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ROYPOW

Global Lithium+ Industry Solution Leader

400V/800V Liquid-Cooled $LiFePO_4$ Battery Systems for Electric Port Equipment

High-Volt True Powerhouse
for Port Equipment

Li-ion

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www.roypowtech.com

Scan it!

Electrification of Port Equipment

Most port equipment, such as reach stackers, rubber-tired gantry cranes, and straddle carriers, are typically powered by diesel fuel or a blend of diesel fuel and batteries.

As concerns about total ownership costs and environmental impact grow, fully electric power solutions supported by batteries emerge as ideal alternatives. These solutions offer green, safe, reliable, cost-effective power for efficient cargo handling.

ROYPOW High-Volt LiFePO4 Battery Systems for Port Equipment

Problems of traditional solutions:

- **Higher fuel consumption and costs**
- **Increased equipment failure rate and maintenance frequency**
- **Higher operation costs**
- **Larger carbon footprint**
- **Related safety and health risks for port personnel**

ROYPOW solutions address the problems of diesel or hybrid diesel/battery systems while maintaining high performance standards. Our all-in-one system seamlessly integrates: **a high-volt battery system, liquid cooling system, PDU, and charger** into a single powerful unit, ensuring efficient and safe power delivery for Port Equipment. Both standard and customized systems are available, tailored to different equipment needs, maximizing performance across the board.

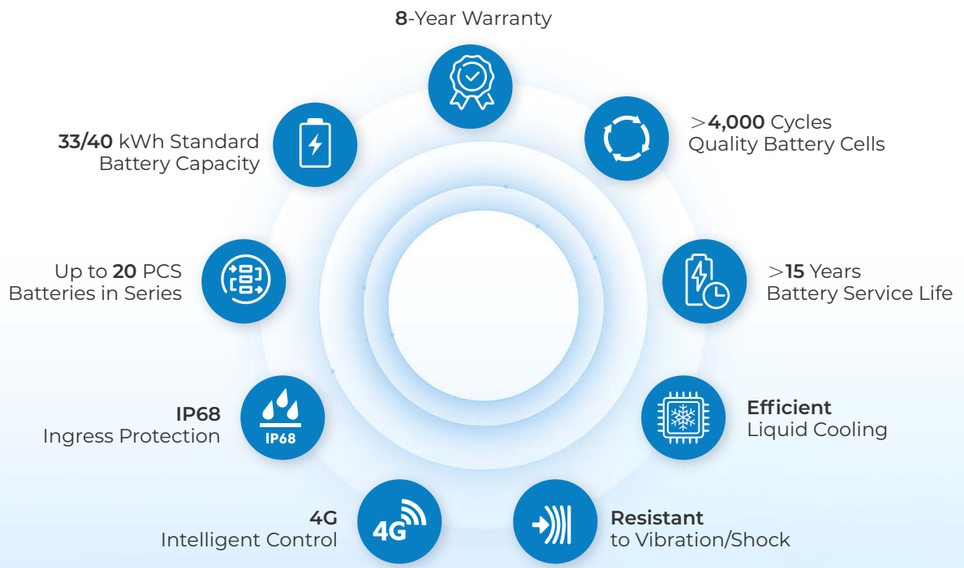
ROYPOW LiFePO4 Battery Systems

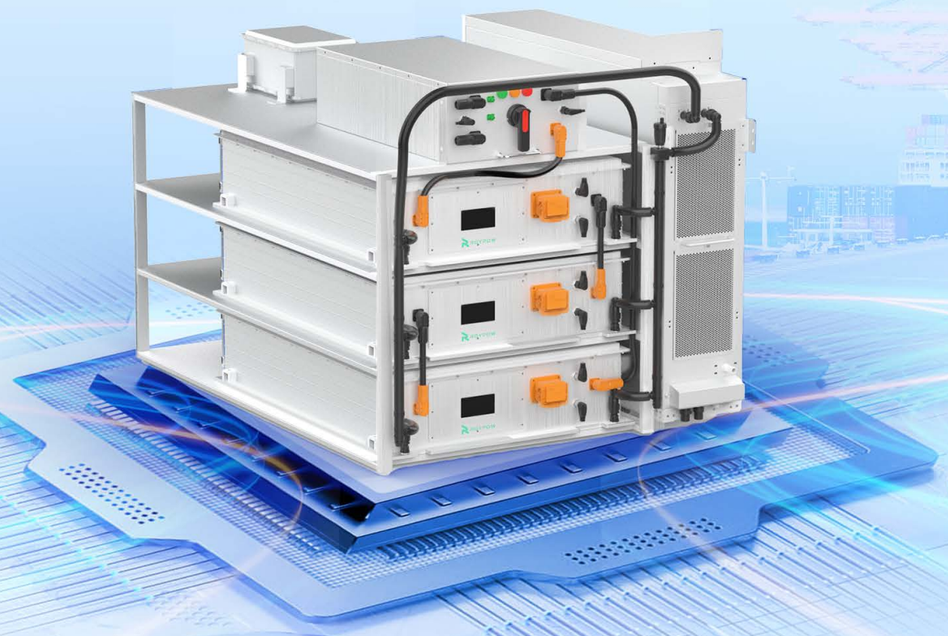
- ✔ Reduced Reliance on Fuel
- ✔ Zero Maintenance
- ✔ Lower Operation Cost
- ✔ Improved Port Environmental Sustainability
- ✔ Enhanced Safety Protection

All-In-One, Efficient Solutions

Why ROYPOW Battery System

ROYPOW uses its cutting-edge Lithium iron phosphate battery technologies, proven the ideal power solutions in industrial applications for years, to power the electric Port Equipment, combining exceptional performance with efficiency, safety, and maintenance-free operation.





Designed to ensure safe operation, and disconnect the circuit when necessary to prevent electric shock or other unexpected incidents.

Can be recharged during breaks to ensure increased equipment uptime and flexibility without unexpected equipement unavailability.

Robust casing and well-structural internal designs are strictly manufactured and tested to the highest quality standards to withstand intense vibrations and shocks in heavy-duty uses.

Each battery system integrates the fire extinguisher. Once exceeding the temperature limit and has the potential to fire, the device will activate automatically to ensure safety.

High Voltage Interlock (HVIL) Function

Fast & Opportunity Charge

Automotive-Grade Reliability

Built-in Fire Extinguishing System

Higher Flexibility

No complex external cable wiring, making the port equipment easier to move around the harbor.

Low Temperature Heating

When the ambient temperature is below the battery limit during the cold months, the heating function will activate for stable charging and discharge at a low temperature.

Zero Maintenance

ROYPOW batteries last longer and eliminate the need for frequent swaps or maintenance, saving abundant time and labor costs to replace the battery inside the port equipment.

Powering Port Efficiency and Productivity

Battery Systems for Port Equipment including Reach Stackers, Empty Container Handlers, Carriers, Cranes, Terminal Tractors, and other electric equipment.

Self-Developed Intelligent Battery Management System (BMS)

ROYPOW's self-developed BMS ensures the electric port equipment battery system's peak performance and safety through real-time monitoring and multiple protections, maximizing efficiency and extending battery life.

- All-Time Cell Balancing and Energy Management
- Real-time Monitoring and Communication Through CAN
- Battery Maintenance and Remote Upgrades
- Fault Alarm and Safety Protections

Smart 4G Module

ROYPOW high-voltage LiFePO4 battery systems for Port Equipment feature the smart 4G module to realize real-time remote monitoring and minimize maintenance frequency and costs.

- Remote Battery Status Monitoring via APP and Web
- Remote Software Upgrades
- Easy Network Connection
- Faults Alarm

Power Distribution Unit (PDU)

- Integrated Design for Easy Installation
- Optimized Power Transmission
- Reduced Energy Loss

DC Charger / Optional On-Board Charger

- Safe Charging Experience
- Multiple Charging Ways Available
- Best Communication with the High-Volt Battery System
- Optimal battery performance for Extended Battery Life
- Optional On-Board Charger

High-Volt Battery System

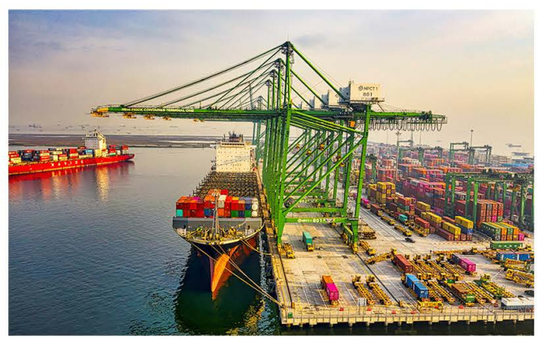
- Advanced LiFePO4 Technologies
- Customizable Voltage Systems
- Superior Performance, Power and Reliability

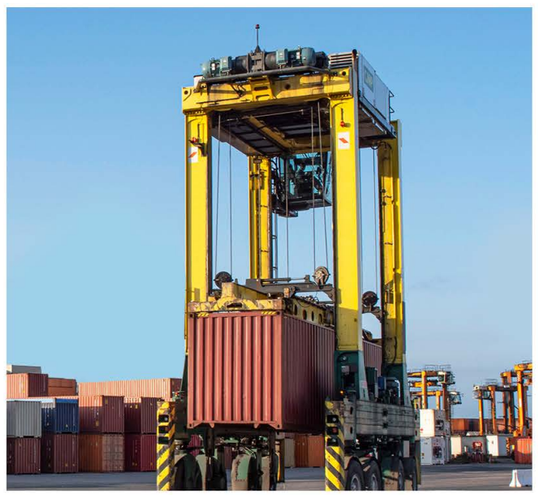
Efficient Liquid Cooling System

- Integrated Design for Easy Installation.
- Optimized Battery Temperature Management for:
  - More Efficient Operation
  - Enhanced Safety
  - Extended Lifespan

400 V/800 V High-Voltage Battery Systems for Various Port Equipment

Customized solutions to maximize performance





Customizable for Specific Power Demands

One Battery Unit

PA19233
192V 33kWH

PA10633
106V 33kWH

One Battery Unit

PA23040
230V 40kWH

PA12840
128V 40kWH

Mode	PA23040	PA12840	PA19233	PA10633
Cell Type	LiFePO₄ Battery			
Voltage (V)	230	128	192	106
Nominal Capacity (AH)	173	314	173	314
Installed Energy (KWH)	39.79	40.19	33.22	33.28
Charging/Discharging Rate	0.5C/1C	0.5C/1C	0.5C/1C	0.5C/1C
Group Solution	Max 10S6P			
Working Voltage Range (V)	180~262.8	100~144	150~219	82.5~120.4
Depth of discharge(DOD)	≥95%			
Lifetime (DoD, temperature and C-rate dependent)	≥3000 Cycles			
Working Temperature	Charging:-20℃~55℃, Dishcarging:-30℃~60℃			
Energy Efficiency	≥94.5%			
Thermal Management	Liquid Cooling			
Dimension (mm)	960×810×245	960×810×245	1060×630×245	1060×630×245
Weight (KG)	285±5	280±5	245±5	238±5
Charger	10~150KW Charger			
Charging Time(Fastest)	≤2 Hours			
Warranty	8-Years			
Main Material	Alumium			
Certificatation	UL 2580/CE/IEC 62619/UN 38.3..etc			

1. All pictures shown are for reference only and data are based on ROYPOW standard test procedures.
2. Actual performance may vary according to local conditions. Only authorized personnel are allowed to operate or make adjustments to the batteries.
3.We reserve the right to make revisions as well as product alterations and improvements at any time without prior notice.

ROYPOW, Your Trusted Partner

For One-stop Energy Solutions

ROYPOW TECHNOLOGY is dedicated to the R&D, manufacturing and sales of motive power systems and energy storage systems as one-stop solutions.

With more than 20 years of combined experience in manufacturing renewable energy and battery systems, ROYPOW provides Lithium-ion Batteries covering most daily living and working fields: for Low-Speed Vehicles such as golf carts, personnel carriers; Industrial Batteries for use in Material Handling Equipment such as forklifts, aerial work platforms and floor cleaning machines as well as renewable Energy Storage Systems for residential, commercial, industrial, vehicle-mounted and marine applications.

ROYPOW has established a worldwide network to serve customers with a manufacturing center in China and subsidiaries in the USA, the UK, Germany, the Netherlands, South Africa, Australia, Japan and Korea to date. ROYPOW owns and operates fully automatic production lines, a full range of test equipment and an advanced MES that collectively address all aspects of its manufacturing process, from electronics, software design to module assembly, battery assembly as well as initial and final testing. ROYPOW focuses on the self-development of power electronics technologies, including PCS, BMS, and EMS as the core competence.

As a renewable energy innovator, ROYPOW is committed to the mission of achieving energy sustainability while creating a better life for human beings.

R&D and Manufacturing Highlights

As a result of these investments, ROYPOW is capable of “end-to-end” integrated deliver y makeing our products out-perform the industry norms.

- All-round testing.
- Integrated design.
- Advanced MES system.
- IATF 16949 automotive quality management system certification
- QC system.
- Persistent technology innovation.
- Fully automatic production line.
- ISO12405-2 vibration performance and safety testing of automotive lithium batteries

Global Sales and Service Network System

- Timely Delivery.
- Hassle-free After-sales Service.
- Fast Response Technical Support.

ROYPOW has comprehensively unfolded its overseas market layout to ensure the localization of R&D, manufacturing, marketing and service, becoming one of your most reliable and valuable partners.

Upgrading to New Technology, with Our Turnkey Solutions.

With years of dedication to new energy solutions, we are proud to offer customers professional solutions for:

- **Low-speed Vehicle Batteries** including golf carts and sightseeing cars;
- **Vehicle-Mounted Energy Storage Systems & Batteries** Including RV and truck energy storage and air conditioning systems, off-grid solar systems for RV, as well as power batteries for electric motorcycles and airport ground support equipment;
- **Residential Energy Storage Systems & Portable Power Units** including home storage and portable energy storage products, as well as off-grid energy storage (for forest cabin, island homes without electricity, etc.);
- **Chargers** for forklifts, aerial work platforms, floor cleaning machines, golf carts and various marine batteries.
- **Industrial Batteries** including forklifts, aerial work platforms, floor cleaning machines and electric excavators;
- **Marine Energy Storage Systems & Batteries** including trolling motors, fish finders, other off-grid energy storage systems for marine, and marine power systems;
- **Commercial & Industrial Energy Storage Systems** including diesel generator power micro-grid energy storage systems (for tower cranes, air compressors, mixers, crushers, etc);
- **Battery Systems for Port Equipment** including Reach Stackers, Empty Container Handlers, Carriers, Cranes, Terminal Tractors, and other electric equipment.