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IMPORTANT: The batteries are shipped partially charged and must be fully charged using a LiFePO4 lithium charger before use. The warning label provides important safety information and charging guidelines. Additionally, the battery must be registered to activate the extended warranty.

SAFETY INSTRUCTIONS

Please read this guide and follow all safety precautions and warning signs related to the product before installation, operation or maintenance. Always shut down the system and check for hazardous voltage before changing connections or performing maintenance. Interstate Batteries® is not liable for any violations of general operational safety requirements or safety standards related to the design, production or use of batteries. Inspect the charging/discharging plug and harness for signs of overheating or melting during regular use. Contact Interstate® support at 888.772.3600 if you notice any issues.

WARNING!

DO NOT immerse the battery in water.

DO NOT use or store the battery near sources of fire or heat.

DO NOT reverse the positive (+) or negative (-) terminals.

DO NOT connect the battery directly to AC outlets.

DO NOT expose the battery to fire or direct heat.

DO NOT short-circuit the battery by connecting wires or other metal objects to the positive (+) and negative (-) terminals simultaneously.

DO NOT pierce the battery case with a nail or other sharp objects or break it open with a hammer or step on it.

DO NOT strike, throw or otherwise subject the battery to physical shock.

DO NOT attempt to disassemble, open or modify the battery in any way.

DO NOT use the battery in combination with primary (such as dry cell batteries) or batteries of different, capacity, type, technology or brand.

DO NOT use the battery if it gives off an odor, generates heat, becomes discolored or deformed or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontinue use.

DO NOT use a desulfation-type charger. Always affix battery cables to battery terminals securely with original bolts and nuts supplied. The battery and/or vehicle may be damaged by sparks caused by loose connections.

Please recycle this product in accordance with your local laws and regulations when the product has reached the end of its useful life.

Keep out of the reach of children and pets.

CAUTION: Misuse or abuse of the battery may result in failure, serious injury, death or property damage, and will void the warranty.

BATTERY INSTALLATION

Safety Precautions

Always wear proper eye protection and personal protective equipment (PPE) when handling batteries. Remove all jewelry or metallic objects that might come into contact with the battery before starting the removal or installation process.

Installation Steps:

1. Check Voltage: Before installation, measure the battery's voltage with a voltmeter. Charge the battery if necessary.
2. Disconnect Old Battery: First, remove the negative cable followed by the positive cable from the old battery.
3. Remove Battery: Remove any holddown brackets or straps, then remove the battery.
4. Install New Battery: Place the new lithium battery on the tray.

Note: If the battery size differs, you may need to install a new tray of the appropriate size.

5. Secure the Battery: Ensure the battery is properly secured in the vehicle. Attach the positive cable first, followed by the negative cable. Be careful not to over-tighten the terminal bolts. The maximum torque is 9.5 Nm (7 lbf-ft).
6. Check for Parasitic Voltage Drain: After installation, test for parasitic voltage drain, which can come from systems like alarms or electronic control modules.
 - To test, turn off the engine and connect a multimeter (in mA mode) in series between the battery's negative terminal and the vehicle's negative cable. Check the vehicle's drain current.
 - > If the drain current is less than 1 mA, you can proceed with the lithium battery installation.
 - > A lithium battery can discharge easily if the drain current is between 1 mA and 3 mA. It's recommended that the battery voltage be checked monthly.

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- > If the drain current exceeds 3 mA, wait to install the lithium battery until the vehicle's charging system is repaired.

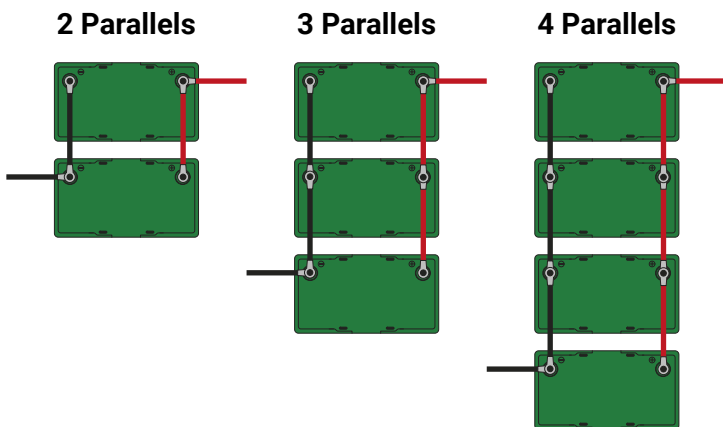
Parallel Connection

Connecting batteries in parallel increases the overall capacity of the battery group, extending the usable time. However, this does not increase the maximum discharge current of the entire battery group.

When connecting multiple batteries in parallel, the wiring harnesses between the batteries must be of equal length. This helps to minimize uneven voltage drops.

For selecting the appropriate wiring harness:

- Always consult a professional.
- Interstate offers appropriate bus bars as an accessory purchase. Consult with a professional for any other connections.
- Ensure that the wiring harness is rated to handle the electrical load. Consult a licensed electrician to ensure that everything complies with safety standards.



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Series Connection

Connecting batteries in series increases the total energy (Watt-hour) available for charge and discharge. However, the battery pack's overall capacity (Amp-hour) does not increase, so the charge and discharge rate remain the same.

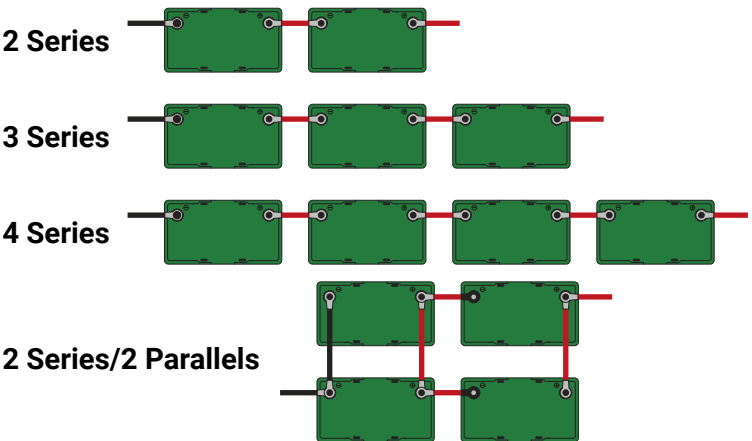
Series Connection Limits:

- **12V series:** Up to 4 batteries
- **24V series:** Up to 2 batteries
- **36V series:** Series connection is not allowed

When connecting multiple batteries in series, the wiring harnesses between the batteries must be of equal length. Ensure the wiring harness can handle the electrical load. Always consult a licensed electrician for compliance and safety.

Maintenance Tip:

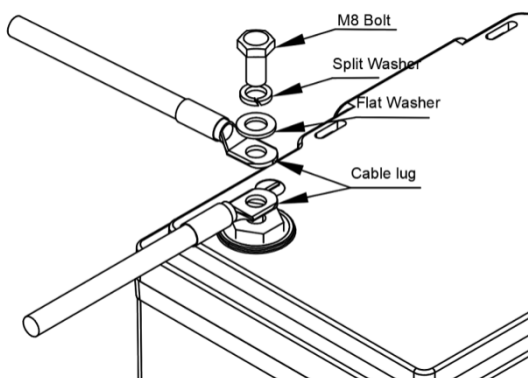
If the usage time noticeably shortens after a long-term series connection, we recommend periodically disconnecting the batteries and recharging them individually.



BATTERY TERMINALS

The internal thread depth of the battery's positive and negative terminals is 11 mm. When selecting a bolt, ensure that after accounting for the wiring harness(es), flat washers, spring washers (when compressed) and any other connectors, the remaining depth of the bolt is between 5 mm and 11 mm.

If the bolt's threaded portion exceeds 11 mm, it may cause irreversible damage to the terminals' internal threads. Such damage is considered user error and is not covered by the limited warranty.



Note: Do not tighten the bolt beyond the specified torque rating of 9.5 Nm (7 lbf-ft).

BATTERY CHARGING

Charging Voltage

Use a dedicated lithium battery charger with a Constant Current/Constant Voltage (CC/CV) function for best results. The charger's full charge voltage should be set within the following ranges:

- **12V series:** 14.4V – 14.6V
- **24V series:** 28.8V – 29.2V
- **36V series:** 43.2V – 43.8V

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Note: If the charger's full charge voltage is too low, the battery pack may not reach a full charge, which can shorten battery life. Any reduction in battery life due to insufficient charging will void the remaining warranty on the battery or batteries.

Float Charge Voltage

Maintaining a lithium battery at full charge voltage for extended periods can cause irreversible damage. To prevent this, we recommend switching the battery to a float charge state once it is fully charged.

The recommended float charge voltage settings are as follows:

- **12V series:** 13.6V–13.8V
- **24V series:** 27.2V–27.6V
- **36V series:** 40.8V–41.4V

Charging Current

The charging current for a single battery should not regularly exceed 20% of its Amp-hour (Ah) rating. Maintaining the charge current at this level (0.2C) helps reduce thermal stress and prevent potential damage to the battery.

The charging current for a parallel battery pack should not regularly exceed 20% of the Amp-hour (Ah) rating of a single battery.

Charging Temperature

Whether batteries are connected in parallel or series, we recommend maintaining the charging environment temperature between 68°–77°F (20°–25°C). If the ambient temperature is higher than this range, reduce the charging current to help prevent increased battery degradation.

Important Note: Both high charging temperatures and excessively high charging currents can speed up battery degradation over time:

1. **High Charging Temperature:** Charging in a hot environment can cause thermal stress, leading to reduced capacity, shorter lifespan and potential safety risks like overheating or swelling.
2. **High Charging Current:** Charging with too much current generates excess heat, putting strain on the battery, which accelerates capacity loss and shortens lifespan.

BATTERY DISCHARGING

Discharge Cut-off Voltage

When the battery pack is exhausted, the built-in battery management system (BMS) will cut off the discharge circuit to prevent the battery from being deeply discharged. We recommend setting the load cut-off discharge voltage higher than the built-in BMS cut-off protection voltage when in use.

We recommend:

12V series set above 11V

24V series set above 22V

36V series set above 33V

Discharge Current

Discharge current limits are listed on the back of the battery. For parallel battery packs, we recommend that the total discharge current is no greater than a single battery's maximum allowable discharge current.

Discharge Temperature

Whether in parallel or series, we recommend maintaining the battery discharge environment temperature between 68°–77°F (20°–25°C). We recommend reducing the discharge current if the actual operating conditions result in an excessively high ambient temperature.

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STORAGE

Storage temperature management

Storage for less than three months: -4°F to 95°F (-20°C~35°)

Storage for less than six months: 32°F to 77°F (0°~25°C)

Storage humidity management

Relative humidity should be kept between 30% and 60%, ensuring it remains non-condensing.

Regular maintenance management

If the battery is not used for a long time, we recommend that you charge and discharge it at least once every three months and keep it at a 30%–50% state of charge.

COMMON FAULTS AND SOLUTIONS

PROBLEM	POSSIBLE CAUSE	SOLUTION
Battery pack does not charge	Check if the external wiring harness is connected correctly.	Ensure correct wiring and tighten bolts to the specifications shown 9.5Nm (7 lbf-ft). If the problem persists, contact Interstate Batteries support at 888.772.3600.
	The ambient temperature is higher than the charging high temperature limit.	Move the battery to room temperature and leave it there for a while. If the problem persists, contact Interstate Batteries support at 888.772.3600.
	The ambient temperature is lower than the charging low-temperature limit.	Move the battery to room temperature and leave it there for a while. If the problem persists, contact Interstate Batteries support at 888.772.3600.
	The charging voltage does not match the current battery voltage.	Use the charging voltage or charger recommended by the manufacturer. If the problem persists, contact Interstate Batteries support at 888.772.3600.
	You are not using a proper lithium charger.	After the lithium battery is over-discharged, the port is 0V. Traditional chargers cannot charge 0V batteries due to protection reasons.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Battery pack does not discharge	Check whether the external wiring harness is connected correctly.	Ensure correct wiring, tighten bolts as required, etc. If the problem persists, contact Interstate Batteries support at 888.772.3600.
	The ambient temperature is higher than the high temperature limit.	Move the battery to room temperature and leave it there for a while. If the problem persists, contact Interstate Batteries support at 888.772.3600.
	The ambient temperature is lower than the low temperature limit.	Move the battery to room temperature and leave it there for a while. If the problem persists, contact Interstate Batteries support at 888.772.3600.
Run time drops dramatically	As the load increases, the battery core temperature rises too high, so protection is required in advance.	Reduce the load and wait for the battery to cool down. If the problem persists, contact Interstate Batteries support at 888.772.3600.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The load increases, and the power suddenly goes out	The wiring harness needs to be better connected, and the power circuit impedance increases.	Fasten the wiring harness. If the problem persists, contact Interstate Batteries support at 888.772.3600.
	The discharge current exceeds the current protection value of the internal BMS.	Disconnect the load and wait for recovery (voltage is restored on the port). If the problem persists, contact Interstate Batteries support at 888.772.3600.
Long-term storage, power consumption decreases	The battery pack BMS has self-consumption of electricity.	Store with 30%–50% charge.
	The lithium-ion battery cell has irreversible capacity loss.	Charge and discharge each battery once every three months.
Shorter operating time at low temperatures	Due to the low-temperature characteristics of lithium batteries, 0°: 0.2C discharge capacity = 70% rated capacity and -20°: 0.2C discharge capacity = 50% rated capacity.	If you use the battery in colder temperatures, you will see a shorter run time.

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WARRANTY INFORMATION

For details about the Interstate Batteries limited lithium warranty, please visit our warranty page at www.interstatebatteries.com/support/warranty


BATTERY DISPOSAL

WARNING!

1. DO NOT dispose of the battery in the trash.
2. DO NOT include a lithium battery with lead-acid battery recycling.
3. Recycle or dispose of the battery in accordance with all federal, state and local regulations or bring it to the nearest recycling facility.

Visit www.interstatebatteries.com/recycling to recycle with us.

For further needs, contact the distributor or dealer from the original purchase.

 **WARNING:** This product can expose you to chemicals including, lithium and nickel, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.



UN 38.3

**BATTERY MUST
BE RECYCLED**

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