Frequently Asked Questions on Lithium Battery Power Centers

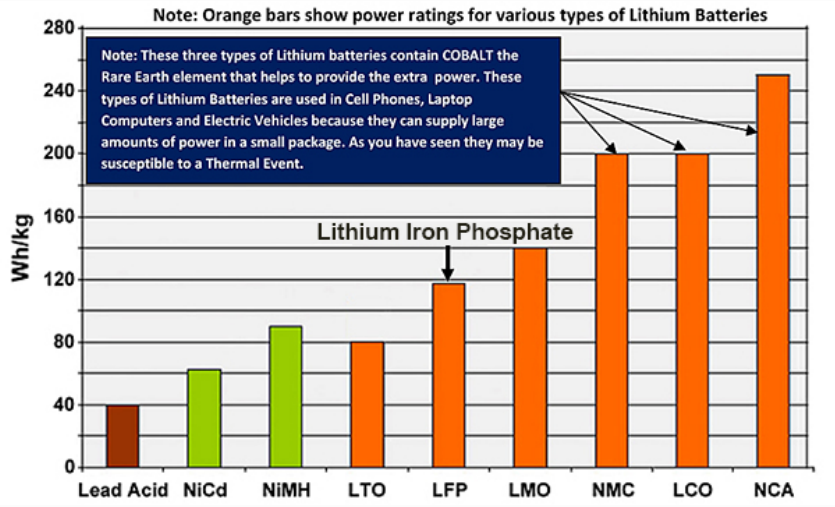
Are the Lithium Battery Systems Presently Available Safe for RV's?

To answer this question you need to understand that there are several types of Lithium Ion Batteries based on the composition of the different materials incorporated in their manufacture. These different compounds can provide additional power per Kilogram (2.2 Lbs.) of battery weight, however; this additional power comes at an increased risk of a thermal event.

Be assured that Lithium Ion batteries are safe and heat related failures are rare. The battery manufacturers achieve this by adding three layers of protection.

1. Limiting the amount of active material
2. Inclusion of safety mechanisms within the cells
3. The addition of an electronic protection circuit in the battery including a **Battery Management System (BMS)**

The chart below compares the amount of power (**Watt Hours**) per **Kilogram** these various battery types can store. Note that the standard **Lead/Acid Battery only stores 40 Watt Hours**, while the **most efficient Lithium Battery, the NCA (Nickel, Cobalt, and Aluminum) battery, can produce 250 Watt Hours** or over six times more than your present RV battery. If it weren't for the cost and possible hazards this would be a great RV battery. For Safety and Cost reasons Progressive Dynamics has decided to design our Lithium Chargers to provide the proper CCCV (Constant Current Constant Voltage) charge profile for **the safer LFP (Lithium Iron Phosphate) Batteries.** As you can see the **Lithium Iron Phosphate (LFP)** battery provides approximately three times the power of **Lead/Acid** at about half the weight and many units are UL listed.



One of the requirements for a Lithium Battery to acquire this UL listing is a built-in **BATTERY MANAGEMENT SYSTEM (BMS)**. This electronic package performs several functions to ensure safety and long battery life.

Safety Features of the BMS Include:

Constant monitoring of each of the four (3.2 Volt) Lithium Cells connected in series required to produce a 12.8 Volt Lithium Battery. This monitoring includes the Voltage of each cell for high or low voltage limits and disconnects the battery from the load or charger, to prevent damage. Each cell is monitored for temperature and excess current drain and again the battery is disconnected from the load if these limits are exceeded. The **BMS** also monitors the state of charge for each of the four cells and automatically balances their voltages during the recharge cycle to bring all cells to full charge at the same time. This balancing ensures a safe full charge and long battery life. Based on these features Lithium Iron Phosphate Batteries (**LFP**) are very safe and reliable. Since 2015 Progressive Dynamics has been monitoring hundreds of Lithium Battery Systems installed in RV's in the field, without any reported Lithium Battery or Charger failures.

How Long Will My Expensive Lithium Battery Last?

Lithium Battery life is based on the number of Charge and Discharge Cycles it is subjected to. A cycle requires bringing the battery to full charge and then fully discharging and then fully charging it again. Lithium Batteries typically are rated for 3,000 to 5,000 cycles. Lead/Acid batteries typically last for only 300-400 Cycles. This is true provided they are recharged as soon as possible after discharge and kept on a trickle charge with periodic equalization charges during winter storage to prevent battery sulfation. Lithium Batteries can be stored without having to be trickle charged and will maintain over 90% of their charge for a year or more. For increased battery life lithium batteries should not be stored with a full charge. Around a 50% to 60% charge is recommended.

Assuming a life of 300 Cycles for your Lead/Acid Battery and it is charged and discharged 100 cycles per year would equal a three-year battery life. Assuming 100 cycles per year for a Lithium Battery with a 3,000-cycle life could theoretically equal 30 years of life. Again, this is a theoretical figure and there are many factors that can increase or decrease battery life, including depth of discharge, operating temperature and aging of materials. Battery manufacturers typically underrate their Cycle Life Number to ensure they will last well past their warranty limit of up to 5 years.

What are the High and Low Operating Temperature Limits for (LFP) Lithium Batteries?

Lithium Batteries have a wide temperature range of operation (-4 to +160 F / -20 to +70 C). Lithium Batteries can be stored and discharged at the upper and lower temperature limits, however, charging currents should be reduced near these limits and Lithium Iron Phosphate Batteries **must not be charged at temperatures below freezing.** Consult Battery Manufacturers website for temperature limit specifications.

What are the Other Advantages of a Lithium Battery System?

Lithium Batteries last years longer than Lead/Acid Batteries and require minimal maintenance, maintain their charge during long periods of storage and are approximately ½ the weight or less than that of an equivalent AH rating of a Lead/Acid Battery. Dry Campers will appreciate that they also provide up to 3 times the power of **Lead/Acid Batteries** and recharge up to 6 times faster with the same sized charger. This results in less generator operating time and faster recharge.

The reason for this faster recharge rate is the unique chemistry of **Lithium Batteries**, which allows them to accept the full charge rating of the charger until it almost reaches full charge. The chemistry in **Lead/Acid Batteries** can only accept the full charge at the absorption phase state and then the charge current rapidly drops down making a full charge take much longer.

How Fast Will My Lithium Battery recharge?

The answer depends on the total Amp Hour (AH) rating of your **Lithium Battery** pack and the current output rating of your charger. For example, a 100 AH **Lithium Battery** connected to a Progressive Dynamics PD9160L (60-Amp) Charger would complete the recharge time as follows (100 Amp Hour Battery divided by 60 Amps per hour recharge rate) equals 1.7 hours. However, as the state of charge nears completion the charge current is gradually reduced, so the real total time would be around two hours. Under these same conditions a **Lead/Acid Battery** would require approximately 6 to 8 hours, more or less, to reach full charge.

Will My Solar Charging System Work in Conjunction with My Lithium Charger?

Yes, the two systems can be operating at the same time. Your Solar System should have a Solar Controller that allows it to be set to limit the **Maximum Charging Voltage** from the Solar Panels. This **Maximum Voltage should be set for 14.6-Volts for Lithium Iron Phosphate Batteries**.

Can I recharge my lithium battery from my vehicle alternator? – Yes, but not necessarily to full charge, due to the fact that most Alternators are adjusted for the lower voltage requirements of the vehicle **Lead/Acid Battery** (approximately 13.9-Volts). **Lithium Batteries** require 14.4 to 14.6-Volts to fully charge. That being said, you can get up to approximately a 70% charge, depending on the depth of discharge and distance driven while recharging from your vehicle alternator.

Can I Use My Present Progressive Dynamics PD9200, PD4000 or PD4500 Series Lead/Acid Units With the Charge Wizard to Charge My Lithium Battery?

Yes, if you are willing to live with an expensive battery that is only partially charged. The Normal Output voltage of the PD9200, PD4000 and PD4500 Series voltage provides only 13.6-volts and a full charge voltage for Lithium needs to be 14.4 – 14.6 Volts. The PD9200, PD4000 & PD4500 Series Charge Wizard will initially jump to 14.4-volts in the **Boost Mode** when first connected to 120 VAC power and will remain there until the battery voltage reaches 13.8-Volts, then automatically drops down to the **Normal Mode** of 13.6-Volts. The faster charge rate of Lithium means that in the **Boost Mode** it will reach this 13.8-Volt point after only a few minutes of recharging and then the charging current will drop to **ZERO AMPS** and will not add any additional charge to your Lithium Battery. This lower charge state will not damage your battery, but will eliminate most of the advantages you paid for.

How Much Will it Cost Me to Update to a Lithium Battery System?

That will depend on the size (Amp Hour Rating) of the Lithium Battery Pack and Amp rating of the charger you plan to install. A typical RV would have at least a 100 AH Lithium Battery which would be equivalent of a 250 AH Lead/Acid Battery, this coupled with a PD9160LAV (60-Amp) charger would provide a two-hour recharge time. Based on pricing available on our Distributors' websites, this upgrade would cost a minimum of about $1,200. To update your present RV to a Lithium System, click here for Lithium Replacement Unit options.

My Present RV has a 45-Amp Converter/Charger. Can I Install a Larger 60-Amp or 80-Amp Unit to Further Reduce My Recharge Time?

No, your RV wiring system is designed to safely handle 45-Amps increasing it to a 60 or 80-Amp charger could cause a thermal event! When updating to a Lithium Battery System, stick with the same size Converter/Charger as presently installed in your RV! Again with the faster charge rate that Lithium Batteries can accept even a 45-Amp Lithium Charger can recharge a 100-AH Battery, (100-AH divided by a 45-Amp charge rate) that would equal about 2.2 hours plus the extra time required at the end of the charge due to a lower charge rate, would equal an estimated recharge time of approximately 3 Hrs.

How Should I Store My RV Lithium Battery During the Winter?

Another advantage of Lithium Iron Phosphate Batteries is that they do not require a trickle charge during long periods of storage. In fact, disconnecting the charger during winter storage or long term inactivity and allowing the battery to rest is actually beneficial and will improve long term battery life. Before putting your RV into winter storage, simply connect it to 120 VAC power for up to 10 hours for large battery packs and fully charge the battery, then remove AC power and hit the battery disconnect switch. In the spring it will be ready to accept a full charge before your first camping trip. Lithium Batteries have a very low self discharge rate and only loose 2 to 4% of their charge per month.

Progressive Dynamics, Inc.
507 Industrial Road
Marshall, MI 49068 USA

Ph: (269) 781-4241
Fx: (269) 781-7802
sales@progressivedyn.com

Sales

- Sales Department
- Manufacturer's Sales Reps
- Distributors
- Where to Buy
- Warranty Information
- Download Product Catalog

Service

- Support Manuals-Troubleshooting guides
- Frequently-Asked-Questions F.A.Q.
- Where to Buy
- Shop
- Service Department
- Service Parts
- Customer Feedback Form
- Discontinued Product Resources
- Installation Guides
- Battery Management 101
- Battery Basics
- Converter Crossover List

Product Industries

- RV Products
- Specialty Products
- Marine Products

Disclaimer Privacy Statement