

# Lithium-ion Battery Systems

Maximum performance for working machines



# Lithium-ion Battery Systems

## Maximum performance for working machines



### The innoelectric solution

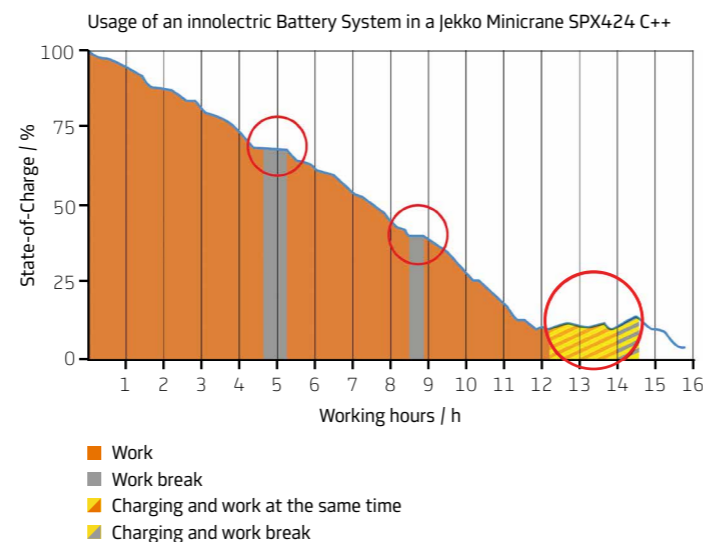
To eliminate existing disadvantages of lead acid technology in the field of working machines innoelectric offers an innovative solution based on lithium-ion technology. The lithium-ion battery system is a drop-in replacement for lead acid batteries of 24 V working machines. Although the size and weight of innoelectric's solution is adapted to four 6 V lead acid batteries, the innoelectric Battery System is characterized by much higher usable capacity and operation range regarding temperature and charging power. For example a working platform operated by the innoelectric Battery System, which drives and lifts with maximum load, can run three times longer than with lead acid batteries.

The battery systems including the battery management system (BMS) are completely developed in-house and verified with our partners, which means that the overall system and its functionalities are perfectly matched. innoelectric's combined expertise in the areas of design, electronics, and validation permits cost-effective and speedy adaption of the battery systems to the customer's requirements in-house.

#### HIGHLIGHTS

- Complete battery system for direct installation and use
- Optimized for use in machinery (installation space, power, etc.)
- Usable capacity three times higher than that of conventional lead acid batteries
- Certified in accordance with UN 38.3

#### 16 working hours ready to use with lithium-ion Battery System



### Reliable operation without interruption

To ensure a fail-safe operation and to avoid misuse of the battery, the innoelectric Battery System is based on a special electrical and mechanical design. The integrated BMS permanently and precisely measures all relevant parameters such as temperature, voltage, current as well as state of charge and disconnects the battery poles in the case of critical events. Thus an operation in the optimal working range of the battery system can be guaranteed. Positive side effect: since the cells are only operated in their optimal working range, the lifespan of the battery system is extended.

The systems also boast outstanding safety features, e.g. reliably disconnected battery terminal during transportation and maintenance of machines to prevent short circuits.

The entire battery system is also certified to UN 38.3. The overall safety concept is further boosted by the use of ultra-safe LFP cells. If the battery system gets closer to the operation limits, it will automatically switch off and the user will be informed by visual and acoustic signals in advance.

#### Advantages of innoelectric's lithium-ion Battery System compared to lead acid batteries

- Higher capacity by same battery volume: Increase of working time and range as well as new fields of application such as supply of external equipment on construction sites, e.g. lighting or tools
- Fast and convenient battery charging: Fast charging thanks to innovative lithium-ion technology and possibility to charge at any time (battery charging up to 80 % within only one hour possible). Even at low state of charge (e.g. by forgotten charge), a quick operational readiness for use can be established.
- Simultaneous charging and operation possible: Depending on the charging power, almost unlimited electrical operation is possible – with simultaneous local flexibility.
- Maintenance-free: No time-consuming and cost-intensive downtimes
- Environmentally friendly: No gas emissions, lead-free
- Wide range of application: Thanks to the cell technology the battery system can be used at a wide temperature range from -20 °C up to +55 °C.
- Safe battery operation and prevention of misuse: Realized by the intelligent innoelectric BMS which is integrated in the battery system and the robust mechanical design
- Additional features thanks to the BMS possible: Integrated BMS optionally allows a huge range of features such as remote maintenance, diagnosis or control. Furthermore data logging or GPS location is possible.

#### Technical data of the innoelectric Battery System

	IN24/288LFP	IN24/144LFP	IN48/288LFP
Nominal voltage	25,6 V		51,2 V
Nominal capacity	288 Ah (0,3C)	144 Ah (0,3C)	288 Ah (0,3C)
Weight	56 kg per module (equivalent to 12 V lead acid battery), 2 modules required, lighter variants possible		56 kg per module, 4 modules required, lighter variants possible
Dimensions	262 x 362 x 281 mm per module, any arrangement		
Degree of protection	IP 54		
Operation temperature	-20 ... +55 °C (discharging), -10 ... +45 °C (charging)		
Current rating	240 A (continuous), 300 A (10 sec), 380 A (5 sec), 480 A (2 sec)		

Through sizes, weight, battery capacities and constructions as well as further characteristics can optionally be adapted to the customer's specification on request.

### Cutting-edge solutions

The innoelectric team is convinced of electric mobility, and works out solutions for our customers that are simply better. Profound comprehension of electric mobility, personal enthusiasm and a strong sense of responsibility are the foundation we build our projects on.

Our portfolio ranges from consulting and development services to the production of battery systems. You can thus also benefit from our know-how in the series production of batteries.

**innoelectric AG**  
Universitätsstraße 136  
44799 Bochum  
Germany

+49 234 60 14 36 50  
sales@innoelectric.ag  
www.innoelectric.ag

**Sales Partner:**  
Liftservice Krome GmbH  
Wullener Feld 27  
58454 Witten  
Germany  
+49 2302 20 22 850  
info@lift-service.de  
www.lift-service.de