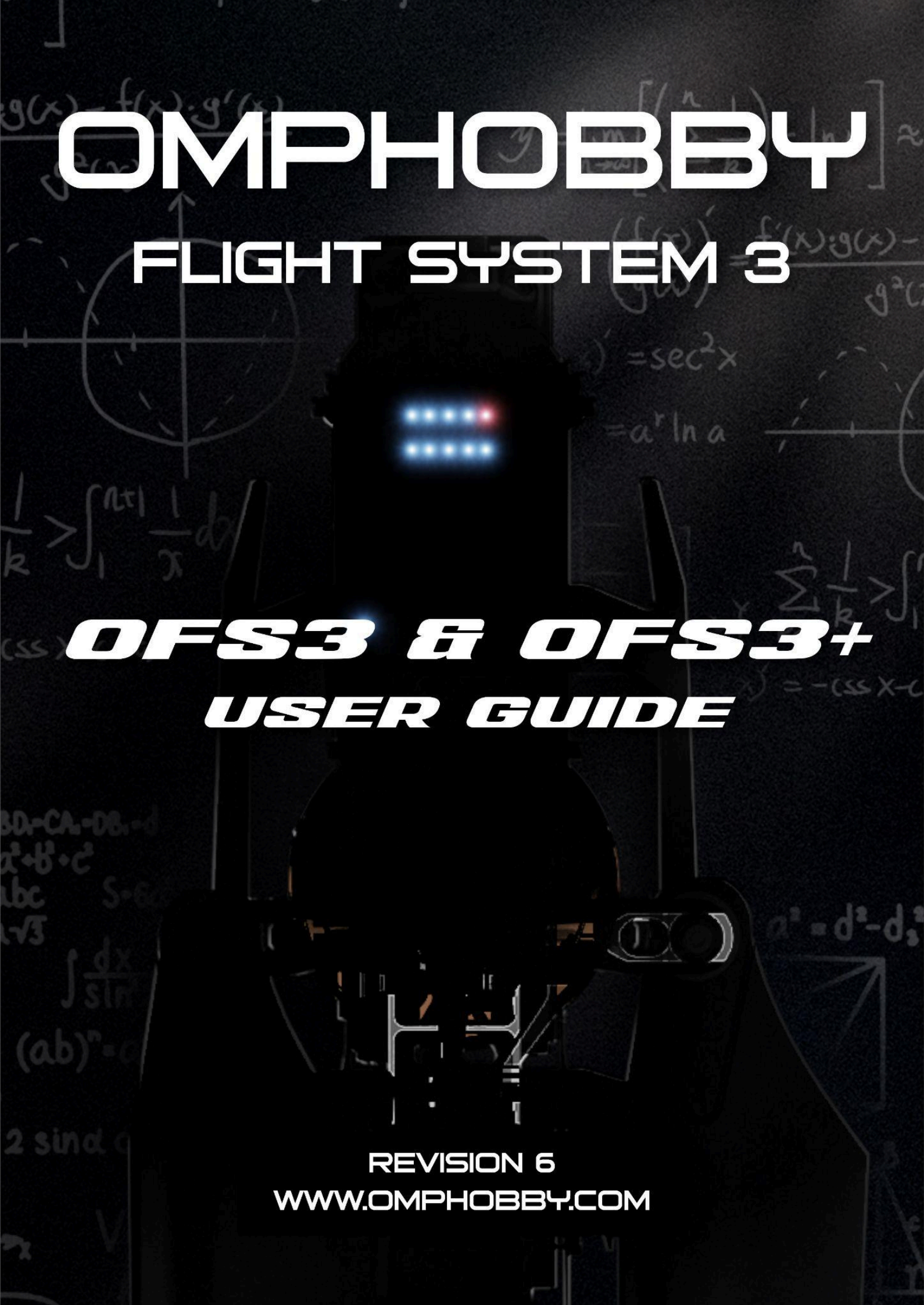
OMPHOBBY

FLIGHT SYSTEM 3



OFS3 & OFS3+

USER GUIDE

REVISION 6

WWW.OMPHOBBY.COM

Change Log

Revision 0 (10.12.2024)

- Initial Release

Revision 1 (17.06.2025)

- Added M2 V3 PRO references where applicable
- Upgraded page references to hyperlinks
- Updated Setting RPM by Throttle Percentage with resonance ranges
- Updated Receiver Connectivity with additional ExpressLRS feature
- Updated Battery Connection to reflect LVC behavior of newer firmwares
- Updated CRSF Telemetry Sensors to reflect new options in ExpressLRS 3.5.5
- Updated Attitude Mode with applicable limitations
- Updated Receiver Connectivity with new CRSF sensors
- Updated Bluetooth® Configuration app picture and Android information
- Updated IMU Static Calibration with additional information
- Updated Attitude Mode Calibration with additional information
- Updated Helicopter Mechanical Setup with app references
- Added Lost Model Beeper
- Added Formatting OFS3 to Factory Defaults
- Reworded some sections slightly, content unchanged if not listed here

Revision 2 (24.10.2025)

- Added Upset Recovery - Rescue Mode (Experimental) section
- Added Rescue Mode (⚠ Experimental Feature ⚠) section and subsections
- Added FrSky F.Port and subsections
- Added Receiver Failsafe section
- Split the combined DSM / S.BUS section into S.BUS and Spektrum DSM2 / DSMX
- Updated DSM Channel Mapping and Ranging with important setup notes
- Updated DSM Channel Mapping and Ranging with DSM receiver output PWM
- Updated DSM Channel Mapping and Ranging with correct channel order
- Updated S.BUS Channel Mapping and Ranging with raw SBUS signal range
- Updated S.BUS Channel Mapping and Ranging with information for VControl users
- Updated Flight Mode - 3D Mode and Flight Mode - Attitude Mode naming
- Updated Attitude Mode Calibration with additional information
- Updated IMU Static Calibration with additional information
- Updated Status Indicator LED Codes with additional information
- Updated Updating OFS3's Firmware with additional information
- Updated Bluetooth® Configuration with additional information
- Updated limitations in Flight Mode - Attitude Mode to specific firmwares
- Updated graphics and instructions for M2 V3 PRO in Helicopter Mechanical Setup
- Accepted defeat with Table of Contents sizing, now spanning two pages
- Reworded some sections slightly, content unchanged if not listed here

Revision 3 (31.01.2026)

- Added Applicability Notes section with latest firmware information
- Added OFS3+ Internal ExpressLRS Receiver and relevant subsections
- Updated Introduction with OFS3+ information
- Updated Additional Components Required For Use with OFS3+ and SRXL2 info
- Updated User Feedback with OFS3+ Information
- Updated Spektrum DSM2 / DSMX and SRXL2 with SRXL2 information
- Updated Bluetooth® Configuration with information on Receiver & Telemetry page
- Updated Bluetooth® Configuration with changes made to app
- Updated Flight Controller Tuning Parameter Reset with relevant info
- Updated Formatting OFS3 to Factory Defaults screenshot
- Updated Flight Controller Tuning Parameter Reset with app button info
- Updated Helicopter Mechanical Setup with mention of M2 V3 SPORT
- Updated Rescue Mode Usage with latest timing updates
- Updated CRSF (ExpressLRS, CROSSFIRE, and Tracer) with internal receiver info
- Combined and consolidated Important Notes & Safety Notice into one section
- Updated app references in various sections with new names
    - **Mechanical Setup** renamed to **Base Configuration**
    - **Expert Settings** renamed to **Advanced Settings**
- Updated all mentions of “M2 EVO MK2 and M2 V3 PRO” to “M2 series helis” due to the addition of the M2 V3 SPORT
- Reworded, restructured and moved various sections and headings around for clearer structure, content unchanged if not listed here. Refer to Table of Contents.

Revision 4 (03.03.2026)

- Updated document header and footer
- Added mention of M1 V3 PRO and OFS3+ for M1 where applicable
- Added OFS3+ for M1 - Physical Interfaces section
- Added byRPM Collective section
- Updated Flight Controller LEDs with more descriptive graphic
- Updated Battery Connection with information for M1
- Updated Setting RPM by Throttle Percentage with information for M1
- Removed Battery Information at a Glance section, as it is redundant with Battery Voltage Indication.
- Updated Battery Voltage Indication with info on M1.
- Updated Terminology Notice to include M1
- Updated Helicopter Mechanical Setup with notes on M1
- Updated Helicopter Mechanical Setup with servo PWM limit notes
- Reworded, restructured and moved various sections and headings around for clearer structure, content unchanged if not listed here. Refer to Table of Contents.

Revision 5 (19.03.2026)

- Updated Additional Components Required For Use with VBar Control Telemetry Info
- Added S.BUS with VBar Control Telemetry and relevant subsections
- Added note about throttle handling to Flying OFS3-Equipped Models

Revision 6 (14.07.2026)

- Added Chapters for easier navigation
  - Chapter 0 - General Information and Overview,
  - Chapter 1 - Helicopter Preparations,
  - Chapter 2 - Control Link Setup,
  - Chapter 3 - OFS3 Setup and Features
- Added Flying a TALY-Equipped Model and relevant subsections
- Added Pre-Made Model Memory for EdgeTX and ExpressLRS and relevant subsections
- Added FAQ - Frequently Asked Questions and relevant subsections
- Added information to Flying OFS3-Equipped Models
- Updated OFS3+ for M1 - Physical Interfaces with receiver LED location
- Updated Updating OFS3's Firmware with updated Android instructions
- Updated ExpressLRS Module Settings to specify 2.4 GHz control link
- Updated Introduction with information on firmware 17.17
- Updated Rate, Feedforward, and Gain Settings to reflect latest firmware update
- Updated Rate, Feedforward, and Gain Settings to reflect behavior of firmware 17.17
- Updated ExpressLRS Module Settings to match latest intelligence
- Updated CRSF (ExpressLRS, CROSSFIRE, and Tracer) with additional information
- Updated information in S.BUS Channel Mapping and Ranging
- Updated references to app sections to reflect new app design
  - **Base Configuration** renamed to **🛠️Maintenance**
  - **Advanced Settings** renamed to **🚁 Flight Setup**
  - **Receiver & Telemetry** renamed to **🎮 Control Link**
  - **Experimental Features** renamed to **🧪 Experimental**
  - "About" renamed to **🚀 Firmware**
- Renamed Receiver Connections to External Receiver Connections
- Removed "Additional Components Required For Use" section, as it is redundant with the receiver chapter.
- Reworded, restructured and moved various sections and headings around for clearer structure, content unchanged if not listed here. Refer to Table of Contents.

Introduction

Congratulations on your purchase of the all-new OMPHOBBY Flight System 3, the most advanced offering in micro helicopter flight control technology today!

OFS3 has been developed, validated and perfected over a period of two years and through thousands of test flights to deliver unparalleled flight performance for novices and 3D champions alike. With completely open flight parameter adjustability and future-proofing, OFS3 comprises an all-new 2-in-1 telemetry-capable ESC with improved governing, as well as a groundbreaking, new flight controller, rewritten from the ground up, which together set a new standard in micro helicopter flight control.

As of OFS3 firmware update 17.17, the newly developed VTS control system provides industry-leading flight stability and response in all situations, specifically optimized for 100-200 size helicopters.

With OFS3+, you can now utilize the integrated ExpressLRS receiver, and bind directly to the model without any external receiver being required anymore. (This applies to models shipped from the factory starting 02/2026.)

Customer feedback has been taken very seriously during the development of OFS3. Those familiar with previous generations of OFS and its derivatives will find vastly improved control characteristics, more precise stick tracking and stopping behavior, enhanced stability and a generally more pleasant flight feel.

The OFS3 system has been carefully designed to provide an effortless setup and tuning experience, catering to the needs of both novice and experienced users. The previous OFS generation's button-and-LED-setup procedure has been retained to allow for simple, fast and tool-free adjustments of the helicopter's flight characteristics at the field without the necessity of external devices.

A new fully-featured, collective-assisted Rescue Mode allows for reliable and fast upset recovery, should the pilot ever lose control of their model during flight. This new capability saves nerves, time, money and keeps users of OFS3 flying with confidence!

For those wanting to dive deeper, OMPHOBBY's Bluetooth® module in combination with the OMPHOBBY smartphone app for iOS and Android opens up a full suite of adjustments, allowing users to access every single parameter that makes OFS3 tick and fly, such as full individual P, I, D, and F gain adjustments, control deadbands, servo travel limits and reverses, expo, vibration filtering, torque assisted left yaw gains and more.

Firmware updates to OFS3 are possible through the OMPHOBBY app, extending and improving OFS3's capabilities for years to come.

In addition to the S.BUS and DSM2/X protocol support, native ExpressLRS, CROSSFIRE, and Tracer support via the CRSF protocol with telemetry return, as well as FrSky F.Port and SRXL2 with telemetry return, open up a new era in micro RC helicopters, where flying by timer is now a relic of the past as all crucial flight information relating to the model's power system and flight performance is now available on the display of your transmitter.

With all these exciting and new capabilities, OFS3 is not just constrained to the M1 and M2 series helis that it is being released with. Being more open than ever, adjustments for flying with scale fuselages, which change the model's dynamics drastically, can be made more easily. OFS3 can even be adapted by the user to fly almost any micro helicopter that features an H-3 120° swashplate and motor-driven tail.

With all this said, we at OMPHOBBY now wish you amazing flights and always happy landings with your new OFS3 flight controller!

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Chapter 0 - General Information and Overview

Applicability Notice

This User Guide assumes that OFS3 is updated to the latest firmware version at the time of writing. The information provided may not be applicable or accurate for older OFS3 firmware versions. Always ensure your firmware is up to date, also see Updating OFS3's Firmware.

The minimum OFS3 firmware for this revision of the User Guide is 17.17

Information Recency Notice

This manual is subject to updates and revisions without prior notice. Firmware update releases normally warrant a manual revision. For the latest documentation on OMPHOBBY products, please visit the official support page at **omphobby.com**. You can also access the website by scanning the adjacent QR code.

Terminology Notice

Besides the original OFS3 flight controller for M2, OFS3+ with an integrated ExpressLRS receiver exists for both M1 and M2. Any information in this User Guide universally applies to all OFS3 and OFS3+ units, unless specified otherwise. Any mention of OFS3 includes both the original OFS3 and newer OFS3+ on both M1 and M2, unless specified otherwise.

Important Notes & Safety Notice

Remote-control helicopters, including those controlled by the OFS3 system, are not toys. They are sophisticated precision models and must be operated with appropriate caution. Read this manual carefully before using OFS3-equipped RC models. Improper use may result in property damage, serious injury, or death. Users must remain constantly aware of their own safety, the safety of others, and the surrounding environment when operating OMPHOBBY products. This product must only be used in safe, open areas, away from obstacles, living beings, homes, and crowds. RC helicopters require skill to operate, and it is strongly recommended that first-time users seek assistance from an experienced pilot before flying an OFS3-equipped helicopter.

The manufacturer and seller assume no liability for the operation or use of this product. OFS3 is intended for use only by adults who have familiarized themselves with RC helicopter operation. After the sale of this product, the manufacturer and seller have no control over its operation or usage. Any damage or dissatisfaction resulting from crashes, incorrect setup, modifications, or insufficient user skill is not covered by warranty. Technical support and parts supply should be obtained through authorized distributors.

RC helicopters may experience accidents, failures, and crashes due to factors including, but not limited to, lack of maintenance, pilot error, or radio interference. Models must always be flown in a manner that ensures such failures cannot result in harm to property or life. The pilot is solely responsible for all actions, damages, injuries, or consequences arising from the use of OFS3 and helicopters equipped with it. All OMPHOBBY models must be inspected before every use for defects, issues, or malfunctions.

FAQ - Frequently Asked Questions

Flight-Related and Mechanical Questions

Question	Cause / Info	Solution
My model's RPM rises to maximum and won't come down, even if I switch flight modes.	At least one part of your airframe is bent and causing severe vibration, to a point where OFS3 cannot function normally anymore.	Perform proper maintenance and fix any vibrations present on your model. More info: TALY Vibration Handling
When testing the model with no blades, left yaw inputs raise my model's main rotor RPM.	This is normal, it is a result of TALY (Torque Assisted Left Yaw) operating in open loop mode.	Mount blades on the model and fly. More info: Flying a TALY-Equipped Model
My servos bind against the airframe at extreme stick input.	Servo limits were introduced in OFS3 firmware update 15.19 to address this.	Update your OFS3 to the latest firmware. More info: Updating OFS3's Firmware
My model shows rotational drift in 3D Mode	Channel centers for elevator, aileron and/or rudder are not set properly.	Ensure channel centers are set correctly and receiver output is compliant with OFS3 requirements More info: Receiver Connection
	IMU calibration is outside the permissible range.	Calibrate IMU More info: IMU Static Calibration
My model doesn't pirouette flat in 3D Mode	Swashplate not leveled, servos not centered.	Set up your model correctly More info: Helicopter Mechanical Setup
My model drifts in Attitude Mode	Horizon reference is not set properly.	Calibrate Attitude Mode More info: Attitude Mode Calibration
My model hovers well in Attitude Mode, but drifts after yaw movements	IMU calibration is outside the permissible range.	Calibrate IMU More info: IMU Static Calibration
My model doesn't climb straight during the Rescue Mode auto-sequence	Attitude Mode horizon reference is not set properly, which is also used for Rescue Mode.	Calibrate Attitude Mode More info: Attitude Mode Calibration
My model makes metallic noises when spinning the rotor by hand	The motor may have ingested a magnetic particle, washer or screw.	Open motor and remove foreign object More info: Respective Model Manual
My tail lacks power and doesn't hold properly under load	Tail propeller installed backwards.	Install tail propeller correctly (concave pressure side pointing to the right) More info: Respective Model Manual
My model wobbles on the pitch axis when in a hover	The model is being operated inside an airframe resonance band.	Raise or lower RPM to exit the resonance band of the specific model More info: Setting RPM by Throttle Percentage
	Rotor blades are clamped too tightly in the blade grips	Loosen rotor blades so that they just barely don't fall under their own weight (M2) or slightly fall under their own weight (M1) when held sideways.
My tail motor only twitches, but doesn't spin	One or more phases not connected to ESC.	Ensure motor connectors are fully seated. Inspect wiring for defects. Replace tail motor if necessary. More info: Respective Model Manual

Question (Continued)	Cause / Info (Continued)	Solution (Continued)
My motor shuts off and the model falls out of the sky when giving negative collective.	Use of “normal mode” or any other mapping of throttle to a stick is not permitted.	Use fixed throttle values only. More info: Flying OFS3-Equipped Models
	Use of latest VBar Control Radio update as of the release of this User Guide revision	Do not use VBar Control until this bug is fixed by the manufacturer. More information: S.BUS with VBar Control Telemetry

Receiver, Transmitter and Model Setup

Question	Cause / Info	Solution
My model does not initialize.	Various causes.	Identify the cause by checking the Status Indicator LEDs. More info: Status Indicator LED Codes
My OFS3+ model will not bind to my ExpressLRS transmitter.	Integrated receiver not enabled.	Enable integrated receiver. More info: Enabling the OFS3+ Internal ExpressLRS Receiver
My OFS3+ model will not initialize with an external receiver.	Integrated receiver enabled.	Disable integrated receiver. More info: Enabling the OFS3+ Internal ExpressLRS Receiver
	Incorrect receiver connection, especially common with full-duplex UART based receivers like ExpressLRS.	Review connection information for your specific receiver, ensure that you obey UART conventions. More info: CRSF, SRXL2, F.Port
Using EdgeTX, ExpressLRS and the pre-made model memory, I get constant callouts for “0 Volts”, constant switch callouts, or similar.	Your ExpressLRS, EdgeTX and/or OFS3 firmwares do not meet the minimum firmware requirement to use the new telemetry sensors.	Update your firmwares to the stated minimum versions. More info: Pre-Made Model Memory for EdgeTX and ExpressLRS
Using EdgeTX with 4-in-1 and the pre-made model memory, my channel assignment is wrong.	The pre-made model memory is only compatible with ExpressLRS, as stated in its documentation.	Use ExpressLRS or create a model memory in accordance with your control link. More Info: Receiver Connections
Using S.BUS as a receiver protocol, my model is either very sluggish or extremely sensitive.	S.BUS range mismatch between receiver and OFS3.	Ensure S.BUS ranges of receiver and OFS3 match and are configured correctly. More Info: S.BUS Channel Mapping and Ranging
When flying, my model runs into low voltage cutoff before the capacity reported by telemetry reaches a certain percentage of the actual battery capacity	Battery not fully charged, HV battery only charged to LV	Ensure your battery is fully charged with the correct program. For OMPHOBBY branded batteries, they should be charged to: • Batteries without HV label (7.4V, 11.1V) → 4.20V/cell • Batteries with HV label (7.6V, 11.4V)→ 4.35V/cell

Flying OFS3-Equipped Models

⚠ OFS3 does not support mapping throttle to a stick or other analog control. Do not attempt to program a legacy "normal mode", do not attempt to slowly increase the throttle value to spool up the motor. The system is designed to operate at a constant throttle value, which corresponds to an RPM setpoint which is maintained by a headspeed governor. The model must be brought to flight RPM by immediately setting the throttle channel to the desired, fixed flight value, which must not change with movement of the flight controls. The only permitted uses for changing throttle values in flight are switching between different RPMs and shutting off the motor. ⚠

Below you will find a recommended checklist for safe operation of your model with OFS3.

Before your flight

- Inspect the helicopter for damage or loose components.
- Check your battery's power level. Only fly fully charged batteries.
- Power on the transmitter and ensure the switches are set to prevent the motor from spinning up accidentally.
- Power on OFS3 and wait for initialization, validate correct initialization based on the Flight Controller LEDs.
- Verify that the transmitter and receiver are connected and that the model reacts to control inputs correctly.
- Place the model in an open area with no obstacles or bystanders.
- Fly and have fun!

During flight

- Let the motors fully spool up before adding collective to take off. Take off quickly.
- A small, short right-aft cyclic input before liftoff helps bring the model into dynamic equilibrium for vertical take off
- Avoid sliding or skidding around on the ground to avoid dynamic rollover
- Always pay attention to your surroundings and land the model if the airspace becomes unsafe to operate in during your flight
- Avoid high energy maneuvers towards yourself, spectators or other infrastructure
- Avoid contact of the rotor with anything non-air, such as foliage, objects or the ground
- Pay attention to your telemetry warnings, temperature warnings or timers
- Operate the model in a safe manner that keeps it in control at all times
- When landing, avoid excessive lateral drift to avoid dynamic rollover

After your flight

- Safe the vehicle against accidental spool-up.
- Disconnect the flight battery.
- Check your battery's physical state. Ensure it isn't excessively hot or swollen.
- Review your telemetry values, if using a compatible transmitter.
- Power down your transmitter.
- Inspect the helicopter for loose components.
- Let the power system cool down, if required.
- Recharge your battery.
- Prepare for your next flight with OFS3

Flying a TALY-Equipped Model

OFS3-equipped M1 and M2 models feature motor driven tails with incredible performance which, thanks to OMPHOBBY's proprietary 2nd-Generation TALY algorithm, easily matches the performance of a collective pitch tail for normal flying. Despite this, like with every system in model aviation, certain limitations apply.

Understanding TALY

TALY, short for Torque Assisted Left Yaw, is an algorithm which extends the control envelope of the tail by means of actively controlling and incorporating the main motor torque within the tail rotor control loop. This allows for crisper acceleration on left yaw commands, crisper stops from right yaw commands, and tail hold in situations where a regular motor tail would go limp and weathervane.

Fundamentally, the tail motor can only produce thrust in one direction. In normal flight, this is usually sufficient to hold the tail. In situations where the tail motor reaches the left idle stop (i.e. it can't turn any slower without stopping), the main motor will seamlessly take over tail control and begin speeding up with whatever torque is necessary to hold the heli's direction.

Two scenarios can occur:

- With a sufficiently high collective pitch angle in the rotor, the main motor will speed up a certain amount and then govern tail hold through main motor throttle changes, as eventually, the increased RPM will raise drag on the main blades, and therefore body reaction torque, enough to compensate for the helicopter's yawing tendency. This happens in about 90% of cases and is considered normal.

- If the collective is held near zero, body reaction torque from RPM increase alone may not be sufficient to arrest the yawing tendency. The only way for OFS3 to respond is to speed up the main motor continuously as the torque from accelerating the mass of the rotor is the only torque available. This happens only in very specific and rare cases, and will eventually saturate the main motor's speed capacity. In this case, eventually the yawing tendency cannot be arrested anymore. The pilot will need to respond by either increasing collective to increase the aerodynamic reaction torque, or by ending the flight phase causing the saturation entirely.

If the main motor saturates, unintended yaw may occur. It is recommended that you increase collective pitch or reorient the model once significant TALY activity becomes audible.

TALY Vibration Handling

Due to TALY's nature of controlling the main motor speed based on the yaw control loop's output, and operating as a closed feedback loop, the system can potentially be sensitive to vibration from mechanical damage. While OFS3 has advanced filtering in place to reduce the impact of vibration on the control loops, at a certain point, even this filtering may not be enough to prevent vibration affecting the TALY control loop.

Excessive airframe vibration may manifest in RPM runaway up to the maximum speed. In such cases, you must perform proper maintenance on your helicopter and repair it in accordance with the user manual before resuming operation.

OFS3 Feature and Capabilities Overview

OFS3 is an advanced multi-axis flight control system with 3D and self-leveling capabilities, developed from the ground up to deliver both exceptional stability and unparalleled 3D performance for micro helicopters. It comes with a full suite of features, which will be outlined in this chapter.

Flight Mode - 3D Mode

3D mode is OFS3's primary flight mode, where the pilot can freely control the attitude and rotation of the model in space. The pilot commands rotation rates of the model around the axes, which the flight controller tracks by fundamentally reimplemented and improved PIDF control loops. In this flight mode, the model is entirely unconstrained and can perform complex maneuvers, such as inverted flight, flips, rolls, loops, tictocs, pirouetting flips, and more, only being limited by the pilot.

Superior yaw stability is guaranteed by a second-generation TALY (Torque Assisted Left Yaw) algorithm, which utilizes throttle changes of the main motor to assist with left yaw commands on motorized tails. Through an entirely new implementation, OFS3's tail rotor performance can easily be compared to that of a traditional collective-pitch tail, without any of the mechanical complexity and any of the drawbacks of previous TALY implementations.

The main rotor speed is controlled by a newly written governor algorithm in the 2-in-1 stack, giving better RPM consistency than ever before. Using the digital DSHOT600 protocol for both motors, RPM changes needed for flight control are faster and more accurate than ever.

Flight Mode - Attitude Mode

Attitude Mode, also called self-leveling mode, is a flight mode where the model always returns to level flight when the cyclic stick (elevator/aileron) is let go. The model cannot be fully flipped or rolled in this mode, and a bank angle limitation of 45° is active at all times. The cyclic stick commands a tilt angle in this mode, and needs to be held to build horizontal velocity, as opposed to the traditional 3D mode.

Attitude Mode can be calibrated for largely drift-free flight when the cyclic stick is centered. The reference for leveling the model is the gravity vector of the Earth. Calibration of the model's gravity vector reference can be done by the pilot to ensure drift-free flight when the cyclic is centered. The procedure is described in detail under Attitude Mode Calibration.

Upset Recovery - Rescue Mode (Experimental)

OFS3 features a fully-fledged, collective-assisted Rescue Mode for upset recovery without pilot intervention. This allows safe recovery of the model from loss-of-control situations and may prevent a crash, where the pilot may otherwise be unable to recover the model.

The feature is currently classified as an experimental feature and should only be used at the pilot's own risk. Once the feature is out of the experimental state, a notice will be issued with a firmware update.

Please see chapter Rescue Mode (⚠ Experimental Feature ⚠) for more information.

Receiver Connectivity

While OFS3 continues to support both S.BUS and DSM2/X known from previous iterations of OFS, it now also supports the CRSF receiver protocol used by TBS CROSSFIRE, Tracer, and ExpressLRS, as well as the FrSky F.Port and Spektrum SRXL2 receiver protocol. The latter three protocols offer the significant advantage of telemetry return, which allows for return of valuable flight data to the transmitter, based on which warnings and vibrations can be played to indicate, for example, an empty battery. Telemetry items include:

- Battery Total Voltage (V)
- Battery Average Cell Voltage (V)
- Battery Current (A)
- Used Capacity (mAh)
- Battery Remaining Percentage (%)
- Rotor Speed (RPM)
- ESC Temperature (°C)
- Vehicle Attitude in Roll, Pitch, and Yaw (Radians, Degrees)

More receiver protocols may be supported in the future via firmware update.

Setup Capabilities

LEDs and Button

Similar to the previous iteration of OFS, OFS3 allows the user to change the most important parameters right on the flight controller, which includes basic settings of the control loops like total gain, feedforward, and rotation rates, as well as servo centering, and collective pitch endpoints.

OMPHOBBY Bluetooth® App with Full Parameter Access

With OFS3, OFS has graduated from being a simplified RTF flight controller to a fully fledged, highly advanced flight control system for micro helicopters. To unlock its full range of capabilities, OFS3 seamlessly connects to the OMPHOBBY app on iOS and Android through the included Bluetooth® module.

The OMPHOBBY app allows the user full customization of all core flight control parameters, providing access to every single value that makes OFS3 fly. This includes full PIDF gain access, rotation rates, control deadband values, vibration filters, stick exponentials, software throttle mode, TALY parameters, and more.

Firmware updates to the flight controller can be done through the app, and firmwares can be rapidly developed and deployed by OMPHOBBY.

To find the latest firmware for your OFS3 flight controller, please visit the support page at **omphobby.com**.

For more information, see Bluetooth® Configuration and Updating OFS3's Firmware.

User Feedback

Special attention in OFS3's development was paid to the flight characteristics, incorporating user feedback on previous iterations of OFS. While OFS3's flight code has been rewritten from the ground up and contains not a single line of previous OFS flight code, certain comparisons with the previous generation of OFS, specifically on M1 V1, M1 EVO, M2 V2 and M2 EVO, can be drawn. Notable improvements include:

- Control deadband on the pitch, roll, and yaw axes has been minimized by default and is now fully user adjustable from no deadband at all, to levels of deadband similar to previous OFS generations.
- OFS3+ is equipped with a state-of-the-art ExpressLRS receiver, which allows direct binding to any ExpressLRS capable remote-control transmitter.
- The TALY (Torque Assisted Left Yaw) algorithm is more robust, does not saturate anymore, is available at much lower RPMs and does not cause yaw creep after a quick yaw stop. TALY now incorporates collective pitch to maintain a more stable rotor thrust level during yaw induced RPM changes.
- Cyclic control range is extended and user-customizable to allow for more cyclic pitch, in turn increasing achievable rotation rates.
- Servo endpoints are now relative to servo center values, eliminating the phenomenon of unequal cyclic throws after adjusting servo centers.
- Cyclic reversals in 3D maneuvers like tictocs can be performed faster and crisper with the model following the control inputs more closely.
- Headspeed governor and TALY remain active at all times.
- Pirouetting control is more stable and smoother, allowing for more precise and consistent pirouetting maneuvers.
- Attitude Mode precision and accuracy has been drastically improved, calibration mode is less sensitive to control inputs for easier handling and better results.
- Telemetry return is now possible with ExpressLRS, CROSSFIRE, and Tracer receivers, as well as FrSky F.Port receivers. Additional protocols may be added in the future.
- RPM can now be accurately set by entering a specific throttle value. Refer to the "Setting RPM by Throttle Percentage" section for a chart of throttle values vs. main rotor RPM.
- An optional, special Software Throttle mode allows the user to define three RPM presets in the flight controller which can be selected through an extra channel, allowing the user to not use transmitter throttle curves at all.
- An all-new, fully fledged, collective-assisted Rescue Mode has been implemented, which enables the aircraft to return itself to a stable flight attitude after the simple flick of a switch. See Rescue Mode (⚠ Experimental Feature ⚠) for more information.

These and more improvements to OFS3 make it one of the best flying, most versatile and most complete flight control units on the market.

Chapter 1 - Helicopter Preparations

OFS3 Helicopter Component Connections

OMPHOBBY Flight System 3 requires the following connections to fly a helicopter:

- Receiver
- Servos
- Main Motor
- Tail Motor
- Battery

Receiver Connection

OFS3+ features an integrated ExpressLRS receiver, which requires no external receiver to be connected. Additionally, OFS3+ and OFS3 support the following external receiver protocols:

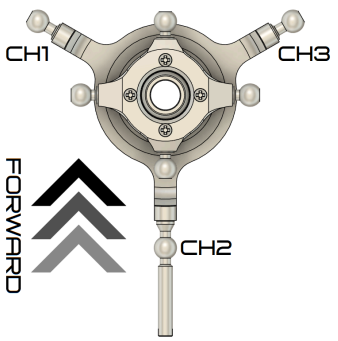
- CRSF (ExpressLRS / CROSSFIRE / Tracer)
- FrSky F.Port
- DSM2/DSMX
- SRXL2
- S.BUS

The receivers' respective connection details are outlined in Receiver Connections.

Servo Connections

If you purchased OFS3 installed in an OMPHOBBY helicopter, the servos are already connected. Refer to this section if you are retrofitting a helicopter with OFS3, or if you need to reconnect the servos during a repair.

OFS3 currently supports helicopters with an H-3 120° swashplate with two front servos, and one rear servo. The adjacent diagram correlates the servo positions to the channels on OFS3.

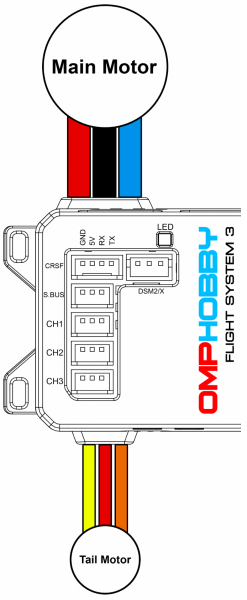


Servo is connected to…	Servo Port on OFS3
Left Swashplate Joint	CH1
Rear Swashplate Joint	CH2
Right Swashplate Joint	CH3

If you are using OFS3 in a helicopter with a servo layout different from the corresponding OMPHOBBY helicopter, you may need to reverse servos according to its specific layout. This is only possible through the OMPHOBBY app.

⚠ **Always ensure proper servo leveling and mechanics setup after a repair, or when retrofitting an existing helicopter with OFS3. Failure to do so can, depending on the severity of the setup errors, lead to off-axis pirouetting, asymmetric flight characteristics, reduced control margins, axis cross coupling, servo saturation, loss of control, and total loss of the vehicle. Review the relevant sections of this manual for guidance.** ⚠

Motor Connections

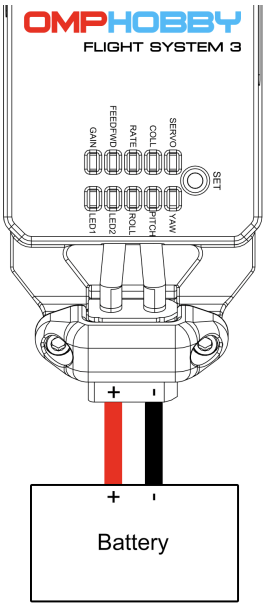


If you purchased OFS3 installed in an OMPHOBBY helicopter, both motors are already connected from the factory. Refer to this section if you are retrofitting a helicopter with OFS3, or if you need to reconnect the motors during repairs.

⚠ **The main motor and tail motor must be connected to the correct outputs of the flight controller. The color-coding of the motor wires must be obeyed to guarantee correct direction of rotation, as otherwise the helicopter will become uncontrollable upon motor start. Do not connect the motors to the wrong outputs, this may have catastrophic consequences for the model, as well as your health and safety.** ⚠

The adjacent diagram illustrates the correct motor connections by the example of the M2. For motor connector locations on M1, refer to OFS3+ for M1 - Physical Interfaces. Note that M1 uses screws to connect the main motor wires, and that the main motor wires are coded by length rather than color. Do not overtorque the motor connector screws. The tail motor uses a JST-MX 1.25mm 3-pin connector and cannot be reversed.

Battery Connection



In the case of the M2 series helis, OFS3 for M2 comes equipped with an XT30 connector and is compatible with 3S (11.1 V) LiPo batteries. The maximum input voltage is 13.05V, use of 3S LiHV batteries is permitted.

In case of the M1 V3 PRO, OFS3+ for M1 comes equipped with a GY15 3-pin connector and is compatible with 2S (7.4 V) LiPo batteries. The maximum input voltage is 8.7 V, use of 2S LiHV batteries is permitted.

Higher voltage than stated above can cause permanent and irreparable damage to your OFS3 flight stack and is not covered under product warranty.

⚠ **Pay close attention to the battery connector's polarity. While the GY15 and XT30 are keyed, contact can potentially be made by forcing the connector in reverse. Connecting the battery with reversed polarity is strictly prohibited and will lead to permanent and irreparable damage to your OFS3 flight stack, which is not covered under warranty.** ⚠

OFS3's low voltage cutoff (LVC) is set to 3.3 V per cell on M2 series helis, and therefore 9.9 V total battery voltage, and 3.1 V per cell or 6.2 V total battery voltage on the M1 V3 PRO. Once LVC is triggered, the ESC will gradually reduce the rotor speed to a set speed, hold this speed for 15 seconds, and then reduce the throttle gradually to 0, indicating that the pilot should land immediately in order to prevent damage to the flight battery.

It is not recommended to fly the model to LVC. To prolong battery life, it is recommended to never let the battery drop below 3.5 V per cell in flight, and to land the model once the battery reaches a level of about 3.7 V per cell of resting voltage.

OFS3 also indicates battery voltage through a row of LEDs directly on the flight controller, see Battery Voltage Indication for more information.

Bluetooth® Module

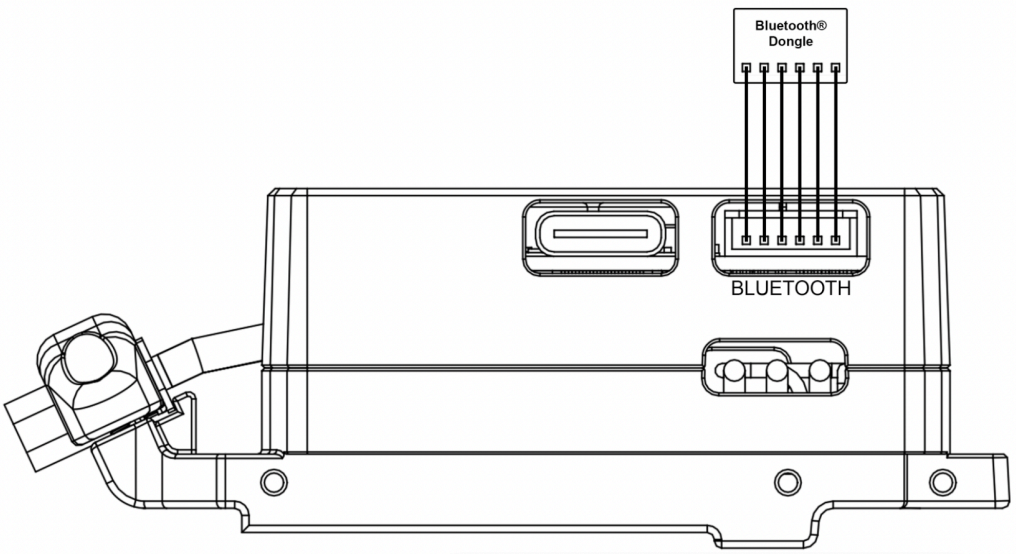
OFS3 supports configuration and firmware updates via the included Bluetooth® module, which can be connected to the flight controller's BLUETOOTH port, as shown by the example of the M2 series flight controller below. The connector and BT module on the M1 series OFS3+ flight controller are the same as on M2, refer to OFS3+ for M1 - Physical Interfaces to locate the Bluetooth® port. iOS and Android devices can connect to OFS3 and adjust model parameters by installing the OMPHOBBY app from the Apple App Store or Google Play Store, respectively. See section Bluetooth® Configuration for more information.

The Bluetooth® module is not required for flight operation, but can be optionally left connected to OFS3 for quick configuration via smartphone in the field. For this purpose, it is strongly recommended to attach the Bluetooth® module to the helicopter with double-sided tape, or similar.

While parameter adjustments through the OMPHOBBY app can be made to OFS3 while the motor is running, it is generally not recommended to change the configuration in flight, as it is possible to render the model unflyable by setting some expert parameters to their extremes. Due diligence and caution is advised. Expert parameters should only be adjusted by experienced pilots, and doing so happens at their own risk. Adjustments to the configuration made while the motor is running are only held in RAM and cannot be permanently saved to flash until the motor is fully shut off. Saving of adjusted parameters is only supported when the motor is stopped.

Firmware updates to OFS3 can be performed through the Bluetooth® module and the OMPHOBBY app for iOS and Android. To find the latest firmware for your helicopter, please visit the support page at **omphobby.com**. See section Updating OFS3's Firmware for more information.

As OFS3 is STM32-based, its bootloader generally cannot be bricked by failed firmware updates. In case of a failed firmware update, the user should simply try again. If the flight controller firmware cannot be recovered for any reason, the SERVICE USB type-C port can be used to reflash the flight controller's firmware entirely. There is no additional functionality to the SERVICE port at this time.



OFS3+ for M1 - Physical Interfaces

The M1 V3 PRO helicopter ships with a smaller version of OFS3+. Although reduced in size, this version supports an identical feature set compared to OFS3+ for M2 with all the same interfaces, connections, and software features. Unlike OFS3 and OFS3+ on M2, OFS3+ for M1 does not feature a plastic case for purposes of weight saving, and therefore needs to be treated with additional care.

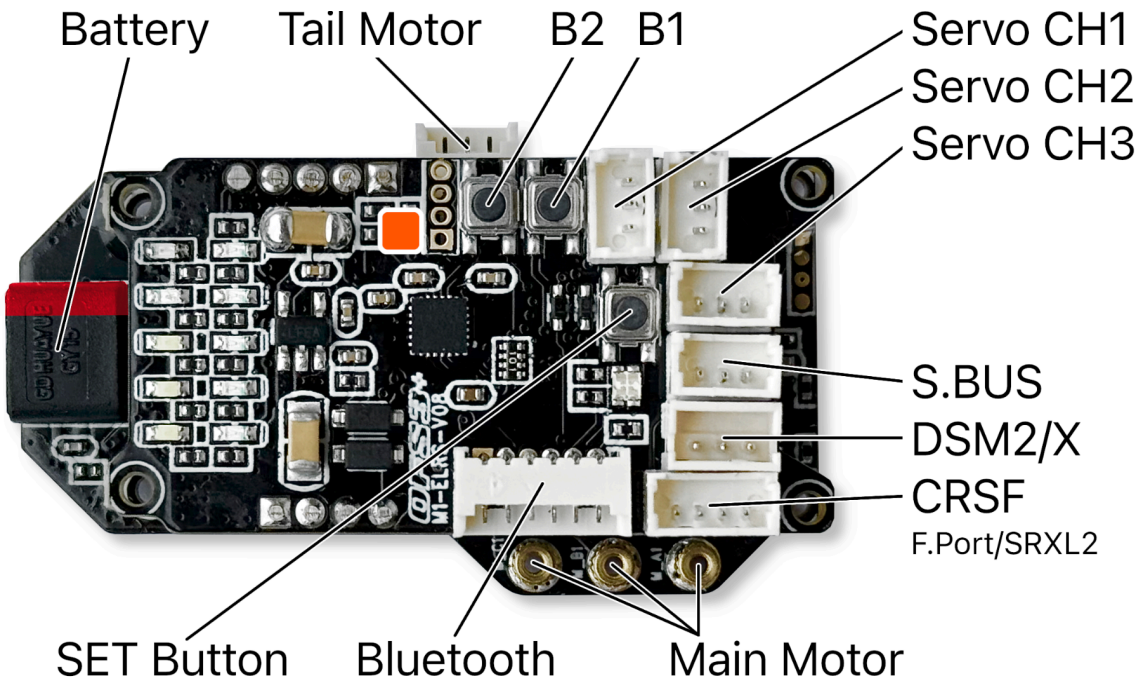
⚠ **Avoid directly touching the PCB unless absolutely necessary. Ensure proper grounding of your body when touching OFS3+ for M1. Use of anti-static tools to operate the buttons on OFS3+ for M1 is preferred.** ⚠

⚠ **Due to the open PCB stack layout of OFS3+ for M1, its connector sockets, particularly the Bluetooth socket, are more susceptible to damage from bending loads and lateral forces compared to OFS3 and OFS3+ for M2. When connecting or disconnecting peripherals, ensure connectors are inserted and removed straight in and straight out only. Do not twist, angle, or apply lateral force, as this may result in damage to the sockets or the board.** ⚠

⚠ **The GY15 battery connector is keyed to prevent reverse polarity. Due to the nature of GY15 being a miniature connector, attempting to insert the connector in reverse with enough force can override the keying and potentially lead to a reverse polarity event, which will destroy both the ESC and flight controller. Such an event is not covered by warranty and should be avoided. Check the diagram below to find the positive side marked in red.** ⚠

As OFS3+ for M1 comprises a stack of two tightly populated PCBs, its interfaces are not labeled on the PCB. Refer to the following graphic to identify the interfaces relevant for your operation. For identification of the LEDs in the LED array, refer to Flight Controller LEDs. The layout of the array is identical to that found on OFS3 and OFS3+ on M2.

The **ExpressLRS RX LED** is located on the **bottom right-hand side of the OFS3+ PCB**, above the tail motor connector. Its relative location is noted below by the orange square.



Chapter 2 - Control Link Setup

OFS3+ Internal ExpressLRS Receiver

If your OMPHOBBY helicopter is equipped with OFS3+ (applicable to models which left the factory starting February 2026), it features a built-in ExpressLRS 2.4 GHz receiver. This makes the model truly bind-and-fly with any ExpressLRS capable transmitter, and in case of EdgeTX transmitters, OMPHOBBY even offers pre-configured model memories through **omphobby.com** (see also Pre-Made Model Memories for EdgeTX and ExpressLRS)

OFS3+ on M2 models can be identified by the OFS3+ logo on the top face of the flight controller housing, and the "ExpressLRS Inside" writing on the right side, as shown in the adjacent images. Models that do not have these markings do not feature integrated ExpressLRS, and this section does not apply. For such models, you should instead choose an external receiver as outlined in Receiver Connection. The M1 V3 PRO exclusively features OFS3+, with no OFS3 variant available. OFS3+ for M1 is marked with the OFS3+ logo on the PCB.



⚠ **While this User Guide will describe the process of binding, flashing and configuring the integrated ExpressLRS receiver, the excellent ExpressLRS Quick Start Guide always has greater authority than this OFS3 User Guide. If in doubt, always follow the official ExpressLRS documentation.** ⚠

Enabling the OFS3+ Internal ExpressLRS Receiver

⚠ OFS3+'s ExpressLRS receiver is connected to the CRSF/SRXL2/F.Port port internally, and may only be enabled if no external receiver is connected. It must be disabled when using external receivers of any kind, including ones that do not communicate using the CRSF protocol. Connecting an external receiver while the internal receiver is active is not permitted and will lead to neither receiver signal being interpreted correctly. ⚠

By default, OFS3+'s internal ExpressLRS receiver is disabled to provide maximum compatibility with a variety of control systems which may connect externally. To enable the integrated receiver, use one of the following options.

OMPHOBBY App

The internal receiver can be enabled via the OMPHOBBY app. Connection instructions can be found under Bluetooth® Configuration. Ensure the app is up to date and find the 🎮 **Control Link** section. In it, you will find the toggle to enable the integrated receiver. Confirm the receiver's power status through the LED cutout on the right side of OFS3+.

Hardware Button

The internal receiver can be enabled by pressing and holding the **B1** button on the right side of OFS3+ for 2 seconds. The receiver can be disabled again by holding the button for another 2 seconds. This can be done both before and after OFS3+ initializes. Confirm the receiver's power status through the LED cutout on the right side of OFS3+.

Updating OFS3+'s ExpressLRS firmware

For updating the internal ExpressLRS firmware of OFS3+, you will need to either install the ExpressLRS configurator on your computer, or you can use the ExpressLRS Web Flasher, which allows you to generate firmware through your browser, as long as you choose to flash via Wi-Fi. It is recommended that you configure the firmware as follows:

Setting	Value	Note
Releases	Latest available release	Ensure the major version matches your remote-control firmware. **v4.x.x is incompatible with v3.x.x**
Device Category	OMPHOBBY 2.4 GHz	
Device	OMPHOBBY OFS3+ 2.4 GHz RX	
Flashing Method	Wi-Fi	Choose "UART (Serial)" for bricked receiver recovery.
Regulatory Domain 2.4 GHz band	2.4 GHz LBT (EU and UK) 2.4 GHz ISM (Rest of the world)	Ensure correct domain selection for compliance with local law.
Binding Phrase	[Your personal binding phrase]	Choose the same binding phrase as for your transmitter.
Wi-Fi startup delay (in seconds)	30	We recommend this value to reduce waiting time for Wi-Fi connection. Not required, default is 60 seconds.

Wi-Fi Method (Recommended)

This is the most common method of flashing ExpressLRS. It requires no additional tools, and can be done completely wirelessly.

- Once you have entered the above settings into the ExpressLRS configurator, click the [Build] button it will build your firmware and open the corresponding folder once done. Save the firmware file in a convenient location, or keep the folder with the file open.
- Place OFS3+'s internal ExpressLRS receiver in Wi-Fi mode. For this, you can either connect OFS3+ to your transmitter and enable the RX Wi-Fi through the ExpressLRS Lua script, or power OFS3+ without your transmitter being powered up, and wait for the Wi-Fi delay to elapse (default 60s), after which the receiver will automatically enter Wi-Fi mode.
- Connect the device you have stored the firmware on to the local Wi-Fi network opened by ExpressLRS, named "ExpressLRS RX". The Wi-Fi password is "expresslrs".
- Depending on your device, the receiver web interface may open automatically. In case it doesn't, type "10.0.0.1" into the URL bar of any browser on the device.
- Select the "Update" tab, and upload the firmware you built previously through the ExpressLRS configurator, or ExpressLRS Web Flasher. Once the firmware is uploaded to the receiver, it will flash itself and reboot into a functional state.

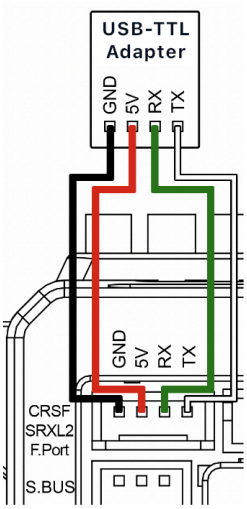
The official documentation for Wi-Fi flashing can be found on Typical Updating Steps - ExpressLRS.

DFU Method for recovering soft-bricked receivers

This method should be used if a Wi-Fi update fails and the firmware on the receiver is corrupted in the process, also called “soft-bricked”. A soft-bricked receiver will be unresponsive, unable to connect, may not show correct LED patterns, or no LED at all. This method requires either the ExpressLRS configurator to be installed on your computer, or can be done via the Web Flasher. The method outlined here describes use of the configurator.

This method requires additional hardware to create an interface, which will be called “Recovery Adapter” in the following guide:

- A USB-to-TTL adapter of any kind, for example the “RadioMaster ExpressLRS USB UART Flasher V2”, or any generic device which converts USB to UART RX/TX.
- An OSHM2133 cable for connecting to the receiver inside OFS3+.



Creating the Recovery Adapter for this procedure is done by connecting the OSHM2133 cable to the USB-to-TTL-adapter as shown in the adjacent diagram. Note that UART conventions do not apply to the connection of the recovery adapter with the CRSF/SRXL2/F.Port port, as you are connecting to the receiver connected to the port internally, which in turn obeys UART conventions (RX → TX and TX → RX).

Therefore, you must connect TX of the USB-to-TTL adapter to TX on the OFS3 housing, and RX to RX in the same fashion.

To flash the receiver in DFU mode, follow these steps:

- Press and hold the **B2** button on OFS3+ while connecting the battery, or while powering up the receiver through the **B1** button or the OMPHOBBY app. This will bridge the receiver’s BOOT pin to GND on bootup and enable the receiver’s bootloader mode.
- Open the OMPHOBBY app, connect to OFS3+ via Bluetooth, and tap on the rightmost 🚀 **Firmware** tab. This will place OFS3+ in bootloader mode, ensuring it does not interfere with the serial communication between the computer and the built-in receiver.
- Connect the Recovery Adapter to the CRSF/SRXL2/F.Port port and to a USB port of your computer.
- In the ExpressLRS Configurator, ensure the Flashing Method is set to UART (Serial). Under ⚙Actions, select the appropriate serial device that corresponds to your Recovery Adapter. On Windows, this will be a COM port, on MacOS, this will be a /dev/tty device, the exact naming may vary.
- Once the firmware parameters in the ExpressLRS configurator are set correctly as per Updating OFS3+’s ExpressLRS firmware, click the [FLASH] button, observe the console output. The ExpressLRS Configurator should now write the firmware to the receiver, and once done, the receiver should reboot into a functional state.
- If flashing fails, you may try enabling the “Force Flash” option under Flashing Options.

For further documentation, please see Unbricking - ExpressLRS.

Binding OFS3+'s internal ExpressLRS Receiver

Binding Phrase

The ExpressLRS binding phrase is a method to simplify binding of receivers, and can be baked into the receiver firmware before flashing, as described above. Should your receiver not have a binding phrase set, and you wish to use one, follow these steps:

- Ensure your transmitter is configured according to ExpressLRS Module Settings.
- Place OFS3+'s internal ExpressLRS receiver in Wi-Fi mode. For this, you can either connect OFS3+ to your transmitter and enable the RX Wi-Fi through the ExpressLRS Lua script, or power on OFS3+ without your transmitter powered up, and wait for the Wi-Fi delay to elapse, after which the receiver will automatically enter Wi-Fi mode.
- Connect the device you have built the firmware on to the local Wi-Fi network opened by ExpressLRS, named "ExpressLRS RX". The Wi-Fi password is "expresslrs".
- Depending on your device, the receiver web interface may open automatically. In case it doesn't, type "10.0.0.1" into the URL bar of any browser on the device.
- Under the "MODEL" tab, find the "Binding Phrase" subsection. It is recommended to leave Binding storage set to "Persistent"
- Enter your Binding Phrase in the corresponding field. This should be the same binding phrase as in your transmitter.
- Scroll down and hit SAVE.

Alternative Binding Methods

ExpressLRS receivers can be bound in several ways. When powering up the receiver for the first time, it will automatically enter bind mode. If the receiver was bound before, there are several other ways to initiate binding mode on the receiver:

- Power cycle OFS3+ and its internal receiver 3x in quick succession.
- Once OFS3+ is powered, press and hold the **B2** button on OFS3+ for 2 seconds.
- Select "Bind ExpressLRS" under 🎮 **Control Link** in the OMPHOBBY App before flight controller initialization.

Once bind mode has been entered successfully, the receiver **LED will flash twice, pause briefly, flash twice again, etc.** The receiver can then be bound to the remote-control via the ExpressLRS Lua script, by clicking [Bind].

For further documentation, please see Binding ExpressLRS - ExpressLRS.

Additional Notes

We recommend using Model Match to ensure that your OFS3+ only binds to the correct model memory. Should the LED, after binding, **flash 3x, pause, flash 3x again**, disable and enable model match in the ExpressLRS Lua script to set the correct model ID in the receiver.

Your transmitter should be configured as documented in CRSF (ExpressLRS, CROSSFIRE, and Tracer), section ExpressLRS Module Settings onward to ensure proper functionality.

CRSF (ExpressLRS, CROSSFIRE, and Tracer)

OFS3 supports the CRSF receiver protocol with full telemetry return. The CRSF protocol is used by ExpressLRS, TBS CROSSFIRE (XF), and TBS Tracer receivers. **This includes OFS3+'s integrated ExpressLRS receiver.** If not specified otherwise, any instructions regarding CRSF are valid for ExpressLRS, XF, and Tracer transmitter systems.

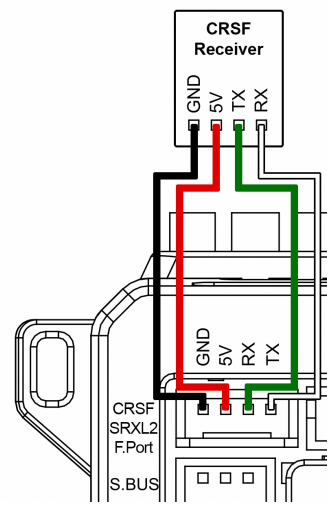
CRSF is the protocol used by the internal ExpressLRS receiver of OFS3+ flight control units, and everything in this section from ExpressLRS Module Settings onward applies to its usage. **When using OFS3+'s internal ExpressLRS receiver, no external receiver of any kind must be connected.**

When purchasing an external ExpressLRS, XF, or Tracer receiver, ensure that it supports the CRSF protocol and operates at 5V. Telemetry return is only supported when a full duplex connection between receiver and OFS3 is established, which requires both UART RX and TX to be connected.

CRSF Physical Connections

If not using OFS3+'s integrated ExpressLRS receiver, CRSF requires a connection between the CRSF/SRXL2/F.Port port of the OFS3 flight controller and a corresponding receiver. The serial connection follows UART conventions. The connector used is a JST-MX 1.25mm 4-pin, but is also compatible with Picoblade 4-pin type connectors. A pre-made cable can be purchased under part number OSHM2133. Note that JST-MX 1.25mm is not compatible with JST-GH 1.25mm, as commonly used by Rotorflight flight controllers, and receivers like the RadioMaster RP3-H. You must not connect a JST-GH connector into a Picoblade/JST-MX port under any circumstances. Only use compatible connectors.

Receiver	OFS3	OSHM2133	Purpose
GND	GND	Black	Power Delivery
5V	5V	Red	Power Delivery
TX	RX	Green	Control Signal
RX	TX	White	Telemetry Return



The adjacent diagram illustrates the required connection between the CRSF receiver and flight controller. Note that it is possible to fly with the receiver's TX pin connected only, but no telemetry will be returned.

⚠ **Ensure correct connection of RX and TX lines. Neither control nor telemetry will work if not connected as described above, and OFS3 will not initialize.** ⚠

⚠ **Ensure OFS3+'s integrated ExpressLRS receiver is DISABLED when using an external CRSF connection!** ⚠

ExpressLRS Module Settings

When using ExpressLRS, the transmitter module should be configured to match the receiver being used. The following settings are recommended as a baseline and have been tested with OFS3. As Channel 6 is used for throttle, the ExpressLRS Switch Mode should be set to 8ch to allow for the maximum possible resolution and range.

Setting	Value	Note
Baud Rate	1.87M Baud	Data rate module ↔ transmitter
Packet Rate	333 Hz Full 2.4 GHz	Data rate of the control uplink
Telemetry Ratio	1:32	Data rate of the telemetry downlink
Switch Mode	8ch	Enables high-resolution throttle range

ExpressLRS/XF Transmitter Channel Mapping

The ExpressLRS channel convention and PWM ranges outlined in the table below are expected by the flight controller when a CRSF receiver is connected.

⚠ **Channel 5 must be set to at least 1501 µs or higher for flight**. **ExpressLRS 3.x.x treats Channel 5 as an arming channel and will only output full transmission power when Channel 5 is set above 1500 µs. The motor will remain OFF if Channel 5 is left at 1500 µs or below. OFS3 will however initialize when Channel 5 is above 1500 µs. Channel 5 can double as a safety switch, or can be permanently set high.** ⚠

⚠ **ExpressLRS 4.x.x moves the arming channel to channel 14 by default. OFS3's arming via Channel 5 remains unchanged, it must still be set correctly for the motor to start on ExpressLRS 4.x.x. Ensure you also arm ExpressLRS properly in this case.** ⚠

Ch	Control Function	PWM (Min / Center / Max)	Output HIGH when..
1	Aileron	988 µs / 1500 µs / 2012 µs	Rolling Right ↷
2	Elevator	988 µs / 1500 µs / 2012 µs	Pitching Forward ↑
3	Collective	988 µs / 1500 µs / 2012 µs	Collective Up ⇧
4	Rudder	988 µs / 1500 µs / 2012 µs	Yawing Clockwise ↷
5	Optional Motor Safety Switch (ExpressLRS Arm)	988 µs – 1500 µs Safe 1501 µs – 2012 µs Armed	Vehicle is Armed
6	Throttle / Motor Switch	988 µs – 2012 µs, ⇧2140 µs	RPM is High
7	Attitude / 3D Mode Rescue Mode	988 µs – 1212 µs Attitude/Rescue 1213 µs – 2012 µs 3D	Flight Mode is 3D
8	Software RPM Selection (If enabled, see Software Throttle)	988 µs – 1329 µs RPM1 1330 µs – 1688 µs RPM2 1689 µs – 2012 µs RPM3	RPM 3 is Selected

CRSF Telemetry Sensors

OFS3 supports a variety of CRSF telemetry sensors, which deliver useful information about the state of the model to the pilot. Using ExpressLRS 3.5.5 and EdgeTX 2.11.2 (or later), main rotor RPM, ESC temperature and single cell voltage are also directly supported. In older versions, the Altitude and Heading sensors are used to transmit RPM and ESC temperature. Refer to the table below for proper usage. Due to the nature of how the CRSF protocol transmits sensors, other sensors such as GPS Coordinates, GPS Satellites, Vertical Speed, and Ground Speed may be populated during sensor discovery. These sensors are unused and can be deleted from the list, if desired.

To discover these sensors in EdgeTX, the following steps are necessary:

1. Ensure the model is powered off.
2. Open the “Telemetry” tab in Model Settings.
3. Under “Sensors”, click the “Discover new” button.
4. Power up the model, wait for connection.
5. Observe the sensor list populating.
6. Once no new sensors are being discovered anymore, click the “Stop” button.
7. Set up your telemetry screens and warnings as desired and required.

Sensor	Function	Note
RxBt	Battery Voltage (V)	Displays total pack voltage.
Curr	Battery Current (A)	Displays battery current.
Capa	Used Capacity (mAh)	Displays total used capacity since power-on.
RPM	Rotor Speed (RPM)	Main Rotor Speed in [1/min].
Temp	ESC MOSFET Temperature (°C)	ESC MOSFET temperature in degrees Celsius.
Volt	Average Cell Voltage (V)	Calculated from Battery Voltage Volt=RxBt/3 on M2; Volt = RxBt/2 on M1
Ptch	Pitch Attitude (rad)	Default unit is radians, can be changed to °.
Roll	Roll Attitude (rad)	Default unit is radians, can be changed to °.
Yaw	Yaw Attitude (rad)	Default unit is radians, can be changed to °.
Bat%	Remaining Battery %	Calculates remaining percentage based on battery capacity set in the OMPHOBBY app.
Alt	Alternative source for Rotor Speed (RPM) (Pre-ExpressLRS 3.5.5)	Rotor Speed in [1/min]. Rename the sensor to “NR” or “RPM”. Change units from m to RPM.
Hdg	Alternative source for ESC MOSFET Temperature (°C) (Pre-ExpressLRS 3.5.5)	ESC MOSFET temperature in [°C]. Rename the sensor to “Tmp”. Change units from ° to °C. Change precision from 0.00 to 0.--

Pre-Made Model Memories for EdgeTX and ExpressLRS

General Information

OMPHOBBY offers a pre-configured model memory for EdgeTX transmitters using ExpressLRS. It is available for both Monochrome (Pocket, Zorro, Boxer…) and ColorLCD (TX15, TX16S…) transmitters and can be found on omphobby.com under Tech Support -> Radio Files, titled "OMPHOBBY_OFS3_EdgeTX_Model_Files_R#", where R# is the revision.

⚠ **The information here is summarized. A comprehensive documentation of the model file's features and requirements can be found in the file called README_OFS3_Model_Files_R#.txt. It is imperative that you READ and UNDERSTAND this document before using the provided model file.** ⚠

System Requirements

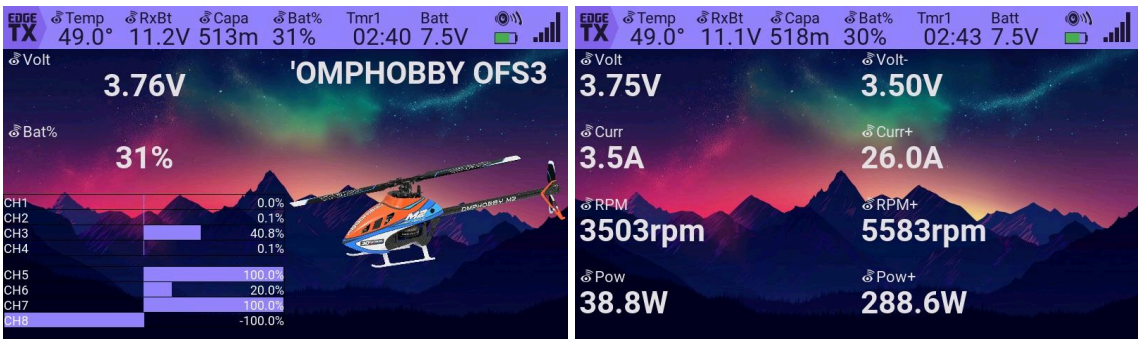
Ensure these requirements are met. Failure to do so will lead to the setup not working correctly, such as constant telemetry warnings, missing telemetry items, etc.

OFS3(+) Version	17.17 or later
Transmitter Models	EdgeTX Color LCD or Monochrome ExpressLRS Transmitter
Radio Module Type	ExpressLRS (NOT compatible w/ S.BUS, F.Port, SRXL2 or DSM)
EdgeTX Version	EdgeTX 2.11.2 or later
ExpressLRS Version	ExpressLRS 3.5.6 or later

Features

- One model memory can be used for any and all OFS3(+) models, no copies required
- Easy switch remapping through **Inputs** page
- Comes with model images for several OFS3(+) equipped models
- Full telemetry with multiple useful telemetry screens and warnings already set up
- Proportional throttle and Software Throttle Special Mode supported
- Attitude Mode and Rescue Mode supported by default
- Automatic telemetry and timer reset on model power on, no manual reset required
- Talking switches set up by default

Screenshots

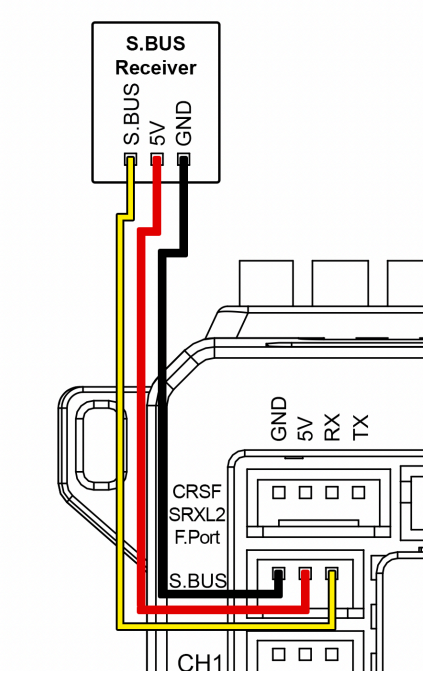


S.BUS

OFS3 supports the S.BUS receiver communication protocol, which is used by a variety of receivers and brands. S.BUS does not support telemetry return.

S.BUS Connection

The adjacent diagram illustrates the connection of a receiver outputting S.BUS to OFS3. OMPHOBBY part number OSHM2076 can be used for receiver connection.



Receiver	OSHM2076	Purpose
S.BUS GND	Black	Power Delivery GND
S.BUS 5 V	Red	Power Delivery VCC
S.BUS ⎍	Yellow	Control Signals

The S.BUS port provides output from a stabilized 5 V rail, which is a common working voltage for S.BUS type receivers. Verify that your receiver supports 5 V before powering it up through OFS3 for the first time. The connector type used is JST-MX 1.25mm 3-pin, but is also compatible with Picoblade connectors.

S.BUS Channel Mapping and Ranging

This table applies to most common transmitter systems using S.BUS receivers, either natively or through a MULTI-Module. Futaba transmitters, as well as other transmitters using Futaba's narrow channel ranging, must extend all channel ranges to 119%, or toggle S.BUS Range in 🎮 **Control Link** from "Wide" to "Futaba" in the OMPHOBBY app.

S.BUS Mode Wide: 1500us/1520us ±512us
S.BUS Mode Futaba: 1500us/1520us ±410us

Ch.	Function	Transmitter % Range	EdgeTX PWM (µs)	S.BUS Rx Raw Signal
1	Aileron	−100% / 0% / +100%	988 / 1500 / 2012	1690 / 1020 / 350
2	Elevator	−100% / 0% / +100%	988 / 1500 / 2012	1690 / 1020 / 350
3	Throttle	−100% – +100%, ⇧+125%	988 / 1500 / ⇧2268	1690 / 1020 / 350
4	Rudder	−100% / 0% / +100%	988 / 1500 / 2012	1690 / 1020 / 350
5	Attitude / 3D Rescue Mode	−100% – −57% Att/Resq −56.0% – +100% 3D	988 – 1212 Att/Resq 1213 – 2012 3D	1690 – 1396 Att/Resq 1395 – 350 3D
6	Collective	−100% / 0% / +100%	988 / 1500 / 2012	1690 / 1020 / 350
7	Software RPM (If enabled, see Software Throttle)	−100% – −33.5% RPM 1 −33% – +36.5% RPM 2 +37% – +100% RPM 3	988 – 1329 RPM1 1330 – 1688 RPM2 1689 – 2012 RPM3	1690 – 1244 RPM1 1243 – 773 RPM2 772 – 350 RPM3

S.BUS with VBar Control Telemetry

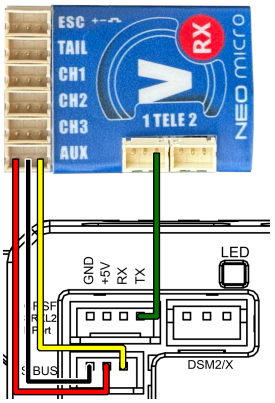
⚠ As of the editorial deadline of this user guide revision, the latest update for VBar Control has broken support for OFS3, which leads to the motor shutting off in flight with negative collective. It is strongly advised to not use a VBar Control Radio with OFS3 until the manufacturer fixes this issue. Other radio systems are not affected. ⚠

OFS3 supports telemetry through the VBar Telemetry protocol when using a VBar Control Radio and a VBar RX-Only Receiver via S.BUS.

Physical Connection

OFS3 outputs VBar Control Telemetry through the TX Pin of the CRSF/SRXL2/F.Port connector when a valid S.BUS signal is detected and VBar Control Telemetry is enabled in the OMPHOBBY app (see below). Subsequently, the aforementioned TX pin must be connected to the TELE port of a compatible VBar receiver, as shown in the adjacent diagram. The S.BUS connection remains unchanged.

OFS3	Receiver	Purpose
SBUS GND	AUX GND	Power Delivery GND
SBUS 5 V	AUX 5 V	Power Delivery VCC
SBUS ⎍	AUX ⎍	Control Signal
CRSF TX	TELE ⎍	Telemetry Return

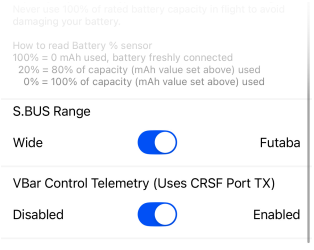


Transmitter Setup

At the time of the editorial deadline of this revision of the OFS3 User Guide, Mikado's transmitter setup for OFS3, as delivered with VBar Control, does not conform to OFS3's requirements and does not produce satisfactory control resolution, mapping and flight feel. Users of VBar Control transmitters are therefore strongly advised to download the official OFS3 VBar Control Setup from **omphobby.com** under Support → Radio Files to obtain full functionality and control resolution.

Enabling Telemetry

VBar Control Telemetry is disabled by default and must be enabled if users intend to use it. The option for this can be found in the OMPHOBBY app under **🎮 Control Link**. Please note that for VBar Control, the S.BUS Range option must be set to "Futaba" to achieve proper control throws.



Limitations

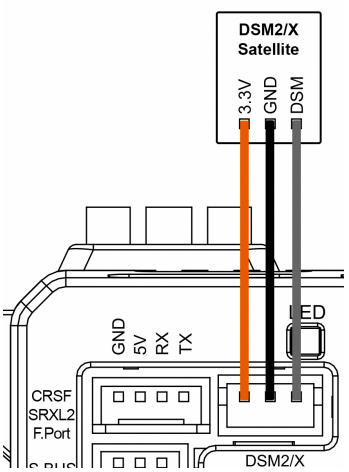
VBar Control Telemetry should remain disabled if not absolutely needed, as the same USART is used for receiving the SBUS signal and sending telemetry packets. As sending VBar telemetry packets is a relatively lengthy process, this leads to OFS3 missing a receiver frame whenever a telemetry packet is sent, which occurs approximately every 30 receiver packets when set to 5ms update rate. It is recommended to disable VBar Control Telemetry when using S.BUS without the explicit need for the feature.

Spektrum DSM2 / DSMX and SRXL2

OFS3 supports Spektrum receivers, both DSM and SRXL2. DSM2 and DSMX do not support telemetry return. SRXL2 supports partial telemetry return of the most important flight parameters. The older SRXL protocol is not supported.

DSM2/DSMX Physical Connection

OFS3 can be used with Spektrum DSM2 and DSMX satellite receivers, which must be bound externally before connecting to OFS3. DSM receivers should be connected as shown in the adjacent diagram. OMPHOBBY part number OSHM2074 can be used for receiver connection.



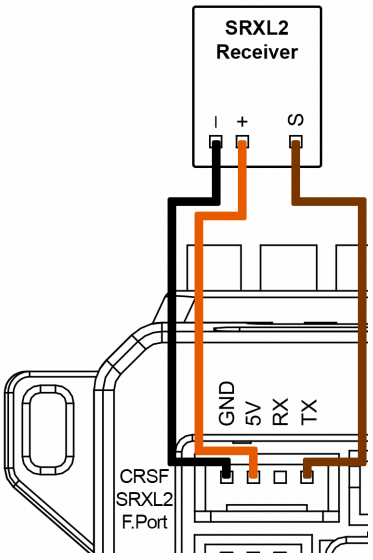
Receiver	OSHM2074	Purpose
DSM 3.3 V	Orange	Power Delivery VCC
DSM GND	Black	Power Delivery GND
DSM ⎍	Gray	Control Signal

The DSM port provides output from a stabilized 3.3 V rail, which is a common working voltage for DSM receivers. Verify that your receiver supports 3.3 V before powering it up through OFS3 for the first time. The connector type is JST-ZH 3-pin.

If using a DSM satellite without an integrated bind button, the satellite must be bound using a separate receiver to the transmitter before it can be used with the flight controller.

SRXL2 Physical Connection

OFS3 can be used with SRXL2 receivers. SRXL2 receivers should be connected as shown in the adjacent diagram. OMPHOBBY part number OSHM2368 can be used for receiver connection. Note that if you decide to create your own connection cable, the signal pin S of the receiver needs to be connected to TX of the CRSF/SRXL2/F.Port port.



Receiver	OSHM2368	Purpose
5 V	Orange	Power Delivery VCC
GND	Black	Power Delivery GND
S	Brown	Control Signal, Telemetry

The CRSF/SRXL2/F.Port port provides output from a stabilized 5 V rail, which is a common working voltage for SRXL2 receivers. Verify that your receiver supports 5 V before powering it up through OFS3 for the first time. The connector type is JST-MX 4-pin, but Molex Picoblade is also compatible.

DSM / SRXL2 Channel Mapping and Ranging

The following table applies to both DSM and SRXL2 protocols. Both receiver types can be bound to the same model memory, and will work interchangeably for flight control, with the difference of telemetry.

Setting DSMX 11ms or Hybrid 11ms/22ms is recommended for maximum resolution and lowest latency.

Note that 4-in-1 MULTI-Modules automatically convert the control channel order from the transmitter's default, e.g. AETR for EdgeTX, to the protocol's order, in DSM's case TAER.

Ch	Function	Transmitter % Range	EdgeTX PWM (µs)	Rx Output PWM (µs)
1 Thro	Throttle	−100% – +100%, ⇧+125%	988 / 1500 / 2268	1160 / 1500 / 1840
2 Aile	Aileron	−100% / 0% / +100%	988 / 1500 / 2012	1160 / 1500 / 1840
3 Elev	Elevator	−100% / 0% / +100%	988 / 1500 / 2012	1160 / 1500 / 1840
4 Rudd	Rudder	−100% / 0% / +100%	988 / 1500 / 2012	1160 / 1500 / 1840
5 Gear	Attitude / 3D Rescue Mode	−100% – −57% Atti/Resq −56.0% – +100% 3D	988 – 1212 Atti/Resq 1213 – 2012 3D	1160 – 1308 Atti/Resq 1309 – 1840 3D
6 Pitch	Collective	−100% / 0% / +100%	988 / 1500 / 2012	1160 / 1500 / 1840
7 Aux2	Software RPM (If enabled, see Software Throttle)	−100% – −33.5% RPM 1 −33% – +36.5% RPM 2 +37% – +100% RPM 3	988 – 1329 RPM1 1330 – 1688 RPM2 1689 – 2012 RPM3	1160 – 1386 RPM1 1388 – 1624 RPM2 1626 – 1840 RPM3

SRXL2 Telemetry Sensors

OFS3 supports a variety of Spektrum X-Bus telemetry sensors. The following table outlines their functions:

Sensor	Item	Function	Note
ESC	RPM	Main Rotor RPM	
ESC	Voltage	Battery Voltage	
ESC	Current	ESC Current	
ESC	Throttle %	ESC Throttle %	
Flight Pack	Consumption	Battery Consumption	
Flight Pack	Current	ESC Current	
Attitude	Roll/Pitch/Yaw	AHRS Data	Not all transmitters will display the data reported by this sensor.

FrSky F.Port

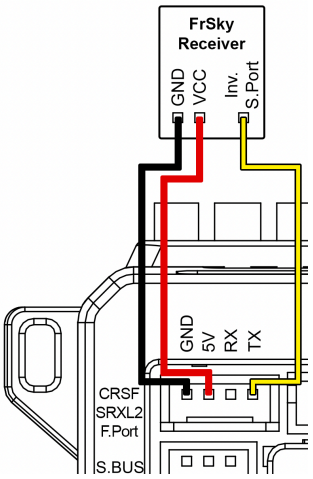
OFS3 supports the FrSky F.Port receiver protocol. F.Port supports full telemetry return on both FrSky and MULTI-Module (CC2500 and 4-in-1) transmitters. Note that FBUS and S.Port are not currently supported.

F.Port Limitations

OFS3 only supports use of the Inverted F.Port protocol. Certain FrSky receivers support Inverted F.Port, either by way of an alternative firmware, a dedicated inverted solderpad, or on certain newer FrSky receivers, a toggle in the receiver settings menu. Please consult the instruction manual of your specific receiver for further information.

F.Port Physical Connection

F.Port requires a connection between the TX pin of the CRSF/SRXL2/F.Port port on the OFS3 flight controller and a corresponding receiver. The connector type is JST-MX 1.25mm, but is also compatible with Picoblade 4-pin. A pre-made cable can be purchased under part number OSHM2133. As the RX pin of the CRSF/SRXL2/F.Port port is not used for F.Port, the green wire of OSHM2133 should be de-pinned. Refer to the adjacent diagram for correct connection.

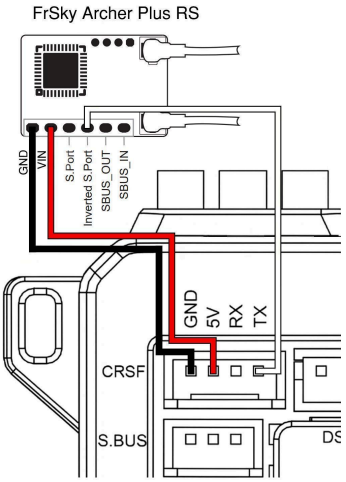


Receiver	OFS3	OSHM2133	Purpose
GND	GND	Black	Power Delivery
5V	5V	Red	Power Delivery
Inv. F.Port	TX	White	Control/Telem Signal

F.Port Receiver Specific Tips

Archer Plus RS (Ethos or MULTI-Module CC2500/4-in-1)

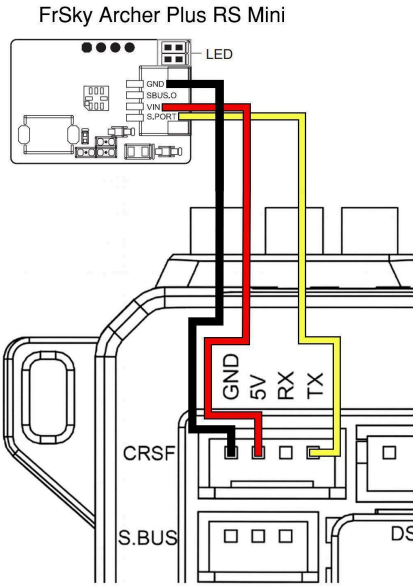
The Archer Plus RS can be used with both FrSky Ethos transmitters, as well as MULTI-Module CC2500/4-in-1 transmitters. This receiver requires the end user to solder on a connector, for which OSHM2133 can be used as described previously. Note that the Archer Plus RS must be flashed with a dedicated F.Port firmware from the FrSky website for use with MULTI-Modules (CC2500/4-in-1).



Receiver	OFS3	OSHM2133	Purpose
GND	GND	Black	Power Delivery
VIN	5V	Red	Power Delivery
Inv. S.Port	TX	White	Control/Telemetry Signal

Archer Plus RS Mini (Ethos Transmitters only)

The Archer Plus RS Mini receiver includes a pre-made cable for SBUS connection to OFS3 or OFS2. Using the connector housing from OSHM2133, this cable can be easily reconfigured for F.Port connection with OFS3 by re-pinning the wires into the connector housing of OSHM2133 in the order shown in the adjacent diagram. Pay attention to the correct orientation of the crimp terminals when inserting them into the housing.



Receiver	OFS3	Purpose
GND	GND	Power Delivery
SBUS.O	N/A	Not Connected
VIN	5V	Power Delivery
S.PORT	TX	Control/Telemetry Signal

Once the Archer Plus RS Mini is connected to OFS3, power it up, bind it if required, and enter the receiver options on an Ethos transmitter. Here you will need to change the telemetry port mode from S.Port to F.Port, and enable “Bus invert”. This feature requires Ethos 1.6.2 or above.

F.Port Channel Mapping and Ranging

Ch	Control Function	PWM (Min / Center / Max)	Output HIGH when..
1	Aileron	988 µs / 1500 µs / 2012 µs	Rolling Right ↷
2	Elevator	988 µs / 1500 µs / 2012 µs	Pitching Forward ↑
3	Throttle / Motor Switch	988 µs – 2012 µs, ⇧2140 µs	RPM is high
4	Rudder	988 µs / 1500 µs / 2012 µs	Yawing Clockwise ↷
5	Attitude / 3D Mode Rescue Mode	988 µs – 1212 µs Attitude/Rescue 1213 µs – 2012 µs 3D	Flight Mode is 3D
6	Collective	988 µs / 1500 µs / 2012 µs	Collective Up ⇧
7	Software RPM (If enabled, see Software Throttle)	988 µs – 1329 µs RPM1 1330 µs – 1688 µs RPM2 1689 µs – 2012 µs RPM3	RPM 3 is Selected

F.Port Telemetry Sensors

OFS3 supports a variety of F.Port telemetry sensors, which deliver useful information about the state of the model to the pilot. Refer to the table below for proper usage.

To discover these sensors in Ethos, the following steps are necessary:

1. Ensure the model is powered off.
2. Open the “Telemetry” tab in Model Settings.
3. Under “Discover new sensors”, switch the toggle to ON
4. Power up the model, wait for connection.
5. Observe the sensor list populating.
6. Once no new sensors are being discovered anymore, toggle the switch OFF
7. Set up your telemetry screens and warnings as desired and required.

To discover these sensors in EdgeTX with a MULTI-Module (CC2500/4-in-1), the following steps are necessary:

1. Ensure the model is powered off.
2. Open the “Telemetry” tab in Model Settings.
3. Under “Sensors”, click the “Discover new” button.
4. Power up the model, wait for connection.
5. Observe the sensor list populating.
6. Once no new sensors are being discovered anymore, click the “Stop” button.
7. Set up your telemetry screens and warnings as desired and required.

FrSky Sensor	EdgeTX Sensor	Function	Note
RxBatt	**RxBt**	Receiver Voltage (V)	Displays receiver supply voltage.
ESC Current	**EscA**	Battery Current (A)	Displays battery current.
ESC consumption	**Capa**	Used Capacity (mAh)	Displays total used capacity since power-on.
RPM	**RPM**	Rotor Speed (RPM)	Rotor Speed in [1/min].
ESC temp	**EscT**	ESC Temperature (°C)	ESC MOSFET temperature in degrees Celsius.
ADC4	**A4**	Average Cell Voltage (V)	Calculated from Battery Voltage, Volt=RxBt/3 (M2), RxBt/2 (M1)
P.angle	**Ptch**	Pitch Attitude (deg)	Default unit is °.
R.angle	**Roll**	Roll Attitude (deg)	Default unit is °.
GPS course	**Hdg**	Yaw Attitude (deg)	Default unit is °. Init heading is 180°
ESC RPM	**EscR**	Mag. field RPM (1/min)	Not needed for normal operation.
ESC voltage	**EscV**	Battery Voltage (V)	Displays total battery voltage.
FUEL	**Fuel**	Battery Level (%)	Percentage calculated from capacity set in OMPHOBBY app

Receiver Failsafe

OFS3 includes a sophisticated protection mode against various forms of loss of signal between the transmitter and the flight controller. All receiver protocols supported by OFS3 support failsafe capabilities. This failsafe mode applies to:

- Loss of control link between transmitter and receiver
- Loss of signal between receiver and OFS3
- Loss of physical connection between receiver and OFS3
- Any other reason the signal provider might indicate a failsafe state to OFS3

The time between loss of signal and indicating the failsafe state can vary from protocol to protocol. The failsafe sequence for all protocols consists of the following two steps, and is started once OFS3 receives information about the failsafe state:

Phase 1

- Hold the last control and throttle command (1000 milliseconds, 1.0 second)

Phase 2

- Center all controls to minimize aircraft energy (until signal returns)
- Shut off motor, enable throttle protection (indefinitely, until explicit user action)

Should the signal return and the failsafe state be cleared within the time window of step 1, the model will continue flying as normal, with all controls recovered and the motor continuing to run at the previously set governor speed.

Should the signal only return after more than 1000 ms of signal loss, after which OFS3 will have entered phase 2 (indicated by LED1 and LED2 blinking in parallel, also see Status Indicator LED Codes), OFS3 will enter a throttle protection mode, and subsequently shut off the motor. In such a case, the pilot will only regain immediate control of the aircraft's swashplate controls (collective and cyclic pitch) and can then, depending on the situation, attempt to perform an emergency autorotation to the ground, or attempt to restart the motor, if the model is still at a sufficient altitude.

In order to restart the motor from the throttle protection mode, the throttle channel needs to be returned to the motor OFF position to clear the protection flag, before being returned to FLIGHT throttle. This is intended to prevent an inadvertent motor startup of the model after it may have already crashed due to a prolonged loss of signal without recovery in the air.

Chapter 3 - OFS3 Setup and Features

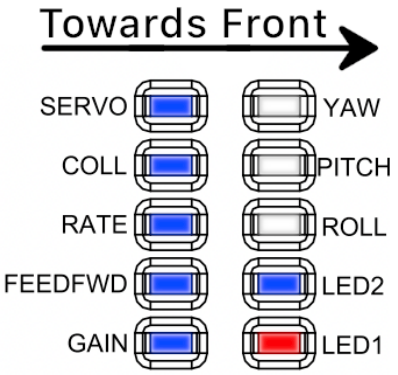
Flight Controller Setup

OFS3 requires a valid receiver signal to successfully initialize. Refer to the receiver connection chapter for more information. Flying or entering setup mode before the flight controller is fully initialized is not possible. The flight controller requires battery power in order to power up, change settings and fly. Please ensure that the connected battery is charged to an appropriate level at all times to supply sufficient voltage to the flight controller.

Configuration of the flight controller can be performed in button mode or with the OMPHOBBY mobile application with Bluetooth® module.

Flight Controller LEDs

OFS3 provides an array of ten LEDs for simplified setup purposes, allowing the user to adjust the most important functions of the flight controller without the use of the BT dongle and smartphone app. The LED array is shown on the right, and is divided into a parameter row (left) and a status row (right) the parameter or status behind each LED is listed in the following table. The name of some of the setup items has been adjusted from previous generations of OFS, their legacy designations are also listed in the table.



Setup Mode LED Descriptions

Item	Description	Legacy Designation
SERVO	Servo Centering Mode	SERVO
COLL	Collective Endpoints Adjustment	PITCH
RATE	Rotation Rate Adjustment	SPEED
FEEDFWD	Feedforward Adjustment	AGILE
GAIN	Control Loop Sensitivity Adjustment	GYRO
YAW	Yaw Axis Adjustment Group	RUDD
PITCH	Pitch Axis Adjustment Group	ELEV
ROLL	Roll Axis Adjustment Group	AILE
LED1	Status Indicator LED 1	LED
LED2	Status Indicator LED 2	LED

Status Indicator LED Codes

OFS3 uses two status indicator LEDs to display useful information to the user. LED 1 is **RED**, LED 2 is **BLUE**. Their location in the array is shown under Flight Controller LEDs.

State	LED 1 and LED 2	Message
Before Init	LED 1 ON LED 2 Flashing Rapidly	No valid receiver signal detected Rate controls not centered
Before Init	LED 1 & LED 2 Flashing synchronously	Throttle Channel High
Before Init	LED 1 & LED 2 Flashing 180° out of phase	ESC Telemetry Init Failure Maintenance Action Required!
After Init	LED 1 & LED 2 Flashing synchronously	Receiver Failsafe Throttle Protection
After Init	LED 1 Flashing Slowly LED 2 ON	Flight Mode, 3D
After Init	LED 1 ON LED 2 ON	Flight Mode, Attitude
After Init	LED 1 ON LED 2 Flashing Slowly	Attitude Calibration Mode IMU Static Calibration in Progress
After Init	LED 1 OFF LED 2 OFF	Setup Mode
Anytime	All LEDs ON	Bootloader Mode (Reboot required to exit)

Battery Voltage Indication

After initialization, the flight controller uses the parameter row of LEDs to show a **voltage based estimate** of the battery level for the pilot to validate whether it is safe to take off with the current battery level. Note that this indication is only intended as a helpful reference and cannot replace a proper battery voltage checker or telemetry! Battery voltage can change with load and with ambient conditions. Proceed with proper caution. The table below outlines the voltage levels on M1 and M2 series helis.

LEDs lit	Battery Voltage M1	Battery Voltage M2	Individual Cell Voltage
5	8.7 V – 8.2 V	13.0 V – 12.3 V	4.35 V – 4.10 V
4	8.1 V – 7.8 V	12.2 V – 11.8 V	4.06 V – 3.93 V
3	7.7 V – 7.6 V	11.7 V – 11.5 V	3.90 V – 3.83 V
2	7.5 V – 7.3 V	11.4 V – 11.2 V	3.80 V – 3.73 V
1	7.1 V - 6.0 V	11.1 V – 10.0 V	3.70 V – 3.0 V
1 Flashing	<6.2 V at any point in flight for 2 seconds	<10.0 V at any point in flight for 2 seconds	<3.1 V at any point in flight for 2 seconds (M1) <3.33 V at any point in flight for 2 seconds (M2)

Setup Mode (Button Based, no Smartphone Required)

Entering Setup Mode

1. Power on the transmitter.
2. Power on the model and wait for the flight controller to initialize.
3. Press and hold the **SET** button for 3 seconds to enter setup mode. The tail motor will emit a sequence of beeps to confirm successful setup mode entry.

The LEDs will change state and begin blinking according to the onboard LED menu once setup mode has been successfully entered. Changed settings will not be saved unless setup mode is explicitly exited through a long press of the **SET** button.

Changing a Setting Value

Short press the **SET** button until the desired setting LEDs are illuminated. The number of continuous flashes of the specific LED indicates the value, with the highest value being 9 and the lowest value being 1. The factory default value for all settings is 5 flashes. White LEDs specify the axis (if applicable), blue LEDs indicate the respective setting for the selected axis, as well as its current value.

To change the value, use your transmitter's elevator control.

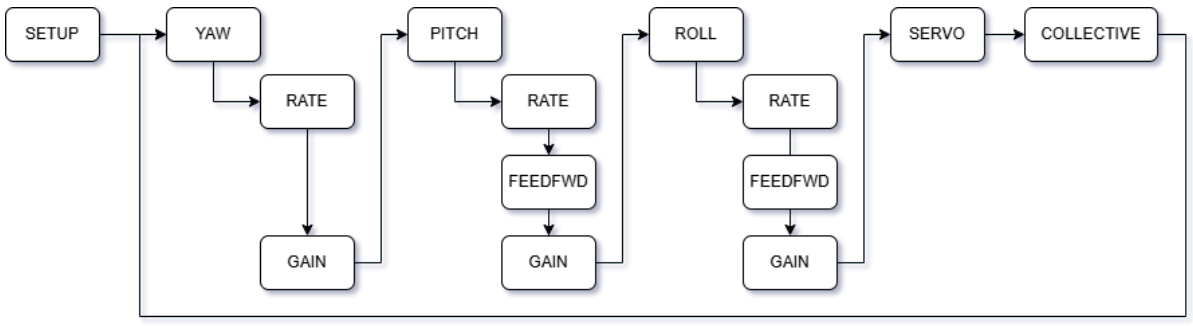
- Increase the value by pushing the stick forward briefly and returning to center.
- Decrease the value by pulling the stick back briefly and returning to center.

Saving Setting Changes

Press and hold the SET button while in any menu point until the flight controller exits back to flight mode, which will be confirmed by the tail motor emitting a sequence of beeps. This will save all changes made since entering the menu.

Navigating OFS3

When moving through OFS3's onboard LED menu, menu items will activate in the order of the following flow chart. Once the end of the chart is reached, OFS3 will loop around to the first item. The menu can be exited at any point through a long press of the **SET** button with all previously adjusted parameters saved.



Rate, Feedforward, and Gain Settings

The Rate, Feedforward, and Gain can be adjusted for the Yaw, Pitch, and Roll axes via the LEDs on the flight controller. These are the same basic adjustments also found on earlier OFS versions, allowing the pilot to easily tune the model's behavior.

Adjustments can be made directly on the flight controller without any additional tools or interfaces required, through an array of ten LEDs. For a given parameter, the number of continuous LED flashes indicates the value, with the highest being 9 and the lowest being 1. The factory default value for all settings is 5 continuous flashes.

RATE adjusts the absolute maximum rotation rate of the model for a given stick input, as long as the model is able to achieve the requested rate.

- Higher numbers of flashes increase the rotation rate for a given input.
- Lower numbers of flashes decrease the rotation rate for a given input.

FEEDFWD adjusts how much cyclic stick command is passed directly to the swashplate without any control loop interaction, which is used to tune the acceleration and stopping behavior of the model on any cyclic stick command.

- Higher numbers of flashes increase the feedforward, making the model more aggressive, but may also lead to strike-back after a stop.
- Lower numbers of flashes decrease the feedforward, making the model gentler in its reaction, but may also lead to creep after a stop.

GAIN adjusts the overall sensitivity of the control loop's P, I, and D terms in equal proportions. This is used to tune the overall stability of the model.

- Higher numbers of flashes increase the gain, making the model more stable, allowing it to follow control inputs more precisely and reject disturbances like wind better, but may lead to wobbling and oscillation if set too high.
- Lower numbers of flashes decrease gain, making the model less stable, shifting the control feel towards more fluid and smooth, but may lead to the model not following the stick command as precisely if set too low.

For deeper adjustments, such as free tuning of expert parameters like individual P, I, D, and F gains, control deadbands, servo travel limits and reverses, vibration filtering, TALY gains and more, the Bluetooth® module in combination with the OMPHOBBY smartphone app for iOS and Android is required. The default expert parameters are equivalent to all LEDs being set to 5 flashes.

When changing rates and feedforward through the LED menu, the changes are reflected in the higher-resolution Expert settings in the app. Respectively, settings made to rates and feedforward in the app are reflected in the LED menu.

Gain setting changes are separate between Basic and Expert mode, and can be toggled in the app.

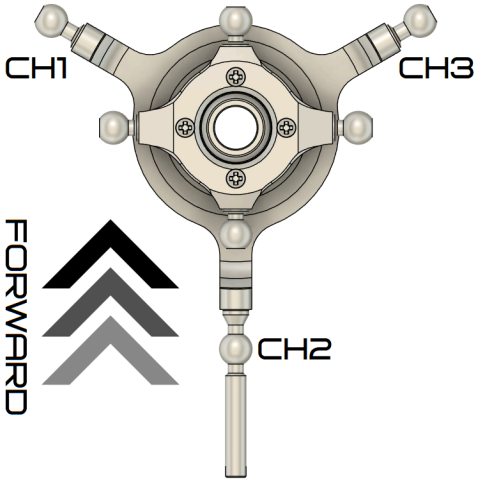
SERVO Settings

The SERVO menu allows the user to fine-tune their servo centering, as might be necessary after replacing a servo arm or servo after sustaining damage from a collision with terrain.

Once the SERVO menu is entered, the transmitter control axes will each be assigned to a servo for fine-tuning its center. The servo centers can then be modified by moving the respective control axis as specified in the table below.

Alternatively, servo centers can be modified numerically using the OMPHOBBY app.

When centering servos, the motor is disabled when in servo centering mode. The model cannot be flown until servo centering mode is exited through the app again, or the model is rebooted entirely.



Servo	Stick Axis	Servo Up	Servo Down
CH1	AILE	Left	Right
CH2	ELEV	Forward	Backwards
CH3	RUDD	Right	Left

COLLECTIVE Settings

The COLL menu allows the user to individually adjust the magnitude of the positive and negative collective pitch of the model's rotor blades. This adjusts the total amount of rotor thrust that can be generated at a given RPM, in turn adjusting the total lift of the model, and how aggressively it responds to collective inputs.

In the COLL menu, the collective transmitter control works as usual, with the elevator control modifying the respective positive or negative endpoint the collective stick is set to. Adjusting one endpoint does not affect the other. Adjusting either endpoint does not affect the servo centers or zero collective.

Alternatively, the collective pitch endpoints can be adjusted numerically through the OMPHOBBY app.

Endpoint	Collective Stick	Elevator Forward	Elevator Backwards
Positive	High	Increase Positive Coll.	Decrease Positive Coll.
Negative	Low	Increase Negative Coll.	Decrease Negative Coll.

Additional Functionality

Flight Controller Tuning Parameter Reset

OFS3 supports tuning parameter reset. This reset does neither reset servo settings or collective adjustments, nor the selection of Software Throttle mode and output adjustments – it only affects parameters directly related to the flight control loops and will return them to factory defaults, both for the LED menu and app-adjusted expert parameters.

To reset the flight controller, wait for it to initialize into flight mode, then press the SET button five times (5x) in rapid succession. A bar of 5 LEDs will flash three times (3x) and the tail motor will emit a sound to confirm the reset.

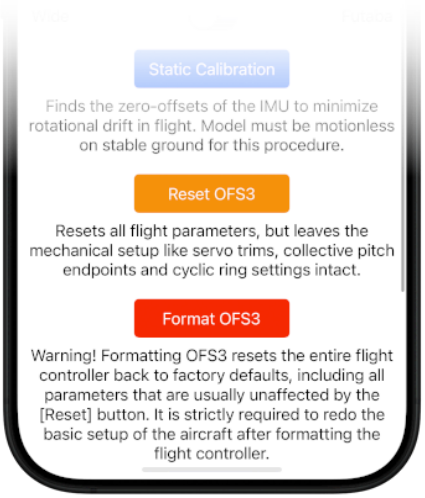
Alternatively, 🛠️ **Maintenance** in the OMPHOBBY app holds a **Reset OFS3** button, which accomplishes the same parameter reset. (See screenshot below.)

Formatting OFS3 to Factory Defaults

OFS3 supports formatting the entire flight controller back to factory defaults. This will reset every flight parameter, mechanical parameter, Attitude Mode trim and the static calibration offset back to default for a given firmware. This can be useful for troubleshooting, resetting an aircraft with suboptimal mechanical adjustments, or simply getting back to a clean-slate starting point for advanced users.

⚠ **When formatting OFS3, it is strictly required to redo the basic mechanical setup of the aircraft. The aircraft is not flyable immediately after formatting OFS3, as servo centers are reset to 0. Formatting OFS3 is a permanent action which cannot be undone.** ⚠

The factory reset option is only available through the OMPHOBBY app. It can be found at the bottom of the 🛠️ **Maintenance** page, titled **Format OFS3**. Carefully read the warning below the button before proceeding. For instructions on how to connect to the OMPHOBBY app, see Bluetooth® Configuration.



Lost Model Beeper

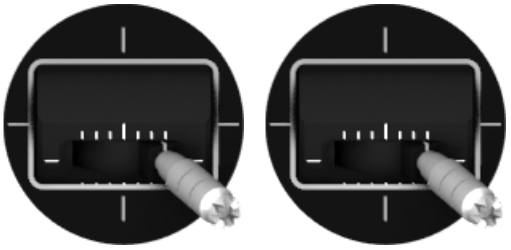
OFS3's tail motor ESC supports a beeper functionality to help with locating a lost model. It will be initiated after 10 minutes of the tail ESC receiving a continuous OFF throttle signal from the flight controller, with the battery connected uninterruptedly. Switching on the motor for any amount of time resets the 10-minute timeout until it is shut off again, and aborts any currently running beeper operation. Servo or control movements have no effect on the beeper timeout. The model is safe to start up and fly from an active beeper state.

IMU Static Calibration

OFS3 uses a next generation Inertial Measurement Unit (IMU), which, unlike traditional flight controllers, does not require gyroscope calibration upon power up for regular flight (it is required when used with rescue). This is achieved by factory-calibration and advanced drift compensation methods, which account for varying environmental conditions.

In the rare case of drift occurring in flight, both in 3D Mode as well as after yaw movements in Attitude Mode, the user can easily and quickly redo the static calibration of the IMU. For this procedure, the motor must be fully switched **off**, and the model must be placed on a solid, stable surface. This surface isn't required to be level, as the calibration only finds the zero-offsets for the rate gyroscopes and does not affect the accelerometers. For calibration of the accelerometer for Attitude Mode, see Attitude Mode Calibration.

To initiate the calibration, hold **both sticks in their bottom right-hand corners on your transmitter**, until the LED pattern changes as described under Status Indicator LED Codes, and the main motor starts beeping. Should you fly a non-standard channel direction, the required control input corresponds to:



- Negative Collective,
- Clockwise Yaw,
- Backwards Elevator,
- Right Roll.

All channel outputs must be beyond ± 90%.

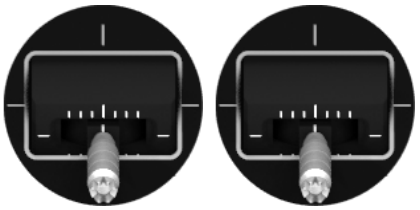
The main motor will continuously beep during the procedure. Once calibration is successfully finished, the tail motor will confirm exiting the procedure by playing a beep sequence once, and the LED pattern will return back to flight mode. The model has now stored the new calibration data and can be flown immediately to validate the result of the calibration.

Should OFS3 not find successful calibration values within 15 seconds, e.g. if the model is unsteady on the surface, shaken by wind or otherwise moved, OFS3 will consider the procedure failed and exit static calibration mode without making any changes to the configuration. Failure is indicated by the tail motor playing the beep sequence twice. It is recommended to then steady the model, and reattempt calibration.

If Rescue Mode (⚠ Experimental Feature ⚠) is enabled, static calibration is forced on every power-up of the model to improve rescue horizon tracking. The model then needs to be set down for initialization, and will only unlock the controls once the IMU static calibration is successfully completed. The previously mentioned failure state does not exist in this particular case, instead, OFS3 will try calibrating the IMU indefinitely until the model stops moving and a converging solution is found for all three axes.

Attitude Mode Calibration

In Attitude Mode, the model will always return to level once the cyclic controls are released. To achieve this, OFS3 aligns the model's pitch and roll orientations with the local gravity vector of the Earth, intending to provide a reproducible level attitude. While this is not a position hold mode, minimizing lateral drift of the model in this mode can be desirable for the user, especially since the **Attitude Mode reference is also used for Rescue Mode.** As each and every helicopter is unique and local conditions can vary, OFS3 provides a procedure to fine-tune the Attitude Mode's reference orientation. **It is recommended to perform an IMU Static Calibration before calibrating Attitude Mode.**



To enter Attitude Mode calibration, the flight controller must be in Attitude Mode and the motor must be OFF. **Move the collective to full negative and elevator fully backwards, both channel outputs must be beyond -90%,** and hold them for about 3 seconds until the LED pattern changes as described under Status Indicator LED Codes. The tail motor confirms entering calibration mode through a single beep sequence.

The model is now in attitude calibration mode, its flight characteristics are different to regular Attitude Mode, and the model needs to be flown accordingly:

- The model will still self-level, the effect of cyclic control is severely reduced.
- The cyclic stick now permanently trims the model's attitude in 3D space instead of only changing the model's attitude temporarily.
- If a control input is given into any particular direction, the level attitude of the model will permanently shift in this direction, and the model will remain in this new attitude, even if the cyclic stick is released. The length and magnitude of the control input determines the magnitude of the attitude change.

Flying in this mode is roughly similar to flying a model in 3D mode at drastically reduced rates. The pilot's objective is now to hold the model in a stable hover and adjust its attitude with small control inputs, until no more apparent drift in any direction is occurring. At this point, the model's dynamic equilibrium is found, where all lateral forces cancel out.

The pilot should now land vertically using only collective, without touching the cyclic controls any further, and shut off the motor so as to not change the model's attitude reference. Once the model has landed and the rotor has stopped, repeat the stick command used for entering calibration mode to save the calibration data and exit back to normal flight mode. The tail motor will confirm this with a beep sequence.

⚠ **Please note that even after successful attitude mode calibration, the swashplate may shift slightly into a random direction when switching between 3D mode and attitude mode. This is normal and expected. Do not misuse Attitude Mode Calibration in an attempt to level the swashplate. The model must only be trimmed in flight.** ⚠

Attitude Mode calibration cannot be reset directly. When trimming Attitude Mode, the model will always start out with the previous trim value, from which the new value will then be adjusted. If a complete reset of the Attitude Mode calibration is desired, OFS3 must be formatted. See Formatting OFS3 to Factory Defaults for more information.

Setting RPM by Throttle Percentage

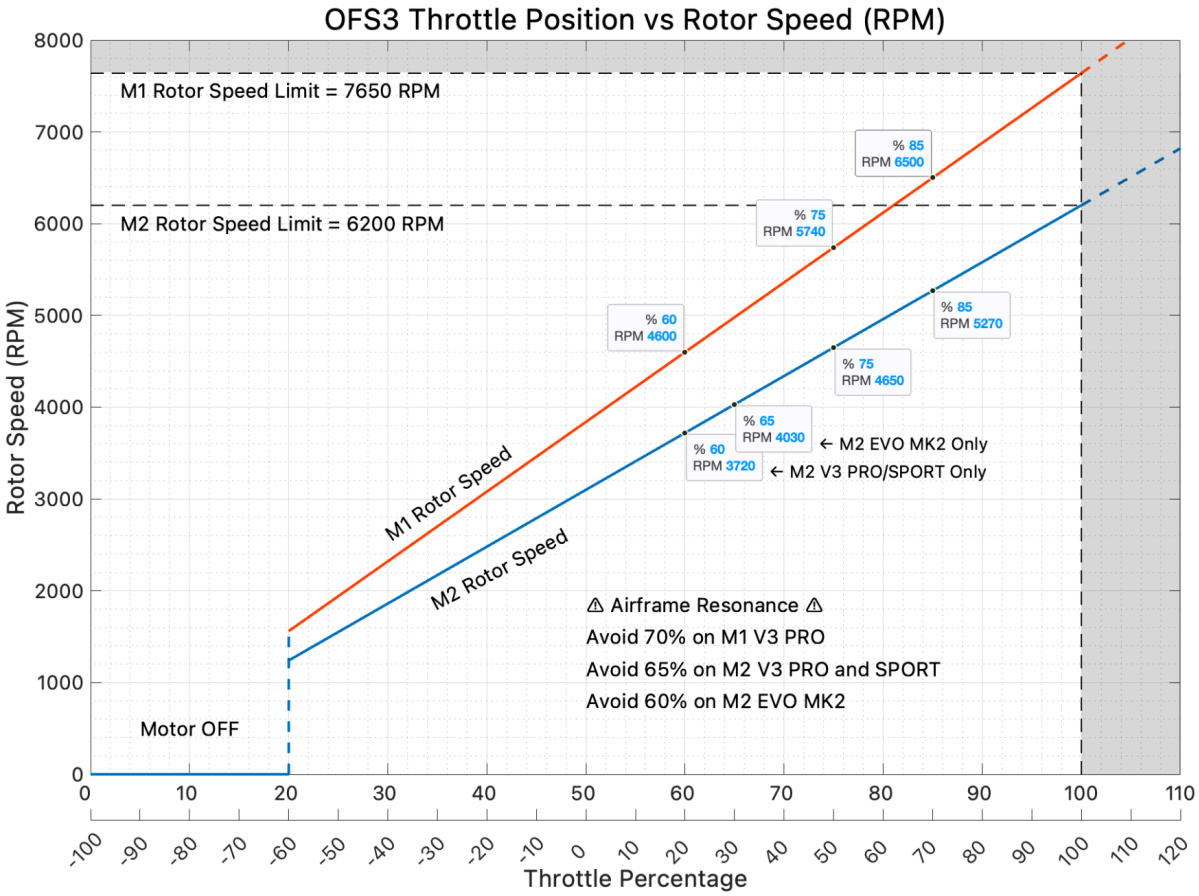
OFS3's fully integrated nature allows the user to precisely select RPM by setting a specific throttle percentage in the transmitter. Specific throttle mapping varies by helicopter. A 20% safe zone at the bottom of the range prevents accidental startup.

Shown below is the throttle mapping for the M1 and M2 series helis flight stack. In this example, the throttle is mapped to the range of the throttle channel in the range of 20% (-60%) to +100%, at a **maximum of 6200 RPM for M2, and 7650 RPM for M1**. The default rotor speeds for Software Throttle Special Mode are marked in the graph. Due to the linear nature of RPM vs. throttle, throttle values for specific rotor speeds can easily be calculated as per the following examples, showing 5400 RPM for M2, and 6000 RPM for M1:

$$\frac{Desired\ RPM}{MAX\ RPM} = Throttle \qquad M2: \frac{5400\ RPM}{6200\ RPM} * 100\% = 87\% \qquad M1: \frac{6000\ RPM}{7650\ RPM} * 100\% = 78\%$$

By setting the calculated percentage, the ESC will then govern the corresponding RPM. It is important to note that this approach only works if the throttle channel's 100% value corresponds to the receiver protocol's 100% PWM output, as otherwise, the transmitter's channel display may become mismatched with the chart below.

⚠ **The 100% speed is set to the maximum allowed continuous RPM of the model sold with OFS3. While the model can technically be set to continuously run higher rotor speeds by increasing throttle beyond 100%, this is not permitted or endorsed by OMPHOBBY, might lead to the destruction of the model, will void the product warranty and happens solely at the user's responsibility.** ⚠



Software Throttle Special Mode

Specifically for those users who wish to use more than one OFS3-equipped model with a single model memory, OFS3 offers a special mode called Software Throttle. This is disabled by default, and can be enabled through the OMPHOBBY app's 🎮 Control Link **tab**.

If enabled, **Channel 7 on DSM, F.Port, SRXL2 and S.BUS** or **Channel 8 on CRSF** will act as an RPM preset channel, while the usual throttle channel acts solely as a motor ON/OFF switch. The startup point is the same as in regular mode, therefore, a single model memory can be set up to use both throttle modes. By setting the RPM Preset channel to values -100, 0, and +100, each of the RPM presets can be selected, which can be customized in the OMPHOBBY app. The throttle values correspond to the graph under Setting RPM by Throttle Percentage in a total range of 0% to 125%.

An example of this mode's usefulness: A pilot may own an M2 EVO MK2 installed into a scale fuselage, and a stock M2 V3 PRO. The scale model requires much lower rotor speeds than the 3D model, which previously required different throttle outputs from the transmitter, meaning a switch of model memories before each flight.

Software Throttle removes the requirement to use throttle curves in the transmitter, as rotor speeds are directly set in the app. This allows the scale model to turn at a docile 3000, 3250, and 3500 RPM, while the 3D model can run high rotor speeds of e.g. 4800, 5100, and 5800 RPM, on the same model memory, without having to adjust throttle values to match. Additionally, control attributes like expo, rotation rates, collective pitch, and other flight parameters can also be adjusted in OFS3, individually for each model and independent of the transmitter's settings.

(Default) Proportional Throttle Mode

S.BUS/DSM	CRSF	Function	Range
Channel 3	Channel 6	Proportional Throttle	0% – 19% Motor OFF 20% – 100% Motor RPM
Channel 7	Channel 8	NONE	NONE

Software Throttle Mode

S.BUS/DSM	CRSF	Function	Range
Channel 3	Channel 6	Motor ON/OFF	0% – 19% Motor OFF 20% – 100% Motor FLY
Channel 7	Channel 8	RPM Presets	−100% – −34% RPM 1 −33% – +33% RPM 2 +34% – +100% RPM 3

byRPM Collective

OMPHOBBY helicopters are able to fly at a large variety of rotor speed settings, from very low speeds for gentle, efficient flight to very high speeds for extreme 3D maneuvers. Since rotor thrust increases with the square of the rotor speed, a significant thrust differential arises between the lowest and highest speeds a user may fly.

To address this, OFS3 features byRPM Collective, which linearly scales the collective pitch output automatically over a predefined rotor speed range, by a predefined amount. This feature is enabled by default for M1, and disabled by default for M2, but can be switched as desired in the OMPHOBBY app. byRPM Collective is programmed as per the following table:

Model	Start RPM	End RPM	Scale	Default State
M1	4500	7000	18.5% (0.185)	ON
M2	4000	6000	15.0% (0.15)	OFF

The interpolation between the start and end RPM is linear. The reduction is relative to the collective pitch value the user sets in the app, which can be observed when the motor is off.

⚠ **If you enable byRPM Collective on a model that was previously flown without it, you may need to adjust your collective pitch values to achieve the same flight performance as before. Conversion can be done by the following equation within the Start to End range of the feature, as specified above.** ⚠

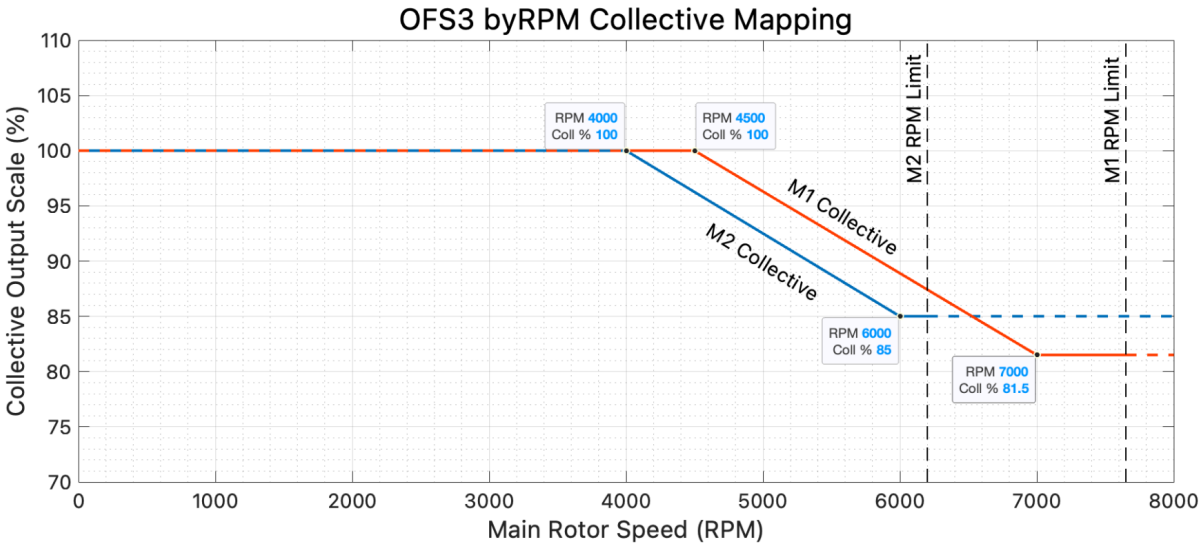
$$Collective_{new} = Collective_{old} * (1 + Scale * \frac{RPM_{Target} - RPM_{Start}}{RPM_{End} - RPM_{Start}})$$

Example: Before enabling byRPM Collective, a user was flying their M2 with Collective Max and Min set to 75 for positive and negative, at an RPM target of 5270 RPM. The new equivalent Collective Max and Min with byRPM Collective enabled calculate as follows:

$$Collective_{new} = 75 * (1 + 0.15 * \frac{5270\ RPM - 4000\ RPM}{6000\ RPM - 4000\ RPM}) = 82.14$$

Note that if your Max and Min differ, the calculation must be performed for each value.

The below graph visualizes the mapping of the feature. Note that the Y axis starts at 70%.



Rescue Mode (⚠ Experimental Feature ⚠)

OFS3 offers a fully-featured upset recovery mode (“Rescue Mode”), which, once triggered by the pilot, uses an auto-sequence to rapidly establish a positive rate of climb and return the aircraft to a safe attitude for the pilot to regain control. This is enabled by an advanced data fusion and state estimation algorithm, using all flight data available to OFS3, which can perform error-correction on the fly in any situation and therefore largely circumvents the limitations of the previously used algorithm.

Rescue Mode Limitations and Conditions

⚠ **OFS3’s Rescue Mode is an EXPERIMENTAL feature and is not intended for regular or safety-critical use at this stage**. **Rescue Mode is under active development, and its behavior, including auto-sequence logic, abort triggers and exit criteria, is subject to change. Rescue Mode may not yet perform as expected in all scenarios.** ⚠

Limitations and Conditions

- Rescue Mode **cannot and does not control or restrict horizontal movement** of the aircraft during or after the auto-sequence. The aircraft will **largely retain any horizontal momentum** it carries before activation of Rescue Mode.
- Rescue Mode will **always choose the quickest path to level**, which may include cross-axis rotation, and inverted leveling. **Yaw orientation** at the end of the auto-sequence **is not controlled or predictable.**
- **Rescue Mode uses the Attitude Mode reference** established through Attitude Mode Calibration. **Calibrate Attitude Mode before using Rescue Mode.**
- **Never limit any control throws in the transmitter.** OFS3’s Rescue Mode relies on all channels being able to reach **certain deflections to trigger an abort.**
- Upon initiation of the auto-sequence, the model will **immediately begin climbing rapidly. Never trigger Rescue Mode indoors** under any circumstances.
- Rescue Mode may **not function correctly** on aircraft with **high levels of vibration**.
- The ability of Rescue Mode to **arrest a descent** relies heavily on rotor speed, rate of descent and ground separation. Proper upset recovery **cannot be guaranteed in situations of low rotor speed (RPM), high vertical rate of descent, and close proximity to the ground.**
- When Rescue Mode is enabled, **IMU static calibration is forced at each power-up**. The aircraft **must be placed on a stable surface** for OFS3 to initialize.
- While the new data-fusion algorithm is highly robust, **minor drift may still occur during prolonged, extreme 3D flight.** During internal testing, this drift remained within a few degrees of level and never impeded the rescue function itself.

⚠ Use at Your Own Risk ⚠

By enabling or flying with OFS3’s Rescue Mode enabled, the pilot confirms full understanding of all associated limitations and risks, and expressly assumes sole responsibility and liability for the use or misuse of Rescue Mode, and any resulting damage, injury, or death. OMPHOBBY assumes no responsibility or liability for the consequences of usage of Experimental Features under any circumstances.

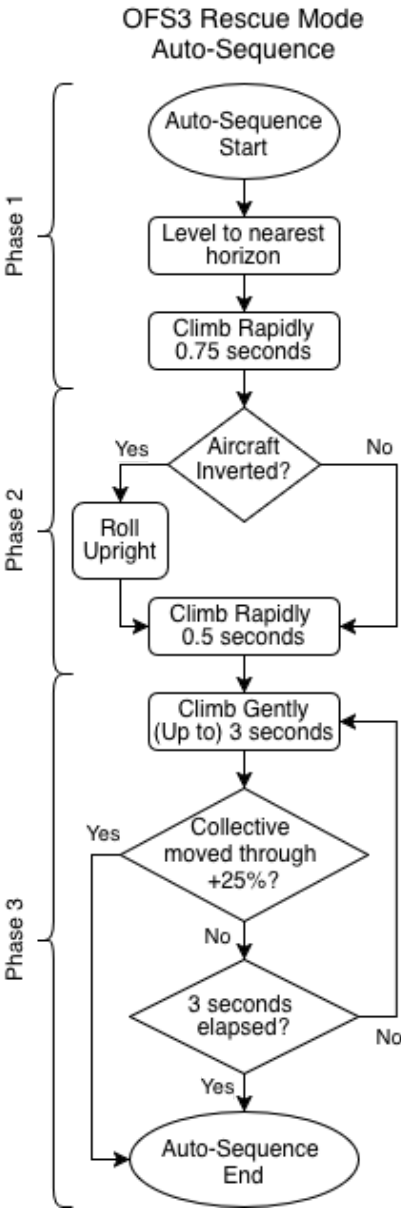
Rescue Mode Usage

OFS3 Rescue must explicitly be enabled through the OMPHOBBY app (see Bluetooth® Configuration) under the 🧪 Experimental section, and replaces Attitude Mode entirely. By doing so, **you accept all responsibility and liability arising from usage of Rescue Mode**, as outlined in Rescue Mode Limitations and Conditions chapter.

Rescue Mode is triggered in the same way Attitude Mode is triggered. The triggering channel depends on the receiver protocol used, please see the ExpressLRS/XF, S.BUS, F.Port and DSM Channel Mapping sections for correct channel assignments. As Rescue Mode is designed to exit automatically or by user intervention through the flight controls, it is strongly recommended to **map the triggering channel to a momentary switch.**

Once Rescue Mode is triggered, OFS3 will perform the auto-sequence outlined in the adjacent graphic. For better clarity, the auto-sequence is divided into 3 phases:

1. Level the aircraft to the nearest horizon, start climbing rapidly.
2. Ensure the model is returned to upright, continue climbing.
3. Slow the ascent to allow the pilot to regain control, or return control after a time-out without pilot action.



After triggering Rescue Mode, **OFS3 is locked into the auto-sequence for 0.5 seconds** to protect against accidental aborts. After this delay, the following actions by the pilot **trigger an immediate abort to 3D mode** during phases 1, 2 and 3:

- Cyclic control is moved beyond ±75% in any direction.
- Collective control is moved beyond ±85%.
- The rescue channel is triggered a second time.

The following actions by the pilot **will not trigger an abort** during phases 1, 2 and 3 of the auto-sequence:

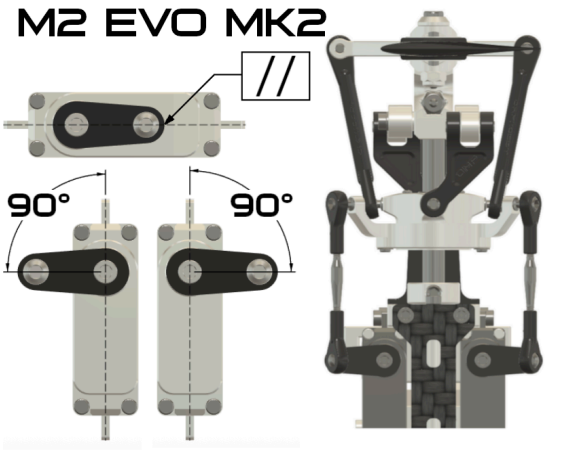
- Any yaw input of any magnitude is given or held anywhere in the auto-sequence.
- Cyclic control is held beyond ±75% during rescue start, or is moved below ±75% during the auto-sequence.
- Collective control is held beyond ±85% during rescue start, or is moved below ±85% during the auto-sequence.

The following actions by the pilot **will trigger completion with return to 3D mode** during phase 3 of the auto-sequence:

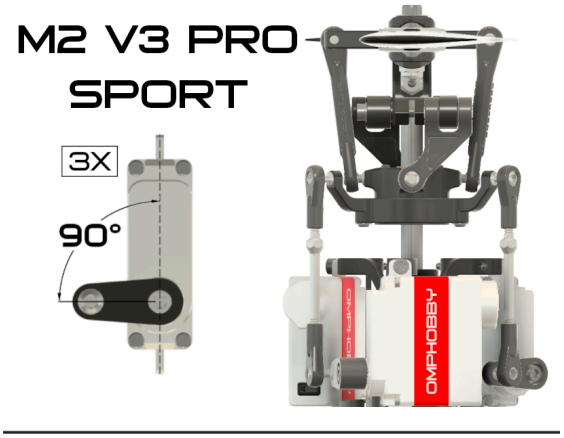
- Collective control is moved through +25% in either increasing or decreasing direction.
- 3 seconds elapse without the collective being moved through +25%, or an abort being triggered by any means outlined above.

Helicopter Mechanical Setup

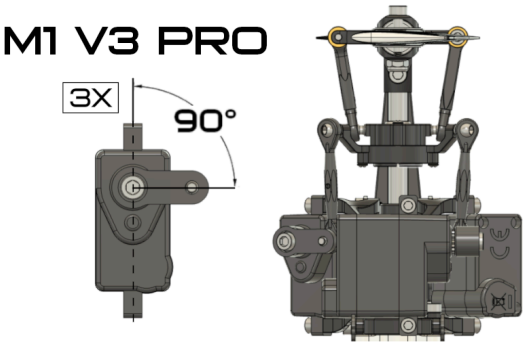
While all OFS3 helicopters come ready-to-fly and pre-set from the factory, it may be necessary to redo the mechanical setup after performing repairs, or when retrofitting an existing model with OFS3. The following steps will provide an example to guide you to a clean mechanical setup.



1. Enter servo centering mode (SERVO), or use the **Servo Trim** toggle in the OMPHOBBY app.
2. Adjust the servo centers as required and verify that all servo arms rest at a **90° angle relative to the main rotor shaft**.
   a. In case of the M2 EVO MK2, this is perpendicular to the housings of servos CH1 and CH3, and parallel to the housing of CH2.
   b. In case of the M2 V3 PRO/SPORT and M1 V3 PRO, this is perpendicular to all three servo housings.
      i. **In case of M1 V3 PRO**, this is the only centering step, as all linkages are fixed in length. **Verify that the swashplate is level, and that the main blades rest at 0°** by folding them to one side and checking for parallelity, then **skip to step 5**.



3. Adjust the metal turnbuckles of the swashplate linkages individually in such a way that the **swashplate rests perpendicular to the main rotor shaft** in both lateral and longitudinal direction. Clockwise turns on the linkages' metal turnbuckles shorten them, counter-clockwise turns lengthen them.



4. Adjust the turnbuckles of the swashplate equally, so that the swashplate rests at a vertical position that sets the **blade pitch of both blades to 0°**, which can be verified by folding the blades and checking for parallelity. After these adjustments, the swashplate should still be level.
5. Enter the collective endpoints adjustment mode (COLL) by short-pressing **SET** once, or disable Servo Trim and use the Collective Pitch settings in the app.
6. Adjust your positive and negative collective endpoints by setting the collective stick to either endpoint, and moving the elevator stick accordingly, or adjusting Min and Max endpoints in the app. It is recommended to set symmetric collective endpoints of about ±12° to ±14°.
7. If mechanical binding should occur, you can manipulate the servo PWM limits to prevent this. Limits are relative to servo center, and therefore require proper centering to work.
8. Save your adjustments by holding the **SET** button until the flight controller returns to flight mode, or by hitting the **Save** button in the OMPHOBBY app and disabling **Servo Trim**.

Bluetooth® Configuration

OMPHOBBY Flight System 3 supports configuration and firmware update via the included Bluetooth® adapter.

To connect to the iOS / Android application:



1. Download the OMPHOBBY application from the Apple App Store or Google Play Store.
2. Connect the Bluetooth® adapter with the corresponding port on your OFS3 Flight Controller, as shown under Bluetooth® Module.
3. Open the OMPHOBBY application and grant the Bluetooth® permissions once prompted. This step is crucial, as otherwise, the app will not be able to connect to the flight controller.
4. Power on your transmitter, OFS3, and wait for initialization.
5. Open the OMPHOBBY application and press “Connect Device”.
6. Select the ID of your Bluetooth® module in the following dialog window.
7. Upon successful connection, the main page of the app will open automatically.
8. Bluetooth® will stay connected if you back out of the flight controller settings. You can re-enter the settings main page by tapping “Go to Settings”. OFS3’s firmware can be updated through the About tab.

The following tabs exist for setting up your model:

🚁 **Flight Setup** holds the core parameters that make OFS3 fly, giving the user unlimited access to all control loop parameters. Things found here include all PIDF gains, TALY PI gains, filter cutoff frequencies, control deadbands, expo settings and more.

🛠️ **Maintenance** holds all options pertaining to the mechanics of the helicopter, such as servo centers and collective endpoints, cyclic ring adjustments for center and high/low collective, as well as options to calibrate the gyroscope, reset or format OFS3.

🎮 **Control Link** holds settings related to receiver and telemetry configuration, as well as functionality to replace legacy transmitter functions, like Software Throttle and byRPM Collective.

🧪 **Experimental** holds new features which are under development, intended for testing purposes only and should be used only if the user understands and is willing to accept all associated risks and implications of using such features (see Rescue Mode Limitations and Conditions for an example.)

Updating OFS3's Firmware

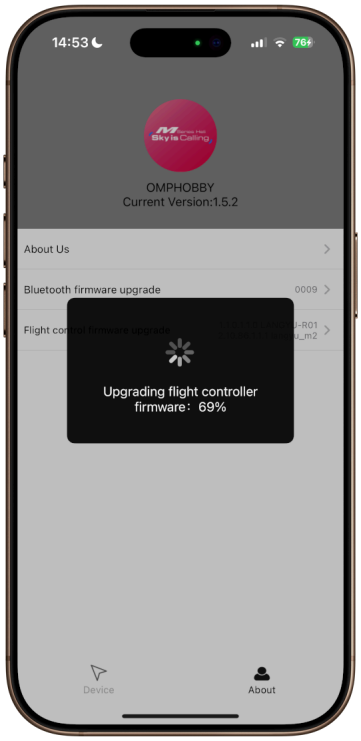
Firmware updates to OFS3 can bring new functionality, improvements, and bug fixes to your flight controller. New firmwares can conveniently be installed via the OMPHOBBY smartphone app for iOS and Android. **OFS3 and OFS3+ share the same firmware files.**

⚠ **Only download and flash official OFS3 firmwares from omphobby.com. Do not download or install firmwares from anywhere else on or off the internet. Installing firmwares not directly downloaded from omphobby.com will void your OFS3 and model warranty.** ⚠

iOS

To update the flight controller's firmware on iOS:

1. Ensure the OMPHOBBY app is up to date.
2. Find the latest firmware for your OFS3 flight controller on the support page at **omphobby.com**, download it, and save it to your phone's Files app in a place you remember.
   - Different models require different firmwares, be sure to download the correct one for your model.
3. Open the OMPHOBBY app and connect to OFS3 via Bluetooth®, as described under Bluetooth® Configuration.
4. Head to the 🚀 **Firmware** tab.
5. Tap the "Flight Control Firmware Upgrade" option. Should your Bluetooth® module require an update, this will automatically be done first. The Bluetooth® module firmware is integrated into the app.
   - Should the Bluetooth® Module firmware not update automatically, it can be manually updated by tapping the Bluetooth® Firmware Upgrade button.
6. If prompted, select the latest firmware you downloaded earlier, and the app will conduct the update for you.



7. Once the firmware update is complete, OFS3 will automatically reboot into flight mode.
8. If the firmware update should fail for any reason, for example an unstable Bluetooth® connection, the flight controller will reboot into bootloader mode and cannot be flown. In this case, simply repeat the firmware update procedure and ensure a stable connection between your phone and OFS3.

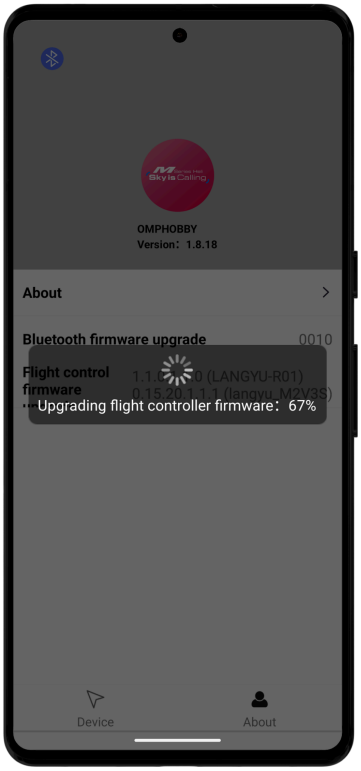
To download the latest firmware for your OFS3 flight controller, please visit the **Firmware Download** page in the **Support** section on

www.omphobby.com

Android

To update the flight controller's firmware on Android:

1. Ensure the OMPHOBBY app is up to date.
2. Find the latest firmware for your OFS3 flight controller on the support page at **omphobby.com**, download it, and save it to your phone. Locate it in the Files app, likely under Downloads.
    - Different models require different firmwares, be sure to download the correct one for your model.
3. Open the OMPHOBBY app and connect to OFS3 via Bluetooth®, as described under Bluetooth® Configuration.
4. Return to the Files app of your phone where you previously located the downloaded firmware.
5. On the firmware file, select either "Share" or "Open with", and select the OMPHOBBY app.
6. The app will prompt you whether you want to upgrade your firmware, and show you the selected file again. Confirm the prompt. Should your Bluetooth® module require an update, this will automatically be done first. The Bluetooth® module firmware is integrated into the app.



    - Should the Bluetooth® Module firmware not update automatically, it can be manually updated by tapping the Bluetooth® Firmware Upgrade button.
7. Once the firmware update is complete, OFS3 will automatically reboot into flight mode.
8. If the firmware update should fail for any reason, for example an unstable Bluetooth® connection, the flight controller will reboot into bootloader mode and cannot be flown. In this case, simply repeat the firmware update procedure and ensure a stable connection between your phone and OFS3.

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