

### you for purchasing ZTW A-Series Brushless Electronic peed Controller (ESC).

tigh power systems for RC model can be very dangerous and we strongly uggest that you read this manual carefully. ZTW Model have no control wer the use, installation, application, or maintenance of these products,

Brushless Controls thus no liability shall be assumed nor accepted for any damages, losses of costs resulting from the use of this item. Any claims arising from the operating, failure or malfunctioning coast resulting from the use of material ray claims arising from the operating, failing on manufactoring etc. will be denied. We assume no liability for personal injury, property damage or consequential damages resulting from our product or our workmanship. As far as is legally permitted, the obligation for compensation is limited to the invoice amount of the product in question.

The ZTW ESC's high power BEC has been specifically designed for extreme aerobatics and therefore has the capability to support the higher momentary peak demand loads to eliminate the possibility of unwanted shutdowns, and is also capable of supporting continuous simultaneous multiple servo operations typically found in CCPM equipped hardcore 3D E-helicopters.

The speed controller can be connected to the motor by soldering directly or with high quality connectors. Always use new connectors, which should be soldered carefully to the cables and insulated with heat shrink tube. The maximum length of the battery pack wires shall be within 6 inch.

- Solder controller to the motor wires,
  Solder appropriate connectors to the battery wires,
  Insulate all solder connectors with heat shrink tubes,
  Plug the "JR" connector into the receiver throttle channel,
  Controller Red and Black wires connects to battery pack Red and Black wires respectively.

### Brushless Speed Controller



Туре	Cont. Current(A)	Burst Current(A) 10 sec.	Battery cell NiXX/Lipo	Weight (g)	BEC Output	Size (mm) W*L*H	User Program
A-ZTW3A BEC	3A	5A	3-10 NC \ 1-3 Lipo	2.5	5V / 1A	11 x 17 x 4	yes
A-ZTW6A BEC	6A	8A	5-10 NC \ 2-3 Lipo	5	5V / 1A	13 x 21 x 4	yes
A-ZTW8A BEC	8A	10A	5-12 NC \ 2-4 Lipo	8	5V / 1A	21 x 22 x 4	yes
A-ZTW10A BEC	10A	12A	5-12 NC \ 2-4 Lipo	8	5V / 1A	21 × 22 × 4	yes
A-ZTW12A BEC	12A	16A	5-12 NC \ 2-4 Lipo	8	5V / 1A	21 x 22 x 4	yes
A-ZTW20A BEC	20A	30A	5-12 NC \ 2-4 Lipo	18	5V / 2A	23 × 33 × 6	yes
A-ZTW25A BEC	25A	35A	5-12 NC \ 2-4 Lipo	20	5V / 2A	23 x 33 x 6	yes
A-ZTW30A BEC	30A	40A	5-12 NC \ 2-4 Lipo	28	5V / 3A	23 x 43 x 6	yes
A-ZTW40A SBEC	40A	60A	5-18NC \ 2-6 Lipo	32	5.5V / 4A	23 x 52 x 7	yes
A-ZTW50A SBEC	50A	70A	5-18NC \ 2-6 Lipo	32	5.5V / 4A	23 x 52 x 7	yes
A-ZTW60A SBEC	60A	80A	5-18NC \ 2-6 Lipo	44	5.5V / 4A	23 x 52 x 14	yes
A-ZTW70A SBEC	70A	90A	5-18NC \ 2-6 Lipo	48	5.5V / 4A	23 x 52 x 14	yes
A-ZTW85A SBEC	85A	100A	5-18NC \ 2-6 Lipo	60	5.5V / 4A	34 x 52 x 14	yes
A-ZTW110A SBEC	110A	120A	5-18 NC \ 2-6 Lipo	86	5.5V / 4A	34 x 52 x 20	yes
A-ZTW100A OPTO HV	100A	120A	18-38NC\6-12Lipo	76		34 x 52 x 20	yes

	Programming Mode Audible Tone	s
Г	Programming Mode Audible Tones	ESC Functions

Throttle Calibration	
(within the first 4 Sec )	
1 Brake	
* * * *	Brake On /Off
2 Battery type	
~ ~ ~ ~	NiCad
~~ ~~ ~~ ~~	LiPo
3 Low Voltage Cutoff Threshold	
	Low2.8V/50%
* * * * * * * *	Medium3.0V/60%
	High3,2V/65%
4 Restore Factory Setup Defaults	
	Restore
5 Timing Setup	
	Automatic (7-30°)
	Low (7-22°)
	High (22-30°)
6 Soft Acceleration Start Ups	
VV VV VV VV	Very Soft
V V V V	Soft Acceleration
VVV VVV VVV VVV	Start Acceleration
7 Governor Mode	
	Rpm off
** ** ** **	Hell first range
*** *** ***	Heli second range
8 Motor Rotation	
w w w w	Forward/ Reverse
9 Switching Frequency	
// // // //	8kHz
11 11 11 11	16kHz
10 Low Voltage Cutoff Type	
	Reduce Power
	Hard Cut Off

Improper polarity or short circuit will damage the ESC therefore it is your responsibility to double check all plugs for proper polarity and first fit BEFORE connecting the battery pack.

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After Tones

The ZTW ESC is equipped with audible alert tones to indicate abnormal conditions at power up.

1. Continuous beeping tone (\*\*\*\*\*) – Indicates that throttle stick is not in the minimum position.

2. Single beeping tone followed by a one second pause (\* \* \* \* \*)- Indicates that the battery pack. 2. Single beeping unit intolled by a only section page of the page once the battery is connected). Built-in Intelligent ESC Safety Functions

1. Over-heat protection: When the temperature of ESC exceeds 110 deg C, the ESC will reduce the output power to allow it too cool.

2. Lost Throttle signal protection: The ESC will automatically cut power to the motor when it detects

### a lost of throttle signal for 2 seconds, then the motor will emit continuous beeping tone. POWERING UP THE ESC FOR THE FIRST TIME & SETTING THE AUTOMATIC THROTTLE

CALIBRATION
The 2TW ESC features Automatic Throttle Calibration to attain the smoothest throttle response and resolution throughout the entire throttle range of your transmitter. This step is done once to allow the ESC to "learn and memorize" your Transmitter's throttle output signals and only repeated if you change

Switch your Transmitter ON and set the throttle stick to its maximum position.

2. Connect the battery pack to the ESC. Wait for about 2 seconds, the motor will been for twice, then put Accounted the disdutery pack to the ESC, what for about 2 sections, the hotorown beep for funce, men put the throttle in the minimum position, the motor will also beep, which indicates that your ESC has got the signal range of the throttle from your transmitter.

The throttle is now calibrated and your ESC is ready for operation.

### ENTERING THE PROGRAMMING MODE

- 1. Switch your Transmitter **ON** and set the throttle to its **maximum** position.
  2. Connect the battery pack to the ESC.
  3. Wait until you hear two short beeps (••••••••) confirming that the ESC has now entered the
- 2. Connect the battery pack to the ESC.
  3. Connect the battery pack to the ESC.
  4. If the thretile stick is left in the maximum position beyond 5 seconds, the ESC will begin the programming mades.
  5. When the thretile stick is left in the maximum position beyond 5 seconds, the ESC will begin the below to cors reference the functions with the audieblomes) another (flease refer to the blok below to cors reference the functions with the audieblomes).
  5. When the desired tone for the function and setting option is reached, move the throttle stick down the desired tone for the form of the ESC only allows the setting of one function at a time.

  Therefore should yallows the setting of one function at a time.

  Therefore should still second to reconnect the battery and repeat the above steps.

### ZTW A-Series ESC's Features:

- Extremely low internal resistance
- Super smooth and accurate throttle linearity
- Safety thermal over-load protection

  Auto throttle shut down in signal lose situation
- Supports high RPM motors
- er arming protection (prevents the motor from accidentally running when switched ON) New Advanced programming software

# ZTW A-Series's ESC allows you to program all functions to fit your specific needs, which makes it very efficient and user friendly: 1. User programmable brake setting (we recommend using brake for only folding props applications)

2.User programmable battery type(LiPo or NiCd/NiMh)

2.0ser programmable flow voltage cutoff setting
4.User programmable factory default setup restore
5.User programmable timing settings (to enhance ESC efficiency and smoothness)

6.User programmable soft acceleration start ups (for delicate gearbox and helicopter applications)

Nuser programmable governor mode (for helicopter applications)
 Suser programmable motor rotation(clockwise\counterclockwise)
 User programmable switching frequency

10.User programmable low voltage cutoff type (power reduction or immediate shutdown)

# Settings: 1.Brake: ON/OFF

- \* ON- Sets the propeller to the brake position when the throttle stick at the minimum position On Sets the propeller to the orace position when the throttle stick at the minimum (Recommended for folding props).
   OFF- Sets the propeller to freewheel when the throttle stick is at the minimum position.
   2.Battery type: LiPo or NiCad/NiMh

NiCad/NiMH - Sets Low Voltage protection threshold for NiCad/NiMH cells

Nicady Nimin – sets Low volcage protection threshold for Nicady/Nimin cells.
 LiPo – Sets Low voltage protection threshold for LiPo cells and automatically detects the number of cells within the pack.
 Note: Selecting the NiCad/NiMH option for the battery type, triggers the ESC to automatically set the

cutoff threshold to the factory default of 60%. The cutoff threshold can then be subsequently altered through the Low Voltage protection function, if required. The ESC will read the initial voltage of the NiCad/NiMh pack once it is plugged in and the voltage read will then be used as a reference for the cutoff voltage threshold.

voltage intersnote.

3.Low Voltage Protection Threshold ( Cutoff Threshold ):

Low / Medium / High

1) For Li-xx packs- number of cells are automatically calculated and requires no user input apart from defining the battery type. This ESC provides 3 setting options for the low voltage protection threshold Cheming the Buckey type: This Last province 3 security opublish of the row Wondey indication (This sharp Last (Last 2004) and the State (Last 2004)

battery pack. For example: A fully charged 5 cell NMM pack's voltage is 1.44V x 6=8.64V/s hem 1.0W<sup>2</sup> cutoff voltage is set, the cutoff voltage is: 8.64V x 50%=4.3V and when "Medium" of "High" is set, the cutoff voltage is now 8.64V x 65%=5.61V.

4. Restore factory setup defaults:

Restore- Sets the ESC back to factory default settings:

Battery type Detect: Low voltage Cutoff threshold: LiPo with Automatic Cell Medium (3.0V/60%) Timing Setup: Automatic Soft Acceleration Start Un-Soft Acceleration

Governor Mode : RPM OFF Frequency : Low Voltage Cutoff Type: Reduce power

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NORMAL ESC START UP PROCEDURE

1. Switch your Transmitter ON and set the throttle to its minimum position. Switch your Transmitter ON and set the throttle to its minimum position.
 Connect the battery pack to the ESC.
 When the ESC is first powered up, it emits two sets of audible tones in succession indicating its

- working status.

  \*The first set of tones denotes the number of cells in the LIPO pack connected to the ESC. (Three beeps (\*\*\*)Indicates a 3 cell LIPO pack while 4 beeps (\*\*\*\*) indicates a 4 cell LIPO pack.)

  The second set of tones denotes Brake status (one beep(\*) for Brake "ON" and two beeps (\*\*) for Brake "OFF").

  The ESC is now ready for use.

### General Safety Precautions

Do not install the propeller (fixed wing) or drive pinion(helicopter) on the motor when you test the ESC and motor for the first time to verify the correct settings on your radio. Only install your Never use nytured or punctured battery cells. The settings on your radio is correct, Never use nytured or punctured battery cells. Never use pottery packs that are known to overheat. Never use pottery packs that are known to overheat. Never use pottery packs that are known to averheat. Never use potter that have material for enable insulation. Always use proper cable connectors. Do not exceed the number of cells or servous specified by the ESC.

## Wrong battery polarity will damage the ESC and void the warranty.

- wrong battery polarity will damage the test and vold on the warranty.

  Install the ESC in a suitable location with adequate ventilation for cooling, This ESC has a built-in over temperature cutoff protection feature that will immediately cut power to the motor once the ESC temperature exceeds the 200 beg // 110 beg // Bigh temperature limit, before connecting, the connecting the battery pack.

  Switch your Transmitter ON and ensure the throttle stick is in the minimum position before connecting the battery pack.

  Never switch your transmitter off while the battery is connected to your ESC.

  Never switch your battery pack just before flying and do not leave your battery pack connected after flying.

  Handle your model with extreme care once the battery pack is connected and keep away from the propeller at all times, Never stand in-line or directly in front of any rotating parts.

  Always fly at a designated flying site and abide by the rules and guidelines set by your flying dub.

Trouble	Possible Reason	Action	
Motor doesn't work, but there are audible tones signalling the number of cells after powering up ESC.	The ESC throttle calibration has not set up.	Set up the ESC throttle calibration.	
	Poor/loose Connection between battery Pack and ESC.	Clean connector terminals or replace connector.	
Motor doesn't work and no audible tone emitted after connecting the battery. Servos are not working either.	No power	Replace with a freshly charged battery pack	
	Poor soldered connections (dry joints)	Re-solder the cable connections	
	Wrong battery cable polarity	Check and verify cable polarity	
	ESC throttle cable connected to receiver in the reverse polarity	Check the ESC cable connected to the ESC to ensure the connectors are in the correct polarity.	
	Faulty ESC	Replace ESC	
	Poor / loose connection between ESC and motor	Clean connector terminals or replace connectors	
Motor doesn't work and no audible tone emitted after connecting the battery BUT servos are working. Or Motor doesn't work after	Burnt motor coils	Replace motor	
	Poor soldered connections(dry joints)	Re-solder the cable connections	
powering up the ESC. An alert tone with single beeping tones followed by a short pause (* * * *) is emitted.	The battery pack voltage exceeds the acceptable range.	Replace with a freshly charged battery pack Check battery pack voltage	

### 5.Timing Setup: Automatic/Low / High.

- Automatic (7-30 deg) ESC automatically determines the optimum motor timing
- Low (7-22 deg) Setting for most 2 note motors.

 High(22-30 deg)-setting for motors with 6 or more poles.

In most cases, automatic timing works well for all types of motors. However for high efficiency we recommend the Low timing setting for 2 pole motors (general in-runners) and high timing for 6 poles recommend use Low uniming security to Z pote moords (general int-imments) and interming or 6 potes and above (general out-numers). For higher speed, High timing can be set, Some motors require different timing setups therefore we suggest you to follow the manufacturer recommended setup or use the automatic timing setting if you are unsure.

Note: Run your motor on the ground first after making any changes to your motor timing!

- notes: who repure motor on the ground insis after making any changes to your motor timing!

  6.Soft Acceleration Start ups: Very Soft / Soft Acceleration/ Start Acceleration

  7 Very Soft Provides initial slow 1.5 sec ramp-up from start to full rpm intended to protect delicate gears from start springing under instant load. This setting is recommended for either fixed wing models equipped with gearboxes and / or beliconters.
- equipped wirit gearnows and / or neticoprers.

  \* Soft Acceleration- Provides initial slow 1 sec ramp-up from start to full rpm. This setting is recommended for either fixed wing models equipped with gearboxes and or helicopters.

  \* Start Acceleration Provides guick acceleration start ups with a linear throttle response. This is
- recommended for fixed wing models fitted with direct drive setups.

### 7.Active RPM Control (Heli Governor mode)

- \* RPM Control OFF

  \* First range: There will be a 5-second delay from start to full rpm, but if the throttle is cutoff after

First range: new sit said a 3-second make the master to full prin, but not entrustie is cutorifiated starting, then the start will be a 15-second delay me start full prin put in the thorities is cutorif after starting, then the cent start will be a 15-second delay me start full prin start full prin starting than the cent start will be a so normal start.

Note: Once the Governor Mode is enabled, the ESC'S Brake and Low Voltage Cutoff Type settings will automatically be reset to his Brake and Reduce Power respectively regardless of what settings they were nreviously set

### 8 Motor Potation: Forward / Peverse

Trouble

In most cases motor rotation is usually reversed by swapping two motor wires. However, in cases where the motor cables have been directly soldered the ESC cables, motor rotation can be reversed by changing the value of setting on the ESC

changing the value of setting on the ESC.

9.Switching Frequency: 8kHz/16kHz

\* 8kHz – Sets ESC switching frequency for 2 pole motors, e.g. in-runners.

\* 16kHz – Sets ESC switching frequency for motors with more than 2 poles, e.g. out-runners.

default is 8kHz due to the higher RF noises caused at 16kHz.

10.Low Voltage Cutoff Type : Reduce Power / Hard cutoff

### Although 16kHz is more efficient with our Thrust motors, the setup

Reduce Power – ESC reduces motor power when the pre-set Low Voltage Protection Threshold value is reached. (recommended)

Hard Cutoff – ESC instantly cuts motor power when the pre-set Low Voltage Protection Threshold

3

Possible Reason

Action

Motor doesn't work after powering up the ESC. An alert tone with continuous beeping tones (****) is emitted.	The throttle stick is not in the minimum position at power up.	Move the throttle stick to the minimum position.
Motor doesn't work after powering up the ESC.ESC emits two audible tones followed by short beeps (•• •••••)	Reversed throttle channel caused the ESC to enter the programming mode.	Enter the servo reverse menu on your transmitter and reverse the throttle channel. Note: For Futaba radios set the throttle channel to Reverse.
Motor runs in reverse rotation	Wrong cables polarity between the ESC and the motor.	Swap any two of the three cable connections between the ESC and the Motor or access the Motor Rotation function via the ESC programming mode and change the pre-set parameters.
Motor stops running in flight.	Lost throttle signal	Check proper operation of the radio equipment. Check the placement of the ESC and the Receiver and check the route of the receiver's serial and ESC cables to ensure there is adequate separation to prevent RF interference. Install a ferrite ring on the ESC's throttle cable.
	Battery Pack voltage has reached the Low Voltage Protection threshold.	Land the model immediately and replace the battery pack.
	Possible bad cable connection	Check and verify the integrity of the cable connections
Motor restarts abnormally ESC	Possible RF Interference at the flying field.	The normal operation of the ESC may be susceptible to surrounding RF interference. Restart the ESC to resume normal operation on the ground to verify recurrence. If the problem persists, test the operation of the ESC at a different flying field.
Overheats	Inadequate Ventilation	Relocate the ESC to allow better ventilation
	Servos drawing too much current and over loading the ESC.	Use servos that are adequately sized for the ESC. The maximum BEC current drawn should be within the BEC limits.
	Over sized motor or prop	Reduce Prop size or resize the motor



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