CHARGING YOUR LITHIUM ION BATTERY PACK:

1. Turn off the power with the switch on the side of the battery. "0" is off. "I" is on.
2. Move aside the rubber dust cover on the battery.
3. Plug in the output lead of the charger into the socket on the side of the battery case.
4. Plug the AC power input plug into a 110-volt household power socket to begin charging.
5. The red indication light will illuminate when charging. It will turn green when the battery is full. A complete charge on a fully drained battery may take up to eight hours, depending on the battery model.
6. Depending on model, your display or the battery itself will show you the level of charge.

TIPS ON USAGE - LITHIUM BATTERY PACKS:

- The battery pack may be charged after every use, or when low on charge level (see suggestions below in the Q&A section).
- The 48-volt lithium ion battery has no memory effect, so you can charge the battery after short periods of use without any damage.
- The battery can be recharged on or off the bike.
- Remove the battery from the bike frame by turning the key to unlock position, and carefully pulling the battery by the handle until the battery pack lifts out of the frame.
- After charging is complete, unplug the charger from the wall first, and then from the battery charging port.
- Always charge in dry conditions and indoors away from direct sunlight.
- Check the charger, cables and battery for damage before beginning each charging session.
- Ideally charge your battery at common room temperatures, between 50-80 F. Also, as a best practice on lithium batteries … avoid temperature extremes when storing to increase lifespan and capacity.
- If storing your ebike for an extended period of time, charge the battery to 50 - 80% prior to departure, as your battery will lose a small percentage each month, and leaving a completely discharged lithium battery risks not being able to recharge it.
- Keep the charger in a safe place and away from children.
- Do not charge the battery with chargers other than the original.
- Avoid charger contact with liquids and/or other metal objects.
- When in use, the charger should not be covered as to prevent overheating, damage, or fire. Chargers will feel hot when plugged in and charging
- The charger is only for indoor use. Please use in a dry and ventilated place.
- If you notice a smell coming from the charger, or it is too hot, stop charging immediately and contact us.
- Read on … here are some common questions pertaining to lithium-ion battery packs:

BATTERY CARE Q&A:

1. **I just got a new E-bike … how should I treat my battery?**

   Awesome – it's amazing technology, so treat it with care! Your eBike comes with a battery charger, and most of the ebikes are shipped with the battery at approximately an 80% charge level. The level may be higher or lower, and you can power up and check your display for an exact reading. Once you plug in your charger, the LED light on the charger will be red, and when fully charged will turn green, indicating the battery is fully charged and ready for use. Unplug it and enjoy your ride!

   We use the term "battery" here, but your ebike battery includes the case, individual cells within the case, a circuit board inside the case that manages the cells and communicates with the bike's controller, an off/on switch, a connection plug for mating with the bike, a lock with key for removing the battery, and typically also a push button that will give an approximate read on the battery charge level (independent of your LCD dashboard).

2. **What is the best practice for charging my E-bike battery after my ride?**

   You may have heard, "top it off after each ride." Yes and no. If you aren't overly concerned about the longevity of the battery, just charge it after each ride. A high voltage cutoff (HVC) in the battery management system (BMS) will shut off power into the battery cells after it reaches a level considered 100% (approximately 42V for a 36V battery system or 54.5V for a 48V battery system). This practice provides roughly 400-500 cycles before there is a substantial degradation in the cell chemistry. If you simply don't have the mental interest in managing your battery, and you are happy to replace the battery after a few years, then you don't have to read any further. Ebike battery packs are relatively economical and an easy replacement – they range in price from $300. to $700. depending on your model. For most people, five years of charging twice a week is 500 charge cycles, and your battery is still alive, but your range is reduced a bit (similar to year two on a cell phone).

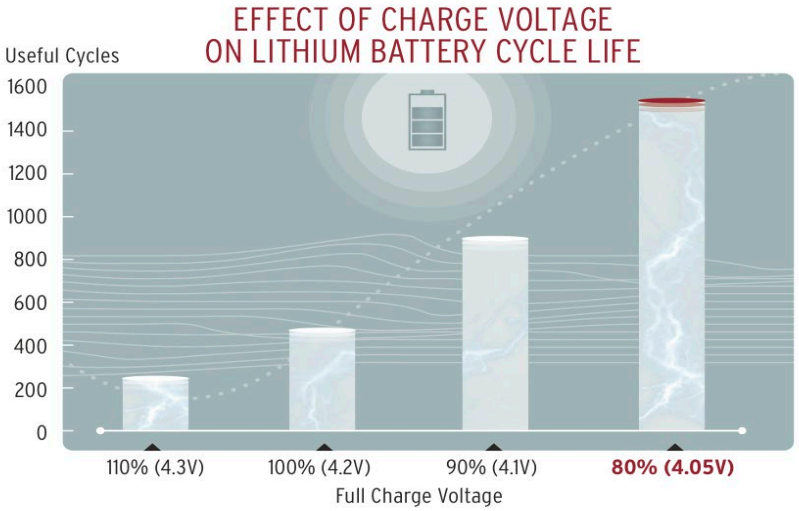
   Since Li-ion batteries have infiltrated our lives (laptops, phones, tablets, cars), it can be good to know a bit more. Have you ever wondered why cellphone batteries or laptop batteries die quickly, or experience significant loss of charge time - frequently within a year or so? Plugging it in overnight, so every night charging, is definitely one of the causes. With cell phones, the average user upgrades their phone and contract in 2-3 years. Most ebike riders anticipate a longer span, and your battery can provide it. Read on, there can be a few more reasons ...

3. **What should the temperature be on the pack before charging my battery ?**

   Observe the battery temperature by touching the pack, and charge your battery when it (battery) is not too cold or too hot. Ideally the room air temperature around your ebike, when idle, should be 50 – 80 degrees (normal room temperatures). Avoid storing your ebike where direct sunlight hits the battery and raises the pack's resting temperature.

   Let's say you just came back from a 50- mile ride and the battery pack is pretty warm (you may not be able to feel it by touching the plastic case, but it does get warm). Leave it for 30 minutes so it is back close to the room temperature. Also, charge your battery so it does not regularly sit fully charged for days. If your morning commute starts at 7.30am, we suggest you charge your battery to 80% the night before, or very early that morning.

4. **Studies show you can double the cycle life of your battery by charging it only to 80%,** rather than 100%. Here is an **i**nfographic - from Grin Tech, one of the innovators in the Li-ion space:



5. **To maximize battery life, be mindful of a couple parameters**:

   A. **High temperature = BAD** for Li-ion cells. So, what is high temperature? Anything above 40'C or 105'F (trunk of a car on a hot summer day, or exposing the battery to direct sunlight in hot, sunny climates).

   B. **Time** (days or weeks) **spent at high voltage** = **BAD** for Li-ion cells. You charged it to 100% and you're going away for a long weekend, or a month's vacation. This may not be a good idea in the long run. And conversely, avoid **time spent at 0% charge level = BAD**. Although your BMS may report 0%, there is technically a little bit of voltage left, but after time passes, you may lose this little bit of charge and then not be able to recharge the cells at all – the chemistry magic ends.

   In the electric automobile space, Tesla's Elon Musk responds to this topic from a customer's question, and he recommends charging to 80%:

6. **How should I store my E-bike battery?**

   It is best to store your battery at room temperatures (cool, less humid conditions) and again at a 50-80% charge level. If that's not possible, just avoid frequently storing it at 100% or 0%. After a period of time, a fully discharged battery won't be able to recharge, due to the Li-ion chemistry in the cells. Professor Jeff Dahn provides scientific insights regarding Li-on battery degradation - Prof. Dahn is the world's foremost expert when it comes to these batteries. He invented the NMC chemistry and heads the current Tesla battery research program in conjunction with a Canadian university. Here is an excerpt from his scientific article on how the charge level and calendar life ageing and conditions affect Li-ion battery degradation. Basically, what he is saying is that the degradation is minimal in the 30%-70% zone:

   "The storage initial state of charge – "SOC" level is one of the factors of battery ageing during its calendar life. According to our studies, a high SOC level (>70%), or a low one (<30%), engenders a huge potential disequilibrium on the electrode/electrolyte interface, and this accelerates chemical reactions. Through our experiments, we placed the battery under many conditions, including extreme SOC (>90% or <10%) quite often during each use session. Our studies show time spent at high charge, approaching 100% charge, is bad. If you leave your charger plugged in overnight, where the battery is consistently charged to 100%, expect ~500 cycles, instead of 800+ cycles. It's perfectly ok to charge your battery to 100%, but keeping the batteries at 100% for many days will shorten the battery capacity and may not be a good idea."

7. **What kind of charger should I use?**

   Use the charger supplied with your ebike and plug into your 110 outlet. Your ebike charger will charge the battery at less than 8A (most ebike chargers run at 2A-4A), and won't overheat the chemical compounds inside the cells. When fully charged, the LED light on the charger will turn green, and you can unplug it. Many suggest using an outlet timer to run power to the charger for a set block of time (4-5 hours) without worrying about it. Today's chargers detect a full battery charge, and turn power flow to the battery off.

   In the automobile world, a Tesla can be fast-charged to 80% in 40 minutes, thus avoiding higher battery cell temperatures, but the car has very complex thermal management systems for the battery, the power control unit, and the engine. Since E-bike batteries do not have such cooling (or expense), it takes longer to charge at a lower power level, and avoid longer-term problems.

8. **What is the battery warranty?**

   The battery warranty provided by the manufacturer is the same as the ebike. However, because it is easy to damage the battery with improper care or lack of proper maintenance, diagnostic tests can be ran on the battery and cells. When it is found that environmental conditions caused the premature failure, the warranty on the battery can be voided. In other words, take precautions regarding your battery, or be prepared to replace it. The most expensive component on your ebike is the battery pack.

9. **Can I get a bigger battery for my ebike?**

Most of our ebike models have an option for a larger battery, and typically a 40-70% longer range. Some models support an onboard second "live" battery. We suggest first determining your rider's range – for most rider's, the two-hour ride time commonly provided with the standard battery is plenty of ride time. If you discover you are able to ride for longer periods, it is easy on most models to carry a 2nd battery pack on the rear rack in a pannier bag.

BATTERY POWER-SAVING TIPS:

Your ebike's range depends on your battery capacity, rated in Amp hours (or watt hours which is volts x amp hours), and then on a variety of rider variables and riding habits. Under normal conditions, on flat and paved terrain, and on a medium power setting, the average rider can expect to travel close to 20 miles on a full charge, without much pedaling. With pedaling, and using the power as an assist, the rider can use less power than just with the throttle alone, and can achieve thirty to fifty miles, model and rider dependent. Without pedaling, extra battery power will be consumed during frequent braking and starting, riding uphill, riding against strong winds, starting from a standstill and using only the throttle, riding on rough or muddy roads and trails, and while carrying or pulling heavy loads. Here is a tip list:

- When frequent braking - try to look ahead and coast, rather than "stopping and going" frequently.
- Riding uphill or in stiff winds – shift the gears down, and pedal to supplement the battery power.
- When starting from a standstill - use the pedals to help bring you up to speed.
- When battery voltage is low, reduce or turn off power setting and switch to manual pedaling mode.
- If the bike is being stored for long periods, remove the battery from the frame and recharge it to 80% once a month. Leaving a completely discharged lithium-ion battery to sit for extended periods can ruin the battery.
- Do not push the throttle too suddenly. The bike should accelerate slowly, reducing consumption and risk of damage to the electrical system. It is better to use the pedals to avoid sudden stops and startups.
- The bike's controller has a charge overload protection system. If the bike is overloaded or overheated, power will be cut automatically and restored when it returns to normal.
- When riding, avoid using the throttle while braking.