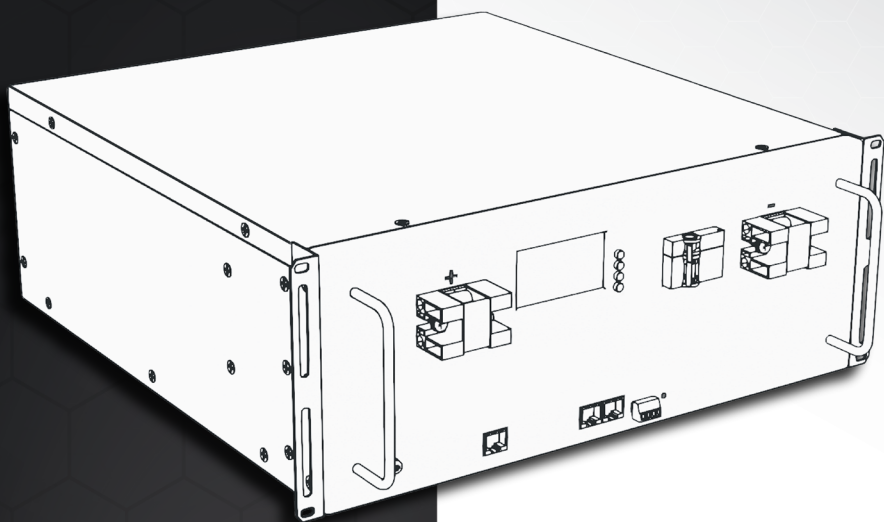


# EXPERT POWER<sup>®</sup>

[www.ExpertPower.us](http://www.ExpertPower.us)



## 48 Volt

## BATTERY

## LiFePO<sub>4</sub>

Lithium Iron Phosphate

## EP48100



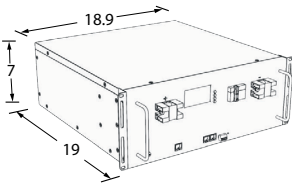
## Overview

The ExpertPower EP48100 battery is optimized to be a high energy density storage solution for commercial or residential use; our modular solution allows parallel connections of up to 51.2KWH and discharge of 100A per battery for large commercial applications.

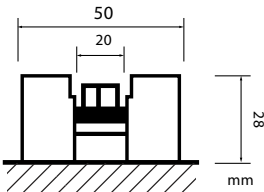
## Features

- RS485 communication for computer monitoring.
- Built-in BMS with automatic protection for a variety of conditions.
- Built-in cell by cell monitoring
- Convenient modular approach for easy replacement and maintenance.
- A+ grade cells for reliable and long lasting power

## Battery Dimensions



## Terminal Dimensions



## Battery Specifications

NOMINAL CHARACTERISTICS	
Nominal Voltage	51.2 V
Nominal Capacity ( 77°F, 0.2C )	100 Ah
Normal Energy ( 77°F, 0.2C )	5120 Wh
MECHANICAL CHARACTERISTICS	
Dimensions ( L x W x H )	19 x 18.9 x 7 in
Weight	98 lbs
Terminal	M6
ELECTRICAL CHARACTERISTICS	
Max. Charge Current	50 A
Max. Constant Discharge Current	100 A
Charge Voltage	56 V
Cut-off Voltage	40 V
Charging Standard	CC: 0.2C to 56 V CV: 56 V Floating: 55.2 V - 56 V Charging end current: 0.01C
OPERATION CONDITIONS	
Estimated Life ( 77°F )	> 10 Years
Cycle Life ( 0.2C, 77°F )	8000 with 50% DOD 4000 with 80% DOD 3000 with 100% DOD
Operating Temperature	Charging: 32 - 131°F Discharging: -4 - 131°F
Storage Time / Temperature	Less than 18 months at -4 - 77°F Less than 12 months at 25 - 95°F Less than 3 months at 95 - 131°F
GENERAL INFORMATION	
Casing Material	Steel
Assembly	16S1P - Single cell Capacity 100Ah
Recommended Charging Type	CC - CV - Float charge
BMS	Integrated with LCD display

# EP48100

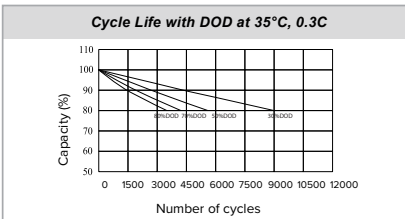
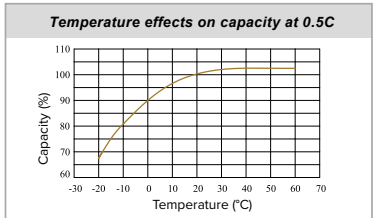
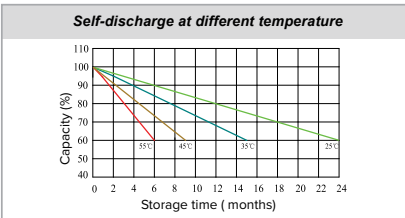
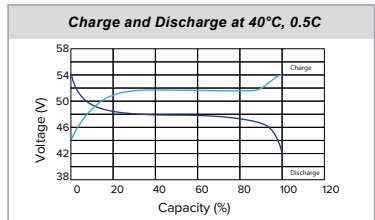
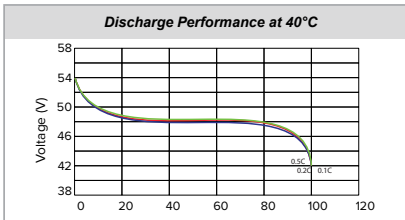
## LiFePO4 Deep Cycle

### BMS Parameters

TYPE		FUNCTION	SETTING VALUE	DELAY	RECOVERY
CHARGING	Cell	Over Voltage Alarm	3.5V		
		Over Voltage Protection	3.7V	1-2S	1. Discharging Current > 1A or 2. Cell Voltage < 3.38V 3. SOC < 96%
	Battery	Over Voltage Alarm	56V		
		Over Voltage Protection	59V	1-2S	1. Discharging Current > 1A or 2. Battery Voltage < 54.8V 3. SOC < 96%
	Current	Over Current Protection	> 120A	1-2S	Auto recover after 60s
DISCHARGING	Cell	Low Voltage Alarm	2.7V		
		Low Voltage Protection	2.5V	1-2S	1. Charging Current > 1A or 2. Cell Voltage > 2.9V
	Battery	Low Voltage Alarm	43.2V		
		Low Voltage Protection	40V	1-2S	1. Charging Current > 1A or 2. Battery Voltage < 46.4V
	Current	Over Current Protection	120A	1S	1. Charging Current > 1A or 2. Auto recover after 60S
≥ 150A			0.5S		
CELL TEMPERATURE	Charging	High & Low Temperature Alarm	≥ 131°F or ≤ 32°F		
		High & Low Temperature Protection	≥ 158°F or ≤ 23°F		> 32°F and < 131°F
	Discharging	High & Low Temperature Alarm	≥ 140°F or ≤ 14°F		
		Low Temperature Protection	≥ 149°F or ≤ -4°F		> 14°F and < 140°F
BMS TEMPERATURE	High Temperature Alarm		≥ 194°F		
	High Temperature Protection		≥ 239°F		< 185°F
AMBIENT TEMPERATURE	High & Low Temperature Alarm		≥ 140°F or ≤ -4°F		
	High & Low Temperature Protection		≥ 149°F or ≤ -13°F		> -4°F and < 140°F
STATE OF CHARGE	Low Capacity Alarm		≤ 5%		> 5%

## Battery Operation Performance

Performance may vary depending on, but not limited to, battery usage and application. If the battery is used outside its specified operation instructions and maintenance requirements, the battery is expected to deteriorate, become damaged/non-operational, or significantly reduce its operational quality. All information and specifications provided here represent general operational standards across our manufactured batches. If your battery falls significantly outside of these specification ranges, please contact us for further information before use; it could indicate a defective battery or an update in batch specifications.

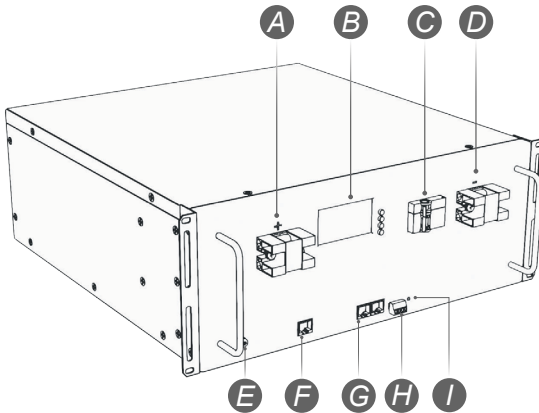


# EP48100

## LiFePO4 Deep Cycle

### Components

For detailed information, reference page numbers are provided in parentheses (p.xx).



- A Positive Terminal
- B Smart BMS Display (p.4-7)
- C DC Breaker ON/OFF
- D Negative Terminal
- E Ground Terminal
- F RS-485 Port for Inverter Communication
- G RS-485 Port for PC and Battery
- H Intercommunication Dry Contact
- I Reset Button

### Smart BMS Display

Monitor your battery health and status by using the different menus which allow you to monitor and view the status of each internal cell as well as all 14 different protections. Navigate using the MENU, ENTER, DOWN, and ESC buttons located on the right side of the display.

```
Welcome To Use
Smart BMS
-----
Press MENU Key
```

- MENU** — Menu Button for Main Menu Access
- ENTER** — Enter Button to Select Menu
- DOWN** — Down Button to Navigate
- ESC** — Escape Button for Previous Window

```
>> Analog Info >>
--BMS Status>>
--Para Setting >>
--Sys Setting>>
```

#### Main Menu

- Analogue Information
- Battery Management System
- Parameter Settings
- System Settings

## Analog Info Menu

```

>> PackV: 52.70 V
--Im: -16.24 A
--Temperature>>
--Cell Voltage>>
    
```

```

>> CellCapacity>>
    
```

```

--T1: 26.9°C
--T2: 26.9°C
--T3: 26.7°C
--T4: 27.0°C
    
```

```

--PCB_T: 29.0°C
--ENV_T: 30.5°C
    
```

```

--Ce1101: 3294 mV
--Ce1102: 3293 mV
--Ce1103: 3293 mV
--Ce1104: 3292 mV
    
```

```

SOC: 96.30%
FCC: 99.6Ah
Rm : 95.9Ah
CC : 74
    
```

### Analogue Information

<b>PackV:</b>	Battery Voltage
<b>Im:</b>	Charge/ Discharge Current
<b>Temperature:</b>	Cell by Cell Temperature
<b>Cell Voltage:</b>	Cell by Cell Voltage
<b>Cell Capacity:</b>	Battery's SOC, FCC, Rm, and CC

1

### Temperature

Cell by Cell Temperature Monitoring
<b>PCB_T:</b> Printed Circuit Board Temperature
<b>ENV_T:</b> Environment Temperature

2

### Cell Voltage

Cell by Cell Voltage Monitoring
---------------------------------

3

### Cell Capacity

<b>SOC:</b> State of Charge
<b>FCC:</b> Full Charge Capacity
<b>Rm:</b> Remaining Capacity
<b>CC:</b> Cycle Times

### BMS Status Menu

```

>> Status:      DSG
--Record>>
--BMS Status>>
    
```

```

>> SCP:         1
--O/UTP:       2
--OCP:         3
--UVP:         4
    
```

```

>> OVP:         5
    
```

```

>> OT:          N
--OTP:         N
--OV:          N
--OVP:         N
    
```

```

>> UV:          N
--UVP:         N
--OC:          N
--OCP:         N
    
```

```

>> SCP:         Y
--Failure:     N
    
```

### Battery Management System Status

**Status:** Battery Status

**Record:** Protection History

**BMS Status:** Short Circuit Protection (SCP) and Failure Status

1

### Record

**SCP:** Short Circuit Protection History

**O/UTP:** Over and Under Temperature Protection History

**OCP:** Over Current Protection History

**UVP:** Under Voltage Protection History

**OVP:** Over Voltage Protection History

2

### BMS Status

**OT:** Over Temperature

**OTP:** Over Temperature Protection

**OV:** Over Voltage

**OVP:** Over Voltage Protection

**UV:** Under Voltage

**UV:** Under Voltage Protection

**Y:** Yes

**N:** No

**SCP:** Short Circuit Protection

**Failure:** Failure Status

**OC:** Over Current

**OCP:** Over Current Protection

## Para Setting Menu

```
--Non-production  
manufacturer can  
not use.
```

### Parameter Setting

Manufacturing Use Only

## Sys Setting Menu

```
--Baud rate:9600
```

### System Setting

Current Baud Rate

## Reset Button

The provided reset button allows you to place the battery's Battery Management System (BMS) into a low-power or sleep mode. To transition IN or OUT of low-power mode, simply press and hold the reset button for a duration of 3 to 6 seconds. This action will enable you to control the power state of the battery.

## Battery Communication Pinout

The ExpertPower EP48100 battery employs the industry-standard ANSI/TIA 568B protocol for communication. It incorporates a dedicated cable for facilitating intercommunication among batteries. To ensure seamless computer-based communication and monitoring, we invite you to visit our website for detailed instructions on utilizing the PBMS Tools in conjunction with your battery and computer.

For establishing communication with your inverter, we recommend that you consult with the manufacturer of your specific inverter model. They will be able to provide you with the requisite pinout information for the inverter's end, ensuring a compatible and efficient connection. Additionally, please ensure that the battery protocol on your inverter is set to "LIB" to facilitate proper communication.

## Caution

To ensure the effectiveness and longevity of your battery configuration, adhere to these essential guidelines:

1. **Battery Consistency:** Utilize identical batteries for parallel connections.
2. **Uniform Voltage Levels:** Prior to connecting in parallel, guarantee that all batteries share the same voltage level by fully charging each individual battery. The permissible voltage difference is less than 0.2V.
3. **Avoid Mixing Batteries:** Do not combine old and new batteries within the same setup.
4. **Parallel and Series Separation:** Avoid simultaneous parallel and series connections for the batteries.
5. **Circuit Limitation:** Do not exceed connecting more than 10 batteries per circuit.



# EP48100

## LiFePO4 Deep Cycle

6. **Regular Maintenance:** Annually, the batteries should be individually charged after being detached from the series. Upon reassembly, the voltage difference should not exceed 0.5V.

Compliance with these precautions ensures reliability and longevity for this LiFePO4 battery system.

### Warnings

1. Do not immerse the battery in water or allow it to get wet.
2. Do not use or store the battery near sources of heat such as a fire or heater.
3. Do not reverse the positive (+) and negative (-) terminals.
4. Do not connect the battery directly to wall outlets or car cigarette-lighter sockets without proper charging equipment. Do not allow exposed ends of cables connected to opposite terminals to touch.
5. Do not put the battery into a fire or apply direct heat.
6. Do not use the battery if the battery casing has been pierced, broken, cracked, or otherwise visibly damaged. Do not forcibly open the battery casing for any reason.
7. Avoid severe physical shock. Do not throw the battery or heavily strike the battery in any way. Do not put excessive pressure or step on the battery.
8. Never solder anything directly to the battery terminals.
9. Do not attempt to disassemble or modify the battery in any way.
10. Do not place the battery in a microwave oven or pressurized container.

### Series & Parallel Configuration

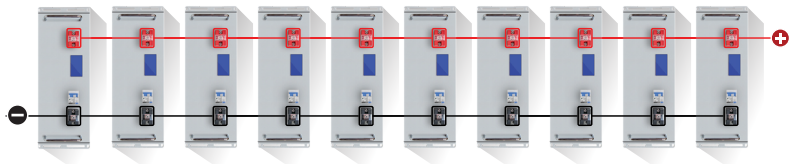
Our system supports expansion with up to 10 batteries connected in parallel, achieving a robust 48V 1000Ah setup.

**EP48100 batteries cannot be used in series.**

#### Wiring Considerations

During the wiring of sequenced batteries, it is imperative to adhere to the following guidelines to ensure optimal safety and performance:

- **Avoid Connecting to a Single Battery:** Do not connect both negative and positive wires from your electrical system to a single battery. Also, avoid connecting them to batteries located in the middle of the sequence.
- **Wiring Multiple Batteries in Parallel:** When connecting several batteries in parallel, it is important to ensure that the negative and positive wires from your electrical system are attached to the battery bank correctly. The first battery in the sequence should have its negative terminal connected to the negative wire of your system, and the last battery in the sequence should have its positive terminal connected to the positive wire of your system. Please note that these batteries cannot be connected in series.



10 In Parallel - 48V 1000Ah

## Battery Charging

Efficiently charging LiFePO<sub>4</sub> Batteries involves a precise 2-stage algorithm known as "Constant Current/Constant Voltage" (CC/CV). Following the standard LiFePO<sub>4</sub> profile, the process entails a 0.2C Constant Current (CC) charge up to 56.8V, followed by Constant Voltage (CV) at 56V charge until the current reduces to  $\leq 0.05C$ .

For optimal results with a 100Ah LiFePO<sub>4</sub> battery, we recommend adhering to these specifications:

- **Recommended Max Charging Current:** Ideally, the charging current should not exceed 50A (0.5C). However, when circumstances demand, a faster charge of 100A (1C) can be employed. Nonetheless, consistent usage of the 1C charge method may lead to reduced battery lifespan and capacity due to heightened heat generation during this process.

It's crucial to note that the utilization of chargers designed for other battery types, such as SLA and Gel chargers, is strongly discouraged. These chargers, tailored for acid-based chemistries, often come with features like desulfation, equalization, and float charging, which are detrimental to LiFePO<sub>4</sub> batteries. The built-in BMS may not suffice to safeguard against the potential damage incurred from using such chargers.

The improper use of SLA chargers can trigger adverse effects:

- **Accelerated Aging:** Maintaining a LiFePO<sub>4</sub> battery at 100% charge using the SLA float charging feature could significantly expedite the aging and degradation process due to the constant stimulation of battery cells.
- **Polarization and Electrolyte Decay:** The excess power supplied by an SLA charger can lead to material buildup at the electrode-electrolyte interface, known as polarization, and result in electrolyte decay.

Additionally, using an SLA charger with an OCV (Open-Circuit Voltage) detection setting might damage the battery and fail to revive an over-discharged LiFePO<sub>4</sub> battery. The BMS will deactivate the battery for protection, resulting in a situation where the battery is seemingly in an open-circuit state.

To prevent these issues and ensure optimal battery performance:

- **Use Correct Charging Algorithm:** Employ the appropriate CC/CV algorithm (56V) for LiFePO<sub>4</sub> batteries. SLA smart chargers lack the capability to fully charge or properly maintain LiFePO<sub>4</sub> batteries.

## Usage and Storage

1. **Before Use Inspection:** Before using the battery, conduct a thorough examination to ensure its integrity, free from visible damage or structural irregularities.
2. **Terminal and Other Visual Checks:** Do not use the battery if terminals are bent, broken, or if the battery exhibits any of the following conditions: abnormal heat, leaks, water exposure, severe physical or water damage extending to the battery from the packaging, leaks, loose components, cracked casing, bloating, melting, heavy stress, or indentation. In such instances or if there are concerns about the battery's integrity, promptly contact our support team for expert assistance.
3. **Professional Installation:** For optimal performance and prevention of damage or malfunctions, it is strongly recommended to have these battery packs installed by a professional or experienced individual. Monitor charging and discharging during initial use, and diligently observe temperature and operational performance. Any operational issues should be directed to our support team.
4. **Proper Storage Conditions:** Store the battery pack in a well-ventilated, cool, and dry environment. Avoid stacking it under heavy objects, exposing it to high temperatures, open flames, or corrosive substances.
5. **Temperature and Humidity Considerations:** Store the battery within specified temperature conditions. Maintain a recommended humidity of  $60\pm 15\%$ .

- 6. Ideal Storage Capacity:** Store the battery at a capacity between 40% and 60%. Every three months during storage, follow these steps:
- Fully charge the battery.
  - Discharge the battery completely.
  - Recharge the battery to a capacity between 40% and 60% to prevent over-discharge during storage.

### *Warranty & Disclaimer*

These batteries have a four year warranty. This warranty guarantees that the batteries will be free from defects in materials and workmanship under normal use. However, it does not cover damages caused by customer abuse, improper handling, overcharging, undercharging, water damage, fire, or any other circumstances beyond our control like natural disaster. Furthermore, the warranty does not extend to normal wear and tear, capacity loss over time, or gradual decrease in battery performance.

This warranty will not apply where the product has been misused, neglected, improperly installed, or repaired by anyone other than ExpertPower. In order to qualify for the warranty, the product must not be disassembled or modified. Repair, replacement or credit are our sole remedies, and ExpertPower shall not be liable for damages, whether direct, incidental, special, or consequential, even caused by negligence or fault.

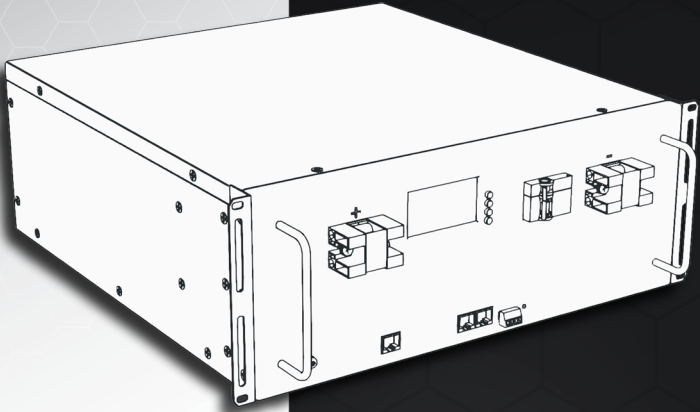
For your safety and the optimal functioning of your electrical system, we strongly advise engaging a qualified professional for installation. Properly handling electrical connections and components demands a comprehensive grasp of electrical principles and adherence to local building codes, along with appropriate installation techniques. Employing a trained professional ensures accurate and secure installation, significantly reducing the risk of accidents and equipment damage.

### *Terms and Conditions*

Prior to operation, carefully review all specifications, usage instructions, storage conditions, and warnings detailed in this document. Adherence to our handling and operation guidelines for this battery pack is paramount. Misuse of batteries can lead to malfunction, capacity reduction, degradation, overheating, explosion, or fire hazard. Responsibility for appropriate usage and storage, as outlined in this document, rests solely with the customer. If the battery exhibits excessive heat, leaks, malfunctions, visible damage, or fails to operate as expected, refrain from use and promptly contact our support team for assistance.

ExpertPower is not responsible for any damages resulting from the misuse of this battery, whether intentional, accidental, or environmental such as damage due to natural disaster or improper storage or exposure to the elements.

# EP48100



## LiFePO4 Battery

### SUPPORT INFORMATION



Address ..... **6437 Alondra Blvd  
Paramount, CA 90723**

Phone ..... **(562) 630-3002**

Fax ..... **(562) 630-3006**

Email ..... **support@expertpower.us**

Website ..... **ExpertPower.us**