

# Traxxas Battery Basics

## NiMH and LiPo

These terms refer to the materials and chemistry within the battery. Nickel-Metal Hydride (NiMH) batteries have cells with the familiar “cylinder with a button on top” construction and a metallic case. Lithium Polymer (LiPo) batteries are usually constructed of flat cells stacked together. The cells may be encased in heat-shrink to form the final pack, or enclosed in a “hard case.” Traxxas iD Power Cell LiPos use a “semi-rigid” design that is durable and allows greater battery capacity in a pack of a given size.

**NiMH** = Nickel-metal hydride

**LiPo** = Lithium Polymer

## Capacity

A battery’s capacity refers to the amount of energy the pack can store. Think of capacity as your model’s gas tank; the greater the capacity, the larger the gas tank, and the longer your model can run per charge. In addition to giving your model a longer run time per charge, using a pack with greater capacity also increases “punch,” the feeling of power you get when you accelerate from a standstill or out of turns. The large number (3300, 4000, 5800, etc.) on your iD-equipped battery refers to its capacity in milliamp-hours (mAh).

One milliamp is a thousandth of an amp, and amps are the measure of load or “current draw” on the battery. To convert milliamps to amps, divide by 1000; for example, 7600mAh is equal to 7.6 amps. Milliamp-hours, or amp-hours, refer to the amount of current draw the battery can sustain for one hour. To continue with the example of a 7600mAh battery, it would handle a load of 7600 milliamps (or 7.6 amps) for one hour. Since your powerful Traxxas R/C vehicle will likely draw more than 7.6 amps, it will run less than an hour per charge. The important thing to remember is this: the larger the capacity number, the longer your run time.

## Voltage

The more voltage a battery has, the faster your car will go. Battery voltage is determined by the number of cells in the battery. Traxxas iD Power Cell NiMH cells deliver 1.2 volts each; a 6-cell pack has 7.2 volts, a 7-cell pack has 8.4 volts, and an 8-cell pack has 9.6 volts. LiPo cells have higher voltage at 3.7 volts per cell. Because of this, they need fewer cells to provide the voltage needed for high-performance. Traxxas iD Power Cell LiPos are available with 2 cells (7.4 volts) and 3 cells (11.1 volts).

## C-Rating

C is short for capacity. The load a battery can sustain is indicated as a multiple of capacity. For example, a load of 1C for a 7600mAh battery is 7600 milliamps or 7.6 amps. A 2C load would be double the capacity to 15.2 amps ( $7.6 \times 2 = 15.2$ ). All Traxxas LiPo batteries are rated for 25C. Using our example of a 7600mAh pack, that would be  $7.6 \times 25 = 190$  amps. The amount of

amperage that can be used to charge a battery may also be indicated as a “C” value. All Traxxas iD Power Cell LiPo batteries have a recommended charge rate of 1C, and a maximum charge rate of 2C. For maximum performance and longevity, charge at 1C whenever possible. For example, a 1C charge rate for the 5800mAh Power Cell LiPo would be 5.8 amps. A 2C charge rate for the same battery would be 11.6 amps. An important note about C-Rating: each battery manufacturer has their own formula and methodology for determining the C-Rating assigned to their LiPo batteries. For example, a Traxxas 25C battery evaluated using another brand's method of calculating C-Rating might be determined to have a 50C rating. For this reason, you should not compare batteries from different manufacturers by their C-Ratings.

## **2S, 3S**

LiPo batteries contain 2 or 3 cells connected in series (S). A battery pack with 2 cells is a “2S” battery, and a pack with 3 cells is a “3S” battery. A 2S battery has 7.4 volts, and a 3S battery has 11.1 volts. If your vehicle or speed control is rated for “6S” and has two battery plugs, such as the E-Revo Brushless Edition, you can plug two 3S packs into it for a total of “6S”. Two 2S packs would be “4S.”

“Series” connection means the cells are connected inside the pack; the first cell’s positive tab is connected to the second cell’s negative tab. This combines their voltages. The two 3.7 volt cells deliver 7.4 volts combined. The other way to connect the cells is in parallel (P), which means the cell’s tabs are connected “positive to positive” and “negative to negative”. This combines their capacities. If you look at the specifications of your Traxxas iD Power Cell LiPo, you may see that your 2S pack is actually 2S2P, meaning it has two pairs of cells, each connected in parallel (2P), and the two pairs of cells are then connected in series (2S).

## **Chargers for RC Batteries**

It is critical for the longevity of your batteries and your personal safety that you always use the correct charger or charger settings for your battery, and observe all the precautions outlined in your battery and charger documents. Traxxas offers the 4amp peak-detecting DC fast charger (part #2975) and the 2amp peak-detecting DC fast charger (part #2974) for use **exclusively** with Traxxas iD Power Cell NiMH batteries. NEVER use a NiMH charger to charge a LiPo battery. Failure to use a LiPo balance charger to charge LiPo batteries can result in explosion, fire, and personal injury! The Traxxas EZ-Peak Plus 4-amp NiMH/LiPo charger with iD Auto Battery Identification (part #2970) can be used with all Traxxas iD-equipped LiPo batteries. Always place your LiPo battery in a fire-retardant/fireproof container while charging. All rechargeable batteries should be charged in a fire-retardant/fireproof container and on a non-flammable surface, such as concrete.

## **Storing Your Batteries**

Nickel-Metal Hydride (NiMH) batteries should be stored fully discharged (just use the battery in your R/C vehicle until the battery can no longer move it). LiPo batteries should be stored at 50% capacity. Store LiPo batteries in a fire-retardant/fireproof container. Do NOT store LiPo batteries discharged, as this will reduce battery performance and may lead to over-discharging if the packs

are stored in a discharged state for longer than 7 days. The Traxxas EZ-Peak Plus charger (part #2970) makes it easy to store LiPo battery packs properly; just select the Storage mode, and it will charge or discharge the pack to the proper storage voltage.

### **LiPos and Low Voltage Detection**

Over-discharging a Traxxas iD LiPo battery will cause irreparable damage and may cause battery failure. To prevent over-discharging, only use Traxxas iD Power Cell LiPo batteries with an electronic speed control (ESC) that has Low Voltage Detection. All current Traxxas vehicles equipped with the XL-5, VXL-3s, VXL-3m, and Castle Creations ESCs have Low Voltage Detection. Traxxas ESCs will show a green light to indicate Low Voltage Detection is turned on; the Castle Creations ESC will beep once for each LiPo cell it detects (for example, 4 beeps if you have installed two 2-cell packs in your model). The Castle Creations ESC automatically activates Low Voltage Detection when it detects a LiPo battery connection. If you are uncertain about how to turn on and use Low Voltage Detection, consult your vehicle's manual or [click here](#) for some helpful support instructions. If you need further assistance, feel free to call 1-888-TRAXXAS. We're happy to help!

### **Never Use Damaged Batteries**

No matter which type of battery you use, you should discontinue its use if it becomes damaged. Never use a battery with frayed or damaged wires or torn insulation. Never use a NiMH battery if it is dented or has other physical damage. Never use a LiPo battery that has visible damage to its outer covering. Never use a LiPo battery that feels soft, or has swollen.

## **Battery Charging (NiMH & NiCad)**

High performance battery chargers with a minimum charge rate of 4 to 5 amps are required to completely charge some of today's high-capacity (3000 - 5000 mah) NiCad and NiMH batteries in one cycle. Most inexpensive manual timer chargers that are available (non-peak chargers) have a 15 to 30-minute timer and a preset charge rate of 4-amps or less. These types of chargers can usually charge a battery pack with 1500 mAh or less in one 30-minute cycle, but they may not be able to charge a high-capacity battery pack without subsequent recharges.

When charged properly, the battery pack should be slightly warm after the charge cycle. If the battery is not warm to the touch, recharge it for another five minutes. If the battery is not warm after the 5-minute re-charge then charge the pack for an additional 2 1/2 minutes. You may have to recharge the pack a couple more times if you're charging a hi-capacity battery pack on a charger with a charge rate that's less than 4 amps. It is important, that you do not leave the battery pack unmonitored during the recharge process. Constantly check the temperature of the pack. The moment the pack becomes warm, disconnect it from the charger to prevent damage from over charging. (**Note:** It is recommended to charge all NiMH cells with a battery charger made specifically for charging NiMH cells. NiMH cells are more susceptible to damage from over-charging than NiCad cells are. Using a good peak charger designed to charge NiMH cells will prevent damage to the cells from over-charging.)

Peak chargers are very popular because they feature special peak detecting circuitry that senses the moment the battery pack is fully charged and then shuts down to prevent over charging. They usually also feature adjustable charge current ability for use with the smaller 6v rechargeable batteries used inside nitro vehicles. These types of chargers are recommended for high capacity battery packs and onboard 5 cell receiver packs because they usually feature higher, and adjustable amp rates than manual timer chargers and can quick charge a high-capacity pack automatically in 50-minutes or less. A full "peak charge" is required to properly operate Traxxas electric vehicles as well as to allow proper use of the Traxxas EZ-Start equipped nitro vehicles.

If your battery pack is not warm to the touch after one full charge cycle on a peak charger, press the start button to re-peak the battery pack. If the battery is still not warm after the second cycle, either your charger is malfunctioning, or it's time to replace the battery pack. You may want to test your charger with another battery pack that is known to be in good shape. If the other battery pack charges up OK, you've narrowed down the problem to the first battery pack. If the good pack will not accept a charge either, then the charger could be bad. Follow the manufacturer's recommendations for sending in your charger for service.