Lifepo4 battery charge curve chart

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12V 100Ah LiFePO4 batteries are currently some of the most popular for off-grid solar power systems. They’re a drop-in replacement for 12V lead acid batteries, and a great upgrade.

48V LiFePO4 batteries are more popular for larger solar systems. They are often sold as server rack batteries. They rarely make sense for small-scale projects. Designing a higher voltage solar system allows you to keep amperage low, thereby saving you money on wiring and equipment costs.

You can buy individual LiFePO4 battery cells online. They’re best used for making your own lithium batteries. You can wire cells in series and parallel to make LFP batteries with your desired voltage and capacity combinations.

A battery’s voltage changes depending on its charge and discharge rate. Plus, LiFePO4 batteries have a relatively flat discharge curve from around 99% to 20% capacity. Because of these factors, it can be hard to estimate their state of charge from voltage alone.

To get an even somewhat accurate estimate of LiFePO4 battery capacity based on voltage, you first need to disconnect any loads and chargers from the battery. (Don’t forget to disconnect your solar panels from your charge controller first!)

Compare your measurement to the right voltage curve above, or the state of charge chart in your battery manual. Use it to get a rough estimate of your battery’s remaining capacity.

For example, I own the Ampere Time 12V 100Ah LiFePO4 Deep Cycle Battery (Ampere Time has since rebranded to “LiTime”). I wanted to check its capacity after having stored it for a few weeks. I brought it out of storage and measured its voltage with a multimeter. I got 13.23 volts.

I like this method best for estimating the state of charge of an LFP battery I’ve just received or just pulled out of storage. The battery is already at rest and not connected to anything. I find it too inconvenient to disconnect everything once the battery is in use.

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