Safety First!

For use by adults only.

An electric motor that is connected to a battery and speed control may start unexpectedly and could cause serious injuries. Always treat a powered system with respect.

Always remove the propeller or disengage the pinion gear when you are working on a plane or helicopter with the battery connected.
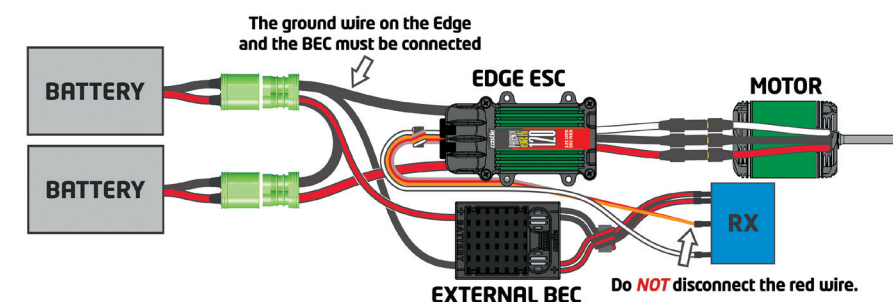
Please observe all local laws regarding the flying of remote control aircraft or other control of remote control vehicles

Never fly over others or near crowds.

Never fly a controller that has been involved in a serious crash. Send it back to Castle for inspection as there may be damage that is not visible to the untrained eye.

Castle Creations is not responsible for your use of this product, or any damage or injuries you may cause or sustain as a result of its usage.

INSTALLING YOUR EDGE HV ESC

The ground wire on the Edge and the BEC must be connected

BATTERY   EDGE ESC   MOTOR
BATTERY
EXTERNAL BEC   RX
Do *NOT* disconnect the red wire.

1. Add your battery connector
You must attach a quality battery connector of your choice to the red (+) and black (-) power wires. Solder the battery connector to the wires. ENSURE THAT THE POLARITY IS CORRECT (red wire to battery red wire, black wire to battery black wire). Follow the instructions provided with the battery connector.

2. Connect the motor to your ESC
Solder the corresponding connectors for your motor to the wires coming from the ESC, or solder the motor wires directly to the motor leads on the ESC.

Always use electronics grade solder and make sure your solder joint is solid. Poor soldering is a common cause of in-flight failure! Ensure connectors are properly protected with insulation or heat-shrink to prevent shorts.

3. Connect the ESC to your receiver
Connect the receiver lead (the brown/red/orange wires with a black plastic connector on the end) to the throttle channel on your receiver.

Edge HV ESCs DO NOT INCLUDE A BATTERY ELIMINATOR CIRCUIT. You must use an external battery or BEC to power your receiver and servos.

There is no reason to disconnect the RED power wire in the Edge HV throttle wire when using a BEC or a battery for RX/servo power.
If you choose to use the white AUX Line, discussed later, please connect it as needed.

NOTE TO USERS WITH A FUTABA TRANSMITTER: You must reverse the throttle channel signal on your transmitter. Please refer to your Futaba instructions.

4. Reversing rotation (if necessary)
You may wish to bench test the motor and speed control to determine the rotation of the motor. To change the rotation of the motor, swap ANY two motor wire connections, or use the Castle Link USB interface to change the rotation direction.

5. Mounting the ESC
Edge HV ESCs have mounting tabs for your convenience. We recommend using Velcro or double sided tape to attach the Edge HV Lite ESCs to the airframe.

Never place undue strain on the ESC by using zip ties on the wires within 1 inch of the controller.

Never use zip ties on the body of an Edge HV Lite controller.

6. Initialization sequence
1. Ensure that the Edge is connected to the throttle channel on your receiver.

2. Turn your transmitter ON and set the throttle stick to mid-throttle.

3. Connect the motor battery to the speed controller. The speed controller will remain disarmed and will not operate the motor until it receives the 0% throttle signal.

When you are ready to fly, move the throttle stick to the lowest position on your transmitter.

The Edge will beep the motor to indicate that it is armed.

Always power your radio transmitter before powering up the receiver and/or the ESC. Some receivers failsafe features, those that are not bound to a transmitter on receiver power up, or those that have a "power-up" output signal that is different from fail safe settings or the stick positions on the TX may cause the arming sequence to occur and command the ESC to drive the motor.

Using channels other than the radio TX manufacturer's recommended throttle channel may lead to unwanted or dangerous results. Use non-throttle channels to control the ESC at your own risk.

Always perform a range check at full, half, and zero throttle before flying any speed controller! For helicopters, range check with the blades off the helicopter at full, half, and zero throttle.

EDGE BEEP CODES / LED PATTERNS
Edge ESCs are programmed to sound a number of tunes and codes using the motor as well as flashing LED patterns to alert the user to certain conditions regarding the power system. The following chart describes these codes, '•' represents a short beep and '–' represents a long beep.

TONE	EDGE LED	MEANING	DESCRIPTION
"Castle Power" tune with beeps corresponding to number of cells	Blinks out cell count with RED LED	Power up notice	ESC plays Castle signature tone and beeps out the number of cells attached to controller. Note: when Auto-LiPo detection is disabled by the user, ESC will not beep the number of cells. ESC will not run motor until it receives an arming signal from the radio via the throttle lead.
Arming tune	none	ESC ready to run motor	ESC plays the Castle arming tune once it receives a signal from the receiver. Controller is ready to run the motor at this point.
•	RED LED matches tone	Powered ESC notice	ESC beeps motor every 10 seconds to remind user that power is connected to the ESC. This notice may be disabled in Castle Link.
•–	RED LED matches tones	Low Voltage Cutoff	Main battery voltage dropped below the cutoff value. The default is Auto-LiPo which sets the cutoff value based on the detected cell count. Other settings may be entered in Castle Link.
•–•	RED LED matches tones	Over Temperature	ESC reached an overtemp condition. Occurs when operated under too high a load or operated without proper cooling airflow.
•––	RED LED matches tones	Excessive Load	ESC detected very high current spikes. Causes may include damaged wiring leading to, or inside, the motor, or the use of too large a motor for the controller. Remove power from the controller and check for shorts. If none are found, verify the controller can handle the motor's current load. As a safety feature, if multiple Excessive Load errors are detected, beeping will be disabled. If error continues, contact Castle Tech Support.
••	RED LED matches tones	Start Fail	ESC was unable to start motor.
••–	RED LED matches tones	Radio Glitch	ESC detected unusual signals or loss of signal on throttle wire.
•••	RED LED matches tones	Motor Anomaly	ESC detected a sudden interruption of the motor's rotation.
–•	RED LED matches tones	Over-Current	ESC detected operating currents that exceed the cutoff value.
–••	RED LED matches tones	AUX Wire Glitch	ESC detected unusual signals or loss of signal on the AUX line.
None	Flashing GREEN LED	Locked head speed	Governor mode has reached programmed head speed and is now locked.
None	SOLID RED LED	Full throttle	ESC is at full throttle.
None	Alternating RED LED and YELLOW LED	Arm Lock	The ESC is currently in the Arm Lock state and will not allow the controller to be armed. For more information the Arm Lock feature and the AUX wire, see page ???.
None	Blinking YELLOW LED	Logging data	The ESC is recording a datalog entry.
None	SOLID YELLOW LED	Data log full	The ESC's data log is now full.

EDGE CONTROLLER AUX LINE (WHITE WIRE) MODES
Edge controllers offer an AUX LINE, which is the extra white wire connected to the receiver cable. This line may be used for a variety of tasks. The AUX line is disabled until another selection is made using the Castle Link USB adapter and the Castle Link Program. Only one mode may be selected at a time.

SETTING	AUX LINE CONNECTION AND SPECS	BEHAVIOR
DISABLED	NOT USED	Disables output/input of the auxiliary wire. Factory Setting
GAIN INPUT (ESC must be in a governor mode)	Connect the AUX line to an open channel on your receiver.	Use to adjust the governor gain in real time. 0% TX signal equals a gain of 1 (min) 100% TX signal equals a gain of 50 (max)
RPM OUT	Connect the AUX line to 3 axis gyros that support RPM sensors.	The ESC toggles the AUX LINE at every electrical commutation. Divide this number by your number of magnetic pole pairs for mechanical RPM.
ARM LOCK KEY*	Requires the Arm Lock Key Harness, (Coupon in package may be redeemed for an Arm Lock Key) which attaches to the AUX LINE and the receiver.	While the key is in the socket, the controller will be incapable of arming. Once removed, the ESC will arm when it receives the low throttle command on the traditional throttle line. If the key is inserted while the motor is running, the ESC will go into the ARM LOCKOUT state stopping the motor from running and preventing the ESC from arming.
RX ARM LOCK*	Connect the AUX line to an open channel on your receiver that is programmed to serve as an arm lock switch.	The controller won't arm or run when the auxiliary channel is below 50%.
AUDIBLE BEACON	Connect AUX line to an open channel on your receiver.	The controller will use the motor to emit an audible locator signal when the AUX LINE is above 50%. The beacon is only emitted if the motor is not running.

*The ARM LOCK KEY and RX ARM LOCK features should be used as an extra safety measure NOT to replace general safety precautions. NEVER leave vehicle unattended or rely solely on the ARM LOCK feature to guarantee safety.

SUMMARY OF FEATURES ACCESSIBLE IN CASTLE LINK
Procedure for connecting Edge HV Series to Castle Link
Castle Link operation:

1. Connect Castle Link USB device to Windows PC running Castle Link Application. Ensure USB link is detected. Green "Light" on interface screen will confirm USB connection.

2. Plug the HV controller into the Castle Link using the ESC throttle connector.

3. Connect power to the main ESC battery leads. Any pack of 4s to 12S will be sufficient for this purpose.

The ESC will not link if connected out of order.

DATA LOGGING

Use Castle Link software to modify data logging settings. The capabilities are briefly described below. See the help files and on screen instructions in Castle Link and Castle Link Graph Viewer for complete details.

***Duration of recording**
The ESC writes the recorded data to a limited amount of memory. Recording time varies with the data points selected and the sample rate. the ESC compresses data wherever possible; periods at IDLE or constant throttle do not take very much memory. Use the Castle Link software to select or remove values from the data logged by the ESC.

Automatic Data Reset

At power up, Automatic Data Reset checks the amount of memory used. If that value is more than the programmed limit, the controller will erase the entire data log. This ensures that the last few runs are saved to memory and available for analysis.

Manual Data Reset

Power controller up with TX & RX on and set to full throttle. The controller will chime the normal power up chimes. Leave TX at full throttle for 6 seconds after power up. The controller will emit a short tone after 1 second and then a long tone 5 seconds later. The controller will then erase the entire data log. Move the throttle stick to lowest position to arm the controller.

Data Analysis

Use Castle Link USB adapter and the Castle Link Windows software to read, analyze and store the data recorded on the ESC.
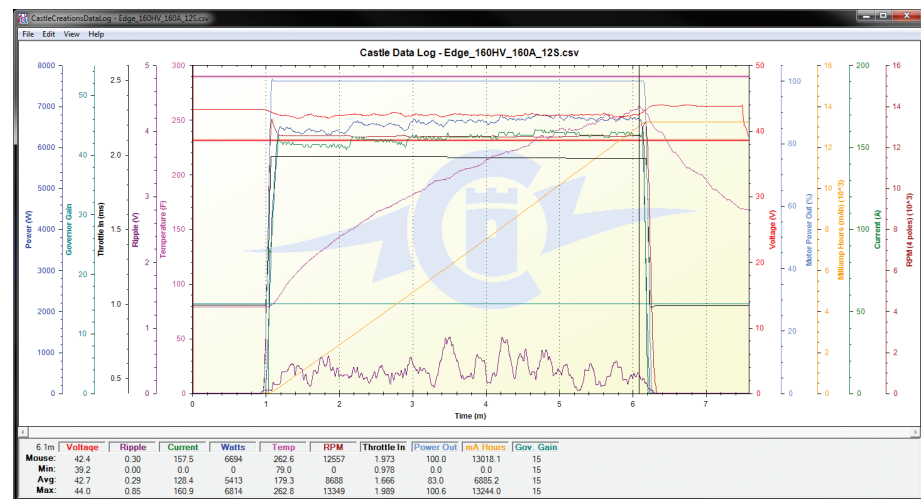
Phoenix Edge controllers support Castle Link Live for real telemetry feedback. Visit castlecreations.com/CastleLinkLive for more information.

PROGRAMMABLE SETTINGS WITHOUT A COMPUTER - STICK PROGRAMMING

The Edge firmware is designed to make it difficult to accidentally enter programming mode. Stick programming can only offer access to a small subset of the settings available on the controller. Castle highly recommends using the Castle Link USB device and our free Windows application to make settings changes on your ESC if at all possible.

Overview

Once in programming mode, the Edge ESC "asks" questions by beeping and flashing the setting number, followed by the number for each of the setting values. You must answer "yes" or "no" by moving the throttle stick on your transmitter as the Edge ESC presents them. The values are always presented in sequence, and do NOT "tell you" what any of the settings are currently programmed for.

The current setting and setting value are "flashed" out by the LED. (For example if you are on setting #3 and value #2, there will be 3 beeps/flashes, then 2 beeps/flashes repeating until you answer). Answering "no" to a setting value will cause the Edge ESC to ask for the next value in sequence. Answering "yes" to a setting value will store that setting in the permanent memory, and skip to the next setting.

NOTE: If you answer "no" to all values for a particular setting, the ESC will keep whatever value had been previously programmed. Only by answering "yes" to a value will the Edge ESC store/change any value.

You will need to move the transmitter stick to the "yes" (full throttle) position or the "no" (zero throttle) position to answer the question. When the Edge ESC has accepted your answer, it will flash the LED rapidly, and emit a constant beeping. Move the throttle stick back to the middle position for the next question.

If you wish to re-program only some of the features you do not need to continue through the programming steps for the remaining settings. Once you have programmed each of the features you wish to change and the Edge ESC has confirmed the selection, instead of returning to mid-throttle for the next question, disconnect battery power, re-connect power, and arm the speed control as normal.

Before manual programming, remove the prop or pinion to ensure safety.

Enter Programming Mode

1. The Edge controller must be connected to a motor to sound beeps. Turn your transmitter on, and leave the Edge ESC unpowered. Move the transmitter stick to the top position (full throttle).

2. Connect battery power to the Edge ESC. The Edge ESC will beep its initialization tones when first plugged in. After a short period of time the Edge ESC will emit another short tone and the LED on the Edge ESC should flash a short, single flash that repeats. If the ESC flashes continuously it is not seeing a full throttle position. Move your throttle trim to the top position or increase your full throttle endpoint or ATV on your transmitter.

3. Move your transmitter stick to the middle position. The Edge ESC will emit another short tone, and the LED on the Edge ESC should flash a short, double flash that repeats.

4. Move your transmitter stick back to the top position again. After a short time, the Edge ESC will emit a short tone, and the LED on the Edge ESC should flash a short, triple flash that repeats.

5. Move your transmitter stick back to the middle position again. The Edge ESC will emit four short tones in a row, and the LED on the Edge ESC will start a repetitive flash sequence of a single flash followed by a long pause.

The Edge ESC is now in programming mode and asking you the first question.

Stick programming offers quick access to basic settings only. Many more may be accessed using Castle Link and a Windows PC.

SETTINGS 1: LOW VOLTAGE CUTOFF BATTERY CELL CUTOFF VOLTAGE*	
Option 1:	3.0V per cell
Option 2:	3.1V per cell
Option 3:	**3.2V per cell (Factory Setting)**
Option 4:	3.3V per cell
Option 5:	3.4V per cell
Option 6:	DISABLED
SETTINGS 2: BRAKE TYPE	
Option 1:	Soft Delayed Brake
Option 2:	Hard Delayed Brake
Option 3:	Soft Brake - No Delay
Option 4:	Hard Brake - No Delay
Option 5:	**Brake Disabled (Factory Setting)**
SETTING 3: LOW VOLTAGE CUTOFF TYPE	
Option 1:	Hard Cutoff
Option 2:	**Soft Cutoff (Factory Setting)**
Option 3:	RPM Decrease
Option 4:	Pulsing RPM (ESC pules throttle)
SETTINGS 4: PWM SWITCHING RATE**	
Option 1:	8kHz (Outrunners)
Option 2:	**12 kHz (Factory Setting)**
Option 3:	16 kHz

* Refer to cell vendor's instructions for cutoff voltage
** Refer to motor manufacturer's instructions for frequency settings.

NON-WARRANTY REPAIRS

Never throw away a damaged Edge! You may send it to Castle and take advantage of our flat price replacement offer. Please check our website for specific pricing.

CONTACT & WARRANTY INFO

Your Edge ESC is warranted for one year from date of purchase to be free from manufacturing and component defects*. This warranty does not cover abuse, neglect, or damage including, but not limited to, incorrect wiring, over voltage, or overloading.

To return your controller for warranty or repair, please go to www.castlecreations.com and complete the data entry page. Print the resulting form and include it in the package with your controller. Send the package to the address below - or to one of the addresses listed on the web site that may be more suited for your location.

*Your warranty may vary based on the laws of the country where the product was purchased.

If you have any questions, comments, or wish to return your Edge ESC for warranty or non-warranty repair or replacement, contact Castle Creations, Inc. at:

**540 North Rogers Road
Olathe, Kansas 66062 USA
www.castlecreations.com
Phone: (913) 390-6939
Fax: (913) 390-6164**

PHOENIX EDGE HV USER GUIDE

www.castlecreations.com/edgeHV

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