FALCON/IBEX ESC RELEASE NOTES

Info

There are three independent firmware files, where each firmware is targeting specific RC telemetry protocols (always choose one according to your system):

- ESC_COMMON – compatible with JETI, Graupner, Multiplex, PowerBox and Futaba telemetry systems.
- ESC_SPEKTRUM – compatible with Spektrum and JETI telemetry systems.
- ESC_FRSKY – compatible with FrSky and JETI telemetry systems.

VERSION 2.06 *(JANUARY 2025)*

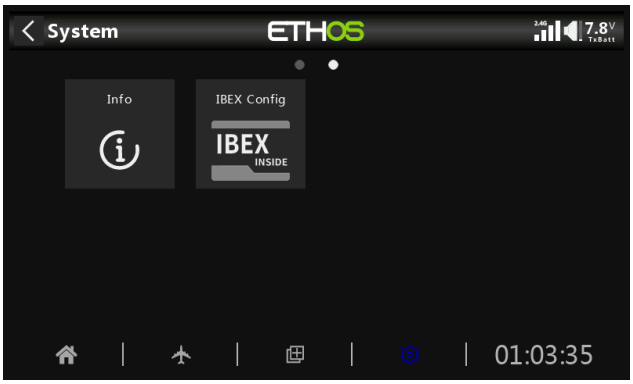
- ArduPilot: Compatibility with the ArduPilot Lua telemetry script has been added. This script, available at www.mavsense.com, enables you to connect up to four additional MAV Sense speed controllers using the SE4. The Lua telemetry script retrieves telemetry data from the device and converts the received runtime values into ESC1–ESC4 telemetry (configurable), compatible with ArduPilot.
- Graupner Hott telemetry has been corrected.

VERSION 2.05 *(JULY 2024)*

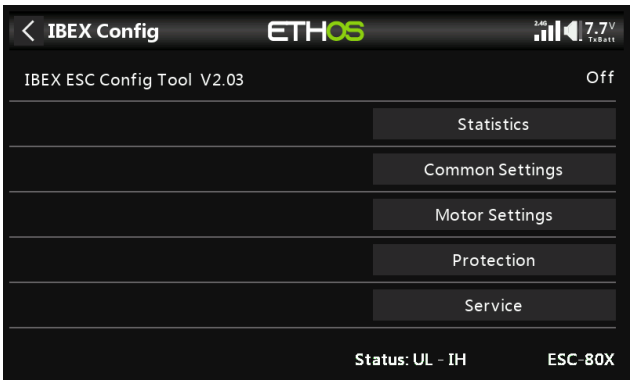
- Introduced standard bidirectional mode. After setting the *Controller Mode* to "Bidirectional", the controller enters a standard dual direction mode commonly used in car and boat models. The throttle neutral position is at the center stick position (1.5ms). Pushing the stick forward sets the motor to rotate in the forward direction, while pulling the stick backward sets it to rotate in the reverse direction.
- The controller offers several propeller positioning options, which can double or triple the positioning speed. The options are:
  - **Disabled:** The propeller positioning function is inactive.
  - **Hall Sensor:** The positioning function becomes active as soon as the motor stops spinning.
  - **Hall S/Retry:** The positioning function is active, with automatic restart in case of a failure.
  - **Hall S/Retry x2:** Doubles the speed of rotation during the positioning process.
  - **Hall S/Retry x3:** Triples the speed of rotation during the positioning process.
- The FPort and FBus telemetry & configuration functionality has been repaired on the IBEX 200/220 line.
- ESC with BEC: The ESC cannot be initialized and started if the BEC circuit is turned off. This feature is useful for indicating an error state in case of a wrongly configured or connected backup battery.
- **Multiplex MSB:** Motor temperature telemetry has been added at a fixed slot No. 7. Improved telemetry function in case of multiple sensors connected to the bus.

VERSION 2.04 *(APRIL 2024)*

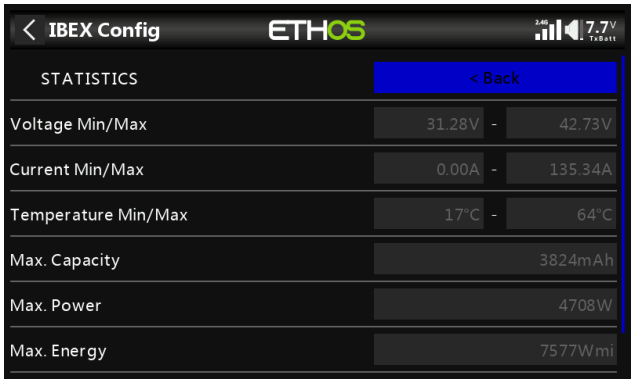
- New types of speed controllers have been introduced:
  - ESC-80X (50V/80A, opto)
  - ESC-160 (50V/160A, opto)
- The firmware has been separated into three independent files, based on the telemetry compatibility (always choose one according to your system):
  - ESC_COMMON – compatible with JETI, Graupner, Multiplex and Futaba telemetry systems.
  - ESC_SPEKTRUM – compatible with Spektrum and JETI telemetry systems.
  - ESC_FRSKY – compatible with FrSky and JETI telemetry systems.
- Propeller Positioning: A new option has been added, the *"Positioning Offset".* You are now able to precisely tune the resting position of the propeller even if the magnet/hall sensor are not perfectly aligned. Please make sure the magnet is still in the range of the Hall sensor after applying the required offset to the propeller position. If the magnet is not in the range at the target position, the procedure won't succeed.
- Propeller Positioning: An option for automatic positioning restart in case of failure has been added. See the *Motor Setting* menu and set the *Prop Position* option to *"Hall S/Retry".*
- FrSky: Introduced compatibility with FPort and FBus capable receivers. The controller receives channel information and sends back telemetry values. The device is able to decode all channel data (from FBus 8 up to FBus 24), only the first 16 channels may be used for internal functions, such as throttle reversing.
- The FrSky compatible firmware is offered as a standalone update file, through the MAV Manager 1.11 package.
- Multiplex MSB slots for voltage, current and capacity are now configurable using MAV Manager 1.11 and later.
- Multiplex: Corrected resolution of RPM telemetry value.
- FrSky: Telemetry and configuration are both possible. To configure the controller, Ethos system is required (minimum version 1.4). You need to download the corresponding Lua application to your transmitter ("*scripts"* folder) and launch it from the second page of the Configuration menu. Please note that only **a single controller may be connected to the telemetry bus** to prevent conflicts in addresses.



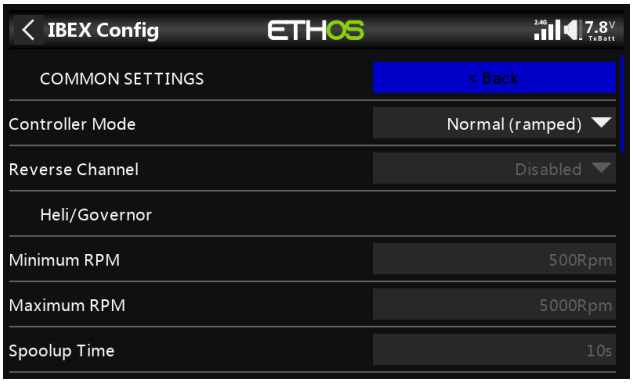
The IBEX Config app is available in the Configuration menu.



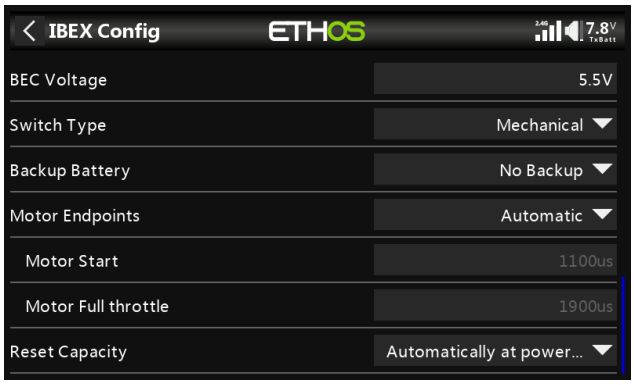
The IBEX main menu displays the controller status and offers links to all submenus.



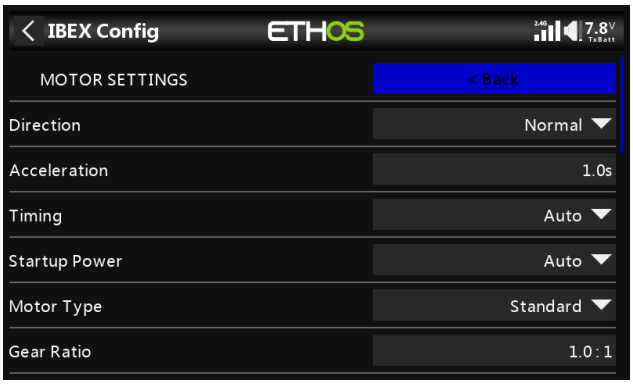
Statistics screen.



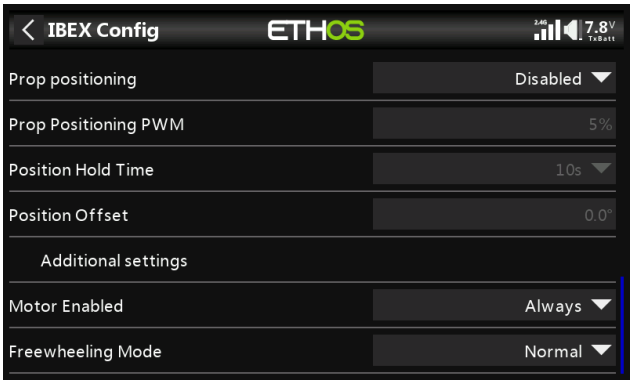
Common Settings.



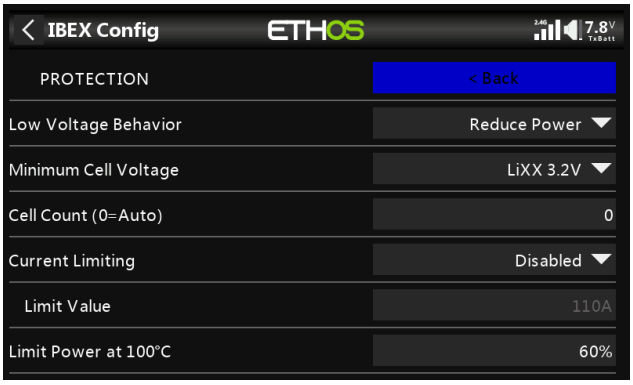
Common Settings.



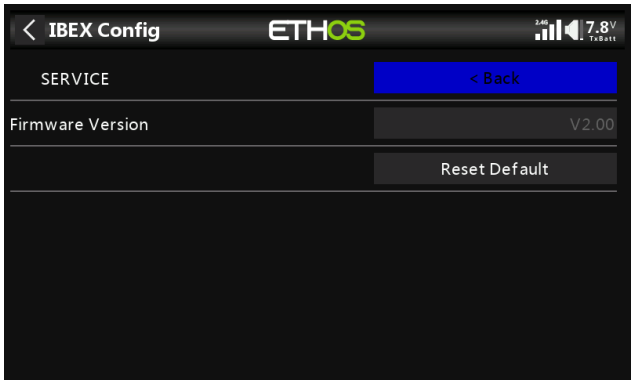
Motor Settings.



Motor Settings.



Protection menu.



Service menu.

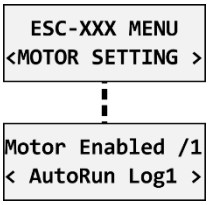
VERSION 2.02

- We have implemented an enhanced overcurrent shutdown protection function to ensure the system safety. This protection system is now constantly active and cannot be deactivated. It automatically shuts down the motor when current levels reach certain thresholds:
    - ESC-55: 150A
    - ESC-80, ESC-85, ESC-65: 200A
    - ESC-120: 200A
    - ESC-115, ESC-155: 300A
    - ESC-130, ESC-145: 400A
    - ESC-200, ESC-220: 800A

  You will be notified of this event through the "IM" status code displayed on the JETIBOX/Hott screens.
- Hott telemetry: The value of calculated capacity has been corrected.
- In the event of a commutation or overcurrent error, the brake and positioning features will now be automatically disabled.
- The adjusted BEC voltage is updated only after rebooting the controller, which can be accomplished either by using the switch or disconnecting it from the power supply.

VERSION 2.01 BETA

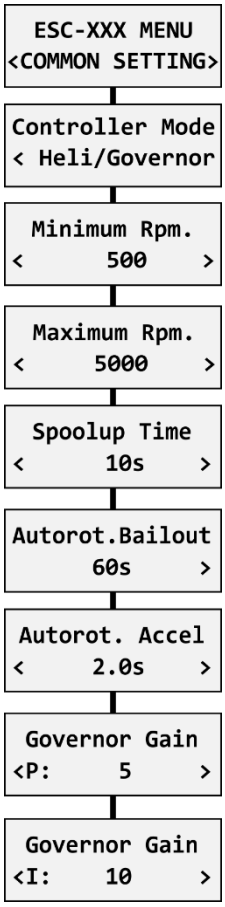
- **Heli/governor** mode has been implemented (see below). Compatible with MAV Manager 1.7.1.
- Modified reading of T125 settings. In this version, after you connect T125ID for the first time, all ESC/motor settings are updated according to the motor-ID chip. And anytime you change the settings stored in your T125ID sensor, the values will be rewritten in the controller.
- In case you use a retractable fan, you are able to choose the setting "Motor Enabled" and select "Autostart when input pin is log.0 or log.1." In this case, the controller will start spinning as soon as the input pin state allows it and throttle position is above idle position.



- Fixed function of motor brake when a backup battery option is enabled. If you now enable the backup battery option, the flight pack and backup receiver battery may be connected in arbitrary order. The flightpack voltage must always be higher than voltage of the backup battery and the backup must be sufficiently charged.
- Spektrum firmware: Sleep mode has been disabled for controllers without BEC. Using this approach, we can reliably provide the detection of Spektrum telemetry and configuration over the transmitter. **Note**: If you use an ESC with a galvanic isolation, always **turn on the ESC before the receiver**.
- Spektrum firmware: Throttle control and telemetry transmission over a single SRXL2 cable has been implemented. The controller is now compatible with the Spektrum SMART Throttle. Connect the RED "Data" connector to the receiver port No.1 (Throttle) and the function will be enabled automatically. Keep the BLACK "Signal" connector unplugged, or use only its +/- wires to strengthen the BEC throughput.

Heli/Governor mode

A fast and precise governor mode has been implemented into the speed controllers. You are able to configure the governor mode in many aspects according to your preferences.



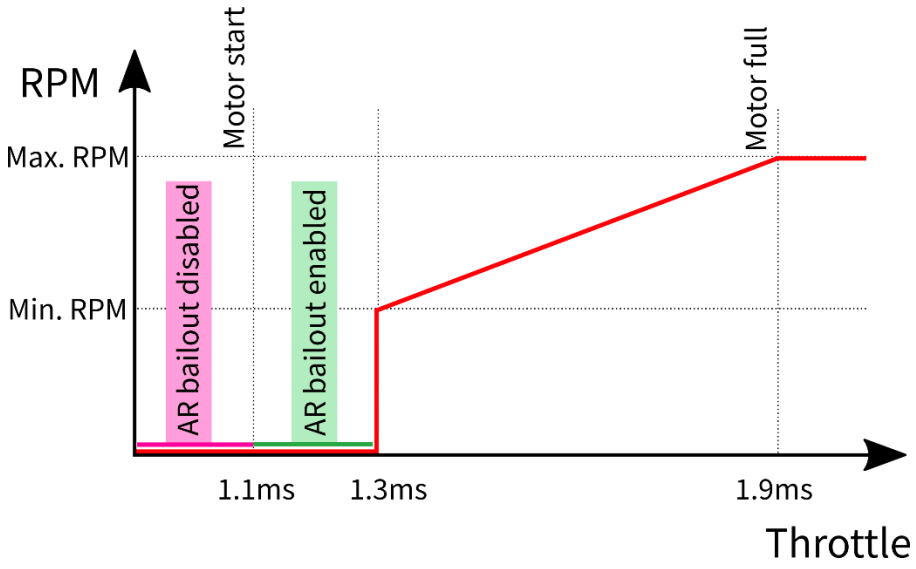
Before enabling the governor mode, please make sure the blades are removed. In the Common Setting menu, set the Controller Mode to "Heli/Governor" and proceed through the settings below:

- Set the minimum and maximum RPM of the main rotor according to your preferences. As soon as you move the throttle away from idle position, the controller slowly spools up until it reaches the target speed. The speed is calculated according to the throttle channel value, where low throttle corresponds to the "Minimum Rpm" and high throttle corresponds to "Maximum Rpm."
- Set the Spoolup Time to make the motor startups as smooth as possible. You may set the time up to 60s. The spoolup time is applied when the motor starts from zero revolutions or if the autorotation bailout is disabled.
- Configure the Autorotation bailout time and autorotation acceleration time. The autorotation bailout function is used in case you need to quickly exit the autorotation and prevent your model from crashing. In this case, as soon as you move the throttle channel away from idle position, the "Autorotation acceleration" will be used to spin the motor until it reaches the required speed. The "Autorotation bailout" parameter sets the time after switching off the motor, where the autorotation bailout function may be activated. After exceeding this time, a standard spoolup time will be applied.
- Advanced setting: Governor gains – (P)roportional and (I)ntegral. You may modify the gains to fine tune the controller response to fast changes in the load during flight maneuvers. Please perform the changes only in small steps and verify the resulting behavior in a short test flight.

- Increase the P gain to eliminate small Rpm fluctuations during straight flight, e.g. while hovering. If you hear some unexpected noise in the motor/gearbox (which means fast oscillations), reduce the P gain by 20%.
- Increase the I gain to hold the precise revolutions during maneuvers. If the motor speed starts to oscillate noticeably, reduce the I gain by 20%.

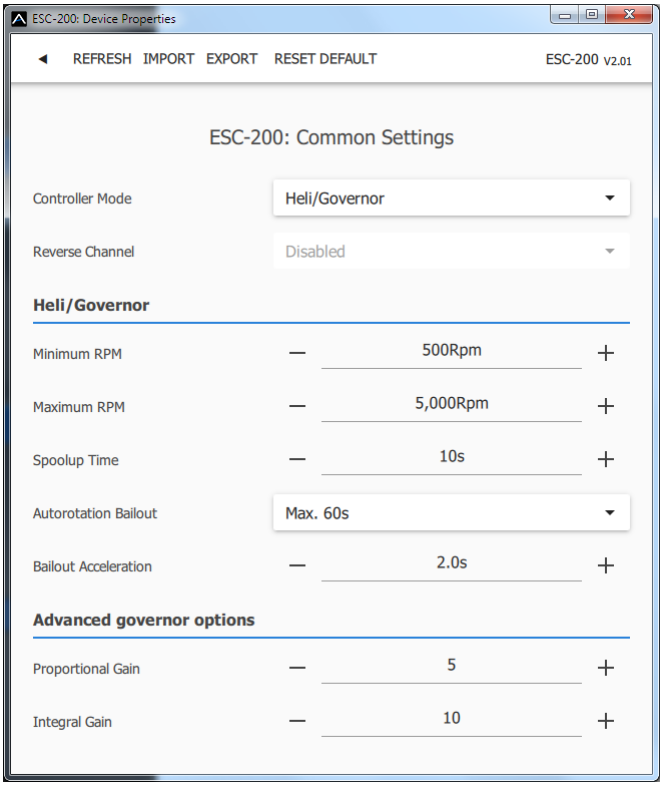
- In the Governor mode, manual throttle endpoints are always used (by default 1.1ms – 1.9ms) and Active braking is enabled as well.

The picture below shows RPM response vs. throttle position. In this case, default throttle endpoints have been used (1.1ms – 1.9ms).



Note: Please make sure the gear ratio and number of motor poles are correctly set in the Motor Setting menu. Also, please verify that the brake is disabled and check the state of the propeller positioning function.

Please note that dynamic changes of the motor revolutions in flight are limited by the "**Acceleration**" parameter configured in the Motor Setting menu. Please make sure the acceleration is slow enough, so that changing revolutions in flight does not lead to sudden changes in model attitude.

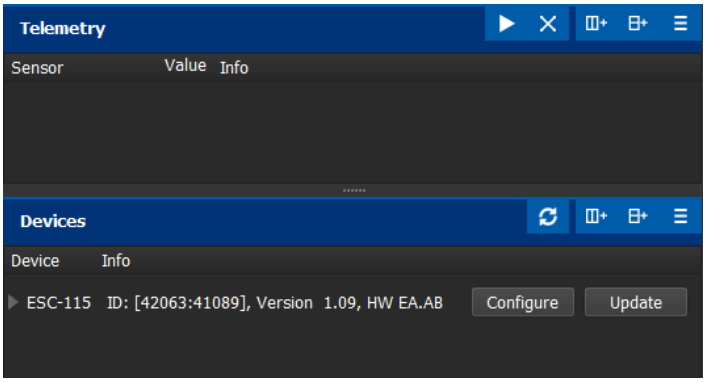


VERSION 1.10

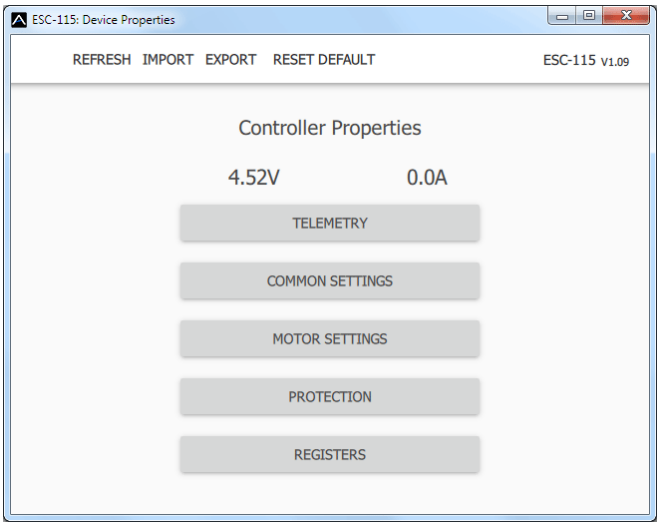
- Improved on-the-fly startups (When the propeller is spinning).
- Optimized PC configuration.

VERSION 1.09

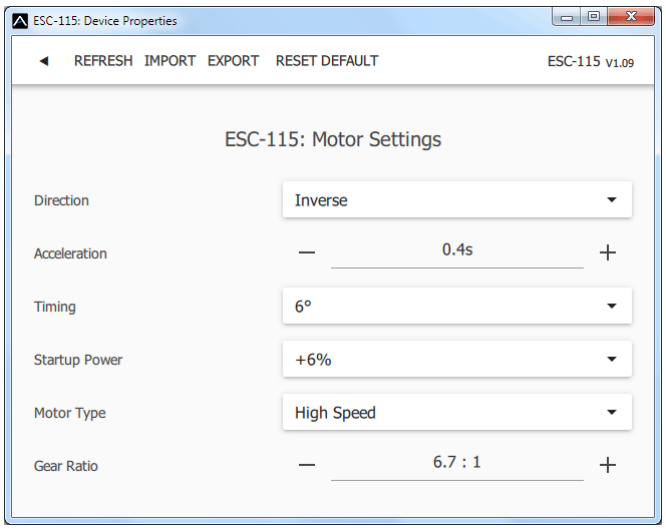
- Supports the latest controller types: ESC-200, ESC-220, ESC-115, ESC-155, ESC-55, ESC-65.
- Implemented **Powerbox P²Bus** telemetry. The telemetry is detected automatically during startup and the ESC offers similar telemetry values as for JETI EX (Battery voltage [V], Motor current [A], Capacity [mAh], Speed [RPM], PWM [%], Power [W], Running time [s], Energy [Wmin], Temperature [°C], External temperature [°C], Motor status (0-5).
- When using **Powerbox P²Bus**, it is also possible to assign a dedicated throttle-reversing channel, which is read directly from the bus. ESC configuration, at the moment, is not possible through the transmitter.
- Better handling of motor startups while the propeller is spinning (on-the-fly start) and if the Freewheeling mode is set to "Active braking". The reaction is now faster and smoother.
- Controller configuration through the PC-USB interface. Use the latest version of MAV Manager (1.4.0 and newer) and connect the ESC through the interface to your PC. After the auto-detection is performed, you'll be able to enter the configuration menu.



The ESC is automatically detected by the MAV Manager.



Main menu.



Motor settings.

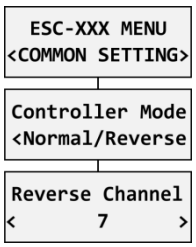
VERSION 1.08

- Reduced heat generation when the PWM value is close to full throttle.

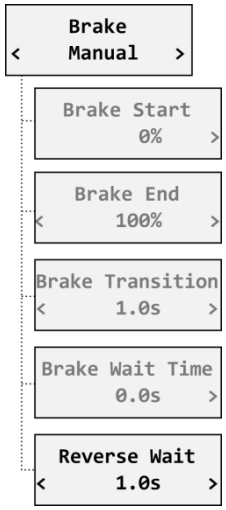
VERSION 1.07

- Propeller positioning is now disabled if the ESC temperature gets above 100°C. Default positioning PWM has been reduced to 5%.
- Added motor reversing feature (EX Bus, S.Bus2, SRXL2).

Set the “Controller Mode” to “Normal/Reverse” and choose one of the serial bus channels to control the direction.



You can play with the brake settings and a *reverse wait time* under “Manual” brake type.



VERSION 1.06

- Added support for BEC controllers with optional switch and backup battery support.
- Added Spektrum SRXL2 integration in a separate firmware file.

VERSION 1.04

- Improved MPX telemetry detection.
- Propeller positioning: Added a telemetry status value (No.5) that informs you about the prop outside of the correct position.

VERSION 1.03

- Initial version.