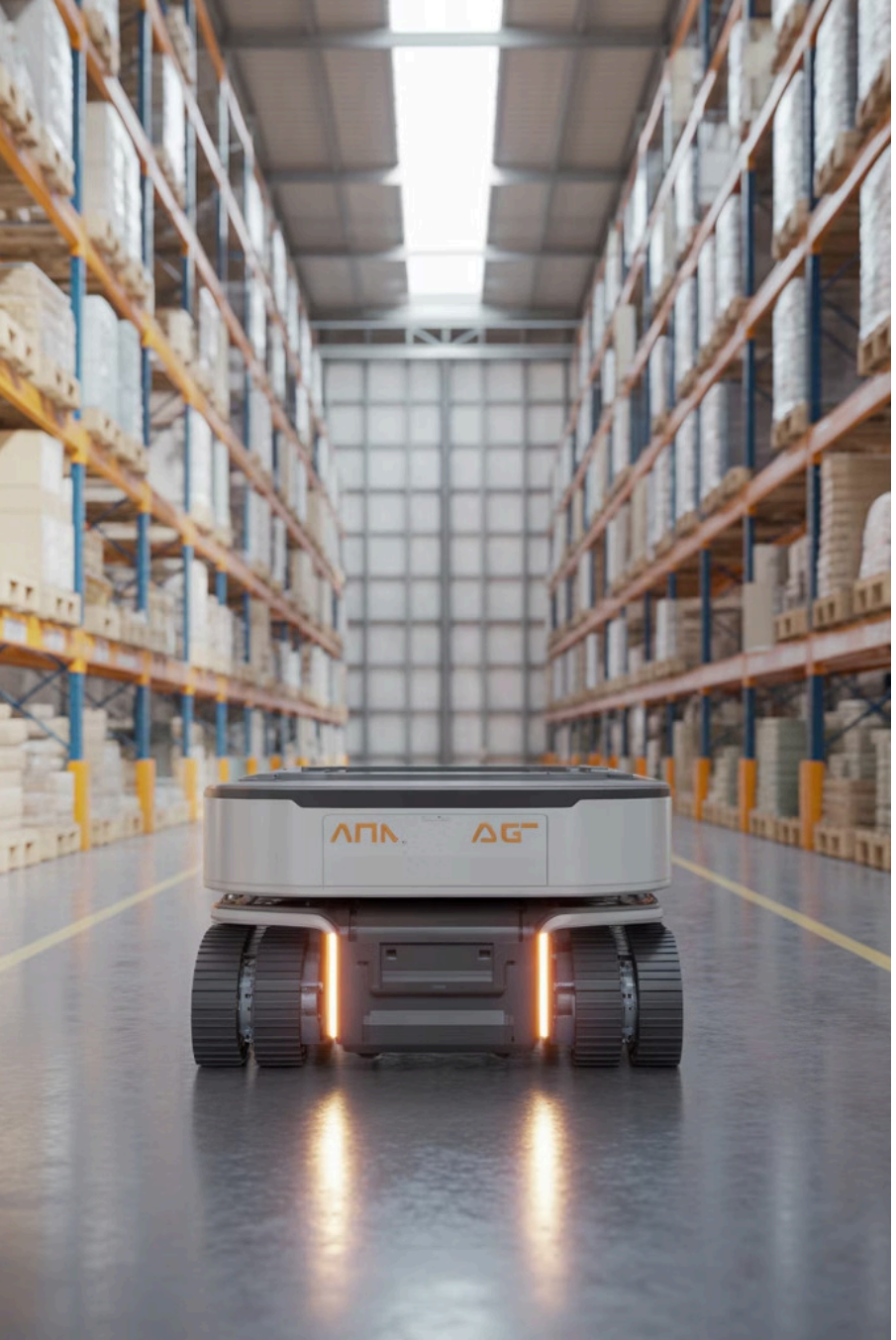


Robots and High-Power Platforms | High-Safety LYP Energy System

High Magnification · Wide Temperature Range · 0 Attenuation Jump · 5000+ Cycle Verification

Winston Battery

Industry Trends and Challenges

Market Drivers

The global robotics market is undergoing rapid transformation, with automation, intelligent security, unmanned operation and maintenance, and outdoor deployment becoming core trends. As application scenarios expand from controlled environments to extreme working conditions, the demands on power systems for robot platforms are growing exponentially.

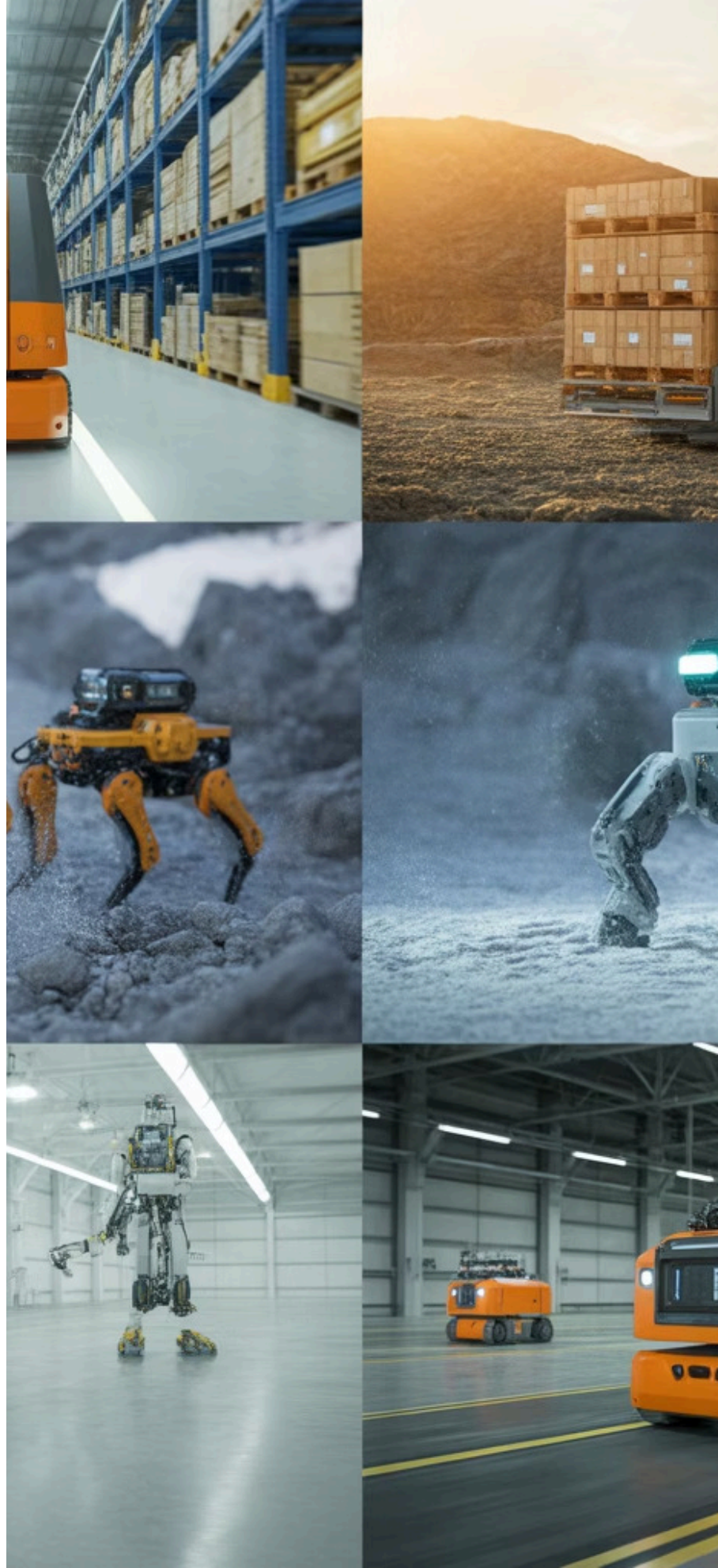
- Increased demand for 24/7 continuous operation
- Deployment in outdoor extreme temperature environments
- High-frequency charge and discharge cycle operations
- Requirements for instantaneous high-power output

Technical Bottlenecks

- Ordinary LFP batteries experience significant voltage drop (0.5–1.0V) at high discharge rates, leading to torque reduction and shutdown/restart.
- Insufficient cycle life, especially for 24/7 high-frequency start-stop robots.
- Severe performance degradation at low temperatures.
- Excessive module parallel connections amplify consistency risks.

Why robots are more demanding on batteries:

> **Robots not only need energy, but also "stable power output."**
>
> **Even a momentary voltage drop can cause shutdown or loss of step.**



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Five Core Pain Points of Robot Power Systems

In practical applications, engineers and product managers face challenges that stem not just from a single performance dimension, but from complex scenarios where multiple factors intertwine. The following five major pain points directly affect robot task completion rates, operation and maintenance costs, and user experience.

Voltage Sag

High-rate instantaneous current draw → ordinary lithium battery voltage drop of 0.5–1.0V → torque reduction / motor step loss / system restart

Low-Temperature Performance Degradation

Ordinary LFP capacity drops to only 40%–60% at -10°C → robot endurance decreases by more than 50%

Insufficient High-Rate Capability

Unable to continuously output 3C–5C, excessive heat accumulation during high current discharge

Rapid Cycle Life Decay

Frequent start-stop + high-frequency high-current cycles = rapid system life decay (especially within three years)

Poor Environmental Adaptability

Dust, humidity, low temperature, and vibration can affect the stability of ordinary modules

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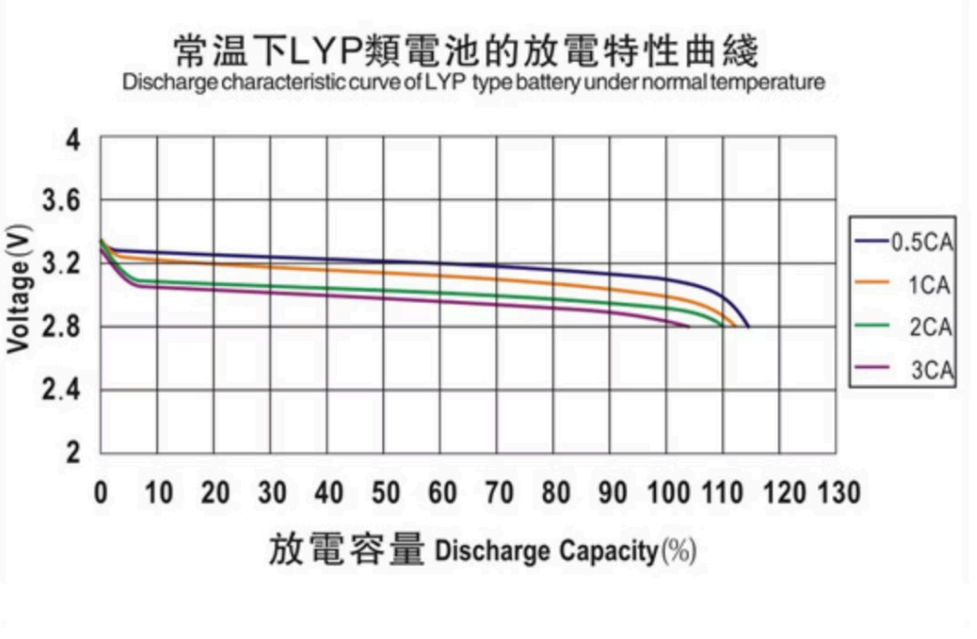
Deep Dive into Key Pain Points: Voltage Sag

Why do robots fear "voltage sag" the most?

- Voltage drop directly leads to decreased motor torque, causing mechanical action failure.
- Frequent voltage fluctuations can cause robots to lag in movement, experience positioning errors, and even lead to system restarts in extreme cases.
- For robots requiring high-speed operation, such as AGVs, AMRs, lawnmowers, and quadruped robots, the risk of voltage sag is higher, severely impacting their operational efficiency and stability.

LYP Technology Advantage

Aqueous Lithium Yttrium (LYP) cells achieve a 30-40% reduction in internal resistance through optimized crystal structure and enhanced conductive networks. During 3C-5C high-rate discharge, the voltage platform remains stable, with voltage drop controlled within 0.2V, ensuring the robot's system voltage stays within a safe operating range during full power output.



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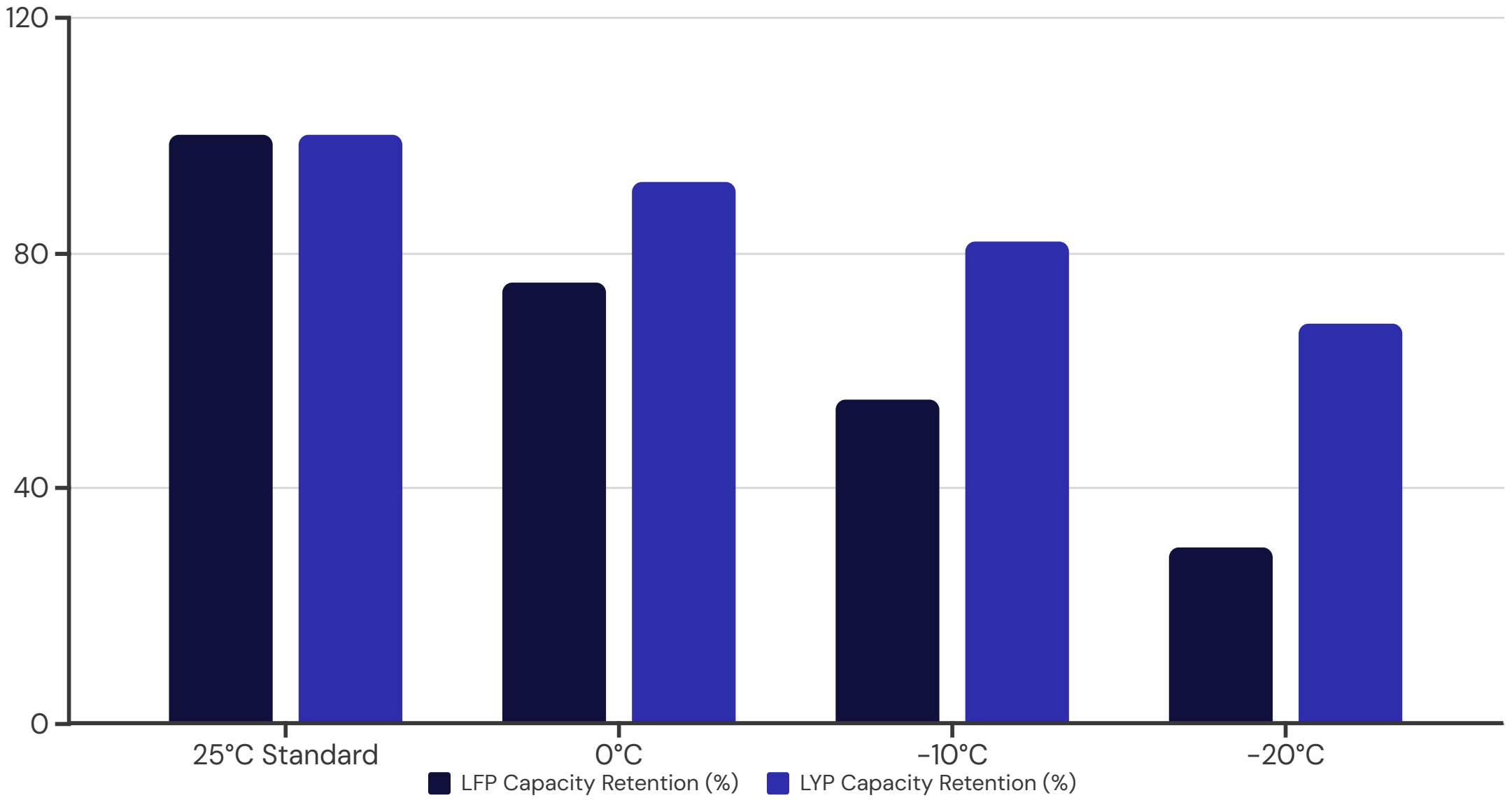
Low Temperature and High Rate Performance Comparison

In northern winters or cold storage environments, battery performance directly determines whether robots can operate normally. We demonstrate the performance differences between LYP and traditional LFP under extreme conditions through comparative testing.



Key Temperature Performance Comparison:

- LFP capacity drops to 20–40% at -20°C
- LYP maintains 60–70% at -20°C
- LFP is almost inoperable at -30°C
- LYP can still discharge at -30°C

The vast majority of robot endurance decay at low temperatures comes from the battery chemistry system, not the BMS.

Internal Resistance Advantage

The DC internal resistance of LYP cells at -20°C is only 60% of that of LFP, ensuring sufficient instantaneous power output even at low temperatures to meet the robot's startup and acceleration needs in cold environments.

High Rate Performance

Supports continuous 3C discharge and 10C peak discharge, with temperature rise controlled within 15°C. For robot platforms that require frequent acceleration and deceleration, climbing, or handling, this significantly improves operating efficiency and task completion rates.

Winston Battery

Key Advantages of Winston LYP Solution

Voltage Stability

Voltage platform deviation ≤3% across full discharge range, no voltage drop-off at high discharge rates, ensuring continuous stable system operation.

Ultra-Long Cycle Life

Capacity retention ≥80% after 5000 cycles at 100% DOD, achieving 8000+ cycles at 80% DOD, significantly reducing total lifecycle cost.

Inherently Safe Design

LYP material thermal runaway temperature up to 350°C, no fire or explosion in extreme tests like nail penetration, extrusion, and overcharge, passed international safety certifications like UN38.3, UL.

Wide Temperature Range Adaptation

Operates across a full temperature range from -45°C to 85°C, with capacity retention still reaching 68% at -20°C, meeting deployment needs in extreme environments like polar regions and deserts.

Large Single Cell Capacity

Single cell capacity from 50Ah-500Ah, reducing parallel connections, lowering BMS complexity and system failure points, enhancing overall reliability.

Winston Battery

Core Product: 50Ah High C-Rate Special Cell

Item	Small Robot Power (50Ah)	Medium Platform Power (160Ah–300Ah)	High Power Platform (500Ah)
High Rate	3C Continuous / 10C Peak	3C Continuous / 10C Peak	3C Continuous / 10C Peak
Life Cycle	5000+ Cycles @100% DOD	8000+ Cycles	8000+ Cycles
Low Temp	-30°C Discharge	-25°C	-25°C
Safety	Passes 350°C, No Thermal Runaway	Passes 350°C, No Thermal Runaway	Passes 350°C, No Thermal Runaway

All models support custom 24V–96V systems and parallel expansion.

Designed for Medium-Sized Robot Platforms

The 50Ah cell is Winston Battery's high-performance solution developed for 50-200kg robot platforms, achieving a perfect balance of high energy density and high power output in a compact size.

No Voltage Drop

Voltage drop ≤0.2V during 5C peak discharge, ensuring system stability under high power conditions

High Continuous/Peak Current

Continuous 3C (150A) discharge, peak 5C (250A), meeting high load demands for climbing, handling, etc.

Low Attenuation Characteristics

Capacity retention rate ≥80% after 5000 deep cycles, ensuring a 5-year service life

Wide Temperature Range

-45°C to 85°C operating range, adapting to all-weather operation throughout the year

Typical Application Scenarios

- Security patrol robots
- Delivery and logistics robots
- Cleaning and disinfection robots
- Education and entertainment robots
- Agricultural picking robots

Winston Battery

Large Capacity Cell System: Heavy-Duty Platform Solutions

For large industrial AGVs, heavy-duty mobile platforms, and long-endurance outdoor robots, Winston offers a series of large capacity cells from 50Ah to 500Ah, meeting the demands for high energy storage and long-term operation.

160Ah Industrial Grade Cell

Suitable for 500-1000kg class AGVs and mobile platforms. Single cell 3.2V 160Ah. Can be configured into 24V-96V battery packs in series. Supports continuous 2C discharge and 8-12 hours of continuous operation.

300Ah Heavy-Duty Specific

Designed for 1-3 ton heavy-duty mobile platforms. Ultra-large capacity single cell reduces the number of parallel connections, enhancing system reliability. Supports applications such as port AGVs, mining transport vehicles, and large outdoor inspection robots.

500Ah Ultra-Large Capacity

Flagship cell with 500Ah single cell capacity, suitable for ultra heavy-duty platforms over 3 tons and extended endurance requirements of 48-96 hours. Typical applications include autonomous mining vehicles, port automation equipment, and off-grid energy storage robots.

All large capacity cells adopt the same LYP chemistry system, maintaining consistent safety performance and cycle life advantages, simplifying product selection and system design.

Winston Battery

Global Success Stories

1 European Warehousing | Intelligent Logistics AGV

Customer Pain Points (Before): Conventional LFP batteries experienced over 50% capacity degradation in -10°C winter conditions; frequent start-stop operations led to rapid battery life decay; required a large number of parallel modules, increasing system complexity.

Winston Solution (Action): Used 50Ah LYP cells to power 120 AGVs, achieving an 82% capacity retention rate in -10°C environments; reduced parallel module count by 40%, simplifying BMS design.

Customer Benefits (After): Achieved 24/7 uninterrupted operation, over 6000 cumulative cycles in 3 years with 85% capacity retention; 40% increase in winter range, 30% reduction in total operating and maintenance costs.

2 US Market | Warehouse Robots

Customer Pain Points (Before): Old batteries experienced power insufficiency when robots carried heavy loads due to high discharge rate voltage drop; rapid voltage dips during fast movement caused system restarts; significant battery life degradation within 2 years, impacting operational efficiency.

Winston Solution (Action): Customized 50Ah high-rate LYP cells, supporting peak 3C discharge with voltage drop ≤0.2V; 3000+ systems delivered.

Customer Benefits (After): Heavy-load handling capacity increased by 25%, system restart rate decreased by 90%, battery life extended to 5-7 years, TCO reduced by 32%.

3 Outdoor Inspection | Power & Energy Industry

Customer Pain Points (Before): Extreme temperature differences from -30°C to 50°C in Northwest regions, preventing normal operation of conventional batteries; over 70% range degradation at low temperatures, making inspection tasks impossible; frequent battery replacements, leading to high labor costs and safety risks.

Winston Solution (Action): Used 50Ah LYP cells to handle extreme temperature differences; normal discharge operation maintained at -30°C; 48-hour range on a single charge, covering 100km inspection routes.

Customer Benefits (After): Achieved year-round, all-weather operation, 60% increase in low-temperature range; inspection efficiency improved by 3 times, labor costs reduced by 50%; battery life extended to over 6 years, significantly lowering safety risks.

Winston Battery

Start Cooperation, Create Future Together

Winston Battery

High-Safety LYP Technology Leader

20 years focused on lithium battery R&D and manufacturing, providing reliable power solutions for global robots and high-power platforms. We not only provide products but also offer full-process technical support from selection, testing to mass production.

Why high-power robots must choose LYP?

✔️ High-rate stability (no voltage drop)

✔️ Reliable operation at -30°C

✔️ 5000+ cycle life

✔️ Inherently safe, no thermal runaway

✔️ Verified by global robot customers: AGV, AMR, quadrupedal, special platforms

Become a Partner | Get a Quote

Sample Request

Provide complete test samples and technical specifications

Customized Solution Design

Provide professional selection advice based on application scenarios

Long-term Strategic Cooperation

Technical support, supply chain guarantee, joint R&D

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