

# STANDARD AND OPTIONAL EQUIPMENT

Model		Li-ION On-board charger	Li-ION charger 9 kW housing	Li-ION charger 17 kW housing	Li-ION charger 30 kW housing
Safety	External start/stop - (safety interlock) - prevents sparking, when the charger cable is disconnected while charging is in progress	●	●	●	●
	Fully harmonised system via CAN bus communication	●	●	●	●
Service	Calendar function - For time-controlled charging	—	●	●	●
	Power peak avoidance - system for managing power consumption and charging times to avoid exceeding max current draw limits	—	●	●	●
	Service contact - displays Aftersales contact details	—	●	●	●
	USB interface - For software updates and analyses	—	●	●	●
Comfort	LED strip, charging status indicator - Simple and quick status identification	—	○	○	○
	In-built display and operational controls	—	●	●	●
	Remote display - to control a number of chargers from a central point	—	○	○	○
Workplace	Air pre-filter - Protecting the inside of the charger from dust and dirt	—	○	○	○
	Standard charger cable 3 m	—	●	●	●
	Charger cable 5 m	—	○	○	○
	Charger housing rental	—	○	○	—
	Charger module small (600)	—	○	○	—
	Charger 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



## Energy solutions

# LI-ION BATTERIES AND CHARGERS

90 V

### Ideal for all kind of applications

- State-of-the-art technology to reduce energy costs (up to 30%)
- Multi-level safety concept at cell, module and battery level
- Emission- and maintenance-free battery technology
- Intermediate and fast charging for higher truck availability
- Continuous CAN bus communication, guaranteeing a fully harmonised overall system

## CHARACTERISTICS



Highest protection in case of accident

### Safety

- 25 millimetre thick steel tray protects cells and modules from damage, even when exposed to massive external forces
- Multi-level safety system at cell, module and battery level ensures smooth operation
- Battery management monitors and harmonises vehicle usage, charging processes and the battery system protecting against damage
- No hazardous gases produced during operation and charging



X35 equipped with Li-ION battery

### Efficiency

- Short charging times and intermediate (opportunity) charging, e.g. during breaks, significantly increases vehicle availability in multi-shift operations
- 2000 full charging cycles within 5 years with 80% residual capacity are guaranteed
- Li-ION battery system enables up to 30% greater utilisation of electrical energy
- Hardly noticeable voltage drop at low state of charge



Quick access to charge

### Handling

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



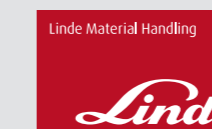
Easy service access

### Service

- Harmonised 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

Presented by:

Subject to modification in the interest of progress. Illustrations and technical details could include options and are not binding for actual constructions. All dimensions subject to usual tolerances.



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Printed in Germany | DS\_LI-ION\_90V\_en\_G\_0423

# TECHNICAL DATA Li-ION 90 V BATTERIES

## E-TRUCKS

Nominal voltage	Available trucks	Minimum nominal energy content in kWh	Minimum usable energy content in kWh	Nominal capacity in Ah	Weight (±5%) in kg	Dimensions (l × w × h) in mm	IP protection class	Full-charging time with on-board charger 80 V/120 A/10 kW <sup>1) 4)</sup>	Full-charging time with charger 80 V/110 A/9 kW <sup>3) D1</sup>	Full-charging time with charger 80 V/210 A/17 kW <sup>3) E1</sup>	Full-charging time with charger 80 V/375 A/30 kW <sup>3) G1</sup>	Chemical system	Standard charging temperature <sup>2)</sup>	Charging temperature with low temp. protection <sup>2)</sup>	Standard operating temperature <sup>2)</sup>	Operating temperature with low temp. protection <sup>2)</sup>	Storage temperature <sup>1)</sup>
90 V	X20/600, X25, X30, X35, E20, E25, E30, E25 L*, E30 L*, E35 L*	31,7	25,4	360	1210	1028 × 708 × 632	IP 6k9k	3 h 24 min	3 h 42 min	2 h	2 h	Nickel-Mangan-Cobalt-Oxide/Lithium-Ferro Phosphate	0°C to +45°C	-	0°C to +45°C	-	-35°C to +60°C
		49,5	42,3	552				5 h 6 min	5 h 36 min	2 h 54 min	2 h		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
		82,4	74,2	920				8 h 42 min	9 h 24 min	4 h 54 min	2 h 48 min		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
	E20/600 H, E25/600 H, E30/600 H, E25/600 HL*, E30/600 HL*, E35 HL*	31,7	25,4	360	1558	1028 × 711 × 692		3 h 24 min	3 h 42 min	2 h	2 h		0°C to +45°C	-	0°C to +45°C	-	-35°C to +60°C
		49,5	42,3	552				5 h 6 min	5 h 36 min	2 h 54 min	2 h		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
		82,4	74,2	920				8 h 42 min	9 h 24 min	4 h 54 min	2 h 48 min		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
	E35/600H*, E40/600H*, E40/600 HL, E45/600H*, E45/600 HL, E50/500 HL, E50/600 HL	41,2	33,8	460	2178	1028 × 999 × 724		4 h 24 min	4 h 36 min	2 h 24 min	2 h		0°C to +45°C	-	0°C to +45°C	-	-35°C to +60°C
		65,9	59,2	736				7 h 6 min	7 h 24 min	3 h 54 min	2 h 12 min		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
		115,4	101,5	1288				12 h 48 min	13 h 18 min	7 h	3 h 54 min		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
	X35/600, X40/600, X45/600, X50/500, X50/600	65,9	59,2	736	1458	1028 × 635 × 852		7 h 6 min	7 h 24 min	3 h 54 min	2 h 12 min		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
		98,9	89,0	1104				12 h 12 min	12 h 36 min	6 h 36 min	3 h 42 min		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
	E60, E70, E80, E80/900	74,2	63,4	828	2178	1028 × 999 × 724		-	8 h 18 min	4 h 18 min	2 h 24 min		0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	-35°C to +60°C
115,4		95,1	1288	-			12 h 54 min	6 h 48 min	3 h 48 min	0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	-35°C to +60°C			

## E-HEAVY TRUCKS

Nominal voltage	Available trucks	Amount of required Li-ION batteries	Minimum nominal energy content in kWh	Minimum usable energy content in kWh	Nominal capacity in Ah	Weight (±5%) in kg	Dimensions (l × w × h) in mm	IP protection class	Full-charging time with on-board charger 80 V/120 A/10 kW <sup>1) 4)</sup>	Full-charging time with charger 80 V/110 A/9 kW <sup>3) D1</sup>	Full-charging time with charger 80 V/210 A/17 kW <sup>3) E1</sup>	Full-charging time with charger 80 V/375 A/30 kW <sup>3) G1</sup>	Chemical system	Standard charging temperature <sup>2)</sup>	Charging temperature with low temp. protection <sup>2)</sup>	Standard operating temperature <sup>2)</sup>	Operating temperature with low temp. protection <sup>2)</sup>	Storage temperature <sup>1)</sup>
90 V	E100/600, E120/600, E140/600, E150/600, E160/600, E180/600, E180/900, E100/1200, E120/1200, E140/1200, E150/1200, E160/1200	2 ×	74,2	63,4	828	2178	1028 × 999 × 724	IP 6k9k	-	8 h 18 min	4 h 18 min	2 h 24 min	Nickel-Mangan-Cobalt-Oxide/Lithium-Ferro Phosphate	0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
		2 ×	115,4	95,1	1288				-	12 h 54 min	6 h 48 min	3 h 48 min		0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	-35°C to +60°C

## VNA TRUCK

Nominal voltage	Available trucks	Minimum nominal energy content in kWh	Minimum usable energy content in kWh	Nominal capacity in Ah	Weight (±5%) in kg	Dimensions (l × w × h) in mm	IP protection class	Full-charging time with on-board charger 80 V/120 A/10 kW <sup>1) 4)</sup>	Full-charging time with charger 80 V/110 A/9 kW <sup>3) D1</sup>	Full-charging time with charger 80 V/210 A/17 kW <sup>3) E1</sup>	Full-charging time with charger 80 V/375 A/30 kW <sup>3) G1</sup>	Chemical system	Standard charging temperature <sup>2)</sup>	Charging temperature with low temp. protection <sup>2)</sup>	Standard operating temperature <sup>2)</sup>	Operating temperature with low temp. protection <sup>2)</sup>	Storage temperature <sup>1)</sup>		
90 V	K-modular	31,7	25,4	360	1558	1028 × 711 × 692	IP 6k9k	-	3 h 42 min	2 h	2 h	Nickel-Mangan-Cobalt-Oxide/Lithium-Ferro Phosphate	0°C to +45°C	-	0°C to +45°C	-	-35°C to +60°C		
		41,2	33,8	460				2178	1028 × 999 × 724	-	4 h 36 min		2 h 24 min	2 h	0°C to +45°C	-	0°C to +45°C	-	-35°C to +60°C
		49,5	42,3	552				1558	1028 × 711 × 692	-	5 h 36 min		2 h 54 min	2 h	0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	-35°C to +60°C
		82,4	74,2	920				1558	1028 × 711 × 692	-	9 h 24 min		4 h 54 min	2 h 48 min	0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	-35°C to +60°C
		115,4	101,5	1288				2178	1028 × 999 × 724	-	12 h 54 min		6 h 48 min	3 h 48 min	0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	-35°C to +60°C
	P120, P180	33,0	29,7	368	1238	1028 × 784 × 567		-	4 h 12 min	2 h 12 min	2 h		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C		
		42,3	33,8	480				1238	1029 × 784 × 567	-	4 h 36 min		2 h 24 min	2 h	0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
		49,5	42,3	552				1558	1028 × 711 × 692	-	5 h 36 min		2 h 54 min	2 h	0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
	P 250 SWB	49,5	42,3	552	1558	1028 × 711 × 692		-	5 h 36 min	2 h 54 min	2 h		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C		
		65,9	59,2	736				2178	1028 × 999 × 724	-	8 h 18 min		4 h 18 min	2 h 24 min	0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C
	W 20, W30	49,5	42,3	552	1210	1028 × 708 × 632		-	5 h 36 min	2 h 54 min	2 h		0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C		
		65,9	59,2	736				2178	1028 × 999 × 724	-	8 h 18 min		4 h 18 min	2 h 24 min	0°C to +45°C	-25°C to +45°C	0°C to +45°C	-25°C to +45°C	-35°C to +60°C

## TOW TRACTORS

<sup>1)</sup> Maximum values for short time storage, recommended 25°C  
<sup>2)</sup> Above +45°C limited performance and lifetime reduction  
<sup>3)</sup> Average charging time, deviation of +/-5% possible. At cell temperature +25°C, different cell temperature can lead to increased charging times  
<sup>4)</sup> Availability of on-board charger depending on its release per truck

<sup>5)</sup> CO process requested  
 In case of usage in a cold store application the highest battery capacity should always be chosen

# TECHNICAL DATA Li-ION 90 V READY CHARGERS

Manufacturer		Linde MH	Linde MH	Linde MH	Linde MH
Model		80 V 120 A 10 kW*	80 V 110 A 9 kW D1	80 V 210 A 17 kW E1	80 V 375 A 30 kW G1
Mains voltage		3-NPE 400 V (-15%/+10%)	3- 400 V (±10%)	3- 400 V (±10%)	3- 400 V (±10%)
Grid frequency	(Hz)	50/60	50/60	50/60	50/60
Mains fuse protection	(A)	16	16	32	63
Leakage current	(mA)	< 3.5	< 3,5	< 3,5	360 VAC - 3.1 mA a.c. 400 VAC - 4.0 mA a.c. 440 VAC - 3.6 mA a.c.
Minimum mains cross section	(mm <sup>2</sup> (in <sup>2</sup> ))	2.5 (0.0039)	2.5 (0.0039)	6 (0.0093)	10 (0.0155)
Length charging cable (DC)	(m)	-	3	3	3
Length mains cable (AC)	(m)	-	3	3	3
Duty cycle	(%)	100	100	100	100
EMC device class		B	B	B	B
RCD type		B	B	B	B
Protection class		I	I	I	I
Degree of protection	(IP)	65	20	20	20
Overvoltage category		III	III	III	III
Operating temperature	(°C (°F))	-25/+60 (-13/140)	-20/+40 (-4/104)	-20/+40 (-4/104)	-20/+40 (-4/104)
Storage temperature	(°C (°F))	-45/+80 (-49/176)	-25/+80 (-13/176)	-25/+80 (-13/176)	-25/+80 (-13/176)
Maximum relative humidity	(%)	95	85	85	85
Maximum altitude above Mean Sea Level (MSL)	(m (ft.))	2000 (6561)	2000 (6561)	2000 (6561)	2000 (6561)
Product standard		EN 61000, EN 62477-1	EN 62477-1	EN 62477-1	EN 62477-1
Dimensions	(mm)	450 × 300 × 161	633 × 180 × 344	647 × 247 × 392	780 × 369 × 1090
Weight	(kg (lb))	20 (44.09)	25 (55.12)	38 (83.78)	104 (229.28)
Pollution level/degree		3	3	3	3
Maximum AC current	(A)	15.5	15.1	30.6	54.3
Maximum AC power	(W)	10700	9710	18110	31970
Nominal DC voltage	(V)	80	80	80	80
Maximum DC current	(A)	120	110	210	375
PF λ (Uac Nom, 50 Hz, Udc Nom, Idc max)		0.98	0.947	0.918	0.908
THDi (Uac Nom, 50 Hz, Udc Nom, Idc max)	(%)	5	32.2	45.86	49.59
Efficiency	(%)	95	93	94	94

\* On-board charger ■ Available for connect.charger