ARROWIND ESC (BEC TYPE) - USER INSTRUCTIONS

www.arrowindhobby.com

Dear Customer,

Thank you for purchasing an Arrowind electronic speed controller (ESC). All our ESCs are made to the highest standards and have been extensively tested in development to ensure that you receive only the very best quality product.

To ensure that you get maximum performance and length of service from your ESC, please read these instructions carefully and completely before attempting to use it. There are safety factors that are important to understand and failure to adhere to the instructions could result in personal injury and/or damage to the ESC.

- Do not use this ESC for any other purpose than radio control model aircraft and helicopters.
- Do not use this ESC when you are unaware of the demands likely to be placed on it (Amps/Volts). This ESC does not have over-current protection.
- Do not allow the ESC to be operated by children under 14 years old without supervision.
- Make sure that the motor and propeller (for aircraft) is suitable for use with this ESC. Please refer to the motor manufacturer for this.
- Do not attempt to use the ESC if it is damaged in any way.
- Do not use a battery type/specification that is not specified in these instructions.
- These ESCs are primarily intended for use with Li-Po batteries. To use other battery types (Nicad, NiMh, Li-Fe, Li-Ion), you will need to program the cut-off voltage precisely using the program card.

1. Main Features

1.1 Equipped with a high-speed, small-sized, multifunctional MCU.
1.2 Low-voltage protection, over-heat protection, signal loss protection, safe power on protection and self-check functions.
1.3 Selectable, 4 second, very-soft start performance feature, which is highly suited to helicopters and folding propellers.
1.4 Excellent startup performance, great throttle linearity and a rapid throttle response.
1.5 Excellent low-speed performance.
1.6 Max speed: 240,000 rpm for 2-pole, 80,000 rpm for 6-pole and 40,000 rpm for 12-pole.
1.7 Separate power supply for MCU and BEC, enhancing the ESC's ability to eliminate magnetic interference.
1.8 The optional program card uses a very large LED panel, making setup both convenient and easy.
1.9 The low-voltage threshold and start-up power can be programmed precisely by the program card.
1.10 The throttle range can be configured to be compatible with different receivers.
1.11 Motor reverse rotation available.

2. Product Specification

Normal Series	Continuous Current	Burst (10S) Current	Battery Cells Li-xx, Li-Fe (Nicad/Nimh)	Dimensions (mm) L x W x H	Weight (g)	BEC (Linear)	Programmable
Arrowind 7A	7A	9A	1-2, 1-2 (3-6)	20 x 12 x 5	4	1A	Yes
Arrowind 12A	12A	15A	1-3, 1-3 (3-10)	22 x 17 x 7	7	1A	Yes
Arrowind 18A	18A	23A	2-3, 2-3 (5-10)	46 x 28 x 9	22	2A	Yes
Arrowind 25A	25A	30A	2-4, 2-5 (5-12)	46 x 28 x 9	25	2A	Yes
Arrowind 30A	30A	40A	2-4, 2-5 (5-12)	50 x 28 x 12	34	2A	Yes
Arrowind 35A	35A	45A	2-4, 2-5 (5-12)	58 x 27 x 10	35	3A	Yes
Arrowind 40A	40A	50A	2-5, 2-6 (5-14)	58 x 27 x 10	35	3A	Yes
Arrowind 50A	50A	65A	2-5, 2-6 (5-14)	58 x 27 x 10	36	3A	Yes
Arrowind 60A	60A	80A	2-6, 2-7 (5-18)	58 x 27 x 15	50	3A	Yes
Arrowind 80A	80A	100A	2-6, 2-7 (5-18)	58 x 27 x 15	60	3A	Yes

Maximum servo load guide for the built-in Linear BEC:

(5V/1A):

Li-xx Battery	2 Cells	3 Cells
Qty of 3-6g micro servo (Max)	3	3

(5V/2A):

Li-xx Battery	2 Cells	3 Cells	Over 3 Cells
Qty of 9g micro servo (Max)	3	3	Do not use BEC

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(5V/3A):

Li-xx Battery	2 Cells	3 Cells	4 Cells	5 Cells
Qty of standard servo(Max)	5	5	4	3

Note: It is not recommended to use the built-in linear BEC when your Li-Po pack has more than 3 cells (12.6V): If you are using more than 3 Li-Po cells, or your radio system power consumption is excessive, you should disable the BEC and use a separate power source for the receiver. A linear BEC is unable to control the voltage to 5v when using more than 3S. Disable the BEC by cutting or removing the red wire from the servo lead wire on the controller: This does not apply to Switch mode BEC versions.

Switch Mode Series	Continuous Current	Burst (10S) Current	Battery Cells Li-xx, Li-Fe (Nicad/Nimh)	Dimensions (mm) L x W x H	Weight (g)	BEC (Switch Mode)	Programmable
Arrowind 35A	35A	45A	2-4, 2-5 (5-12)	58 x 27 x 10	36	3A	Yes
Arrowind 40A	40A	50A	2-5, 2-6 (5-14)	58 x 27 x 10	36	3A	Yes
Arrowind 50A	50A	65A	2-5, 2-6 (5-14)	58 x 27 x 10	37	3A	Yes
Arrowind 60A	60A	80A	2-6, 2-7 (5-18)	58 x 27 x 15	51	3A	Yes
Arrowind 80A	80A	100A	2-6, 2-7 (5-18)	58 x 27 x 15	60	3A	Yes

Maximum servo load guide for the built-in switch mode BEC (5V/3A)

Li-xx Battery	2 - 6 Cells
Qty of standard servo (Max)	5

Note: This series of ESCs uses a high efficiency, switch mode BEC. It is able to cope with a much higher voltage than a linear type, yet it can still can supply a stable 3A current at 5v. Consequently, it can drive more servos and limit internal heat build up very effectively. This series is highly suitable for helicopters with more servos and more complex aircraft.

3. Instructions for Operation
3.1 Normal Startup Procedure (quick start)

Step 1: Pull the throttle stick to the bottom position (low throttle). Make sure the trim is centered.
Step 2: Switch the transmitter on.
Step 3: Switch the ESC on (normally by connecting the battery)
Step 4: The system detects the low throttle position and makes a long "beep" sound.
Step 5: The system then detects the battery voltage and makes several short "beep" sounds, which denote the number of battery cells in the pack.
Step 6: The system then conducts a self-check. If the result is normal, you will hear a long "beep" sound.
Step 7: Move the throttle stick to the Startup position to commence motor operation. The LED on the ESC flashes along with a "beep" sound. This position can be selected (see below).

Note:
The automatic cell number detection only works reliably when the battery is fully charged. A discharged battery can be detected as a lower cell count resulting in damage to the pack.

3.2 Throttle Range Setup Procedure

Step 1: Push the throttle stick to the top position (full throttle).
Step 2: Switch the transmitter on.
Step 3: Switch the ESC on (normally by connecting battery)
Step 4: The system detects the high throttle signal and makes a two "beep" sound, which denotes that full throttle has been confirmed and saved.
Step 5: Quickly pull the throttle stick to the bottom position (low throttle) or the system will enter the program mode.
Step 6: The system detects the low throttle signal and makes a long "beep" sound.
Step 7: The system will then detect the battery pack voltage and make several short "beep" sounds, denoting the number of cells.
Step 8: The system then performs a self-check. If it is normal, you will hear a long "beep" sound,
Step 9: Move the throttle stick to the startup position (adjustable) and the motor will commence operation.

If the system does not detect the throttle signal, it will make constant "beep" sounds without stopping. Any fault in the self-check will result in 20 short "beep" sounds.

3.3 Protection Settings

Low-voltage protection: Whether the ESC cuts motor power immediately, or lowers it when then the input voltage drops below the programmed low-voltage protection voltage, depends on the values set as Cutoff Type.

Loss of signal protection: Motor power will automatically drop to less than 20% when the signal is lost for over 3 seconds and resume when detecting the signal again

Over-heat protection: When the internal temperature rises above 110 degrees Celsius, the motor power will drop to less than 35% and will resume when the temperature decreases.

Hardware self-check: The system will check itself when the battery is connected. Any hardware fault detected will result in 20 "beep" sounds.

4. Configurable Parameters Using the Program Card

A number of performance parameters for the ESC can be changed from default values by using an Arrowind Program Card (available separately). These parameters can be set to meet users' particular performance requirements The Following section will deal with these adjustments.

4.1 Cut-Off Voltage: Low Voltage Protection Threshold Default is 00.0V

You can select an exact voltage threshold according to cell quantity within a range of 00.0~49.9v. The default is 00.0V, which means automatic for Li-po.

Note: The system will calculate the Li-Po battery cells and set a threshold automatically if this setting is 00.0V. This automatic protection voltage for each Li -Po cell is 2.85V (3 cells is 8.55v). To use Nicad, NiMh, Li-Ion or Li-Fe batteries, you must program the voltage exactly. The same applies for a different Li-Po voltage.

Suggested voltages per cell; 1) Li-Fe = 2.6v 2) Li-Ion = 2.8v 3) Nicad/NiMh = 0.95v. The value to program is the total pack voltage.
Note: All cutoff voltages should be raised if the actual discharge rate is low relative to the ESC rating. The voltage sensing is more precise at higher discharge rates.

4.2 Start Power Percent: (00%~29%) - Default is 00%

You can set the percentage position of power-on when the motor starts within a range of 00%~29%. Default is 00%. Under default setting, the motor start position is decided automatically by the system according to throttle stick position.

4.3 Timing Mode: Low/Mid/High/Highest - Default is Middle

Low timing is recommended for high inductance and low KV motors. Mid timing is the default setting and will operate most standard motors, although not necessarily at maximum efficiency. High timing is recommended for low inductance and high KV motors, e.g. high KV outrunner motors. For some high KV motors, if it shakes while rotating in high speed, the "High" timing mode is recommended.

4.4 Brake Type: Off/Soft/Hard - Default is Off (brake disabled)

Soft brake: Less forceful and brake time is longer. Better for big folding propellers and helicopters. **Hard brake:** More forceful and brake time is shorter. For smaller folding propellers. If Soft brake or Hard brake is selected, when the throttle is closed and the motor stopped the brake will continue to hold the motor in the stopped position.

## 4.5 Start Mode: Fast Start/Soft Start/Very Soft Start - Default is Fast

Fast is preferred for fixed-wing aircraft without folding propellers. Soft and Very Soft both have a 4 second start period. The speed of propeller rotation rises slowly during the first 4 seconds of operation. The rotation speed is little faster in Soft and is slower in Very Soft. Soft and Very Soft are suitable for folding propellers and helicopters. When setting Soft or Very Soft mode, if the throttle is closed and the motor stopped yet the throttle opened again within 4 seconds the start will be in Fast mode. If over 4 seconds, the start will be the normal Soft mode or Very Soft mode again (4 second startup). If the brake is on and soft or very soft start is selected, the 4 second start up will not work if the throttle is closed for more than 4 seconds although the first start is soft. After 4 seconds closed, the startup will be fast. This is suitable for the fixed wing models. If the brake is off and soft or very soft start is selected, the 4 second start up will still be soft when you open the throttle after being closed for more than 4 seconds.

4.6 Cutoff Type: Soft-Cut/Cut-Off - Default is Soft-Cut

Cut-Off option: This gives immediate motor shutdown at the low-voltage threshold. **Soft-Cut option:** This reduces the output power gradually to 50% of the current power at the low-voltage threshold.

4.7 Throttle Curve: CURVE1/CURVE2/CURVE3 - Default is Curve1

This function adjusts the optimum ESC response to throttle stick movement. Curve 1 is linear and the normal throttle curve. When the throttle stick position is in middle, the RPM reaches around 50% of the maximum and is recommended for most fixed-wing aircraft. Curve2 At the same middle throttle stick position, the RPM reaches a higher level than 50% of the maximum. This is recommended for helicopters. Curve3 is Logarithmic. At the same middle throttle stick position it achieves much higher than 50% of the maximum RPM. Recommended for both gliders and helicopters.
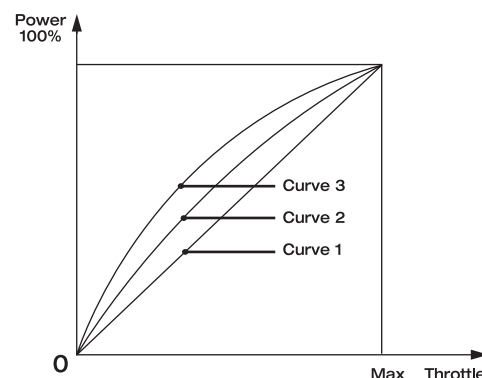
4.8 Motor Rotation: Default is Forward

Forward and reverse motor rotation settings are available. Check the motor rotation direction at startup before using this function.

Please note: if you have any problem with Arrowind products, please contact your local dealer or distributor as soon as possible.

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## Programming via the Transmitter

1. Enter Program Mode
Push the throttle stick to the top position (full throttle), turn on the transmitter, connect the ESC and wait 2 seconds. You will hear two "BEEP" sounds which means the full throttle position has been confirmed. Wait another 6 seconds. It will make "i 3 i 3" tune, then you can start programming via the transmitter.
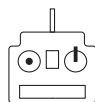
2. Select Program Parameters
There are 9 parameters that can be set by using the transmitter. You will hear 9 different indicating sounds which correspond to 9 different parameters. Pull the throttle stick to the bottom position (throttle fully closed), within 3 seconds you will hear the corresponding sound which will bring you to the parameter setting status. The 9 indicating sounds will repeat in turn as follows.
(1 long sound = 5 short sounds);

1. "**BEEP**-" (a short sound) indicates **Brake Type**
2. "**BEEP**-**BEEP**-" (two short sounds) indicates **Timing Mode**
3. "**BEEP**-**BEEP**-**BEEP**-" (three short sounds) indicates **Start Mode**
4. "**BEEP**-**BEEP**-**BEEP**-**BEEP**-" (four short sounds) indicates **Cutoff Mode**
5. "**BEEP**---" (a long sound) indicates **Throttle Curve Mode**
6. "**BEEP**---**BEEP**-" (a long sound and a short) indicates **Li-XX Cells**
7. "**BEEP**---**BEEP**-**BEEP**-" (a long sound and two short) indicates **Cutoff Voltage**
8. "**BEEP**---**BEEP**-**BEEP**-**BEEP**-" (a long sound and three short) indicates **Motor Rotation Reverse**
9. "**BEEP**---**BEEP**---**BEEP**---" (three long sounds) **EXIT**
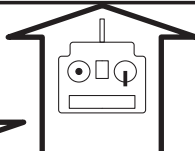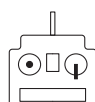
3. Select Program Values
After entering parameter setting status, you will hear the ESC making sounds in cycle. Different sounds indicate different values. Push the throttle stick to the fully open position, within 3 seconds after you here the corresponding sound, then you will hear a special tune "5 6 5 6", which means the corresponding value has been chosen and saved. If you don't want to continue setting other values, just pull the throttle stick to the fully closed position to exit. Or wait 3 seconds to return to the second step and continue programming.
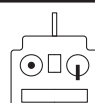
Sound / Parameter	"BEEP-" 1 Sound	"BEEP-BEEP-" 2 Sounds	"BEEP-BEEP-BEEP-" 3 Sounds	"BEEP-BEEP---" X Sounds
Brake Type	OFF	SOFT	HARD	
Timing Mode	LOW	MID	HIGH	
Start Mode	FAST	SOFT	VERY SOFT	
Cutoff Mode	SOFT-CUT	CUT-OFF		
Throttle Curve	CURVE 1	CURVE 2	CURVE 3	
Li-XX Cells	AUTOMATIC	2 CELLS	3 CELLS	XX CELLS
Cutoff Voltage	LOW (2.6V)	MIDDLE (2.85V)	HIGH (3.1V)	
Motor Rotation	NORMAL	REVERSE		

Notes: Under **Li-XX Cells** value status, when the number of Li-XX battery cells is more than 4, the ESC will indicate by making a long "**BEEP**" plus short "**BEEP**" sounds. A long "**BEEP**" sound equals 5 short "**BEEP**" sounds, e.g. you will hear "**BEEP**---**BEEP**-" (a long sound + a short sound) if there is a 6-cell Li-XX pack and you will hear "**BEEP**---**BEEP**---**BEEP**-" (two long sounds + a short sound) for a 11-cell pack.
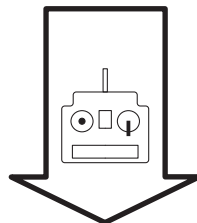
4. Exit Program
Exit programming:

Two ways as shown in steps 2 and 3.