Electric Flight Glossary

Brushed Motor

This is the original type of DC motor that used carbon brushes on a comutator which produces a lot of sparks and is prone to make a lot of electrical noise and wear out quickly. These types of motors are very inefficient typically in the region of 50-65%. You can only use a brushed ESC with a brushed motor. You can tell a brushed ESC from a brushless ESC as a brushed ESC has 2 wires in (normally one black and one red) and 2 wires to the motor (both are usually the same colour). The direction of rotation can be changed by swapping the wires on the motor.

Brushless Motor

This is the modern type of electric motor. It doesn't use any brushes so is quieter electrically speaking. It is actually a 3 phase AC Motor. Only a brushless ESC can be used to power this type of motor. A Brushless ESC converts the DC voltage from the battery into 3 phase AC voltage. Brushless ESC's can be identified by 2 wires in (normally one black and one red) and 3 wires that go to the motor (all 3 are usually the same colour). The direction of rotation can be changed by swapping any 2 of the 3 wires on the motor. Brushless motors are a lot more efficient, generally in the range of 85-92% which means more of the power is converted to rotation and less to heat. This higher efficiency allows them to handle higher amps/power and have longer flight times.
As the only moving parts are bearings, brushless motors are very reliable. Brushless motors come in 2 types, Inrunners and outrunners.

Inrunner Motors

Inrunner motors are a type of brushless motor. The outer case is stationary and the central shaft spins.
Inrunner motors are suited to high speed low torque applications like high speed aircraft, EDF's, geared applications and helicopters.

Outrunner Motors

Outrunner motors are some times referred to as "rotating can" motors. In this design the back part of the motor (where the wires come out) is stationary and the outer can and shaft rotates. Outrunners are suited to high torque lower RPM applications like shocky's, park fliers, general sports and scale models. They throw large propellers at lower RPM which are a lot more efficient then smaller propellers at higher RPM's.

ESC

An ESC is an **E**lectronic **S**peed **C**ontroller. An ESC is placed between the battery and the electric motor with an additional wire to the throttle channel on the receiver. ESC's controls the speed of the electric motor. They come in two types, brushed and brushless. A brushed ESC can only be used with a brushed motor and a brushless ESC can only be used with a brushless motor. Additional circuitry in the ESC will cut power to the motor when the battery voltage drops to a pre-set level to stop damaging the battery.

A Brushless ESC

A Brushed ESC

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BEC or UBEC or SBEC

BEC is short for **B**attery **E**liminator **C**ircuit (UBEC = Universal BEC) (SBEC = Switching BEC). The BEC part of an ESC is completely separate from the circuitry which controls the speed of your electric motor.
Contrary to popular belief it does **NOT** cut power to the motor when the battery voltage drops below a set level. Other circuitry within your ESC controls this function. The BEC's only job is to supply the receiver and servos with power which it converts from the battery that supplies your motor, eliminating the need for a separate battery to power your receiver and servos. Hence the name, Battery Eliminator Circuit.
Your ESC may or may not have a BEC built in. It's best to check before hand to make sure and also check the maximum number of servos it can supply to ensure you are not going to draw too much current and blow the BEC which would cause a loss of power to your receiver and servos which in turn would cause an expensive crash. If you don't want to trust your expensive model to a BEC then fit a separate receiver battery.

Volts

Volts are very important in electric flight as motors have a RPM per volt figure. The more Volts the higher the RPM.

Amps

Amps are also important in electric flight as we need to know how many Amps our electric motor is using. We need to make sure that our ESC, battery and motor can handle the current (expressed in Amps).

Watts

Watts is the measurement of 'Power'. Power is a function of Volts and Amps i.e. Watts = Volts x Amps. Most motors have a maximum Watts rating.

LiPo / Li-Poly / Lithium Polymer

This is a type of modern battery. It has a high voltage per cell. Nominal voltage is 3.7 Volts per cell. Maximum voltage is 4.2 Volts per cell. Minimum voltage per cell before serious damage results is 3.0 Volts per cell under no load. For the same physical size as NiCad's or NiMi's, LiPo cells have higher voltage, larger storage capacity and are 30%-50% lighter. They are capable of delivering high power. On the down side they are relatively fragile cost more and can burst into fire if abused, damaged in a crash, or over charged. As they are a lot lighter, have a higher voltage and can store more energy and they have transformed electric flight along with brushless motors. They do not suffer any memory effect unlike NiCd's.

Lithium Ion / Li-ion

This is another type of modern battery. It has a high voltage per cell. Nominal voltage is 3.6 Volts per cell Maximum charged voltage is 4.1 Volts per cell. They don't have the storage capacity and density of LiPo cells and are also heavier but can resist a crash or two. They are more resilient to abuse and charging.

Ni-Cd / NiCad

Ni-Cd's or to give them their full name Nickel-Cadmium batteries have a nominal voltage of 1.2V per cell.

Ni-Cad is a trademark of the SAFT Corporation. Ni-Cd's are heavy, have a low energy storage density compared to LiPo cells and suffer from memory effect. Due to the poisonous effect of Cadmium NiCd cells are no longer manufactured within Europe and have been replaced by either Ni-MH, Li-ion or LiPo cells/batteries.

Ni-MH
Ni-MH's or to give them their full name Nickel metal hydride batteries have a nominal voltage of 1.2V per cell. Ni-MH's are heavy, but have 2-3 times the energy storage capacity of Ni-Cd's. Ni-MH don't suffer from memory effect.

AC
AC is short for **A**lternating **C**urrent

DC
DC is short for **D**irect **C**urrent

mAh
mAh is short for **M**illi **A**mp **H**our. mAh is a measure of storage capacity of batteries.1000mAh is equal to 1Ah

RPM/V
This is short for **R**evs **P**er **M**inute per **V**olt, normally measured with out any load. Also known as **kv**

EDF
Electric **D**ucted **F**an. EDF's are mini jets. They have an impeller (contained within the airframe) as opposed to a propeller (on the outside of the airframe)

Shock Flyer or Shocky
This is a small profile model normally flown indoors but can be flown outside in very calm conditions.

Memory Effect
This is an effect that Ni-Cd (Nickel Cadmium) batteries suffer from. If Ni-Cd batteries are not fully discharged before recharging then they suffer from a reduced storage capacity

Suppression Capacitors
These are fitted on brushed motors to reduce electrical noise generated by the brushes rubbing on the commutator of the motor. Brushless motors do not need these capacitors.

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