PRODUCT SAFETY & HANDLING MANUAL

Lithium Iron Phosphate (LFP) rechargeable cells and batteries

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Applies to: [SOLARX-LITHIUM] $LiFePO_4$ (LFP) rechargeable cells and battery packs

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1. Purpose

This manual provides safety instructions and handling requirements for manufacture, storage, transport, use, and disposal of [SOLARX-LITHIUM™] Lithium Iron Phosphate (LFP) rechargeable cells and battery products supplied by XUNZEL ENERGY. Its purpose is to ensure safe operation, prevent accidents, and maintain product reliability throughout the life cycle.

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2. Scope

Applies to:

- All LFP cells, modules, and battery packs produced or integrated by XUNZEL ENERGY.
- All personnel handling, assembling, testing, or transporting these products.
- OEM customers and end-users integrating the products into systems or equipment.

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3. Product Description

Item	Typical Specification
Cell type	Cylindrical / prismatic $LiFePO_4$
Nominal voltage	3.2 V
Nominal capacity	All capacities (Ah)
Operating temperature range	Charge: 0 to 55 °C; Discharge: –20 to 60 °C
Recommended storage range	15 to 30 °C, 30 to 60 % SoC
Chemistry	$LiFePO_4$
Main hazards	High energy density, risk of short-circuit, fire, chemical leakage, and gas venting if mishandled

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4. General Safety Warnings

ATTENTION: Read all instructions carefully before handling.

Failure to follow these precautions can result in **fire, explosion, chemical burns, or personal injury**.

Do not:

- Disassemble, crush, puncture, or modify the cell.
- Short-circuit terminals or allow conductive objects to bridge them.
- Expose to open flame or immerse in liquid.
- Charge above specified voltage (typically 3.65 V/cell).
- Discharge below cut-off voltage (typically 2.0–2.5 V/cell) (An always as stated in the technical data sheet for the product supplied)
- Heat above 80 °C or freeze below –20 °C.
- Use different cell models, brands, or capacities in the same pack.

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5. Handling and Assembly Precautions

5.1. Mechanical Handling

- Always use insulated tools.
- Avoid dropping or impacting cells.
- Do not apply excessive pressure or deformation to the cell body or top cap.
- Inspect for dents, leaks, swelling, or corrosion; discard damaged units.

5.2. Electrical Assembly

- Ensure correct polarity.
- Integrate BMS with overcharge, overdischarge, overcurrent, and temperature protection.
- Incorporate cell balancing for series configurations.
- Ensure each cell's voltage and temperature are monitored during operation.

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6. Charging and Discharging Guidelines

Parameter	Recommended Value
Nominal voltage	3.2 V
Max charge voltage	3.65 V ± 0.05 V
Min discharge voltage	2.0–2.5 V (An always as stated in the technical data sheet for the product supplied)
Charge current	As stated in the technical data sheet for the product supplied
Discharge current	Continuous and Peak as stated in the technical data sheet for the product supplied
Charge temperature	0 °C to 55 °C
Discharge temperature	–20 °C to 60 °C

- Use only qualified chargers designed for SOLARX-LITHIUM LFP chemistry.
- Stop charging immediately if any cell exceeds 3.7 V or 60 °C.
- Avoid continuous float charging above 3.45 V.
- Do not recharge cells that have dropped below 1.5 V unless evaluated by qualified personnel.

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7. Storage and Transportation

7.1. Storage

- Store in a cool, dry, and ventilated area (15 to 30 °C, < 70 % RH).
- Avoid direct sunlight, heat sources, or static discharge.
- Maintain 30–60 % SoC for long-term storage.
- Recharge every 6–12 months to maintain voltage > 3.0 V.

7.2. Transportation

- Comply with UN 38.3, IATA DGR, IMDG, and ADR requirements.
- Use UN-certified packaging with appropriate labels:
    - UN3480 (cells), UN3481 (batteries contained in equipment).
- Protect terminals from short circuits using insulation caps or non-conductive separators.
- Do not ship damaged or defective batteries by air.

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8. Inspection and Maintenance

- Perform incoming inspection for mechanical damage, OCV, and internal resistance.
- Maintain records of lot numbers, manufacturing dates, and test results.
- Check periodically for swelling, corrosion, or electrolyte odor.

- Replace any cell showing OCV < 2.5 V, abnormal IR, or leakage.
- Ensure BMS calibration and thermal sensors are operational.

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9. Emergency Measures

Situation	Recommended Action
Electrolyte leakage	Avoid contact; use dry cloth; ventilate area; do not inhale vapors.
Fire	Use Class D (metal fire) or dry powder (ABC) extinguishers. Do not use water on burning cells.
Thermal runaway or venting	Isolate battery, evacuate area, allow to cool; do not handle until temperature < 40 °C.
Inhalation / ingestion	Move to fresh air, rinse mouth, seek medical attention immediately.

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10. Disposal and Recycling

- Dispose of in accordance with local environmental regulations.
- Do not incinerate or dispose of as household waste.
- Return to authorized recycling facilities for lithium batteries.
- Ensure cells are fully discharged or shorted through a resistor under supervision prior to disposal.

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11. Regulatory Compliance

Products manufactured by XUNZEL ENERGY are designed to comply with applicable international standards.

⚠️ **Disclaimer**

The information in this manual is provided for guidance only. XUNZEL ENERGY shall not be liable for any damage or injury resulting from failure to follow these instructions or use outside the specified operating limits.