



24V 100Ah



24V 200Ah



24V 280Ah

ML-S01

Marvel Lithium (LiFePO₄)

New lead Acid Replacement Battery

User Manual

CAUTION

- Flammable/explosive hazard
- Avoid mechanical impact
- Do not short circuit
- Do not crush
- Do not disassemble
- Do not incinerate
- Do not heat above 149°F / 65°C
- Do not exceed charging voltage of 29.2V
- Do not immerse the battery in water
- Do not reverse the polarity of the battery and charger
- Use the appropriate tools when handling the battery
- When connecting batteries in series/parallel, do not use batteries from other brands/types (BMS may not be compatible)
- This battery should be charged using a lithium iron phosphate battery charger with a charging voltage of $29.2 \pm 0.2V$
- Keep the battery away from fire, hazardous materials, or substances

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Product Overview

■ Key Features

Lithium Iron Phosphate(LiFePO₄)chemistry provides exceptional stability and consistent performance

Advanced Battery Management System(BMS) ensures product safety and long lifespan

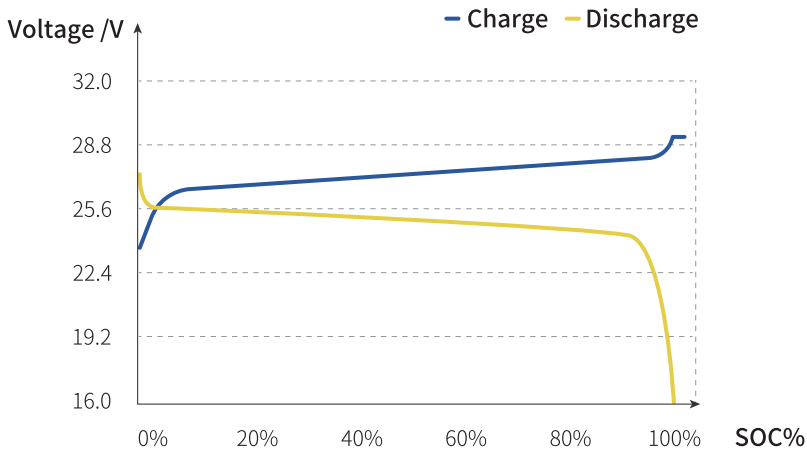
Supports fast charging and discharging

Constant voltage and full usable capacity at any state of charge

IP21 Rated (Dust and Water Resistant)

Grade UL94 V-0 (Fireproof)

■ Charge-discharge Curve @ 77°F/25°C

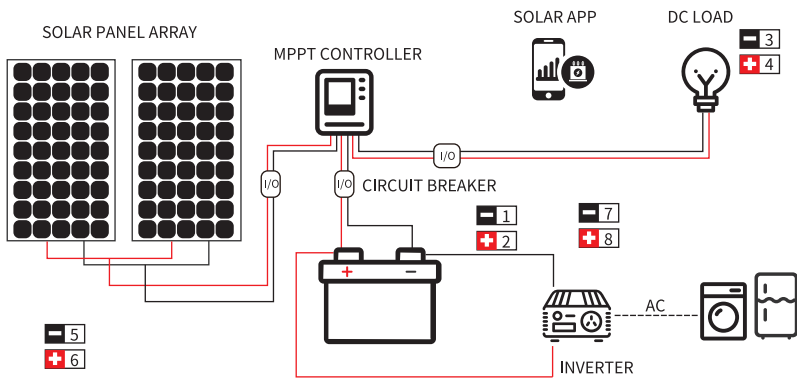


Sample: 24V100Ah battery

*Environmental conditions required for all tests: $77 \pm 9^\circ\text{F} / 25 \pm 5^\circ\text{C}$

■ Connection Diagram

Note: for a 24V100Ah battery, the usage is the same for other models



■ Battery Management System(BMS) Warning and Protection

Content	ML100-25.6-S01	ML200-25.6-S01	ML280-25.6-S01
Standard/Maximum Continuous Charging	20A/100A	40A/200A	40A/200A
Max Continues Discharge Current	100A	200A	200A
Over-charge Voltage Protection	$29.2 \pm 0.2V$	$29.2 \pm 0.2V$	$29.2 \pm 0.2V$
Over-charge Voltage Protection Release	$29.2 \pm 0.2V$	$29.2 \pm 0.2V$	$29.2 \pm 0.2V$
Over-discharge Voltage Protection	$18.4 \pm 0.24V$	$18.4 \pm 0.24V$	$18.4 \pm 0.24V$
Over-discharge Voltage Protection Release	$21.6 \pm 0.24V$	$21.6 \pm 0.24V$	$21.6 \pm 0.24V$
Over-current Discharge Protection	$300 \pm 50A$	$300 \pm 50A$	$300 \pm 50A$
Over-current Charge Protection	$130 \pm 20A$	$130 \pm 20A$	$130 \pm 20A$
Short Circuit Current Protection	Support		
Release Condition	Cut Load		
Charging High Temperature Protection	$149 \pm 41^{\circ}F$	$149 \pm 41^{\circ}F$	$149 \pm 41^{\circ}F$
Discharge High Temperature Protection	$158 \pm 41^{\circ}F$	$158 \pm 41^{\circ}F$	$158 \pm 41^{\circ}F$
High Temperature Protection Release Condition	Drop by $50 \pm 41^{\circ}F$		
Charging Low Temperature Protection	$32 \pm 41^{\circ}F$	$32 \pm 41^{\circ}F$	$32 \pm 41^{\circ}F$
Discharge Low Temperature Protection	$-4 \pm 41^{\circ}F$	$-4 \pm 41^{\circ}F$	$-4 \pm 41^{\circ}F$
Temperature Protection Release Condition	Rise by $50 \pm 41^{\circ}F$		

■ Battery Parameters

Content	ML100-25.6-S01	ML200-25.6-S01	ML280-25.6-S01
Weight(lbs)	23kg	39kg	53kg
Dimensions(inch)	460*172*190mm	480*338*190mm	370*353*274mm
Terminal Bolt Size	M8	M8	M8
Rated Voltage	25.6V		
Standard Charging Voltage	28.6±0.2		
Shipping Voltage	25.6V~29.2V		
Shipping Capacity	50%		
Cycle Life	6000@80%DOD		
Self Discharge Rate	<3%/Month		
Series & Parallel Connections	4 Parallel (Max)2 Series(Max)		
Communications	Not Supported		
Case Material	Metal		
Waterproof Grade	IP21		
Battery Pack Certifications	IEC62133/RoHS/CE/UN38.3/Class9		
Cell Certifications	UL1642/UL2580/UN38.3		
Storage Temperature	32~140°F		

■ Charging with AC-DC Battery Charger

Check the AC-DC battery charger you intend to use has a dedicated lithium charge setting that meets the below charging requirements. A lot of battery chargers are designed for charging lead-acid batteries only and may not have a suitable charge setting for LiFePO4 battery

Charging Tips:

- ▶ Use a 28.6V LiFePO4 battery charger
- ▶ Recommended Charging Voltage: 28.6 ± 0.2
- ▶ Recommended Charging Current:

Charging Current \ Battery Model	ML100-25.6-S01	ML200-25.6-S01	ML280-25.6-S01
20A	5h	10h	14h
50A	2h	4h	5.6h

*Comparison of charging time for 24V series batteries

■ Installation Environment

The battery should be installed in a clean, cool, and dry place, away from water, oil, and dirt. The accumulation of these substances on the battery may cause leakage, resulting in self-discharge and possible short circuits. Adequate ventilation must be maintained to prevent the battery from overheating, and temperature fluctuations between the batteries should be minimized as much as possible.

■ Preparation

Before installing and handling the battery, it is recommended that the following equipment or tools be available:

- ▶ Proper insulation protection equipment and tools
- ▶ Multimeter, battery cables
- ▶ Battery Charger/Charge Controller

■ Inspection

Check for visible damage, including cracks, dents, deformations, and other visible anomalies. The top of the battery and terminal connections should be clean, dry and free of dirt and corrosion. If you find any problem with the battery, please contact us for assistance.

1. Do not short the battery terminals, as doing so may cause a current burst leading to irreversible damage to the system and battery.
2. Please check the polarity before wiring. Polarity reversal will damage the battery.
3. Protect all electrical equipment with circuit breakers, fuses, or appropriately sized circuit breakers as specified by a qualified electrician, licensed installer, or regional regulatory authority.

■ Cable Size

Cable size should be selected based on the expected load.
Refer to the table below for the amperage of copper cables of different sizes.

Cable Specification and Capacity(AWG /MM2)	Current Capacity(A)
14(2.08)	20
12(3.31)	25
10(5.25)	35
8(8.36)	50
6(13.3)	65
4(21.1)	85
2(33.6)	115
1(42.4)	130
1/0(53.5)	150
2/0(67.4)	175
4/0(107)	230

■ Best Practice Guidelines

1. Same brand
(Do not connect any other brand, LiFePo4 battery due to differences in the bms)
2. Same battery type(LiFePO4)
(Do not connect any other battery type with this battery - such as li-ion, SLA etc)
3. Same voltage, it is recommended to use the battery fully charged (24V).
4. Same capacity.
5. The two batteries should be no more than 3 months older than each other.

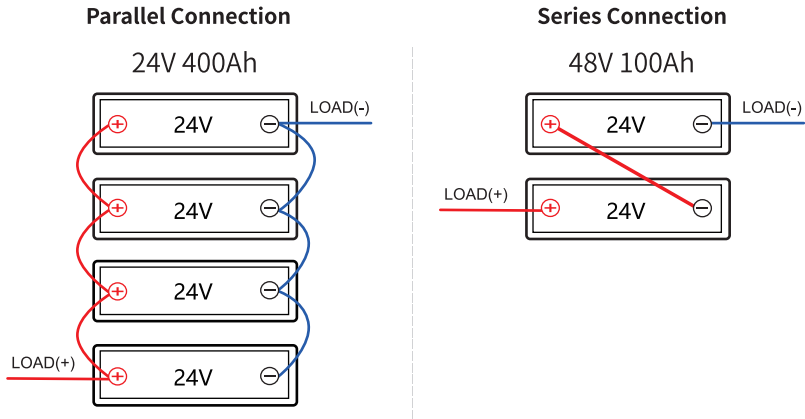
■ Connection Steps

STEP1. Fully charge the battery separately

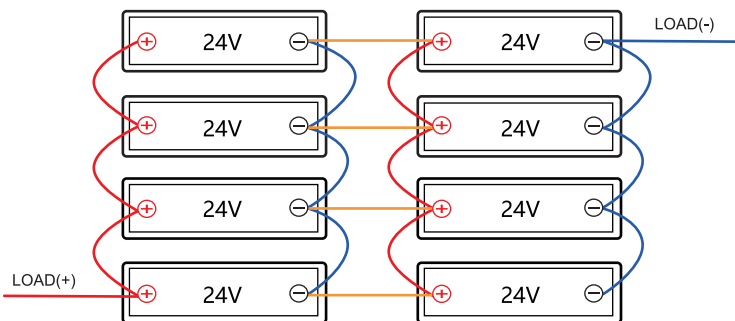
STEP2. Wait 15mins then test the voltage, it should be $>26V$

STEP3. Connect your batteries in series or / and in parallel

(Taking a 24V100Ah battery as an example)



Max. Connect in Series & Parallel(2S4P)



Taking a 24V100Ah battery as an example, first, four 24V100Ah batteries are connected in parallel, and then two 24V 400Ah batteries are connected in series, resulting in a battery pack with a total of 48V and 400Ah.

Over Charge Protection Voltage(>29.2V) //

If an individual cell voltage exceeds a prescribed threshold during charging, the BMS will stop the charging

Over Discharge Protection Voltage(<18.4V) //

If an individual cell falls below the prescribed threshold during discharge the BMS will prevent further discharge when the battery voltage reaches over 21.6V, the battery will automatically reconnect after 15 seconds

Charging High Temperature Protection //

The BMS will not allow a discharging current if the internal temperature of the battery has reached 149°F/65° C

Discharging High Temperature Protection //

The BMS will not allow a discharging current if the internal temperature of the battery has reached 158°F /70°

Low Temperature Charging/Discharging //

The BMS will not allow a charging current under 32°F (0°C) but will continue to discharge down to -4°F (-20°C)

Over Current/Short Circuit Discharge Protection //

If the over current/short circuit protection is tripped, the BMS will shut the battery down and will remain disconnected until you remove the battery cables. While the battery cables are disconnected, we suggest taking the battery voltage with the use of a voltmeter. If it reads above 21.6V, reconnect the battery cables. If you are unsuccessful at obtaining a voltage reading above 21.6V, please contact our technical support team: service@wattcycle.com

Cell Balancing //

A passive balancing process is activated by the BMS at the top of each charge cycle when the battery voltage exceeds 27.8V. This ensures that all the cells remain at the same state of charge, which helps pack performance

The above data can be viewed on Page 03.

■ Wide Application

RV

Solar Energy Storage

Industrial Battery

Used to Replace 24V Lead-acid Batteries

Home Energy Storage & Power Wall

Nautical Applications

Fishing, Boating Electronics

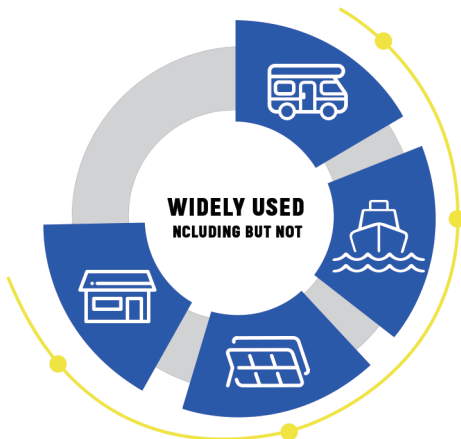
Ice Fishing

Recreational Vehicle

Off-grid Life

Deep Circulation Application

Not Suitable For Starting Gasoline Engines



What should I do if the battery is 0 V ?

Don't worry, if the battery is showing 0 V, this is potentially due to BMS protection. Please disconnect the battery cable from the load, test the battery voltage, if the voltage is more than 21.6V reconnect the battery cable. If the voltage is lower than 21.6V, please contact our technical team: service@wattcycle.com

Is it necessary to charge the battery out of the box ?

Yes, you need to fully charge the battery. NOTE: Please also fully charge the battery if you want to connect the batteries in series or parallel.

How can I check the battery voltage ?

If you don't have a battery monitor , you can use a multimeter to monitor the voltage.

Can mount the battery in any position ?

You can mount our battery in any position. Please make sure to secure and protect the terminals when mounting.

■ Warranty

Scan For Your E-Warranty



Not covered by warranty:

- Damage caused by insufficient or improper fastening.
- Improper installation, use, maintenance, or service.
- Loose battery terminal connections.
- Series connection of more than 2 batteries (48V above) or parallel connection of more than 4 batteries.
- Reverse polarity connection.
- Improper storage conditions defined in the battery user manual.
- Any short circuit caused by accidentally, intentionally, or unintentionally connecting the positive and negative terminals.
- Damage caused by impact, accidents, collisions, or drops.
- Insufficient/overcharging of the battery as defined in the battery user manual.
- Use in conjunction with other third-party products.
- High resistance caused by terminal corrosion, poor crimping, or undersized cables.
- Battery failure caused by electrical system malfunctions.
- Modification of the product without the explicit written consent of the manufacturer
- Use of the battery for applications beyond its design and intended use, including repeated engine starting or consuming more amperes than the battery's rated continuous discharge to meet their respective specifications.
- Batteries left uncharged for more than 1 year (batteries should to be charged regularly).
- Batteries used in commercial applications that cycle to a discharge depth of 80% or more within 24 hours.
- Force majeure, including fires, typhoons, floods, earthquakes, or wars.
- Buyers are responsible for any damage caused by improper operation or misuse of our products and/or failure to follow safety guidelines.

■ After-sales Service

If you need any after-sales service for the product, please contact us
We will provide you with the necessary assistance.

■ How to Store the Battery?

We recommend bringing the Batteries to a 50% state of charge. Then, disconnect the battery from any loads by removing the negative cable from one battery. On average, the batteries lose< 3% capacity per month at 77°F/25°C.

This is subject to increasing if stored in extreme environmental conditions.

■ Disposal and Recycling

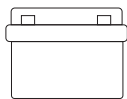
Ensure that the battery is properly disposed of in accordance with the laws and regulations in your area.

This product contains lithium-ion batteries and other recyclable materials.

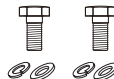
We strongly encourage our customers to recycle used batteries.

■ Packing List

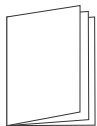
Battery*1



Screw*2



Specification*1



Plastic insulation cap*2

