LiFePO4 Battery 51.2V 400Ah - User Manual (English)

User Manual

LiFePO4 Battery - 51.2V 400Ah (Model: LFR-51.2-400NP)

> ⚡ Important Safety Notice Please read this manual carefully before installing or operating the battery. Failure to follow these instructions may result in damage to the battery, injury, or voiding of warranty.

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1. Product Introduction

Welcome to the 51.2V 400Ah LiFePO4 Lithium Iron Phosphate Battery — a high-performance, safe, and long-lasting energy storage solution designed for solar energy systems, backup power, electric vehicles, and off-grid applications.

Key Features

- Long Cycle Life: >4000 cycles at 80% Depth of Discharge (DOD)
- Built-in Smart BMS: Comprehensive protection against overcharge, over-discharge, short circuit, and temperature extremes
- Lightweight Design: Approximately 1/3 the weight of comparable lead-acid batteries
- Wide Temperature Range: Operates in environments from -20°C to 60°C
- High Efficiency: >90% charge/discharge efficiency
- Maintenance-Free: No water refilling or equalization charging required

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2. Technical Specifications

Parameter	Specification	Remarks

Model Number	LFR-51.2-400NP	—
Nominal Voltage	51.2V	16 cells × 3.2V
Nominal Capacity	400 Ah	—
Energy	20.48 kWh	51.2V × 400Ah
Weight	approx. 128 kg	—
Dimensions (L×W×H)	1060 × 255 × 270 mm	With case

Charge Specifications

Parameter	Value
Recommended Charge Current	50-70 A
Maximum Charge Current	80 A
BMS Charge Voltage Cut-off	59.5 V
Reconnect Voltage	58.0-58.4 V
Balancing Current	20 mA
Balancing Voltage	3.5 V

Discharge Specifications

Parameter	Value
Max. Continuous Discharge	100 A
Peak Discharge Current (1 sec)	200 A
BMS Discharge Current Limit	100 A
Recommended Cut-off Voltage	40-42 V
BMS Discharge Cut-off	38.5 V
Short Circuit Protection	200-600 μs

Temperature Specifications

Parameter	Range
Discharge Temperature	-20 ~ 60°C
Charge Temperature	0 ~ 45°C
Storage Temperature	-20 ~ 40°C
BMS High Temperature Protection	80°C
Reconnect Temperature	50°C

Mechanical Specifications

Parameter	Value
Terminal Type	M8
Enclosure Protection	IP56
Case Material	Metal
Cell Type	Prismatic

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3. Safety Information

> **Warning**

General Safety

- DO NOT puncture, crush, or drop the battery pack
- DO NOT disassemble or modify the battery or BMS
- DO NOT short circuit the positive and negative terminals
- DO NOT expose the battery to fire or extreme heat
- DO NOT immerse the battery in water or liquids
- DO NOT charge the battery at temperatures below 0°C
- DO NOT discharge the battery at temperatures below -20°C
- DO NOT operate the battery above 60°C

Electrical Safety

- Always use appropriate over-current protection devices
- Ensure proper grounding before installation
- Verify polarity before making electrical connections
- Use cables and connectors rated for the current specifications
- Turn off the battery breaker before performing any maintenance

Handling Precautions

- The battery weighs approximately 128 kg — use proper lifting techniques
- Install in a well-ventilated area
- Keep away from children and pets
- Store in a cool, dry place when not in use
- Dispose of properly at designated recycling facilities

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4. Installation Guide

Pre - Installation Checklist

☐ Verify the battery model and specifications match your requirements

☐ Ensure the installation area meets temperature and ventilation requirements

☐ Check all tools and materials are available

☐ Review local electrical codes and regulations

☐ Ensure the mounting surface can support the battery weight (128 kg)

Installation Steps

Step 1: Select Location

Choose a location that meets the following criteria:

- Indoors or covered area with protection from direct sunlight
- Ambient temperature: -20°C to 40°C (optimal: 15-25°C)
- Good ventilation (minimum 10cm clearance on all sides)
- Away from flammable materials
- Accessible for maintenance

- Floor or mounting surface rated for heavy load

Step 2: Mount the Battery

1. Position the battery in the desired location
2. Secure using appropriate mounting hardware
3. Ensure the battery is level and stable
4. Maintain minimum clearances as specified

Step 3: Electrical Connections

> ⚡ Electrical connections must be performed by qualified personnel only!

1. Check polarity — Red terminal is positive (+), Black terminal is negative (-)
2. Select appropriate cables — Use cables rated for minimum 100A
3. Install M8 terminal connectors — Tighten to proper torque specifications
4. Connect to charge controller/inverter — Follow manufacturer instructions
5. Install over-current protection — Use appropriately rated fuse or breaker
6. Verify all connections — Check for tightness and security

Step 4: Initial Setup

1. Verify all connections are secure
2. Turn on the battery breaker
3. Check voltage readings on the BMS display (if equipped)
4. Configure charge controller/inverter settings per manufacturer guidelines

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5. Operation Guide

Charging

1. Connect charger — Use a LiFePO4-compatible charge controller
2. Set appropriate parameters:
    - Bulk/Absorption voltage: 56-58V (recommended: 57.6V)
    - Float voltage: 54V
    - Maximum charge current: 80A (recommended: 50-70A)

3. Monitor charging — The BMS will automatically stop charging at 59.5V
4. Charging time — Approximately 8-10 hours from 20% to 100%

Discharging

1. Connect load — Ensure total load does not exceed 100A continuous
2. Monitor battery status — Check voltage periodically during use
3. Low voltage warning — Recharge when voltage reaches 40-42V
4. BMS cutoff — Battery will disconnect at 38.5V to prevent damage

Parallel Connection

- No limit on number of batteries in parallel
- All batteries should be at similar state of charge before connecting
- Use identical model batteries for parallel connections
- Ensure all parallel cables are the same length
- Install individual fusing for each parallel string

> ✕ Important: This battery model does NOT support series connection. Only parallel connections are allowed.

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6. Maintenance

Regular Maintenance Schedule

Frequency	Task
Monthly	Check terminal connections for corrosion or looseness
Monthly	Inspect battery case for damage
Monthly	Check ventilation openings are clear
Quarterly	Clean battery terminals if needed
Quarterly	Verify BMS readings match actual voltage
Annually	Full capacity test if possible

Tips for Optimal Performance

- Keep the battery charged between 20-80% for longest cycle life
- Avoid storing at full charge for extended periods
- Operate at room temperature when possible
- Perform periodic equalization charges (optional, not required)
- Keep terminals clean and protected from corrosion

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7. Troubleshooting

Common Issues and Solutions

Problem	Possible Cause	Solution
Battery won't charge	Temperature too low/warm	Wait for optimal temperature range
Battery won't charge	BMS protection triggered	Check for short circuit or overload
Battery discharges quickly	Battery at end of life	Consider replacement
Battery discharges quickly	High ambient temperature	Improve ventilation
BMS shows error	Loose connections	Check and tighten all connections
BMS shows error	Cell imbalance	Contact manufacturer
Battery swells	Overcharge or defect	STOP USING IMMEDIATELY — contact supplier

BMS Protection Functions

The built-in BMS provides the following protections:

- Over-charge protection (59.5V cutoff)
- Over-discharge protection (38.5V cutoff)
- Over-current protection (100A continuous, 200A peak)
- Short circuit protection (200-600µs response)
- High temperature protection (80°C cutoff)

- Low temperature protection (charge below 0°C)
- Cell balancing

> 四 If the battery shows signs of damage, swelling, leakage, or unusual behavior, stop use immediately and contact your supplier.

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8. Storage Guidelines

Short-Term Storage (Less than 3 months)

- Store at 40-60% state of charge
- Temperature: -20°C to 40°C
- Keep in a dry, ventilated location
- Recharge every 3 months if stored longer

Long-Term Storage (More than 3 months)

- Store at 40-60% state of charge
- Ideal temperature: 15-25°C
- Recharge every 6 months to prevent deep discharge
- Disconnect from all loads

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9. Warranty Information

Warranty Terms

- Warranty Period: 3 years from date of purchase
- Coverage: Manufacturing defects in cells, BMS, and housing
- Conditions:
  - Must be installed by qualified personnel
  - Must operate within specified parameters
  - Must maintain proper maintenance records
  - Damage from misuse, abuse, or unauthorized modifications not covered

Warranty Exclusions

The warranty does NOT cover:

- Damage from improper installation
- Damage from operating outside specifications
- Damage from physical impact or abuse
- Damage from water ingress (IP56 rating voided if case opened)
- Normal wear and tear
- Consequential damages

> 圈 For warranty claims, please contact your authorized dealer or the manufacturer directly.

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10. Disposal and Recycling

> 廿 Environmental Protection

This battery contains lithium and other recyclable materials. DO NOT dispose of in regular household waste.

Please dispose of the battery at:

- Authorized battery recycling centers
- E-waste collection points
- Professional battery recycling services

Follow local regulations for proper disposal of lithium batteries.

This user manual contains important safety and operating instructions. Please retain for future reference.
