



Castle Creations Motor User Guide

We understand that your R/C equipment is more than just a hobby—it's an investment of your time, energy, and passion. That's why this guide is designed to safeguard your investment and help you extract every ounce of performance from your Castle Creations product. From initial setup to advanced troubleshooting, we've got you covered.

Castle Creations is committed to providing the best assistance possible. If you encounter any challenges or have questions while using our products, our dedicated support team is just a phone call or email away. We're here to lend a helping hand, offering expert guidance and troubleshooting tips to ensure that your R/C journey remains smooth and enjoyable.

Tech Support: (913) 390-6939 Option 1
Monday-Friday 9am-4pm CST

Tech Support Email: <https://home.castlecreations.com/contact-support>

Tech Support Website: <https://home.castlecreations.com/tech-support>

Castle Creations
540 N. Rogers Rd.
Olathe, Kansas 66062
www.castlecreations.com

Additional Resources

We guarantee that our website contains the most up to date information about our products. Each Castle ESC and Motor have detailed descriptions, technical specifications and product use statements on our website and we strongly encourage anyone who has or is interested in purchasing a Castle setup to check out the corresponding product page(s) on our website. We do our best to provide this



information to the Castle resellers globally, however we cannot guarantee their accuracy or level of detail.

Motor Selection

In the R/C Car world the overall power a system will draw, and the heat generated, is determined by vehicle weight, geared speed, terrain, drive style, and motor efficiency. The reason that Castle Creations chooses not to publish maximum amps is because it would not be particularly helpful in determining if the ESC would be acceptable for a vehicle. Instead, we rate the controller/motor for a particular application. Castle provides recommendations for all surface products that relate to the size, number of driving wheels, and weight of the vehicle it's installed in. This information can be found on the product pages of the Castle website.

Shaft Size

If your vehicle has massive power and torque and is run in abusive environments, a 5mm shaft may be the best choice. Obviously, you must match your pinion gear to motor shaft size, 1/8" and 5mm, with 1/8" being the most common. It really comes down to a strength issue, or shaft size, but adapter sleeves are available to convert 5mm pinions to 1/8" if necessary.

Connectors

Check the amperage ratings of your connectors to make sure they meet the amperage requirements for your application, e.g., don't use 40 amp connectors on a 1/5th scale setup! Avoid the common "white plastic" connectors seen on many battery packs, a high-performance brushless setup will draw many times the power that these connectors can safely handle, and poor-quality battery connectors can be a roadblock to performance. Invest in connector sets made for high-powered electric systems such as our CC Bullets, Castle Polarized Connectors, QS8 Anti Spark or QS10 Anti Spark [Click here for Castle connectors](#). Be sure to note any specific application guidelines recommended by Castle in terms of connector current needed to safely operate the ESC/Motor you have selected. This information can be found on the product pages of the Castle website.



Wire

High strand count silicone coated copper wire is essential with higher power electric power systems. Castle Creations' wire (on motors and ESC) is lower resistance than the same diameter of solid copper, meaning more power gets from the batteries to the motor with less wasted as heat. The ultra-high strand count and silicone coating means the wire is very flexible which prevents work hardening and breakage with use. Our wire is available for purchase and this link provides the appropriate wire gauge for your Castle ESC. (Link: <http://www.castlecreations.com/wire-application-chart>)

Wire Length

Motor wires can absolutely be shortened, with the exception of our 1/18th scale 0808 motors. In fact, the shorter the wires the better (in high-speed setups this equals less resistance), they are only too short if they can't connect to the ESC. :)

It takes a very hot soldering iron to get a good connection. If you try soldering to the soldering tabs it is best to do it on the bullet connector end. Cut to length, unsolder bullets from removed wire, solder bullets onto shortened wires, then add new heat shrink.

Batteries

As with any extremely high-powered electric power system, the primary limitations to ultimate vehicle performance are the batteries and connectors. When choosing a LiPo battery for your brushless motor and/or ESC, you should refer to Castle's published battery capacity minimums to ensure your chosen batteries are suitable for the maximum current demands of a particular ESC/motor combination. This information can be found on the product pages of the Castle website.

Gearing

Always start with the smallest pinion and largest spur available for your application. Pinion and spur gear sizes refer to tooth count. The pinion is the small gear on the motor and the spur is the large one attached to the car. Always check your motor temperature frequently on the first run after changing the gearing, motor or increasing battery voltage! Never let the motor get above 180°F. Use an infrared temperature gun to monitor motor temps. If the motor starts to get close to 180° reduce the pinion size, increase the spur size, or reduce the battery pack voltage.



Over Voltage

If your ESC is capable of running up to 6s LiPo you must ensure that the motor is capable of the same. Always use the lesser of the two values otherwise. There is a phenomenon that occurs when increasing the number of cells from say, 4s to 6s, on a motor that is rated at 4s. It is essentially increasing the voltage by 50 % ($6/4 = 1.5$). Voltage affects motor speed, so the motor will want to turn 50 % faster on 6s than on 4s. To do this, the motor will draw more current to overcome internal losses and the inertia of the car. As the load of the motor increases, the current increases. Current in brushless motor windings produces waste heat. Too much heat in your motor will lead to failure of the motor windings. End of story.

Free-Revving

The act of free revving – running a brushless motor at high RPM under no or little load for an extended period of time – can cause damage and subsequent failure of a brushless motor and/or an ESC. If allowed to accelerate too high, the rotor can break apart, causing an immediate halt in the rotation of a brushless motor. Not only will this damage the internals of a brushless motor, but in some instances, can damage the ESC as well. The likelihood of a rotor failure is significantly increased if a brushless motor is free revved while hot, such as after a full-battery pack run. Because brushless motors can attain such high RPM under no – or low – load conditions, the centrifugal forces in the rotor can cause it to break apart. We recommend that you never free rev your brushless motor in or out of your vehicle. Any damage sustained from free revving is not covered under Castle Creations warranty and besides, it's dangerous to you and those around you.

Wiring-Motor Connection

For sensored operation, the motor's wires must connect to their corresponding letters on the ESC (A-B-C) in order to utilize the Hall sensors within the motor. If you aren't going to utilize the hall sensors (the sensor harness is not connected and you intend to run it sensorless), then you can hook up the three drive wires any way without causing internal damage and/or catastrophic failure to the ESC.



Contamination

Contamination from dust, dirt and gravel is one of the leading causes of motor failure. Foreign bodies which find their way inside the motor can dent bearing raceways and balls, leading to high levels of vibration and wear. It can also block the motor cooling fan (if installed), limiting the motor's ability to regulate its temperature, and increasing the likelihood of overheating. Brushless motors have very few parts, so it's easy to take them apart for cleaning. Remove the screws, disassemble the motor and lay the parts on a clean surface. Be sure you don't lose any spacers or washers that are used to properly align the motor shaft (and magnets) inside the motor. Also note the order in which the spacers or washers are installed! Castle offers motor endbell and rotor/shaft replacement kits for the 14 Series and 15 Series motor offerings. <https://www.castlecreations.com/en/motor-service-parts>

Maintaining Motors in Wet Conditions

Although Castle sensored and sensorless motors are not affected by water while they are running, the water can wreak havoc to the steel components when you store them; rusting of the bearings and the stator can cause major issues down the road. So, our motors need some TLC and maintenance to keep your vehicle "over-powered". You can ride them hard, but it's not recommended to put them away wet. For excessively dirty or salty water, rinse with clean water under a faucet before drying.

Dielectric Grease is a non-curing silicone compound ideal for sealing, protecting and insulating electrical components and connectors. It is waterproof and protects against moisture and other contaminants in electrical connections.

The sensor wire connections (sensored operation) can be affected by water and may cause momentary loss of sensored capabilities. Applying a small amount of dielectric grease to the outside of the sensor wire connections can help keep water from causing loss of contact with the sensors; do NOT apply the grease directly to the ports as this will prevent proper connection.

Adding dielectric grease to the sensor port on the ESC side is just as important as doing it on the motor side. If using a sensor harness and standard sensor wire, you'll want to apply dielectric grease at that connection as well. We recommend applying it to the male pins. Then plug and unplug 2 or 3 times to clean the pins. You can add a little extra after making the connection as well.



Castle-Link Settings

When paired with a Castle ESC there are a number of programmable settings related specifically to Castle motors in the Castle Link Programming Suite, which is accessed via the Castle Link USB adapter and freely downloadable Castle Link Windows software, or the Castle Link App and a B-LINK Bluetooth Adapter.

1. Motor Temperature Cutoff

When this setting is enabled on a sensed motor, the controller will shut off if the motor reaches the specified temperature (120F to 210F, user selectable) as indicated by its internal temperature sensor.

2. Sensorless Motor Timing

Motor timing advance changes the timing advance range used on the motor. Generally, low advance gives more efficiency and less power. High advance gives more power at the expense of efficiency (*motor heat*). Every system will respond to changes in advance differently. All Castle Creations controllers automatically determine the correct and best range of timing advance for any motor they are plugged into when running in sensorless mode. You can move up or down within that range via these settings in Castle Link.

3. Motor Direction

The Motor Direction setting allows you to reverse the direction of rotation on your motor shaft. See "Reversing Motor Direction" table below for additional information.

4. Motor Start Power

This setting controls how much power is allowed into the motor to get it started for the first few revolutions from a dead stop. Each power system, airplane and heli is different, so it's best to start with a low setting first, and experiment to find which performs best for you from there.



GENERAL TIPS TO MAINTAIN YOUR BRUSHLESS MOTOR

1. **Keep it Clean:** Regularly clean your motor to remove any dirt, dust, or debris that may accumulate during use. Use a soft brush or compressed air to gently clean the motor's exterior and cooling vents. Avoid using excessive force or abrasive materials that could damage the motor.
2. **Check for Damage:** Inspect the motor regularly for any signs of damage, such as loose wires, bent shafts, or worn bearings. If you notice any issues, address them promptly to prevent further damage or performance degradation.
3. **Proper Gear Mesh:** Ensure that the gear mesh between the motor and the drivetrain is correctly set. Improper gear mesh can cause excessive wear on the motor and reduce efficiency. Refer to your car's manual for instructions on setting the gear mesh correctly.
4. **Monitor Motor Temperature:** Keep an eye on the motor's temperature during operation. Excessive heat can damage the motor and decrease its lifespan. If the motor becomes too hot, consider adjusting the gearing, improving airflow around the motor, or adding a heat sink or fan to help with cooling.
5. **Avoid Overheating:** Extended periods of full-throttle operation or excessive load can lead to overheating. Give your motor occasional breaks to cool down, especially during long and intense running sessions. Overheating can cause damage to the motor's windings and magnets.
6. **Use the Correct Battery:** Ensure that you are using a compatible and properly rated battery for your brushless motor. Using an underpowered or overpowered battery can strain the motor and lead to premature wear or damage. Follow the manufacturer's recommendations for battery specifications.
7. **Store Properly:** Avoid storing your car in extreme temperatures and direct sunlight, as they can degrade the motor's performance and components over time.
8. **Remember, always consult the manufacturer's guidelines and specific recommendations for your brushless motor model.** Proper maintenance and care will not only ensure a longer lifespan for your motor but also enhance the overall performance and enjoyment of your remote control car.