



WATER COOLED MARINE SPEED CONTROL

HYDRA 120 & HYDRA 240 OPERATION MANUAL



Thank you for purchasing the most technologically advanced brushless electronic speed controller in the world for RC boats! Please take the time to read over these instructions to ensure you get the most from your HYDRA brushless speed control, and enjoy years of trouble-free operation.

1.0 Features of the HYDRA™ :

- Extremely Low Resistance (120 is .00043 ohms; 240 is .00022 ohms)
- Up to 120 or 240 Amps continuous current
- Water cooled heat sinks (see section 6.0 below)
- Massive 10 gauge wire on Hydra 120 and double 10 gauge wires on the Hydra 240.
- 12 cells (3s lipo) MAX with BEC
- Six to twenty cells, or 2 to 6 cell Lithium Polymer packs
- BEC (3A) provides power to receiver and servo - eliminates separate receiver battery
- User Programmable Features:
 - Reverse Type
 - Reverse Throttle Amount
 - Low voltage cutoff (LiPo safe)
 - Timing Advance
 - Starting Power
- Safe “power on” arming program helps prevent motor from accidentally turning on. Always use extreme care with high power systems.
- Auto shut down when signal is lost or radio interference becomes severe.

2.0 Making Connections on your HYDRA™ speed control

Tools required:

- Wire cutters
- Wire stripper (optional)
- Soldering iron (30-40W)

Parts required:

- Rosin core electrical solder
- Battery connector

2.1 Adding a battery connector to your HYDRA™:

The battery connector must be added to the power side of the controller (black capacitors, receiver connector, and red and black wire side). The red wire is the positive (+) lead, and must match up to the positive lead from your battery. The black wire is the negative (-) lead, and must match up to the negative lead from your battery. The polarity **MUST BE CORRECT** or the controller will be damaged from reversed polarity.

The Hydra 240 has two SETS of input and output wires. We recommend using a separate connector for each connection to ensure maximum current capacity. Make sure and connect the entire battery pack to both input wire sets of the Hydra 240. Do not connect half of the pack to one input, this will lead to operating problems from potential voltage / current imbalances.

Strip just enough insulation off of the battery wires to solder on your battery connector to the controller leads. After the connector is soldered and insulated (shrink tubing or electrical tape) check it **ONE MORE TIME** to make sure the polarity is correct before you plug in a battery.

2.2 Plugging in motor leads:

With a brushless system, there is no polarity on the MOTOR side of the controller. Simply solder the three leads to your motor (recommended) or solder your choice of connectors to the motor and controller leads. After the throttle calibration routine below – if the motor runs backwards with forward throttle, simply swap any two of the motor/controller connections and it will reverse the rotation of the motor.

The Hydra 120 and 240 controllers are designed to control one motor. Do not attempt to drive two motors with the Hydra 240. Connect the dual outputs of the 240 to a single motor's leads.

2.3 Connecting to the receiver:

Connect the receiver lead (the three color wires with a connector on the end) to the throttle channel on your receiver (usually channel 2). Do not connect a battery to the receiver, as the HYDRA™ will supply power to the receiver and servo through the receiver connector. If you are using more than 12 cells, or 3s Lipo packs, the BEC must be disabled on the controller. Disable the BEC by removing the red wire from the receiver connector. Use a separate battery pack or switching BEC (like our CC BEC) to power the servos and receiver after disabling the BEC.

3.0 Calibrating the HYDRA™ to YOUR transmitter:

IMPORTANT NOTE: Calibration is required for the very first use of the HYDRA™, after updating software using the Castle Link USB programmer, or whenever used with a new/different transmitter.

The HYDRA™ contains a throttle calibration feature that you'll want to use the first time you power it up with a new/different transmitter. Performing this exercise will



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teach the controller how your transmitter works.

- Disconnect battery
- Hold full throttle on your transmitter
- Connect battery
- HYDRA™ flashes LED and rings once
- Wait 2 seconds
- HYDRA™ flashes LED and rings 4 times indicating full throttle measured
- HYDRA™ flashes LED while beeping, indicating it's time to push full brake
- Push full brake
- Wait 1 second
- HYDRA™ flashes LED and rings 4 times indicating full brake measured
- HYDRA™ flashes LED while beeping indicating its time for neutral
- Relax trigger to neutral (center)
- Wait 1 second
- HYDRA™ flashes LED and rings 4 times indicating neutral measured
- Wait for 1 second
- HYDRA™ will flash LED and ring twice indicating that it is armed

3.1 Programming Mode

Programming the HYDRA™ is as simple as answering a few questions. The HYDRA™ asks questions by flashing a setting number, followed by the possible setting values. There are five settings that can be programmed in the HYDRA™:

- 1) Reverse Type,
- 2) Reverse Throttle Amount,
- 3) Cutoff Voltage,
- 4) Timing Advance,
- 5) Starting Power.

You must answer “yes” or “no” to the setting values as they are presented by the HYDRA™. When you enter programming mode the controller will emit a sequence of beeps and LED flashes that tell you which programming step you are in. There are two parts to the beep sequence. The first set of beeps indicates the ‘Setting’ Number (e.g., Cutoff voltage type), and the second set of beeps indicates a Setting Value (e.g 2 cell LiPo). Answering “no” to a Setting Value will cause the HYDRA™ to ask for the next Value. Answering “yes” to a Setting Value will store that setting in the HYDRA's™ permanent memory. After a setting is stored, the HYDRA™ will automatically continue to the next setting until all settings have been stored. NOTE: If you answer “no” to all Setting Values for a particular Setting Number, the HYDRA™ will keep whatever value had been previously programmed. Only by answering “yes” to a Setting Value will the HYDRA™ store/change that value.

When answering a question, you will need to move the trigger to the yes (full throttle) position or the no (full brake) position and keep it there for about 5 seconds. When the HYDRA™ has accepted your answer it will confirm your reply by flashing the LED and emitting a beeping tone. Release the trigger allowing it to

go to Neutral to confirm that you are ready for the HYDRA™ to ask the next question.

You are not required to continue through all five programming options. For example, if you wish only to change the Reverse Type (option 1) then after programming that setting you can disconnect power from the HYDRA™ and you're ready to run. Disconnecting the controller in the middle of programming simply retains the values for the remaining programming options that were previously set up.

.1 Programming Example

The following is a simplified example demonstrating how to “skip” through a program section, how to set a program option, and how to terminate programming early. In this example we will: 1) skip (e.g. do not change) Reverse Type setting, 2) change Reverse Throttle Amount to 12.5%, and 3) terminate programming after this option.

3.2.2 Entering Programming mode

- Disconnect battery
- Hold full throttle on your transmitter
- Connect battery
- HYDRA™ flashes LED and rings once
- Wait 2 seconds
- HYDRA™ flashes LED and rings 4 times indicating that it is ready for CALIBRATION mode
- Continue to hold full throttle
- HYDRA™ flashes LED while beeping
- Wait 8 seconds
- HYDRA™ flashes LED and rings 4 times
- HYDRA™ flashes LED while beeping indicating that you are in PROGRAMMING mode
- Let trigger go neutral (center)

At this point the HYDRA™ will be flashing/beeping the following sequence:

Beep – Pause – Beep... and then Repeats

This indicates that you are at Question 1 and it is asking to accept/reject Value 1.

3.2.3 Skipping Programming Sections – No change required

Looking at the table on the last page you can see that Question 1 is ‘What reverse/brake type do you want?’ and that Value 1 is ‘No Reverse’. We don't want to change the current value of this option, so we will say no to each value thereby skipping the programming option.

- Apply full brake for 1 second (NO)
- HYDRA™ flashes RED LED and rings 4 times, indicating that it has



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accepted your answer

- HYDRA™ flashes/beeps: 'Beep – Pause – Beep - Beep' (Question 1, Value 2)
- Apply full brake for 1 second (NO)
- HYDRA™ flashes LED and rings 4 times, indicating that it has accepted your answer

At this point you will have answered no to both of the questions in Section 1, so the HYDRA™ will move on to Section 2 without modifying the currently stored value.

3.2.4 Changing a Program Option

- HYDRA™ flashes/beeps: 'Beep – Beep – Pause – Beep' (Question 2, Value 1)
From the Table on the last page, Question 2 is 'Reverse Throttle Amount' and Value 1 is '12.5%'. This is the value we want to accept.
- Apply full throttle for 1 second (YES)
- HYDRA™ flashes LED and rings 4 times, indicating that it has accepted your answer.
- At this point the HYDRA™ will move on to Setting Number 3.

3.2.5 Terminating Programming Early

In this example, we do not need to change any of the remaining programming options, therefore we can terminate the programming routine by disconnecting the battery from the HYDRA™. This leaves the remaining programming options at their previously stored values.

3.2.6 A Word About Cutoff Voltages

If you are running NiCad or NiMH cells, the default cutoff voltage of the HYDRA™ (5.0V) is normally what you should use, and anything else in the programming is up to your personal preference to change, so you are ready to run!

**** IMPORTANT NOTE: Lithium Polymer Users ****

If you are using Lithium Polymer (Li-Po) batteries, DO NOT operate your boat with the factory default Cutoff Voltage. You MUST change the Cutoff Voltage BEFORE running your boat.

4.0 Troubleshooting:

Everything is hooked up correctly, the BEC (receiver and servo) works, but the throttle does not work.

The controller is not seeing the four seconds of neutral throttle and is not arming. Try moving your throttle trigger slightly in each direction to arm the controller or follow the calibrating function Section 3.1 above. You may also check to make sure that your endpoint adjustments on your radio (if it has them) are set all the way open (both top and bottom, are furthest from zero).

Every time I throttle all the way up, the controller “cuts off” after a few seconds, even with fresh charged batteries.

The controller will automatically shut down the motor if the battery voltage falls below the programmed voltage cutoff (factory preset at 5.0V) for more than half a second. This is to protect your boat from a loss of control caused by too low a voltage at the receiver. If the cutoff is kicking in with fresh charged batteries, it means that the voltage is dropping very quickly. This is usually an indication of a motor that is drawing too much current for the batteries to handle. Try using a smaller prop on the motor, or using batteries with a higher rating.

Nothing seems to work, receiver and servos are dead, and the throttle is dead.

Check all connections to ensure that they are correct, and that the polarity (+/-) battery connections are correct. If everything is correctly connected, and the receiver and servos still do not work, contact the dealer where you purchased your HYDRA™ or Contact Castle Creations directly.

5.0 Intended Use

The HYDRA™ is intended for exclusive use with boats only. Use in any other vehicles or aircraft is not covered by warranty and will not be supported by Castle Creations, Inc.



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6.0 Water Cooling Tubing

Users must provide their own water cooling tubing.

HYDRA 120 Attach the input and output tubes to one end of the controller. Cut a section approximately 3.75" long and use it to connect the tubes at the opposite end of the Hydra. Make sure the flexible tubes curve gently with no tight bends. Please see the diagram below for reference.



HYDRA 240 There are 4 aluminum cooling tubes on the HYDRA 240™. You must make three crossover sections of plastic or silicon tubing that are approximately 3.75-4" long. Connect the input/output tubes to the two aluminum tubes on the top of the controller closest to the CASTLE text / motor wires. Connect the bottom controller tubes on the motor side together with a 3.75" inch length of tubing. Connect the top left tube on the battery side of the controller to the bottom right tube on the battery side with a 3.75" tube. Now connect the remaining tubes on that side with a slightly longer tube. The water should flow into the controller on the top board, flow to the bottom board, then to the other side of the top board, down to the remaining side of the bottom board and then out of the controller.

Please see the diagram below for reference.



Your HYDRA™ is warranted for *one* (1) year from date of purchase to be free from manufacturing and component defects. This warranty does not cover abuse, neglect, or damage due to incorrect wiring, over voltage, or overloading.

Each controller is tested for proper operation before it leaves our shop.

If you have any questions, comments, or wish to return your HYDRA™ for warranty or non-warranty repair/ replacement contact Castle Creations at:

Castle Creations Inc.

235 S. Kansas Ave

Olathe, KS 66061

Tel: (913) 390-6939

Fax: (913) 390-6164

Email: support@castlecreations.com

Website: <http://www.castlecreations.com>

7.0 Contact/warranty information:

HYDRA 120 & 240 User Guide

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PROGRAMMABLE FEATURES

NOTE: Factory Defaults are indicated by asterisk (*)

Question	Value	Description
1) Brake/Reverse Type	*1) No Reverse	No reverse function.
	2) Forward to Reverse	This setting makes the boat operate freely in forward and reverse
2) Reverse Throttle Amount	1) 12.5%	This setting makes your maximum reverse speed equal to 12.5% of full power
	*2) 25%	This setting makes your maximum reverse speed equal to 25% of full power
	3) 50%	This setting makes your maximum reverse speed equal to 50% of full power
	4) 100%	This setting makes your maximum reverse speed equal to 100% of full power

NOTE: when setting Lipo cutoff voltage follow your battery manufacturer's recommendations.

Question	Value	Description
3) Cutoff Voltage	1) minimal cutoff	Nicad/NiMH cells
	*2) 5V cutoff	Nicad/NiMH cells
	3) 6V cutoff	2 cell Li-Po
	4) 9V cutoff	3 cell Li-Po
	5) 12Vcutoff	4 cell Li-Po
4) Timing Advance	1) Low	Max efficiency/runtime.
	*2) Normal	Balance power/runtime.
	3) Race	More power/less runtime.
	Use at your own risk! 4) Extreme	Max power. Most smoke. No warranty.
5) Starting power	*1) Low	Increase the value of this setting if your model has difficulty starting smoothly under low power.
	2) Normal	
	3) High	