



trak | powerpack lion

Lithium-Ion
Battery System



Power is our passion ...

You are looking at the results of 90 years' work. 90 years of passion for innovative solutions for mobile power supplies – 90 years of German engineering skill and the aim of never being satisfied with what we have already achieved.

This is only possible thanks to the employees, who continuously support us along this path. Together with our business partners, we have continued to push the limits forwards and ensure that the impossibilities of yesterday have now become a jointly achieved reality.

Only through our partnership with you, we are able to create the perfect symbiosis of economically optimised solutions and state-of-the-art technological products.

With our structure of nearly 2000 employees at more than 20 locations around the world, we are always close to you and keep our finger on the pulse of pioneering innovations.

Flexibility in the design of your projects and extremely reliable products are our every day aims. With highly available local service we have ensured a thorough understanding of your special challenges for decades.

If you expect more than just a product but a competent partner who is always at your side, HOPPECKE is the right choice for you.



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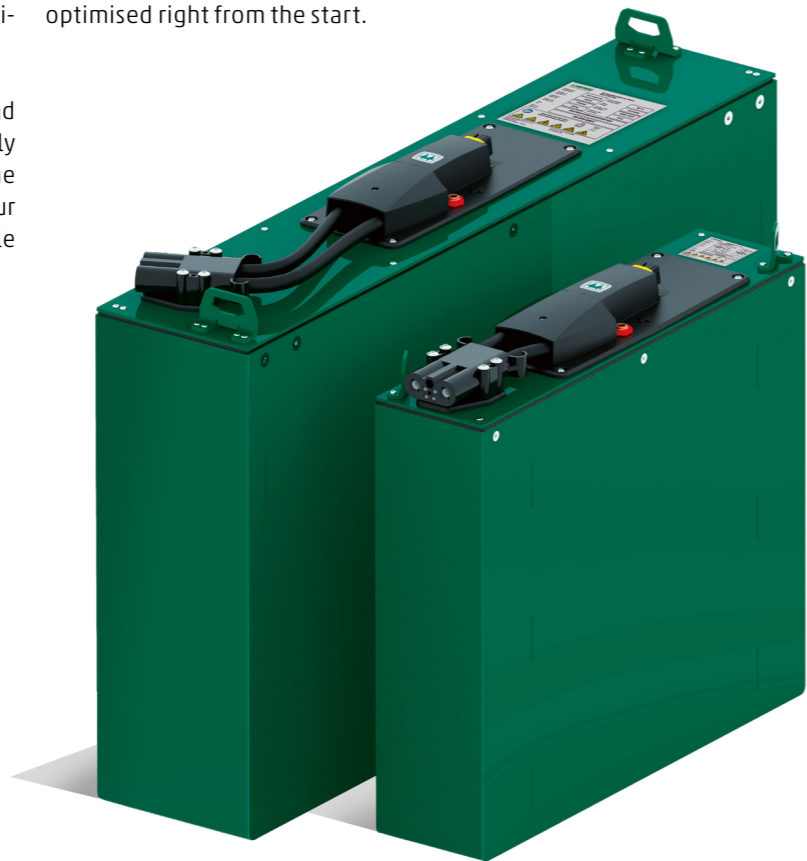
The HOPPECKE lithium-ion battery system

The new trak | powerpack lion is based on the best prismatic cells which are available on the market. Extensive quality controls ensure reliable operation for many years.

In addition to maximum product safety, our new developments focus on combining the most economical solution with the best possible service. With the trak | powerpack lion we ensure optimum productivity – even in 24/7 use.

In combination with our equally innovative and high performance charging units, considerably reduced charging times can be achieved. The systems which are planned and designed by our experts ensure plannable low costs and simple handling.

Especially in warehouse and production logistics, as well as in the food trade, the automotive and pharmaceutical industries, our modular trak | powerpack lion guarantees smooth operation. With fully developed adapter components and expert advice for conversion, almost any fleet of industrial trucks can be quickly and efficiently converted to ensure that costs are optimised right from the start.



The advantages at a glance

- ▶ Ultimate reliability through highest quality components
- ▶ Greater productivity through short charging times – even in 24/7 operation
- ▶ Quicker return on investment due to elimination of battery and equipment replacement costs and lowest possible maintenance costs, longer service life and lower energy consumption
- ▶ Highly versatile and quickly deployable thanks to adaptable tray system – even for vehicles which were developed for use with lead-acid batteries
- ▶ Global, expert and fast advice from HOPPECKE service staff



Applications ready for any challenge



Warehouse logistics



Production logistics



Cleaning applications



Clean room applications



Food industry



Special applications



Agriculture and construction industry



Marine applications



Efficiency in the focus

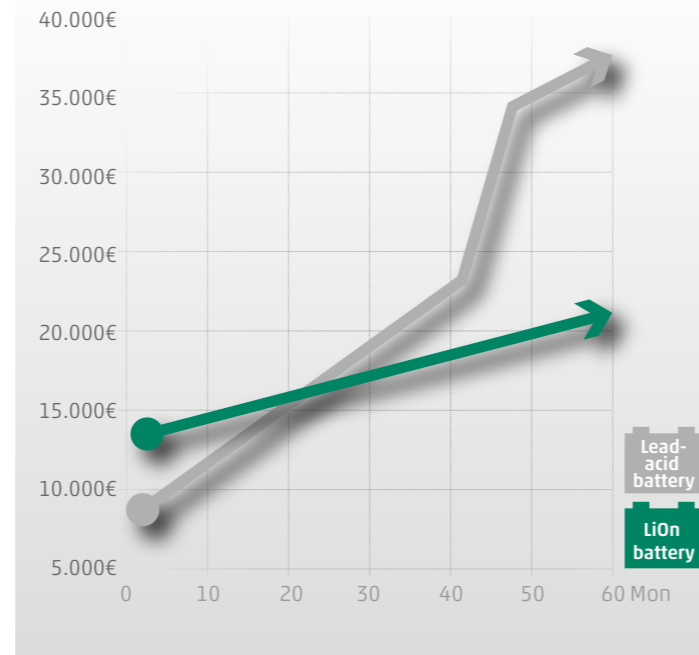
HOPPECKE advises you with the selection of the perfect system solution for your vehicle fleet. Depending on the application and duration, our experts determine your individual requirement profile. This takes into consideration all of the costs which a battery causes over its entire life, in order to determine the return on investment (ROI) for the particular application as precisely as possible.

This results in an optimal cost structure, which is both plannable and economical. With the option of renting all of the systems, you can also avoid large capital commitments. All costs can be perfectly planned and scaled to requirements at all times.

Total Cost of Ownership

Optimisation factors result from the replacement of existing lead-acid solutions, especially because the service life of a LiOn solution is much longer and energy consumption is considerably lower than for a lead-acid solution. Hence, the purchase of high quality and durable LiOn batteries pays for itself not only through the long service life, but also by saving money in daily operation.

By means of decentralised recharging with reduced travel distances as well as quick recharging during breaks, continuous use is ensured, even in 24/7 operation. This eliminates the purchase of additional vehicles or the provision of replacement systems.



LiOn batteries are completely maintenance-free over their entire service life. Filling up water is not required and there is no risk of coming into contact with battery acid. With their closed construction, LiOn systems are ideal for use in the food industry and pharmaceutical applications, as they also meet the most stringent requirements for safety and cleanliness.



Change from
lead to
lithium!

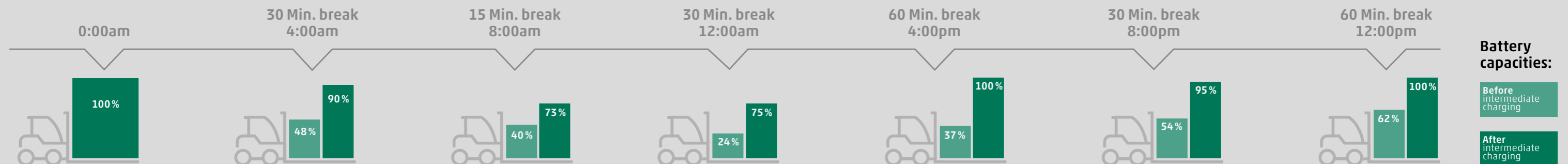
from just
3,55 €
per day

Rent a 24V complete
solution consisting
of battery, tray and
charger from just
3,55 Euro per day.*

*Battery: 24V/120Ah, charger: 24V/70A,
incl. additional weight and accessories,
duration: 84 months, status 02/2018

Capacity curve

in 24-hour operation with intermediate charging during breaks

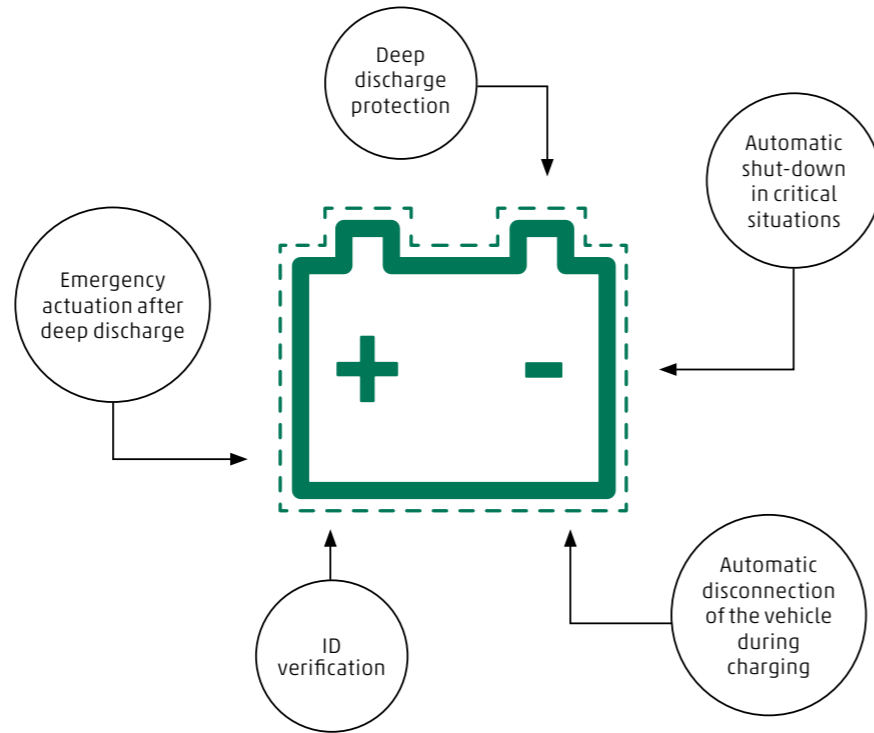




Battery Management System (BMS)

On the safe side with HOPPECKE

The Hoppecke Battery Management System complies with the latest regulations and standards with regard to functional safety (including EC 61508 and EN 1175-Annex J), and ensures that the batteries are in an intrinsically safe condition at all times and in all situations. With BMS you are protected against risks to the battery through deep discharge. In addition, BMS ensures that the vehicle is functionally safely disconnected from the power supply during charging. Automatic shut-down is obligatory in critical situations and ensures that trak | powerpack lion batteries can only be charged with the correct chargers.

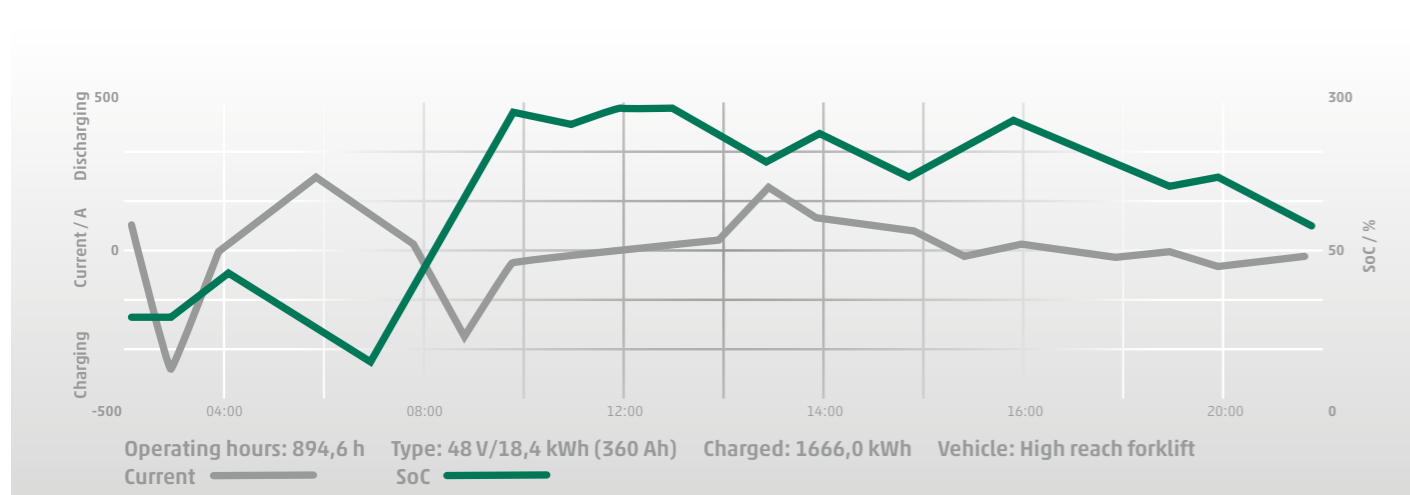


HEMS-Software

All data in view with HOPPECKE

Downtimes cost time and cause stress. To avoid these, your system is customised by HOPPECKE experts. In combination with the HOPPECKE Energy Monitoring Software (HEMS), your battery infrastructure is continually monitored – 24/7, 365 days per year. Whether cell voltage, temperature or current: All important parameters are monitored, to avoid interruptions to operation. This secures operation and optimally protects your investment.

If something needs to be replaced in spite of this, one of our globally available service technicians is quickly available to solve your problem. With the HOPPECKE Energy Monitoring Software, both firmware updates and deep analyses can be carried out. Whether load profiles, real-time data, service life calculations or temperature profiles, the software not only provides the data, but also presents in an understandable form.



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System components

HOPPECKE solutions always consider the complete system in order to ensure optimum operation. The right battery in combination with the matching charger and an

adapter tray, which enables easy upgrading of existing systems form the basis for cost-optimised operation with the shortest possible conversion time.

LiOn battery

Depending on the work profile and the vehicle parameters you can select from a wide range of 24V and 48V batteries.

- ▶ 2.2 kWh – 24.5 kWh
- ▶ Battery casing IP54
- ▶ Intelligent battery management system developed according to functional safety standards
- ▶ High performance lithium-ion cells (NMC)
- ▶ Fully charged in ~1 hour

Adapter components

To adapt the lithium ion batteries flexibly to the size of the particular battery compartment, they are mounted in an additional adapter or external tray.

- ▶ Safe positioning
- ▶ The minimum battery weight is ensured by additional steel weights in the external tray
- ▶ Recess for dedicated charging plug in the correct position for each vehicle

Charger

Optimum design of the charger and the communication between the charger and the battery management system ensures the highest possible efficiency for charging the battery.

- ▶ Upward and downward compatibility within voltage levels
- ▶ Data connection to the battery with ID verification





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Features

All features of the system have been specially developed to ensure smooth and safe operation.

Product range	
24 V/100 A 1-Phase	48 V/160 A 3-Phase
24 V/160 A 3-Phase	48 V/240 A 3-Phase
24 V/240 A 3-Phase	48 V/300 A 3-Phase
24 V/300 A 3-Phase	

Via a communication interface, the software can analyse the saved data and therefore provide essential information about the condition or utilisation of the battery.

Battery Management System (BMS)

- ▶ Connection terminal for vehicle
- ▶ 2nd charging plug for simple intermediate charging
- ▶ On/Off switch
- ▶ LED display
- ▶ USB port

Adapter tray

- ▶ Simple exchange
- ▶ Matched weight

Separate plug connector provides convenient charging options

- ▶ On the top of the battery
- ▶ On the side of the tray

IP 54 tested steel casing

- ▶ Protection against external damage



Charger

- ▶ HF-Charger



Our charging systems a good investment in the future

Modern logistics systems require far more than just a reliable battery charger. With the HOPPECKE trak | charger HF premium we offer a solution which not only charges the battery gently and efficiently, but also ensures an ultimate level of flexibility and safety.

Regardless of whether you need to charge lead-acid, alkali or lithium-ion batteries, the trak | charger HF premium ensures gentle and performance-optimised battery charging. Large energy savings can be achieved thanks to the high efficiency of the charging system. This reduces costs in day-to-day operation and protects the environment.

Especially in combination with our LiOn battery systems they offer excellent efficiency and minimal installation costs due to their compact design and modular construction.



Fast, safe and powerful

Batteries		Chargers							
		Battery/charger combination	24 V				48 V		
			100 A	160 A	240 A	300 A	160 A	240 A	300 A
24 V	85 Ah	Optimally configured	Possible, but with longer charging time	Possible, but more powerful than necessary	Possible, but more powerful than necessary				
	170 Ah	Possible, but with longer charging time	Optimally configured	Possible, but more powerful than necessary					
	255 Ah	Possible, but with longer charging time	Possible, but with longer charging time	Optimally configured	Possible, but more powerful than necessary				
	340 Ah	Possible, but with longer charging time	Possible, but with longer charging time	Possible, but with longer charging time	Optimally configured				
48 V	255 Ah					Optimally configured	Possible, but more powerful than necessary		
	340 Ah					Possible, but with longer charging time	Optimally configured	Possible, but more powerful than necessary	
	425 Ah					Possible, but with longer charging time	Possible, but with longer charging time	Optimally configured	
	510 Ah					Possible, but with longer charging time	Possible, but with longer charging time	Possible, but with longer charging time	

Optimally configured
 Possible, but with longer charging time
 Possible, but more powerful than necessary

With the trak | charger HF premium you can fully charge LiOn batteries in approximately one hour. Thanks to the high charging current you can achieve continuous operation of your vehicles with only a 30 minute intermediate charge. Due to the redundant design of the charger, you have an ultimate level of safety, even if one component fails.

The charger not only verifies the ID of our LiOn batteries to ensure that the correct charging voltage and curve is used for the battery. In addition all relevant data such as cycles, ampere-hours and times of use can be documented and evaluated over long periods in

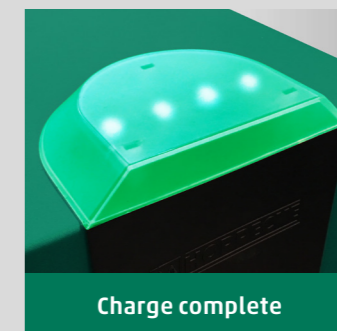
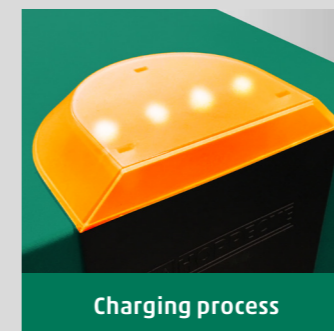
a paperless form. Therefore maintenance intervals can be planned, as well as the necessary extension to the system on the basis of performance and consumption data.

The ideal method for this is to link the trak | charger HF premium to a fleet management system such as our trak | monitor. However, you can also read out all of the relevant data on the ergonomically designed colour display on the device. In addition, the system also remotely indicates its status with the new 360° status board in four signal colours



- ▶ Quick and safe intermediate charging anywhere and at any time
- ▶ High charging rates shorten (intermediate) charging times
- ▶ Increase vehicle availability
- ▶ And ensure considerably better optimised productivity

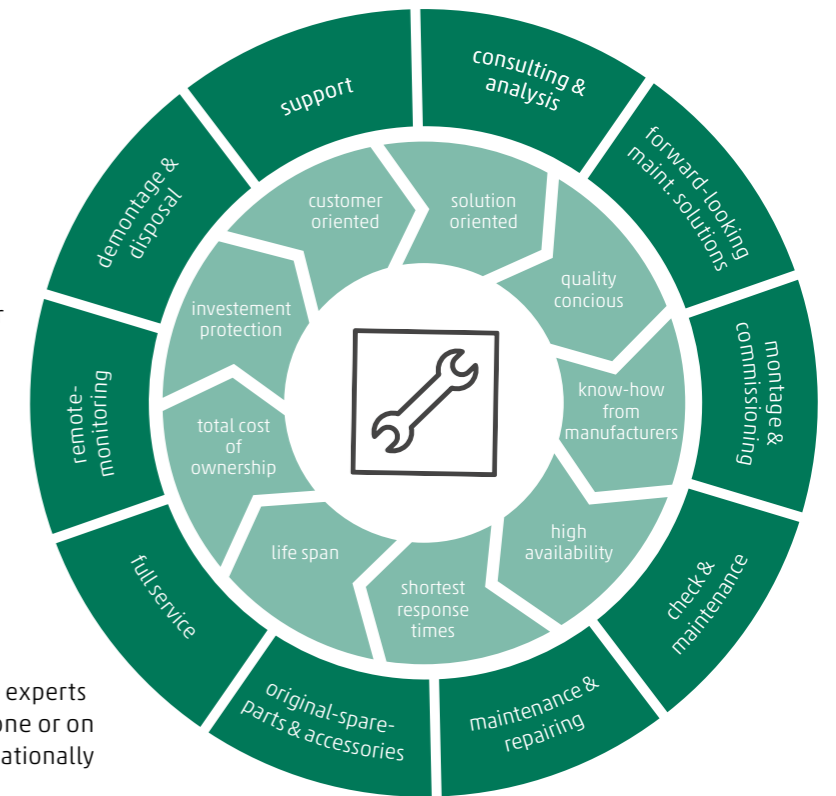
The 360° status board





Our service makes the difference

Under the heading "Lifecycle Services" we offer you far more than just products. From the initial idea, to consultation, installation and ongoing service up to disassembly and recycling, you have HOPPECKE professionals at your side, who make processes simple and transparent and ensure the smooth operation of your company in every situation.



Hotline and technical support

Extensive European service network with more than 250 experts at 15 locations, who are always available - by telephone or on site. International Key Account Management for internationally operating partners.

Analysis and advice

Technological and application advice on site. Process, optimisation, safety and efficiency analyses by certified HOPPECKE professionals. Target group oriented instruction and training for every application.

Monitoring

By linking your systems to the HOPPECKE Remote Service Portal, you integrate our technicians directly into your system environment. In this way, your systems are optimally monitored; HOPPECKE professionals respond proactively to any abnormalities and remedy these immediately.

Installation and commissioning, disassembly and recycling

Our installation teams are professionals in their field and not only ensure simple installation and maintenance according to schedule, but also provide complete turnkey solutions. I. e. complete installation, acceptance and handover to you.

And of course, when the time comes, proper and legally compliant disassembly, including recycling and documentation (certified according to ISO 9001/2008, ISO 14001 and ISO 50001).

Testing, maintenance and repair

With regular servicing, you extend the service life, reduce down times and ensure permanent functional safety. This ensures smooth operation, compliance with all legal regulations and protects your investment.



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