

PLUSH-32 SERIES ESC MANUAL

TURNIGY
power systems

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INTRODUCTION:

Thank you for purchasing Plush-32 ESC product!
Brushless power systems can be very dangerous. Any improper use may cause personal injury and damage to the product and related devices. We strongly recommend you reading through this user manual before use.
Because we have no control over the use, installation, or maintenance of this product, no liability may be assumed for any damage or losses resulting from the use of the product. We do not assume responsibility for any losses caused by unauthorized modifications to our product. For the latest specifications, please visit the website: www.hobbyking.com

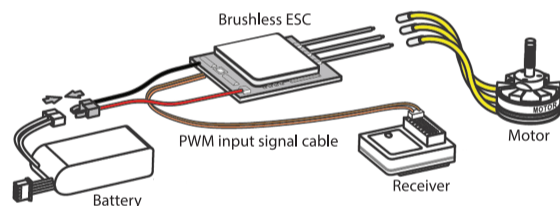
PRODUCT FEATURES:

- 32-bit ARM MCU, small size, light weight and fast response.
- High resolution, smooth and sensitive throttle linearity. Throttle signal loss protection is achieved.
- Compared with other conventional ESCs, synchronous rectification, regenerative braking, and more energy saving.
- Automatically detect the input signal. The throttle valve can be used to set up to be compatible with different controllers.
- Good compatibility with motors, suitable for most motors on the market.
- Easy to program with prog-card, designed for fixed-wing, software with completely independent intellectual property rights, can be continuously upgraded.

SPECIFICATION:

- Support 6A-150A, 2-8S (Please check ESC sticker to verify the specified cells and power, more high voltage model to be added).
- PWM output frequency range is 8-32KHz. Different PWM frequency can be set by programming card.
- Regular throttle range is: 900us-2400us.
- Max RPM: 300,000 (2poles), 100,000 (6poles), 50,000 (12poles).
- Customized settings can be done with prog-card and controller (Brake/Non-Brake).
- 60A and above supports adjustable temperature protection.
- It supports setting direction of motor rotation by prog-card.

CONNECTION DIAGRAM:



OPERATION:

1. Throttle Calibration:

Please set throttle range when you first time to use the ESC.
Step 1: Power on controller and move the throttle stick to the highest position.
Step 2: Power on the ESC, motor beeps "♪♪", means high position throttle is set.
Step 3: Move the throttle stick to the lowest position, motor beeps "♪♪" means low position is set, then another "♪♪" as confirmation that throttle is set ok and ready to go.

2. Setting (Brake ON/Brake OFF) by controller

Set the throttle stick at middle-> Power on ESC->A sequence beeps and then follow with single and repeat "♪"- "♪"- "♪"....., means now it's in controller brake setting procedure -> move the throttle stick to Max throttle position (means Brake is ON), or move the throttle stick to Min throttle position (means Brake is OFF)->a sequence beeps means setting ok and followed 2 beeps "♪♪" means ESC is ready to go.

3. Normal start procedure:

Power on controller and set the throttle stick to Min throttle position (if higher than 1800us, it will get into throttle calibration).
Connect ESC as connection diagram, power on ESC, ESC will automatically detect the battery cells and using beeps to indicate the cells number. For example, using 4s battery, beeps will be: "♪♪♪♪". Then 2 beeps "♪♪" means ESC is ready.

DETAILS SETTINGS WITH PROGRAMMING CARD:

	FLASH	PLUSH-32 SERIES PROGRAM CARD						PROGRAM
CUTOFF MODE	OFF	SLOW DOWN	CUT OFF	Lipo	Lipo	NiMH		
CUTOFF VOLTAGE	2.9	3	3.1	3.2	3.3	3.4	3.5	
LITHIUM CELLS	2	3	4	5	6	7	8	
LITHIUM CELLS	9	10	11	12	13	14	AUTO	
PROTECTOR TEMPERATURE	OFF	90°C	100°C	110°C	120°C	130°C	140°C	
ADVANCED TIMING	0°	6°	12°	18°	24°	30°	AUTO	
BRAKE STRENGTH	OFF	25%	50%	75%	100%	Normal	Reversed	
STARTUP POWER	10%	20%	25%	30%	35%	40%	45%	
AUTO ROTATION RESTRICT TIME	OFF	10S	15S	20S	30S	40S	60S	
MOTOR TYPE	NORMAL	DISC TYPE	EDF					
BEC VOLTAGE	5.0V	5.5V	6.0V	7.4V	8.0V	(Adjustable only for 150A)		
SPROCKET	L1	L2	L3	L4	L5	L6	L7	
PWM FREQ	8K	12K	16K	24K	32K			
BEACON DELAY	OFF	1MIN	2MIN	3MIN	4MIN	5MIN	10MIN	

Safety points:

Due to brushless power system is powerful, improper using may cause the personal injury and device damage. Please strictly follow the instructions to operate.

- Please don't operate long time with the battery under-voltage. It will reduce the battery usage life and ESC working efficiency.
- Please don't operate long time when the ESC is over temperature, otherwise it will damage the MOS FET easily.
- Please don't let ESC overvoltage for a long time, otherwise will short the usage life of ESC.
- Always keep all the things away from propeller when working on a power system with the battery connected.
- Please pay attention to the motor. Don't operate continually when the motor was blocked. Otherwise, it will reduce the usage life of motor and ESC.
- Always use ESC in safe situation.
- Broken ESC can't be used.
- ESC can only powered by batteries, DO NOT connect ESC to AC power directly!

ATTENTIONS:

- If motor rotate direction is wrong, you can exchange any two of the three motor cables to correct.
- Pay attention to the polarity, wrong polarity connection will cause ESC and motor damage!
- If a noise occurred during accelerating, please increase timing angle. If no work until increase timing angle to 30, means the motor is overloaded, please change to use a smaller propeller or lower the voltage or change a better motor.
If motor stop rotating and you heard twice beeps, voltage is under the set value. Please change the cut-off voltage to 2.9V or 3.0V. If not working, maybe battery is over discharged or the motor wires is too thin, too long or connector is out of order.
- Please leave some space between brake point and start up point for stick to move.
- Timing set up:
In-runner motor: 0 ~12°
Out-runner motor: 18 ~30°
Always set the timing as motor manufacturer recommend!

FAULT ANALYSIS BEEPS:

Motor will beep accordingly when ESC happened with below conditions, warning beeps will be cleared after restarting ESC.

- 1 beep repeat: Under-voltage identification.
- 2 beeps repeat: Temperature rise warning.
- 3 beeps repeat: Receiver signals failed.
- 4 beeps repeat: means startup failed.

REVISION HISTORY:

- Rev1.0.0: Initial revision
- Rev1.0.3: 60A and above add temperature protection
- Rev1.1.0: Added more adjustable specifications: Motor type, Spoolup acceleration, PWM freq. and Beacon delay to get a better performance and experience.

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