



AM32 Configuration Settings

For a while now we have had AM32 ESCs for our radio controlled vehicles, giving us lots of options. They are ideal for ground vehicles with settings for brakes, sinusoidal startup and other great features. But as they can be configured in most any way that you like, they are also good for aircraft, and as they come in huge voltage and current capacities, they are excellent for large aircraft. But, with all those settings, it can get confusing as to what values to use. We have done some research into this and are providing you with recommended values in this article.

We are assuming that you know how to get into the current version of AM32 Configurator. You use that on your computer to make adjustments to the settings that we discuss here. If you don't know how to do that, check out this video:

<https://youtu.be/h73-LmelHgU>

AM32 Settings

Reversed

- Tick to reverse the direction of the motor spinning.

3D Mode

- Configures the throttle stick to provide both forward and reverse motor direction, with throttle at zero in the middle.

Disable stick calibration

- Disables the procedure for calibrating your throttle where you turn on the TX with the throttle all the way up, then pull it all the way down when you hear tones. If you are using a controller, the controller should work that out for you.

Stuck rotor protection

- For a quad, helicopter or airplane you don't want the motor to ramp up the amperage when the prop is stuck in a tree. Ticking this item keeps that from happening.

Stall protection

- This is the opposite of stuck rotor protection. If something is adding resistance to slow down the motor, increased power will be sent to the motor to keep it going. Ideal for rock crawlers. Totally wrong for aircraft, especially if it is your finger causing the problem!

Use Hall sensors

- Leave it turned off. Hall sensors are not used in modern brushless DC motors, instead pulses of electricity coming back through the power leads enable the ESC to know the position of the rotor.

30ms telemetry

- Generally, not used when you have a controller. It can conflict with the controller sending requests for telemetry.

- It is used with systems where a constant stream of telemetry data is needed without being requested.

Complementary PWM

- This basically turns the motor into a rather inefficient generator when the throttle is cut. A small amount of power is sent back to the battery, but the biggest impact is the drag that it puts into the system. It's a bit like exhaust brakes on a diesel truck engine. It's either on or off, unlike the brake setting that we will see below.

Auto timing advance

- Timing advance is similar to timing advance in a car engine. With that the spark needs to fire before the piston gets to the top in order to optimize the pressure created from the burning fuel. It takes time for that pressure to build up. With a brushless DC motor it takes time for the current to build up in the magnetic coils, so the pulse of electricity needs to come slightly before the position where the magnetism is most needed to pull or push the permanent magnets around.
- When the automatic option is chosen, the ESC will work out what that advance needs to be, so you don't need to set it.
- As the RPM, load and other factors change, the ESC will make adjustments to the timing advance as needed.

PWM type

- Fixed – the pulse width modulation frequency is kept constant at the value you specify. The problem with this is that the motor doesn't need so many pulses per second when it's running slow, but will run rough if they aren't fast enough at high RPM.
- Variable – the ESC will work out the frequency that's needed, changing it with RPM, load, etc.
- By RPM – similar to variable, only it's just the RPM that determines the frequency. Most of the time you will not be able to tell the difference between this and the variable option, but it can be more efficient in long range applications.

Timing advance

- The degrees of timing advance if using a fixed value. Not recommended.

Startup power

- How much of the potentially available power is applied the moment you move the throttle stick forward from the 'off' position. Brushless DC motors can produce an immense amount of torque at zero RPM, with that dropping off as the RPM increases. The initial jolt can damage drivetrains and send a huge twisting pulse of force through an airframe.
- In AM32, the minimum is 50%. With a plane it could be 5 to 15% if that option was available, so keep it at the minimum.

Motor kv

- This is the targeted RPM per volt of power delivered to a brushless DC motor.
- On the motor, it's the last part of the number.
- Performance will be poor if you don't have this value close to the correct setting, but it doesn't need to be exact. Just pick the closest number.

Motor poles

- The number of magnets in your motor. It will be given in the motor's specifications. This is important as it is helping the ESC to work out the RPM of the motor.

Beeper volume

- How loud the beeps are when the ESC is powered up or when it is informing you of something. It's using the motor to create the beeps, so it needs to be connected to hear them.

PWM frequency

- The range of frequencies used with either variable or by RPM PWM types, as specified.
 - 24-48 would be common for an outrunner
 - 48-96 would be common for an inrunner, such as with an EDF
- Higher values make the motor run smoother and more efficient, but they cause the ESC to generate more heat, which is less efficient and potentially could cause damage.

Extended settings

- Ramp rate
 - This limits how rapidly the throttle can change the throttle signal. It's measured in units of 1% per millisecond. With typical settings it will be up to full throttle within a small portion of a second. So, it's not going to slow things up too terribly!
 - The default setting is 16%, which generally will be fine.
 - For low kv motors or rock crawlers, etc., 4 to 10% would be appropriate.
- Minimum duty cycle
 - This is the minimum amount of power sent to the motor when starting up from zero throttle. So, it is basically setting the speed that the motor is going to run at the lowest throttle position where it will run.
 - 0.5 to 1.5% should be fine.

Limits

These limits are to protect the ESC and your motor from damage. If a limit is hit, the ESC doesn't immediately cut off the motor completely, it typically will reduce power to allow you to have some power to get back on the ground or into a safe position.

- Temperature limit. The temperature of the ESC that you don't want to exceed. Values of 100 to 120 degrees C are typical. Above 120 degrees many electrical components begin to deteriorate rapidly.
- Current limit. When you enable this by giving it a value, you also enable the PID settings below. An appropriate value may be something between the continuous current rating of the ESC or motor, whichever is lower, and the peak current value. That can be difficult to work out what is safe, as it will depend on how you are flying. I generally have it disabled and simply choose a motor/prop combination that only goes up to the maximum continuous current rating at full throttle. That gives me some headroom, and a lot of comfort.
- Low voltage cutoff. Typically 3.4 to 3.5 volts, but the value is multiplied by 100: 340 or 350.
- PID settings

Begin with the default settings, and adjust if you have the problems mentioned below.

- P: Proportional. How aggressive the ESC is going to be in managing various issues that arise. The higher the number the more aggressive it's going to be, generally making it more responsive, but potentially with glitches if it's too high.
- I: Integral. Fixes a potential problem where the motor is having difficulty in matching the rotational speed of the pulses from the poles. High values smooth out the operation, but can make the motor sluggish. It can also cause fluctuations in RPM at a fixed throttle position if set too high.
- D: Derivative. An electronic shock absorber. Can help to avoid a overshoot in the current when the throttle is moved quickly.

Sinusoidal startup

- Only used with ground vehicles.
- At startup, the ESC doesn't know the position of the motor, so it cannot give an accurate set of pulses to be effective in a clean, smooth startup, especially under load.
- Sinusoidal startup simply sends a set of rotating pulses of electricity that the motor will follow at low RPM regardless of the position of the rotor.
- For an airplane, where nothing is holding the prop in a given position, any pulse of electricity going to it will make the prop jump, and the moment it moves, the ESC knows what position it is in and can send appropriate pulses to get it going.
- The range is the percentage of full throttle under which sinusoidal startup will operate. For ground vehicles that is typically 5 to 20%.
- The power is what percentage of power available will be used during this phase. Keep in mind the sinusoidal signal will be at whatever RPM is targeted by the throttle position. If the power applied is too low, the motor will not be able to keep up with that. If it is too high, it will tend to get hot.

Brake

- Car type reverse braking. The ESC will send signals to the motor to use power to slow it down.
- Brake on stop. A parking brake. Power will continually be applied to hold the motor fixed in position. It is only activated once the motor stops spinning.
- Active brake. Using electrical pulses to slow the motor down when throttle position is reduced. It seeks to maintain a given RPM for a given throttle position during the slowdown phase.

Servo settings

- Low, high and middle settings. The micro second values where the throttle will be considered to be at zero, full throttle and mid throttle positions.
- Dead band. The amount of throttle movement away from the zero throttle position specified above where it will still be considered to be at zero. With forward only, the full value above the low position will apply. With a setup with both forward and reverse, half of the value above and below the mid stick position will apply as the deadband.