45 min				
		2 h 40 min				

¹⁾ At temperatures below 0 °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

³⁾ At ambient/battery temperature 20 °C

* CO process requested

In cases of usage in a cold store application the highest battery capacity should always be chosen.

TECHNICAL DATA Li-ION 48 V BATTERIES

VNA

Nominal voltage	Available trucks	Energy content	Capacity	Weight (± 5 %)	Dimensions (l × w × h) in mm	IP protection class	Full-charging time with on-board charger 48 V / 170 A / 8 kW ³⁾
48 V	K-modular	13.1 kWh	268 Ah	856 kg	1030 × 529 × 415	IP 6k9k	1 h 45 min
		26.1 kWh	536 Ah	856 kg	1030 × 529 × 630		3 h 35 min
		49 kWh	1005 Ah	856 kg	1030 × 529 × 630		6 h 30 min
	V-modular	13.1 kWh	268 Ah	708 kg	830 × 522 × 632		1 h 45 min
		26.1 kWh	536 Ah	708 kg	830 × 522 × 632		3 h 35 min
		39.2 kWh	804 Ah	708 kg	830 × 522 × 632		5 h 15 min

Nominal voltage	Available trucks	Full-charging time with charger 48 V / 375 A / 18 kW ³⁾	Chemical system	Charging temperature ¹⁾	Operating temperature	Storage temperature ²⁾
48 V	K-modular	50 min	Nickel-Mangan-Cobalt-Oxide	-20 °C to +45 °C	-35 °C to +60 °C	-30 °C to +40 °C
		1 h 45 min				
		3 h 15 min				
	V-modular	50 min				
		1 h 45 min				
		2 h 40 min				

¹⁾ At temperatures below 0 °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

³⁾ At ambient / battery temperature 20 °C

* CO process requested

In cases of usage in a cold store application the highest battery capacity should always be chosen.

TECHNICAL DATA Li-ION 48 V CHARGERS

Manufacturer		Linde	Linde	Linde
Model		48 V 170 A 8 kW*	48 V 185A 9 kW	48 V 375 A 18 kW
Mains voltage		3-NPE 400 V (-15 %/ +10 %)	3-NPE 400 V (±10 %) 3-PE 400 V (±10 %)	3-NPE 400 V (±10 %) 3-PE 400 V (±10 %)
Grid frequency	(Hz)	50 / 60	50 / 60	50 / 60
Mains fuse protection	(A)	16	16	32
Leakage current	(mA)	< 3.5	< 3.5	< 3.5
Minimum mains cross section	(mm ² (in ²))	2.5 (0.0039)	2.5 (0.0039)	6 (0.0093)
Length mains cable (AC)	(m)	-	3	3
Duty cycle	(%)	100	100	100
EMC device class		B	B	B
RCD Type		B	B	B
Protection class		I	I	I
Degree of protection	(IP)	65	20	20
Overvoltage Category		III	III	III
Operating Temperatur	(°C (°F))	-25 / +60 (-13 / 140)	-20 / +40 (-4 / 104)	-20 / +40 (-4 / 104)
Storage Temperatur	(°C (°F))	-45 / +80 (-49 / 176)	-25 / +80 (-13 / 176)	-25 / +80 (-13 / 176)
Maximum Relative Humidity	(%)	95	85	85
Maximum Altitude above MSL	(m (ft.))	2000 (6561)	2000 (6561)	2000 (6561)
Product Standard		EN 61000, EN 62477-1	EN 62477-1	EN 62477-1
Dimensions	(mm)	450 × 300 × 161	633 × 180 × 344	785 × 247 × 392
Weight	(kg (lb))	20 (44.09)	25 (55.12)	47 (103.62)
Pollution Level / degree		3	3	3
Maximum AC current	(A)	15.5	15.7	31.5
Maximum AC Power	(W)	10700	9940	20340
Nominal DC voltage	(V)	48	48	48
Maximum DC current	(A)	170	185	375
PF λ (Uac Nom, 50 Hz, Udc Nom, Idc max)		0.98	0.948	0.921
THDi (Uac Nom, 50 Hz, Udc Nom, Idc max)	(%)	5	32.2	44.49
Efficiency	(%)	95	92	93

* On-board charger

STANDARD AND OPTIONAL EQUIPMENT

Model		Li-ION On-board charger	Li-ION charger 9 kW housing	Li-ION charger 18 kW housing
Safety	External start/stop – Preventing sparking, if the charging lead is disconnected while charging is in progress	●	●	●
	Fully harmonized system via CAN bus communication	●	●	●
Service	Calendar function – For time-controlled charging	—	●	●
	Current peak avoidance – System managing power consumption and charging periods to avoid peak load	—	●	●
	Dealer text – Display of service contact when error arises	—	●	●
	USB interface – For software updates and analysis	—	●	●
Comfort	LED strip, charging status indicator – Easy and fast status identification	—	○	○
	Operate directly from the device – Through intuitive display	—	●	●
	Remote display	—	○	○
Workplace	Air pre-filter – Protecting the inside of the charger from contamination	—	○	○
	Standard charging cable 3 m	—	●	●
	Charging cable 5 m	—	○	○
	Charging housing rental	—	○	○
	Charging module small (600)	—	○	○
	Charging module large (1500) – Only in combination with wall bracket	—	○	○
	Wall and floor brackets – For simple and secure installation on the wall or on the floor	—	○	○

● Standard equipment ○ Optional equipment — Not available

CHARACTERISTICS



Highest protection in case of an accident

Safety

- 25 millimeter thick steel tray protects cells and modules from damage even when exposed to massive external forces (48 V and 90 V)
- Multi-stage safety system at cell, module and battery level ensures smooth operation
- Battery management monitors and harmonizes vehicle use, charging processes and battery system and thus protects against damage
- No hazardous gases are produced during operation and charging



R20 equipped with Li-ION battery

Efficiency

- Short charging times and the possibility of intermediate charging, e.g. during breaks, significantly increase vehicle availability for multi-shift operation
- 2500 complete charge cycles with 80 % (48 V and 90 V) or 75 % (24 V) residual capacity are guaranteed
- Li-ION battery system enables up to 30 % higher utilization of electrical energy
- Up to 95 % of the total capacity of the battery can actually be used
- Hardly noticeable voltage drop at low charge level



Quick access to charge

Handling

- Elimination of the costly charging infrastructure with separate battery room and gas extraction system
- Chargers can be set up flexibly, e.g. for short intermediate charging near break rooms or close to the area of use
- Elimination of battery change due to battery capacities and charging capacities adapted to the application



Easy service access

Service

- Harmonized CAN bus communication between vehicle, Li-ION battery and charger, ensures safe and smooth operation and extends the service life of the components
- Maintenance, cleaning or refilling of distilled water is completely unnecessary

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.

Presented by:



Linde Material Handling GmbH
Carl-von-Linde-Platz | 63743 Aschaffenburg | Germany
Phone + 49 6021 99 0 | Fax + 49 6021 99 1570
www.linde-mh.com | info@linde-mh.com

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