



Aerostar G2/G2 HV ESC USER MANUAL

Thank you for purchasing this Aerostar G2 RVS/G2 RVS HV Brushless Electronic Speed Controller (ESC). Designed for a range of fixed wing applications with features including settings for outrunner, EDF inrunner and geared brushless motor types, EDF braking/ float plane/flying boat operations with the new 32bit RVS system and more. The Aerostar G2 range is packed with a host of programmable parameters and options plus multiple protection features along with a high level of quality, reliability and performance.

Hobbyking has no control over the use, installation, application or maintenance of this product, thus no liability shall be assumed nor accepted for any damages, injuries or losses of costs resulting from the use of this item. Please read carefully the safety and operation information provided in this manual before using this product.

IMPORTANT WARNINGS

HobbyKing 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.

Always place safety as priority when you use the product.

An electric motor that is connected in combination with a battery and/or ESC may start unexpectedly and cause serious damage and so should always be used with care and respect. ESC/Servo Tester: It works like an RC unit to adjust the speed of the ESC or check servos by pressing the button on the program card.

We recommend you always remove the propeller when working on a model with the power source connected.

Follow and observe all local laws and by-laws relating to model flying when flying RC planes.

Never fly over others or near crowds.

KEY FEATURES

Instant reversing (RVS) function for EDF braking and water flying applications.

High Speed 32bit microprocessors for super fast response and operation.

Utilises powerful next gen MOSFET with low thermal signature, high peak current threshold and reliability.

Adjustable motor timings/settings (for range of set-ups including outrunners, EDF inrunners and geared motors).

Adjustable SBEC output voltage, 5/6V (20-100amp G2 ESC's).

Fully programmable with Aerostar G2 LCD programming card or AerostarG2 app.

Supports Nickel & Lithium type batteries (20-100amp, Nimh/Nicad/LiPo/LiHV, 130-160amp HV, Lipo/LiHV).

Multiple protection protocols; start-up, over heat, low voltage cutoff, signal loss, phase loss etc.

SPECIFICATION

Type	Cont./Burst Current(A)	Battery cell NiXX\LiPo	Weight (g)	BEC Output	Size(mm) L*W*H	User Programmable
Aerostar G2 RVS 20A	20A/30A	5-12NC\2-4Lipo	25	5V/6V 4A	60*25*10	Yes
Aerostar G2 RVS 30A	30A/40A	5-12NC\2-4Lipo	25	5V/6V 4A	60*25*10	Yes
Aerostar G2 RVS 40A	40A/55A	5-12NC\2-4Lipo	37	5V/6V 4A	68*25*10	Yes
Aerostar G2 RVS 50A	50A/65A	5-12NC\2-4Lipo	37	5V/6V 4A	68*25*10	Yes
Aerostar G2 RVS 60A	60A/80A	5-18NC\2-6Lipo	50	5V/6V 8A	70*34*10	Yes
Aerostar G2 RVS 80A	80A/100A	5-18NC\2-6Lipo	75	5V/6V 8A	90*37*10	Yes
Aerostar G2 RVS 100A	100A/120A	5-18NC\2-6Lipo	80	5V/6V 8A	90*37*10	Yes
Aerostar G2 RVS 130A HV	130/160A	6-14 Lipo/LiHV	180	OPTO	78x45x32	Yes
Aerostar G2 RVS 160A HV	160/180A	6-14 Lipo/LiHV	180	OPTO	78x45x32	Yes

WIRES AND CONNECTION

The speed controller is connected to the motor via the three wires coming from the ESC/MOTOR. The Aerostar G2 RVS 20-100amp ESC's come with suitable connectors pre-installed. For the Aerostar G2 RVS HV 130/160amp OPTO ESC's please ensure you use suitable high quality connectors that are properly soldered and insulated and rated for the current draw of the application. Note: Battery wire length should not exceed 152mm (6 inches)

Ensure your choice of connectors/plugs meet the current drawn demands of your set-up (battery and motor connectors/plugs).

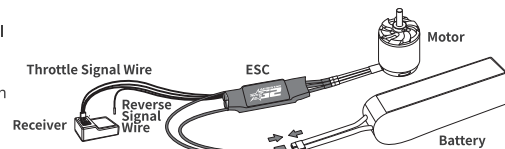
Use heat shrink tubing to cover and insulate all solder joints.

Servo lead/JR plug from the ESC plugs into the throttle channel of your receiver.

Reversing lead from the ESC plugs into the single pin of any spare Rx channel and should assigned to a 2 position switch on your Tx.

If using velcro to secure your ESC in your model ensure you only stick the velcro to the back of the ESC and not onto the label side of it. This ensures your ESC can properly cool.

Ensure correct polarity when connecting the ESC to the battery (red to red, black to black).



THROTTLE CALIBRATION:

(IMPORTANT: Please ensure you manually calibrate the throttle range when using the ESC for the first time. This should always be done with the propeller removed if the ESC is connected to a motor and with the ESC correctly connected to you Rx and your Rx bound to your radio)

1. Turn on radio and move throttle stick to full open/up/100% position (ensure the throttle trim is at neutral first).



2. Connect your flight battery to the ESC and wait for about 2 seconds.

4. Your motor will now give two quick beeps (if it does not give 2 quick beeps, repeat steps 1 and 2 again until it does)

3. As soon as you hear those two short beeps, lower your throttle stick to its lowest position.



5. This indicates that the throttle for your ESC is now calibrated and ready to use.



NORMAL STARTUP PROCEDURE

1. Turn on the transmitter, move the throttle stick to the bottom position.



2. Connect the battery pack to the ESC and wait for about 2 seconds.

4. When the motor emits "Beep----Beep", means self-test is finished, the ESC is ready to work.

3. The motor will beep several sounds, sounds time presents the amount of battery cells (see table below).

CELL COUNT 'TONE' TABLE

AEROSTAR RVS G2 20-100AMP		
Cell Count	Tones	
2S Lipo	"beep.beep"	2 short tone
3S Lipo	"beep.beep.beep"	3 short tone
4S Lipo	"beep.beep.beep.beep"	4 short tone
6S Lipo	"beep.beep.beep.beep.beep.beep"	6 short tone

AEROSTAR RVS G2 HV 130-160AMP		
Cell Count	Tones	
6S Lipo	"beep- -.beep"	1 long 1short
8S Lipo	"beep- -.beep.beep.beep"	1 long 3 short
10S Lipo	"beep- -.beep- -"	2 long tone
12S Lipo	"beep- -.beep- -.beep.beep"	2 long 2 short
14S Lipo	"beep- -.beep- -.beep.beep.beep.beep"	2 long 4 short

PROGRAMMABLE SETTINGS AND DEFAULTS

- 1. RVS (Reversing)** = Reversing function/reverse thrust braking **ON***/OFF. With the single yellow wire from the ESC plugged into the signal pin of any spare channel and assigned to a 2-position switch, RVS can be engaged remotely. As a safety feature, RVS only engages and operates below 50% throttle.
- 2. Brake Type** = Braking function for the model **OFF***/SOFT/MID/HARD. The brake function allows you to choose how quickly the motor stops rotating once the throttle is at 0% (idle). The braking function is ideal for models with folding propellers when you need the prop to fold before landing.
- 3. Motor Timing** = Select the timing most applicable for your motor type, **AUTO***/HIGH/MID/LOW. High timing (25 degrees) for low Kv outrunners (bigger motors, big props), MID timing (15 deg) for moderate Kv Outrunners (small, medium or large motors with smaller props), low timing (5 degrees) for high Kv inrunners (racing prop models and ducted fans). You can check which timing is best via a tachometer/amp meter. The best timing will be the one that gives the highest RPM with the lowest amp draw.\ Alternately you can use watts (greatest watts for lowest current) instead of RPM, but there will be a much more noticeable effect with RPM.
- 4. Motor Rotation** = The direction in which the motor turns, **CW***/CCW. Clock Wise is the standard rotation for plane motors, Counter Clock Wise would be selected if you need a motor to rotate in the opposite direction.
- 5. HEF (Higher Efficiency Function)** = HEF is circuitry in the ESC that allows for better heat dissipation and lower energy loss in the ESC in certain applications **ON/OFF***. Similar to Active freewheeling when on, HEF "OFF" is the default setting and is suitable for use with any medium to low Kv outrunner that is not expected to run for extended periods (long range cruising), typical of the commonly flown model types. Select HEF "ON" when using high Kv out-runners or in-runners applications (such as those used Electric Ducted Fans or direct drive racing models). Please note that whilst the ESC itself will run cooler with HEF set to "ON", the motor and/or battery may run at a higher temperature, so be sure to provide adequate cooling for both.
- 6. Cell count** = Number of cells in the battery used, **AUTO***/2S/3S/4S/5S/6S (**AUTO***/6S/8S/10S/12S/14S G2 HV). You can manually select the number of cells (for example select 6 cells for a 6S lipo) or the ESC will automatically detect based on the voltage it sees when connected.
- 7. LVC (Low Voltage Cut-off)** = The voltage level at which the ESC cuts power to the motor, OFF/NiMH 50%/NiMH 60%/3V, **3.2V***, 3.4V, 3.6V (OFF/2.3V/2.5V/3V/**3.2V***/3.4V/3.6V G2 HV). Selecting a higher cutoff will reduce flight times but increase the life of your flight battery. Conversely, a lower cut-off will give a small increase in flight times but reduce the life span of your flight battery. An LVC of 3.4v is recommended when using LiHV batteries.
- 8. Voltage Cut-off Type** = How the motor behaves once LVC is reached, **Reduce Power***/Cut off Power. As the ESC detects your battery is approaching LVC it can either reduce the power you have when at full throttle, or continue to give full power until LVC is reached, and then cut all power, (dead stick).
- 9. BEC (Battery Eliminating Circuit)** = The voltage the ESC supplies to the Rx from the flight battery, **5V***/6V. Select the voltage your Rx and servos receive from the ESC. If your Rx and servos can handle 6V or more, selecting a higher BEC voltage output will result in faster-responding servos. Note HV ESC do not have a BEC, therefore selecting/changing this setting will have no effect on HV ESC's, even though the option is still given.
- 10. Start-up Power** = The force with which the motor starts rotating when the throttle is applied, **Low/Medium***/Hard. If the low setting is selected, and the throttle stick is moved quickly to full power, the motor will slowly accelerate up to full power. This is perfect for helicopters, large folding propellers, or motors with gearboxes. If medium is selected, the motor will reach full power in a shorter period of time. If hard is selected, the motor will start up instantly with no delay, this is normally used for aerobatic planes with standard non-folding propellers.

PROGRAMMING VIA TRANSMITTER

Turn on the transmitter, move the throttle stick to the top position.

Connect the battery pack to ESC.

Wait for 2 seconds, the motor will emit a fast 2 beep tone 'beep beep'.

Wait for another 3 seconds, the motor will emit a special fast multi beep tone 'da da da dum', which means it has now entered programing mode.

TONE SEQUENCE IN PROGRAMMING MODE

After entering program mode, you will hear 11 tones in a loop with the following sequence.

Tones	Programmable items	
1). "beep"	RVS (Reversing)	(1 short tone)
2). "beep.beep"	Brake Type	(2 short tone)
3). "beep.beep.beep"	Motor Timing	(3 short tone)
4). "beep.beep.beep.beep"	Motor Rotation	(4 short tone)
5). "beep- -"	HEF (Higher Efficiency Function)	(1 long tone)
6). "beep- -.beep"	Cell Count	(1 long 1short)
7). "beep- -.beep.beep"	Low Voltage Cutoff Threshold	(1 long 2 short)
8). "beep- -.beep.beep.beep"	Low Voltage Cutoff Type	(1 long 3 short)
9). "beep- -.beep.beep.beep.beep"	BEC Voltage (not programmable for HV esc's)	(1 long 4 short)
10). "beep- -beep- -"	Start-Up Power	(2 long tone)
11). "beep- -beep- -.beep"	Restore Factory Setup Defaults	(2 long 1 short)

SELECTING FUNCTION TO PROGRAM

Moving the throttle stick to the bottom position immediately after any of the above tones will select this function for programming. Once this item is selected you will then hear a sequence of 'tones' in a loop that correspond to the available programmable 'values' for the selected function. Select the desired value, to the corresponding tone by moving the throttle stick to the full up/open position once more. The motor now emits a special tone like '123' which indicates the value is set and saved.

For example: If you want to set the motor rotation, when you hear four short tones of "Beep", moving the throttle stick to the bottom position within 2 seconds, means you enter the motor rotation menu. One short tone of "Beep" is forward direction(CW), two short tones of "Beep" is reverse direction(CCW). If you want to set to reverse direction(CCW), moving the throttle stick to the top position when you hear the two short tones of "Beep", then you will hear a special confirmation tone like "123", which means the "CCW" is set and saved.

Keeping the throttle stick at top, you will go back to programming mode and you can select other items; or moving the stick to bottom within 2 seconds will exit program mode directly.

PROGRAMABLE VALUES CHART

Items	Tones						
	"beep"	"beep.beep"	"beep.beep .beep"	"beep.beep .beep.beep"	"beep- -"	"beep- - beep"	"beep- - beep.beep"
	1short tone	2short tone	3short tone	4short tone	1long	1long 1short	1long 2short
1.RVS (Reversing)	OFF	*ON					
2.Brake Type	*OFF	Soft Brake	Mid Brake	Hard Brake			
3.Motor Timing	*Auto	Low	Mid	High			
4.Motor Rotation	*CW	CCW					
5.SR Function	ON	*OFF					
6.Cell Count	*Auto	2S (6S HV)	3S (8S HV)	4S (10S HV)	5S (12S HV)	6S (14S HV)	
7.LVC (Low Voltage Cut-Off)	OFF	NiMH50% (2.3V HV)	NiMH60% (2.5V HV)	3.0V	*3.2V	3.4V	3.6V
8.Voltage Cutoff Type	*Reduce Power	Cut off Power					
9.BEC (Battery Eliminating Circuit) (NOT APPLICABLE FOR HV ESC)	*5V	6V					
10.Start-Up Power	Low	*Mid	Hard				
11.Restore Factory Default Sets	Restore (multiple beep sequence played when selected)						

① Note: " * " value means default settings.

PROTECTION FUNCTION

Start-up protection: If the motor fails to start normally within 2 seconds after pushing the throttle to start, the ESC will cut off the output power. If this happens then you will need to carry out the throttle calibration again. Possible reasons: Disconnection or a poor connection between the ESC and motor, the propeller or motor is blocked/jammed, or if using one the gearbox is damaged, etc.

Over-heat protection: Over-heat protection: When the temperature of the ESC goes over 110C, the ESC will automatically reduce the output power for protection. It will not fully shut down but will reduce it to around 70% of the full power to ensure the motor gives enough power to avoid a crash.

Throttle signal loss protection: The ESC will reduce the output power if throttle signal is lost for 1 second, and it will cut off output to the motor if the throttle signal is lost for over 2 seconds. If the throttle signal recovers during power down, the ESC will immediately resume throttle control. In this way, the ESC will only protect when the signal is lost for 2 seconds or longer.

Anything less than 2 seconds then it will reduce the output power gradually instead of cutting it off immediately, this will give you a certain amount of time to save the plane, taking into account safety and practically.

Over load protection: Overload protection: The ESC will cut off power or restart automatically when the load is increased suddenly, possible reason is the motor blocked or jammed.

TROUBLE SHOOTING

Trouble	Possible Reason	Action
After powering up, the ESC emits the sounds for the number of battery cells but the motor does not run..	Throttle range has not been calibrated.	Recalibrate the throttle range.
After powering up, the motor doesn't run or emit any sounds.	1.Poor connection between ESC and battery. 2.Poor soldering can cause a poor contact. 3.Low battery voltage. 4.The ESC could be faulty.	1.Check the connectors and replace if necessary, check polarity. 2.Re-solder the connections correctly. 3.Check the voltage of the battery, and replace or recharge as necessary. 4.Replace the ESC.
Motor does not power up, no audible tones are emitted, and servos also do not work.	1.Poor soldering, or loose connections between ESC and battery. 2. Low battery voltage. 3. Poor soldered connections 4. Battery polarity is not correct. 5. The ESC throttle connection to the receiver is reversed.	1.Check the connectors and replace if necessary, check polarity, re-solder the connections properly. 2.Check the voltage of the battery, and replace or recharge as necessary. 3.Check and reverse if necessary. 4.Unplug the connector from the receiver and rotat through 180°, replace into the receiver.
Servos are working but motor does not run.	1.Poor, or loose connections between ESC and motor. 2.The motor coils could be burnt out.. 3.The battery pack voltage exceeds the acceptable range. 4.The throttle stick is not at the idle/low position. 5.The ESC throttle calibration has not been set.	1.Check all the connections and make sure they are correct. 2.Change the motor. 3.Check the battery pack, use a fully-charged battery. 4.Place the throttle stick in its lowest position. 5.Recalibrate the throttle range again.
With the ESC powered up, the motor does not run, and you get a continuous beeping sound.	The throttle stick is not at its lowest position.	Place the the throttle stick in its lowest position.
Motor rotates in the reverse direction,	The cables are connected incorrectly between the motor and the ESC..	1.Swap any two of the three cable connections between the ESC and the motor. 2.Access the "Motor Rotation" function via the ESC programming mode and change the pre-set parameters.
Motor stops running whilst flying.	Loss of throttle signal.	1.Check your radio equipment, and carry out a thorough range check. 2.Check the placement of the ESC and the receiver, also check the route of the receivers aerial to ensure it is clear of the ESC.

