

Flyduino KISS Flight Controller V2 Manual v1.0

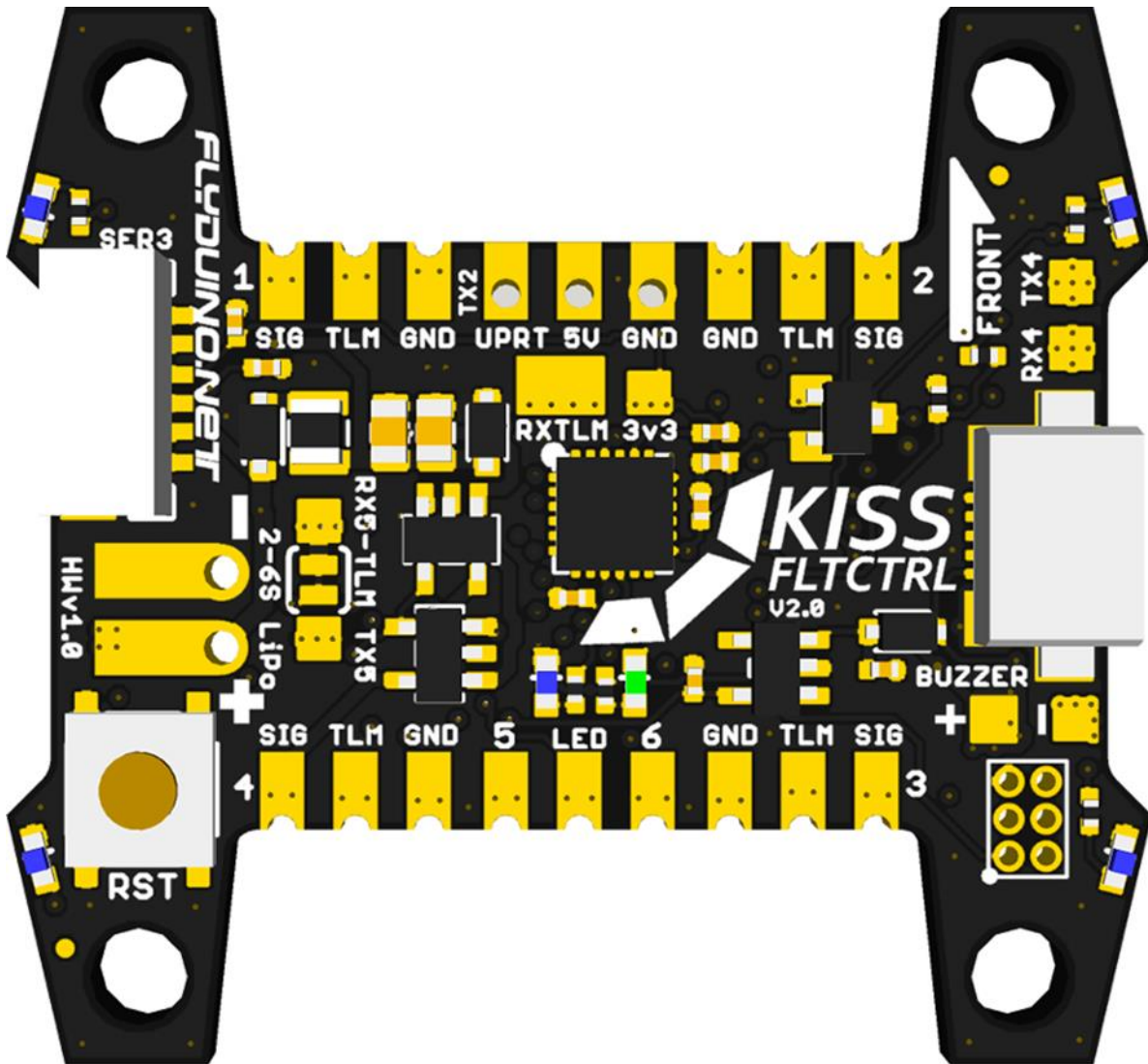


image: Upper / Top Side

A new simplified Flight controller, the KISS FC V2 includes a complete own Flight Control Firmware development.

The Idea was to get the simple KISS FC to the next level and due to intensive long term tests of some pretty good Pilots we were able to optimize the code to a point where you hopefully get your quad in the air quite quick.

Normally you just need to choose your Airframe in the GUI and you are able to fly (at least with KISS ESC), otherwise you can download presets of well known pilots for given configurations and of course you can tweak the PID yourself through the GUI.



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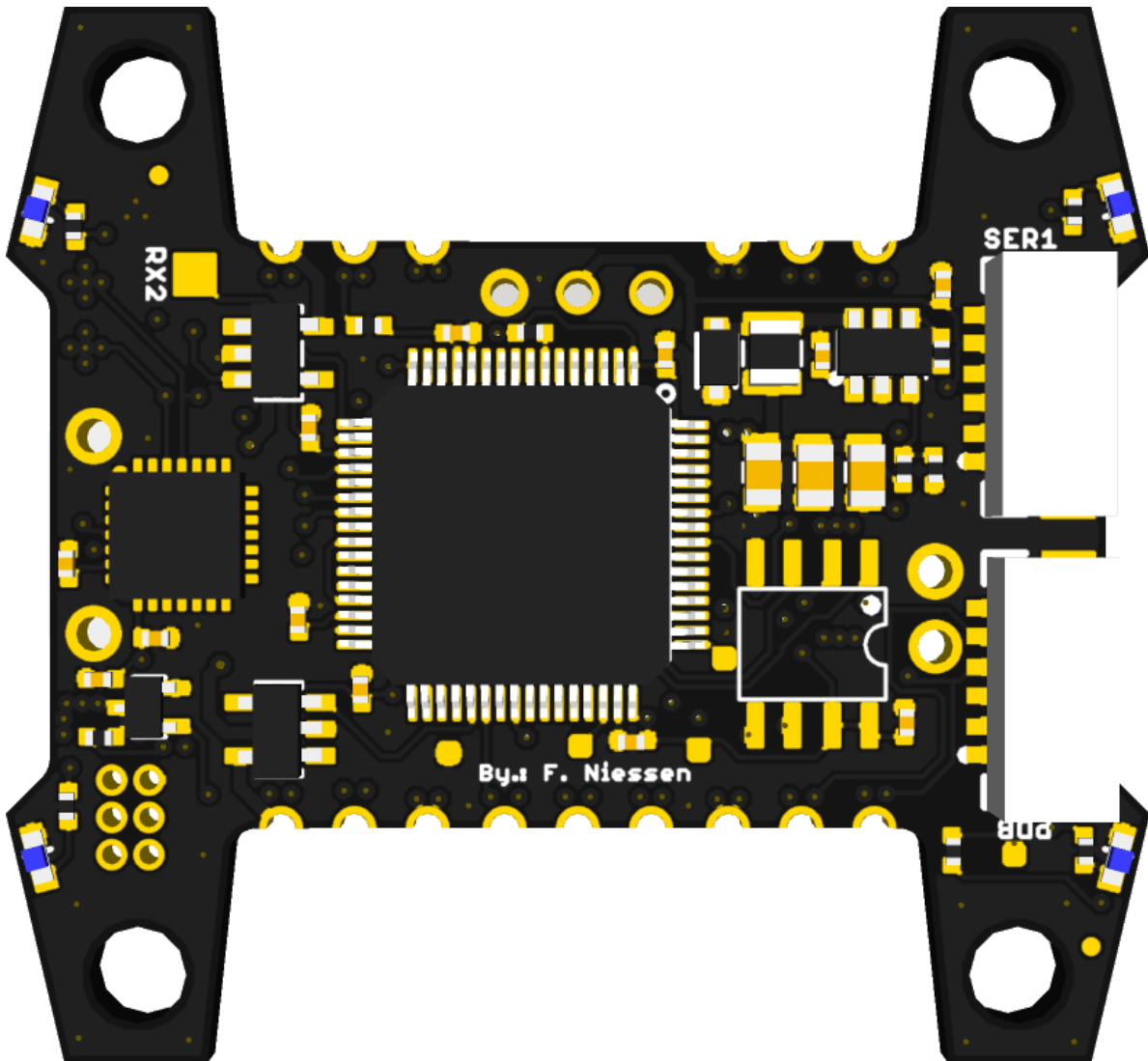


Image: Lower / Bottom Side

The software setup side is reduced as far as we could, many things are already taken into account for you, if you have some solid soldering skills you should be able to build your quad pretty quick.

A known feature is also the telemetry, in combination with our 32bit ESC line it's possible to show the live telemetry data via OSD on your FPV live feed or in the KISS FC GUI.

This way you get useful informations like the Voltage of your battery, current consumption, ESC temperature and motor RPM.

Other FC firmwares (eg. Betaflight) are ported for the use with the KISS FC V2.

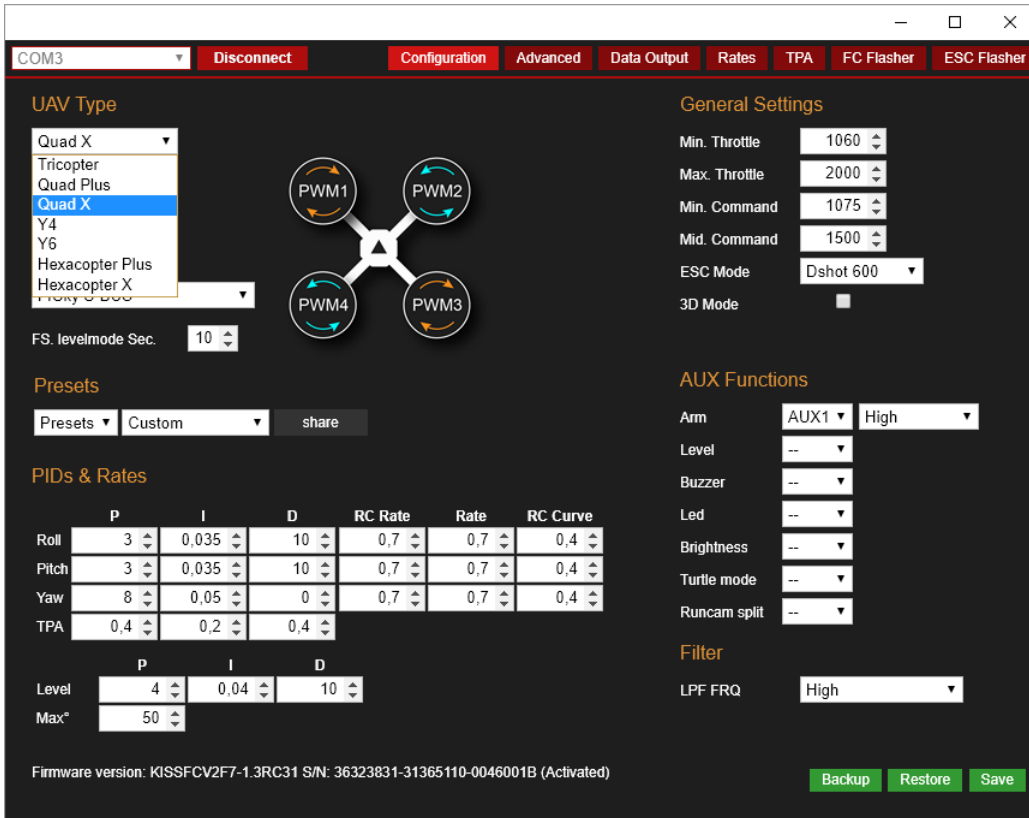
NOTE: its recommended to keep the FC level and firm for at least 5 seconds after you powered it!

If you move it, the gyro calibration might take longer and fails, indicated by the blue LED staying solid.

On startup the green LED should be lit and the blue one should be flashing for several seconds, then go solid for a second and if the calibration is complete go off.

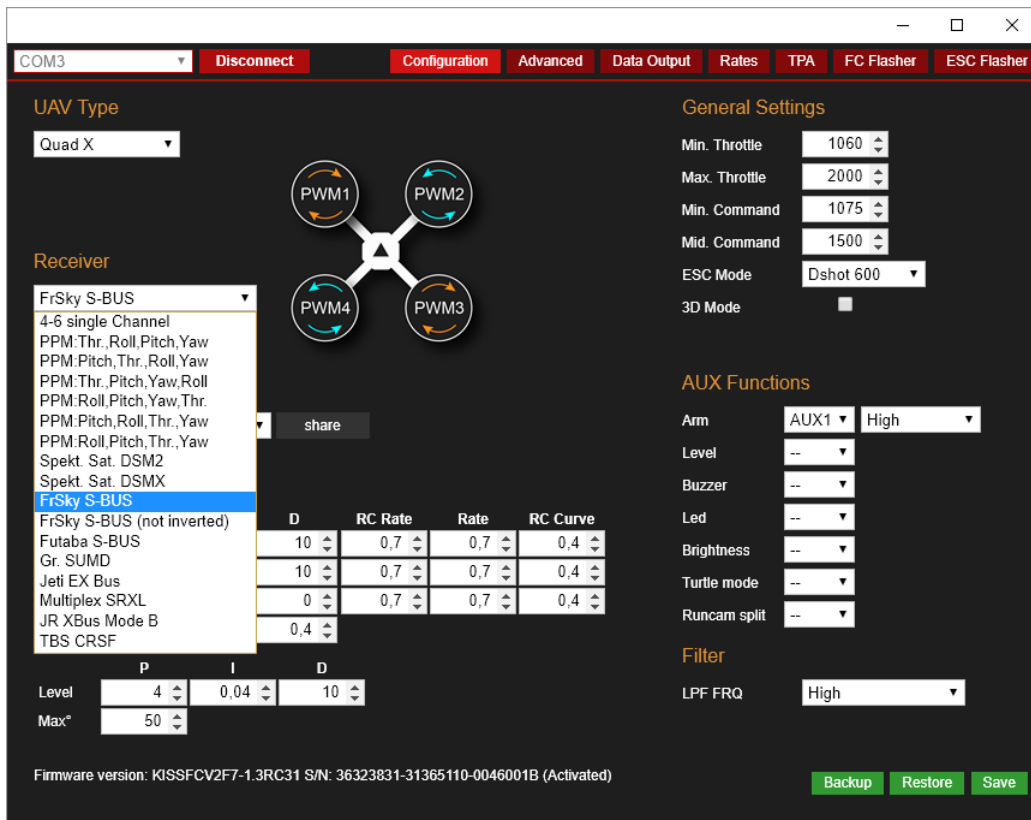
Supported Copter Frames

- Tri, Y4 and Y6
- Quad +/-
- Hexa +/-



Supported Receivers

Receiver	PWM	PPM	Digital	Telemetry	Protocols
Spektrum	no	Yes	Yes (Spektrum Sat)		DSM2 + DSMX
Futaba	no	Yes	Yes		SBUS
FrSky	no	Yes	Yes	Yes (X-Series RX)	SBUS + S-Port
Jeti	no	Yes	--	--	Jeti DX + EX Bus
Graupner	no	Yes	Yes	Yes	HOTT
Hitec / Traditional	no	Yes	Yes (Sbus)		
Multiplex	no	Yes	Yes	Yes	SRXL + Sensorbus
TBS Crossfire	no	Yes	Yes	Yes	CF + SBUS



There are 8 Receiver inputs and channels: 4 for the sticks and 4 AUX channels 1-4

Other Specs & Features

MCU: STM32F722RET6 @216Mhz

IMU: MPU6000

Weight: 5g

Mounting Holes: 3x3cm pattern with 3.3mm holes (compatible with most frame types)

Voltage: 2-6S (direct)

The needed USB driver usually will be installed when you connect the FC for the first time.

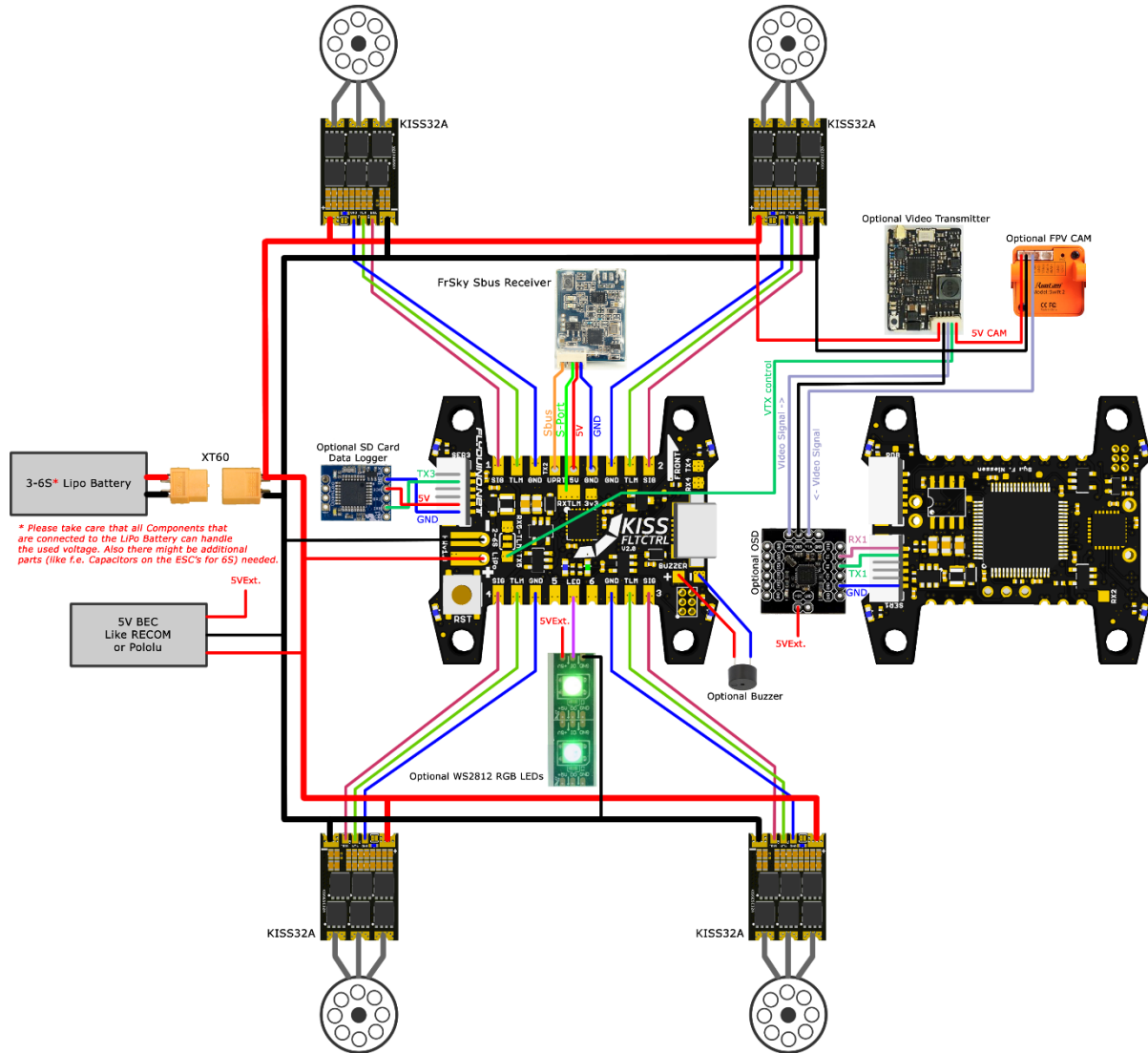
It may take several minutes before you can use the FC and connect it to the GUI.

Connections

There are 6 ESC outputs for 2-6 Motors.

The first 4 ESC Outputs are in place for use on the most common QuadX Copter type

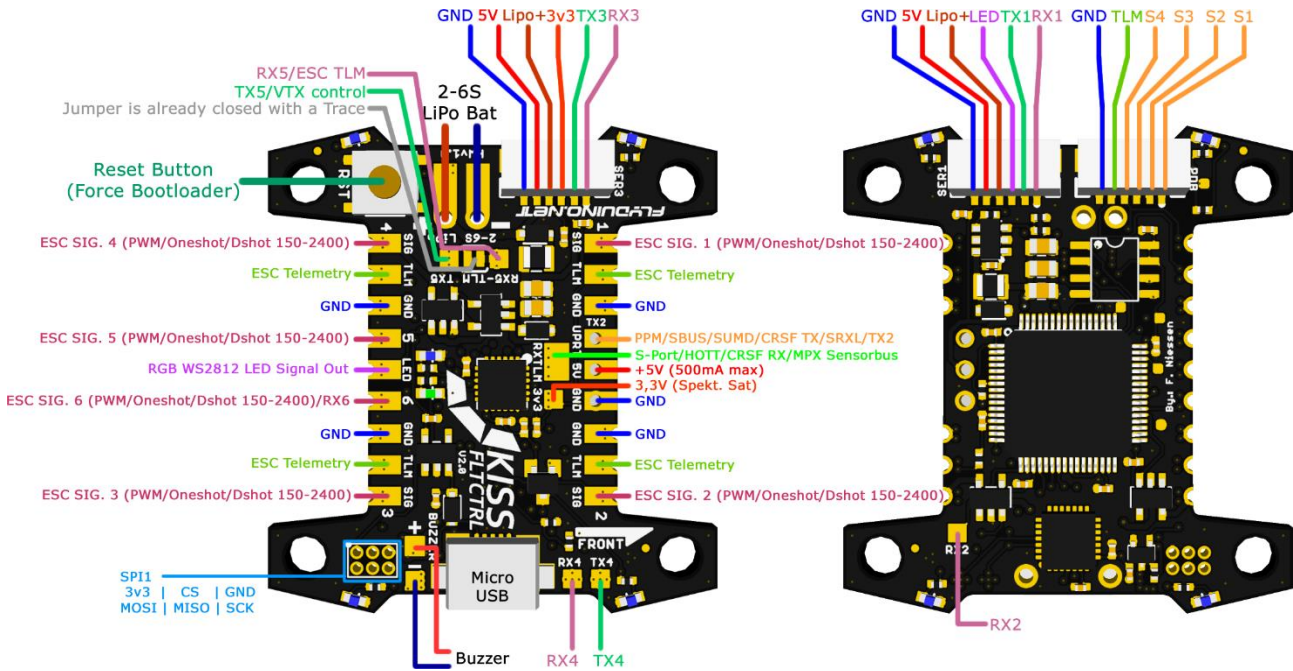
Here's a recommended wiring diagram:



Please note that all Parts that are used together with the KISS FC V2 should be connected referring to their specifications that can be found in their manuals.

Wiring Diagram

All available pins and connections:

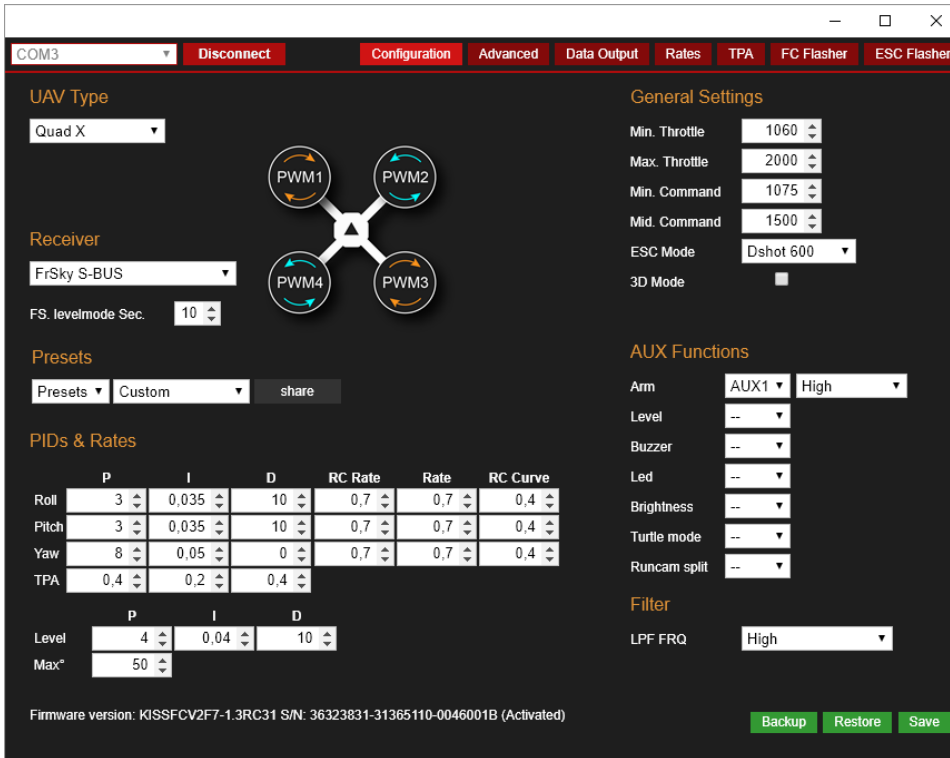


The 6pin sockets (SER1, SER3 and PDB) are used with the KISS Distribution board cable. (6pin 1mm)
e.g.:



GUI (Graphical User Interface)

The GUI (versions for Win, Mac, iOS and Android available) consists of 7 pages: The „Welcome“ page with all connections, the „Configuration“ page for the settings, „Advanced“ for advanced settings, the „Data Output“ for Sensorgraphs, Rates, TPA and the two Flasher tabs.

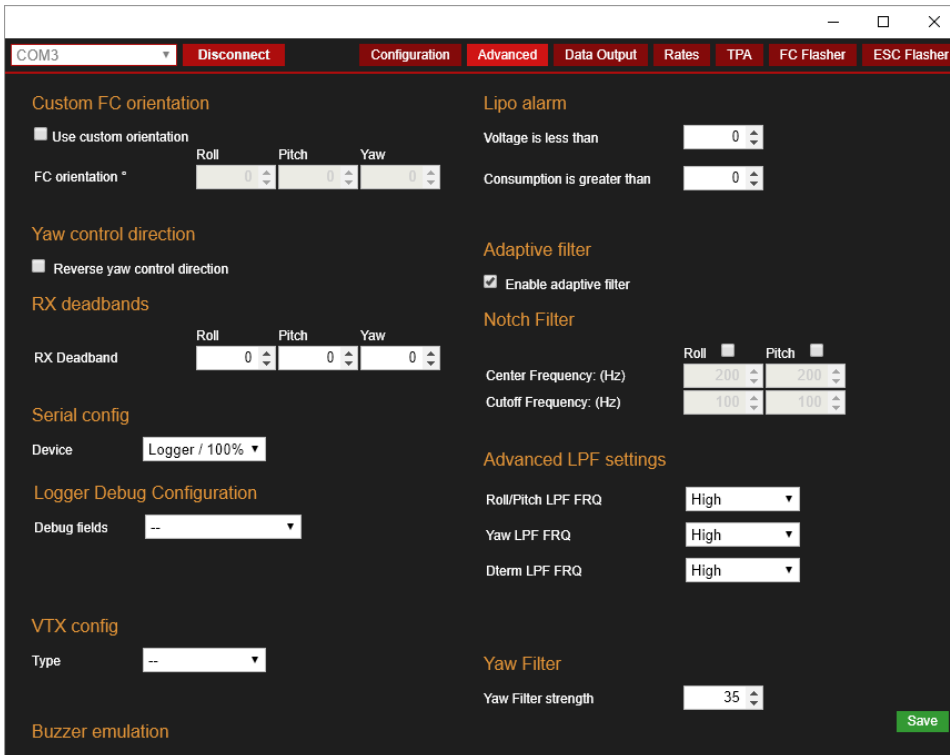


The screenshot shows the 'Configuration' page of the KISS GUI. The interface is dark-themed with a top navigation bar containing tabs: Configuration (active), Advanced, Data Output, Rates, TPA, FC Flasher, and ESC Flasher. The main content area is divided into several sections:

- UAV Type:** Set to 'Quad X'.
- Receiver:** Set to 'FrSky S-BUS'. A diagram shows four PWM channels (PWM1, PWM2, PWM3, PWM4) connected to a central point.
- FS. levelmode Sec.:** Set to 10.
- Presets:** Includes 'Presets', 'Custom', and 'share' buttons.
- PIDs & Rates:** A table for configuring PID values and rates for Roll, Pitch, Yaw, and TPA.

	P	I	D	RC Rate	Rate	RC Curve
Roll	3	0,035	10	0,7	0,7	0,4
Pitch	3	0,035	10	0,7	0,7	0,4
Yaw	8	0,05	0	0,7	0,7	0,4
TPA	0,4	0,2	0,4			
- General Settings:** Includes Min. Throttle (1060), Max. Throttle (2000), Min. Command (1075), Mid. Command (1500), ESC Mode (Dshot 600), and 3D Mode (disabled).
- AUX Functions:** Includes Arm (AUX1, High), Level, Buzzer, Led, Brightness, Turtle mode, and Runcam split.
- Filter:** LPF FRQ set to High.

At the bottom, the firmware version is 'KISSFCV2F7-1.3RC31 S/N: 36323831-31365110-0046001B (Activated)'. There are 'Backup', 'Restore', and 'Save' buttons.



The screenshot shows the 'Advanced' page of the KISS GUI. The interface is dark-themed with a top navigation bar containing tabs: Configuration, Advanced (active), Data Output, Rates, TPA, FC Flasher, and ESC Flasher. The main content area is divided into several sections:

- Custom FC orientation:** Includes a checkbox for 'Use custom orientation' and 'FC orientation' sliders for Roll, Pitch, and Yaw.
- Yaw control direction:** Includes a checkbox for 'Reverse yaw control direction'.
- RX deadbands:** Sliders for Roll, Pitch, and Yaw deadbands.
- Serial config:** Device set to 'Logger / 100%'.
- Logger Debug Configuration:** 'Debug fields' dropdown.
- VTX config:** 'Type' dropdown.
- Buzzer emulation:** Section at the bottom left.
- Lipo alarm:** Voltage is less than (0) and Consumption is greater than (0) sliders.
- Adaptive filter:** 'Enable adaptive filter' checkbox checked.
- Notch Filter:** 'Center Frequency: (Hz)' (200) and 'Cutoff Frequency: (Hz)' (100) sliders for Roll and Pitch.
- Advanced LPF settings:** 'Roll/Pitch LPF FRQ', 'Yaw LPF FRQ', and 'Dterm LPF FRQ' dropdowns, all set to High.
- Yaw Filter:** 'Yaw Filter strength' slider set to 35.

A 'Save' button is located at the bottom right.

COM3 Disconnect Configuration Advanced Data Output Rates TPA FC Flasher ESC Flasher

Receiver

Throttle

Roll

Pitch

Yaw

Aux 1

Aux 2

Aux 3

Aux 4

Motors TEST

PWM 1

PWM 2

PWM 3

PWM 4

PWM 5

PWM 6

Other

Mode: Acro Status: Disarmed

AngleX: -8.32 Idle: 81 %

AngleY: -2.36 Voltage: 0.96 v

Calibrate Accelerometer

Telemetry Gyro & ACC Data

Gyroscope X 0.000

Gyroscope Y 0.000

Gyroscope Z 0.000

Accelerometer X -0.195

Accelerometer Y -0.134

Accelerometer Z 0.945

Reset model

COM3 Disconnect Configuration Advanced Data Output Rates TPA FC Flasher ESC Flasher

Receiver

Roll

Pitch

Yaw

Rates

	RC Rate	Rate	RC Curve
Roll	<input type="text" value="0,7"/>	<input type="text" value="0,7"/>	<input type="text" value="0,4"/>
Pitch	<input type="text" value="0,7"/>	<input type="text" value="0,7"/>	<input type="text" value="0,4"/>
Yaw	<input type="text" value="0,7"/>	<input type="text" value="0,7"/>	<input type="text" value="0,4"/>

Charts

Roll

Pitch

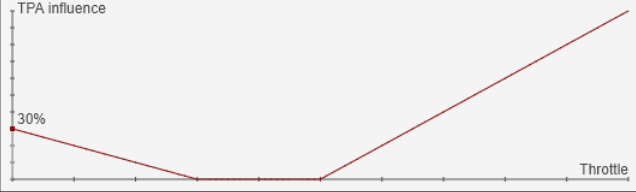
Yaw

Save

COM3 Disconnect Configuration Advanced Data Output Rates TPA FC Flasher ESC Flasher

Receiver Throttle 1000

TPA influence chart



PIDs

	P	I	D	P	I	D
Roll	3	0,035	10	2,64	0,033	8,80
Pitch	3	0,035	10	2,64	0,033	8,80
Yaw	8	0,05	0	7,04	0,047	0,00
TPA	0,4	0,2	0,4			

Use custom TPA influence values

TPA influence

	Zero Throttle	Breakpoint 1	Breakpoint 2	Full Throttle
Throttle [%]	0	30	50	100
Influence [%]	30	0	0	100

Save

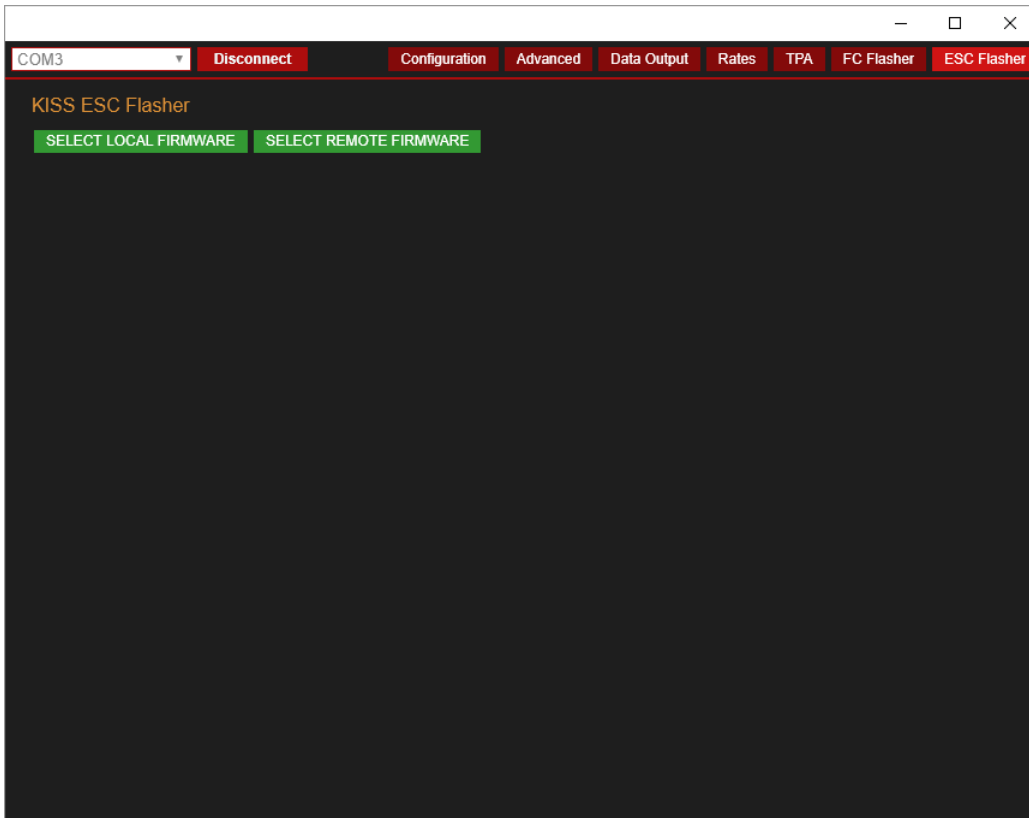
KISS FC Flasher

SELECT LOCAL FIRMWARE SELECT REMOTE FIRMWARE

Loaded 122024 blocks from D:\KISSFC\kissfc-firmware\obj\KISSFCV2F7-1.3RC32s.hex

FLASH FIRMWARE

Progress 32%



Note: If you press the Reset (RST) Button after you connected the FC to your PC, the GUI will automatically switch to the “Flasher” tab once you connect it.

Installation & Setup

Just plug in the FC via Micro USB connection to your PC. Drivers should be installed automatically on WIN7-10.

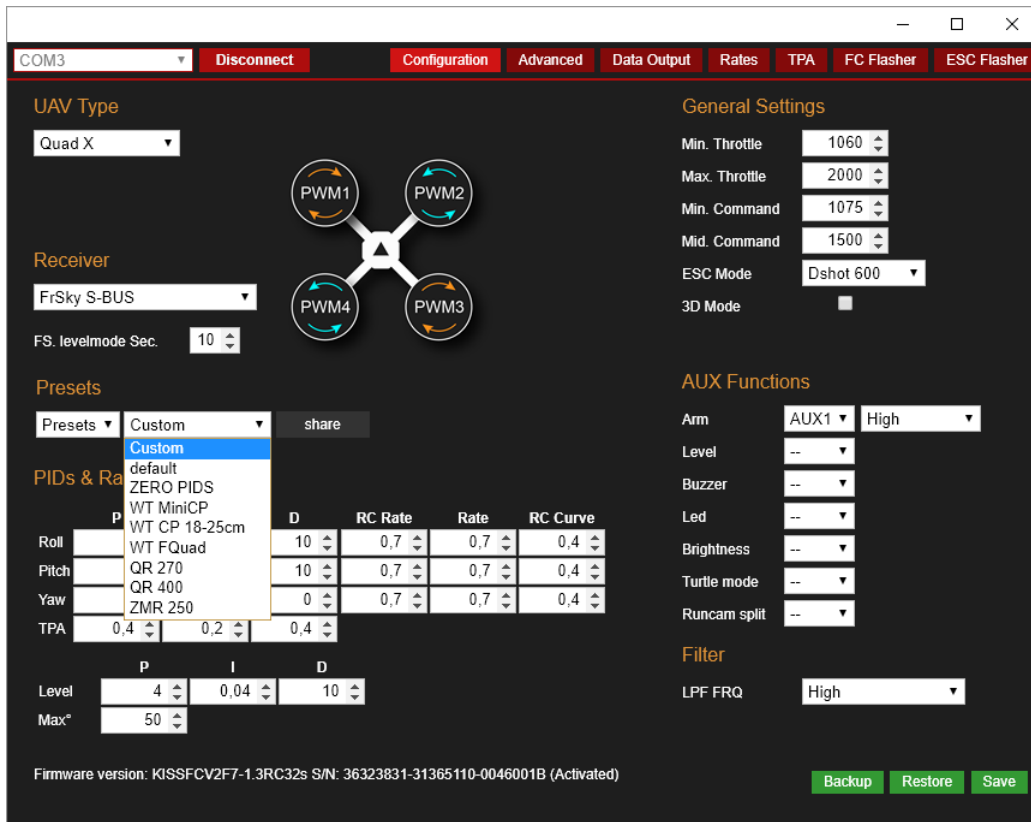
After the installation is complete, unplug the FC from the USB, plug it in again and hold the FC firm and level for at least 5 seconds!

The green LED will be lit constantly while the blue LED will blink, indicating the Gyro calibration. It will be solid afterwards and go off when the calibration is completed und the FC is ready to go.

Then start the Chrome App or one of the stand-alone GUIs and select the COM port for the connection. If no port is shown, the driver installation might have failed.

Note: iOS doesn't work with an OTG USB cable so a WiFi module is required.

PID Presets



The screenshot shows the configuration interface for a KISS FLTCTRL system. The interface is divided into several sections:

- UAV Type:** Set to Quad X.
- Receiver:** Set to FrSky S-BUS.
- FS. levelmode Sec.:** Set to 10.
- General Settings:**
 - Min. Throttle: 1060
 - Max. Throttle: 2000
 - Min. Command: 1075
 - Mid. Command: 1500
 - ESC Mode: Dshot 600
 - 3D Mode: Disabled
- AUX Functions:**
 - Arm: AUX1, High
 - Level: --
 - Buzzer: --
 - Led: --
 - Brightness: --
 - Turtle mode: --
 - Runcam split: --
- Filter:** LPF FRQ: High
- PID Presets:** A dropdown menu is open showing various presets like 'default', 'ZERO PIDS', 'WT MiniCP', 'WT CP 18-25cm', 'WT FQuad', 'QR 270', 'QR 400', and 'ZMR 250'. Below this is a table of PID values for Roll, Pitch, and Yaw, with columns for P, I, D, RC Rate, Rate, and RC Curve.

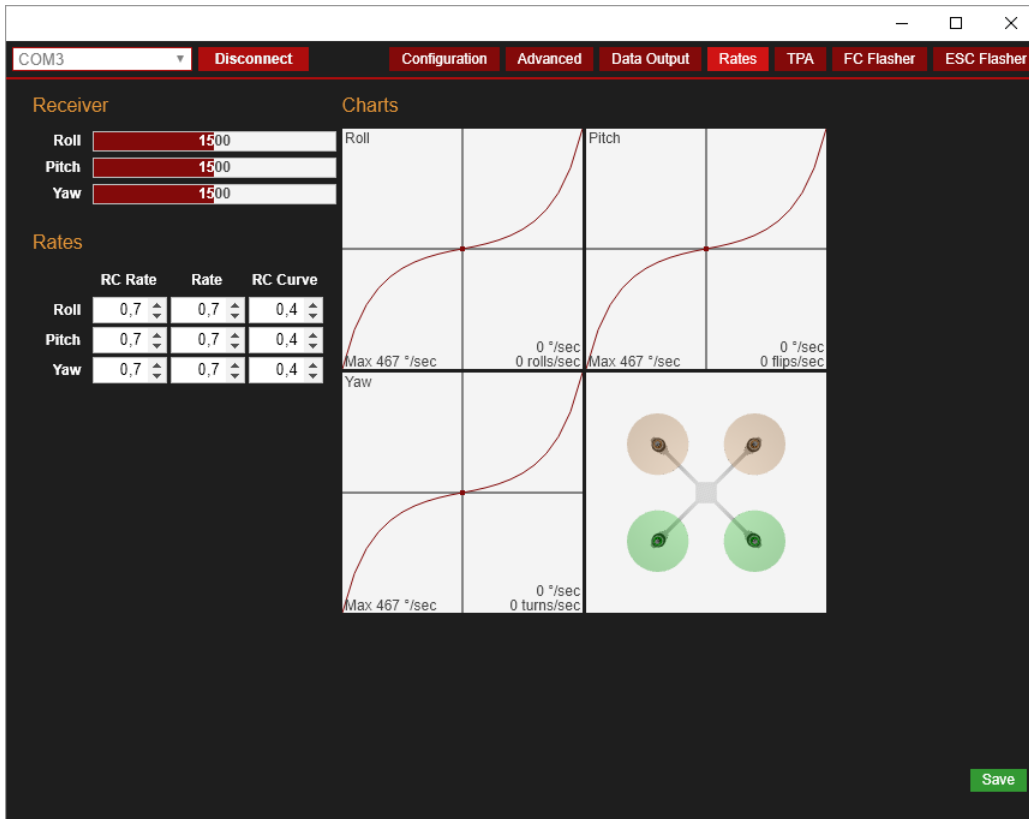
	P	I	D	RC Rate	Rate	RC Curve
Roll	10			0,7	0,7	0,4
Pitch	10			0,7	0,7	0,4
Yaw	0			0,7	0,7	0,4

Firmware version: KISSFCV2F7-1.3RC32s S/N: 36323831-31365110-0046001B (Activated)

Buttons: Backup, Restore, Save

Adjust your settings with care! Only use small steps to increase or decrease the numbers and only one at a time. To make a start easier the GUI offers pre-defined PIDs for several setups tested by skilled pilots. More presets will be available once user share theirs.

PID and Rate Tuning



The screenshot shows the KISS FLTCTRL software interface. At the top, there are tabs for 'COM3', 'Disconnect', 'Configuration', 'Advanced', 'Data Output', 'Rates', 'TPA', 'FC Flasher', and 'ESC Flasher'. The 'Rates' tab is selected.

Receiver

- Roll: 1500
- Pitch: 1500
- Yaw: 1500

Rates

	RC Rate	Rate	RC Curve
Roll	0,7	0,7	0,4
Pitch	0,7	0,7	0,4
Yaw	0,7	0,7	0,4

Charts

The Charts section displays three graphs for Roll, Pitch, and Yaw. Each graph shows a red curve representing the rate response. The Roll and Pitch graphs have a maximum rate of 467 °/sec and 0 °/sec at the center. The Yaw graph has a maximum rate of 467 °/sec and 0 °/sec at the center. A diagram of a quadcopter is shown in the bottom right corner of the charts area.

A 'Save' button is located in the bottom right corner of the interface.

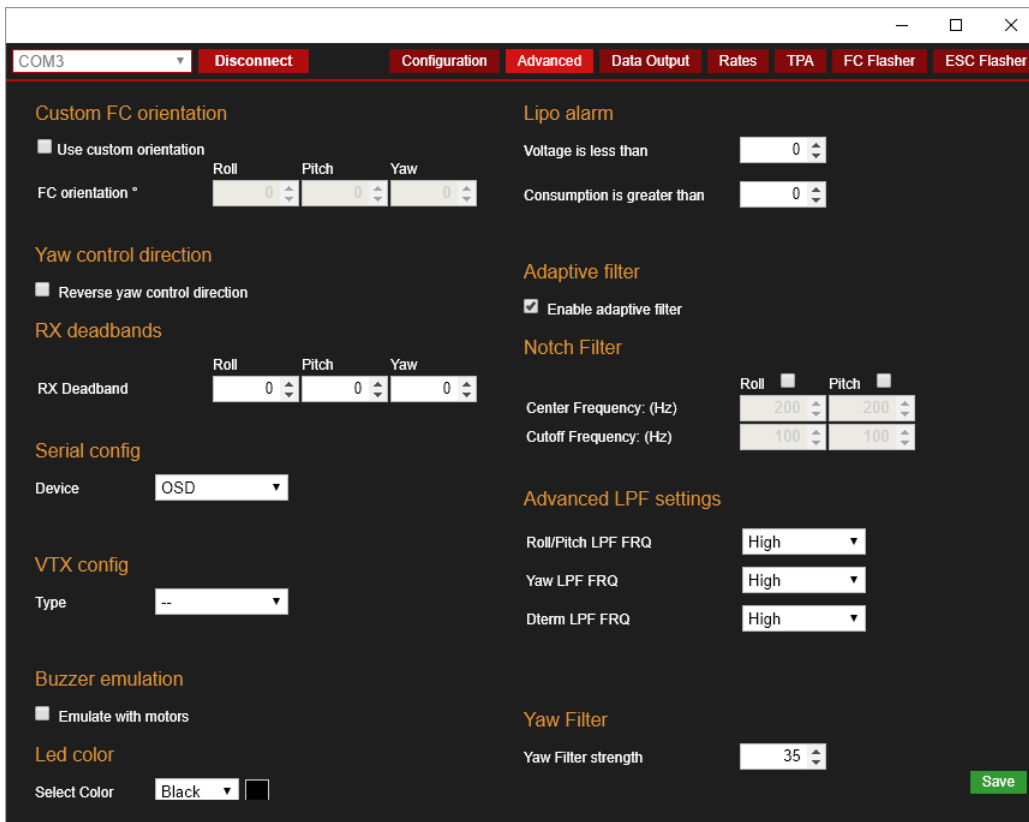
Rate decreases the gyro influence depending on the stick max outputs. E.g. with roll stick at center you will always have 100% gyro influence with rate on 0.00 it will still be 100% with full roll left. But with 0.50 rate it will be 50% gyro influence at full roll left or right.

Rate also gives an Expo like feeling. So to keep the same Expo strength you may lower one if you increase the other.

RC Rate increases the strength of the RC channel signals into the PID controller. so e.g. if you have 0-1000 at RC rate 1.0, it will be 0-2000 with RC rate 2.0

RC Curve is like the Expo on your TX. It lowers the inputs around the middle. You can adjust the RC Curve with 0.01 steps.

Filters and oscillations



The screenshot shows the 'Advanced' configuration tab of the KISS FLTCTRL software. The interface is dark-themed with orange and white text. At the top, there are navigation tabs: 'COM3', 'Disconnect', 'Configuration', 'Advanced', 'Data Output', 'Rates', 'TPA', 'FC Flasher', and 'ESC Flasher'. The 'Advanced' tab is active.

Key settings visible include:

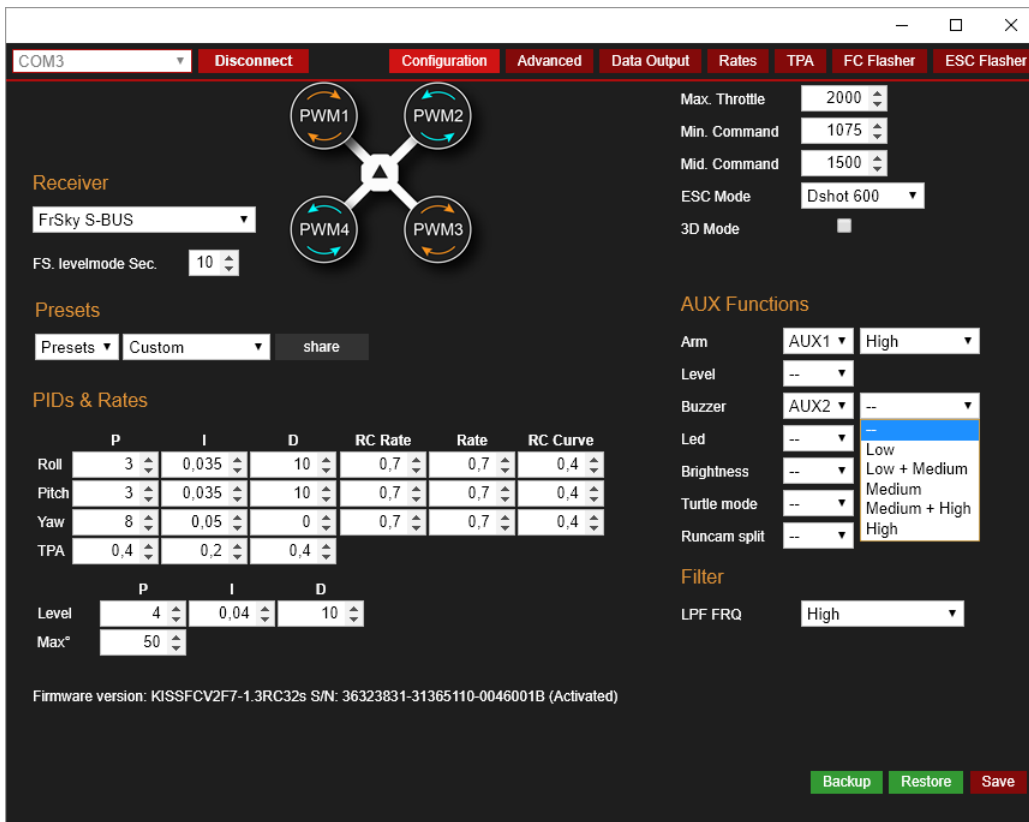
- Custom FC orientation:** A checkbox for 'Use custom orientation' is unchecked. Below it are three spinners for 'Roll', 'Pitch', and 'Yaw', all set to 0.
- Yaw control direction:** A checkbox for 'Reverse yaw control direction' is unchecked.
- RX deadbands:** Three spinners for 'Roll', 'Pitch', and 'Yaw' are all set to 0.
- Serial config:** The 'Device' dropdown is set to 'OSD'.
- VTX config:** The 'Type' dropdown is set to '--'.
- Buzzer emulation:** A checkbox for 'Emulate with motors' is unchecked.
- Led color:** The 'Select Color' dropdown is set to 'Black'.
- Lipo alarm:** Two spinners for 'Voltage is less than' and 'Consumption is greater than' are both set to 0.
- Adaptive filter:** A checkbox for 'Enable adaptive filter' is checked.
- Notch Filter:** Two checkboxes for 'Roll' and 'Pitch' are unchecked. Below them are two columns of spinners for 'Center Frequency: (Hz)' and 'Cutoff Frequency: (Hz)', both set to 200 Hz.
- Advanced LPF settings:** Three dropdown menus for 'Roll/Pitch LPF FRQ', 'Yaw LPF FRQ', and 'Dterm LPF FRQ' are all set to 'High'.
- Yaw Filter:** A spinner for 'Yaw Filter strength' is set to 35.

A green 'Save' button is located in the bottom right corner of the configuration area.

The GUI offers presets for low pass filters to get rid of possible oscillations. The lower you choose the frequency, the more filtering will occur. You can either turn filtering off completely or select one of the other presets to match your setup. "Very Low" offers the most filtering, "High" is the least affecting filter.

Thanks to Alexander Fedorov's aka FedorComander adaptive filter which works even better on the STM32F7, there are mostly no special settings needed. In case there are still oscillations, additional Notch filters can be activated.

AUX Channel Settings



COM3 Disconnect Configuration Advanced Data Output Rates TPA FC Flasher ESC Flasher

Receiver: FrSky S-BUS
FS. levelmode Sec. 10

Presets: Presets Custom share

PIDs & Rates

	P	I	D	RC Rate	Rate	RC Curve
Roll	3	0,035	10	0,7	0,7	0,4
Pitch	3	0,035	10	0,7	0,7	0,4
Yaw	8	0,05	0	0,7	0,7	0,4
TPA	0,4	0,2	0,4			

Level: P 4 I 0,04 D 10
Max[°]: 50

Firmware version: KISSFCV2F7-1.3RC32s S/N: 36323831-31365110-0046001B (Activated)

AUX Functions:

- Arm: AUX1 High
- Level: --
- Buzzer: AUX2 --
- Led: --
- Brightness: --
- Turtle mode: --
- Runcam split: --

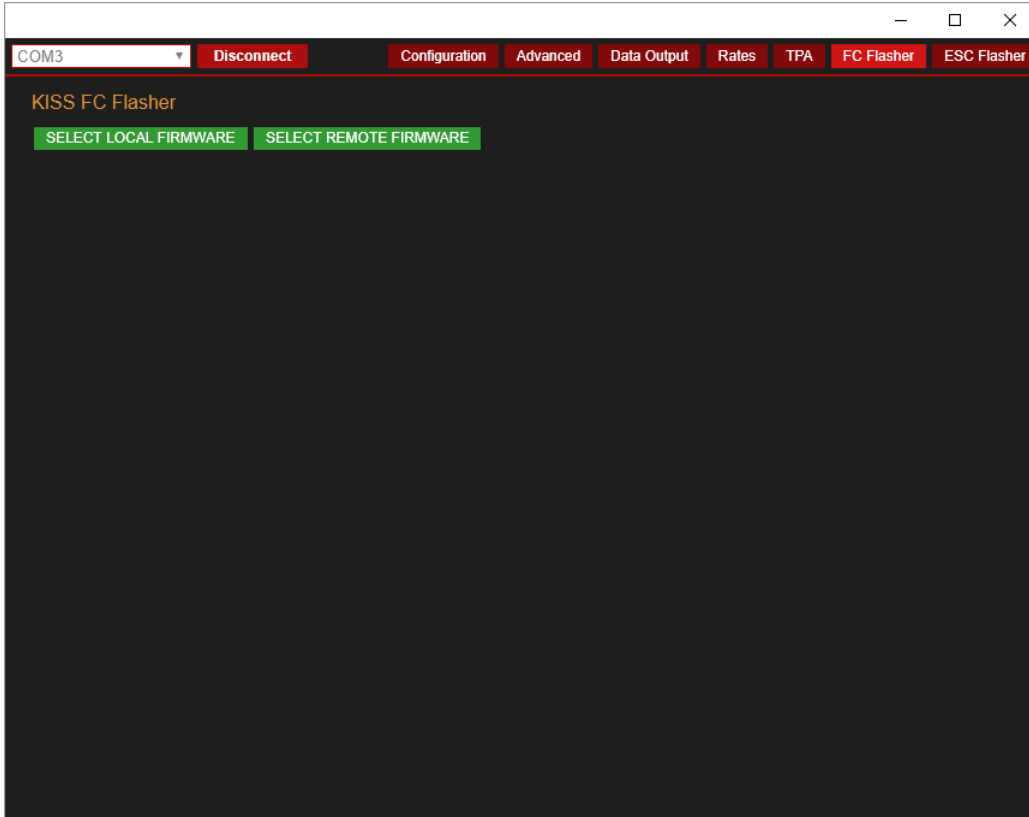
Filter: LPF FRQ High

Buttons: Backup Restore Save

The AUX Channels offer access to advanced features, controlled by switches or knobs/dials on the transmitter, e.g. engaging the Level Mode or activating the buzzer like shown above.

Firmware updates

The KISS FC V2 can be updated using the GUI on PC and MAC (stand-alone versions available)



Note: in case the flashing process failed, or there is a damaged FW on the FC, you can always switch to the FC's Bootloader with pressing the "RST" reset button once.

Important! After flashing the FC you might need to reboot and connect it to the PC with internet connection. It will read your serial number and activate the FC. If the FC is not activated you will see the blue LED flashing once every second.

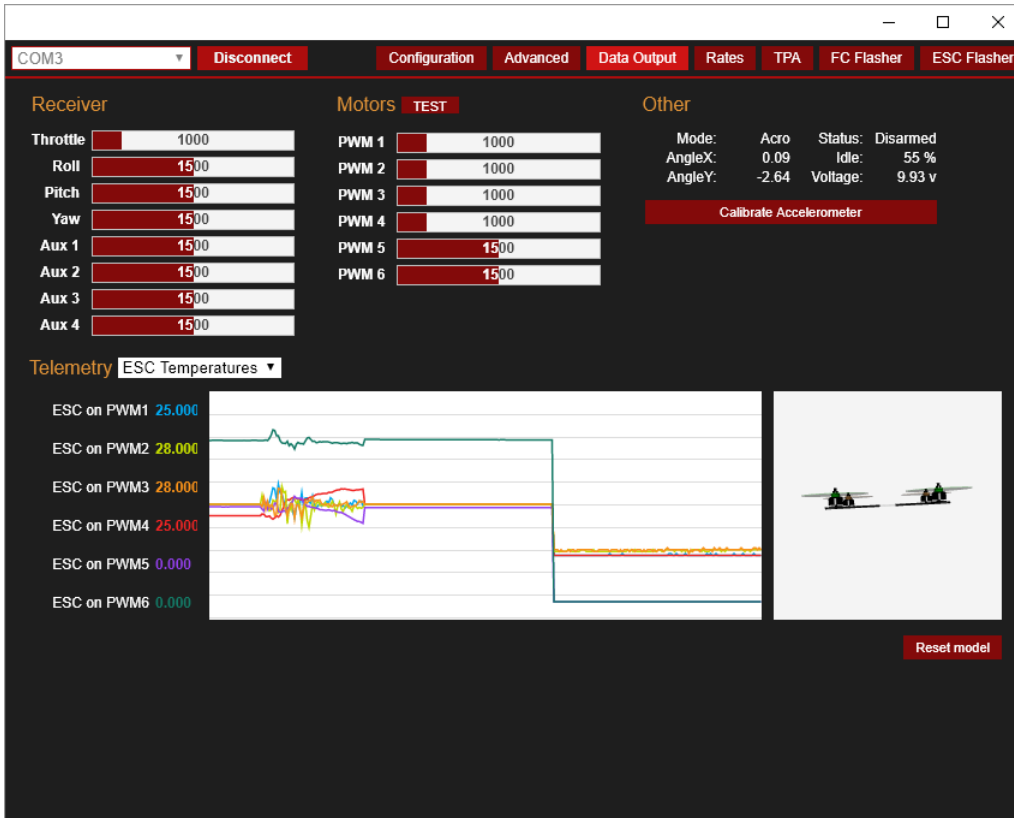
Air Mode activation

If Min Command is set lower than TX Throttle cut, the PIC controller won't be shut off
If Min Command is set to 1000 and the Arm function is assigned to a switch on your radio, the Air Mode is activated automatically. In Airmode on the Ground you might find the FC trying to regulate "something" though it is sitting still. However the Airmode only makes sense in flight.

Telemetry / OSD

The KISS FC V2 offers various possibilities to use telemetry and OSD functions

- internal Telemetry of the FC via GUI



Telemetry of the KISS FC and ESC24A can be viewed on the „Data Output“ page.

- external Modules for Telemetry and OSD, e.g. KISS ESC 24A/32A Telemetry via OSD

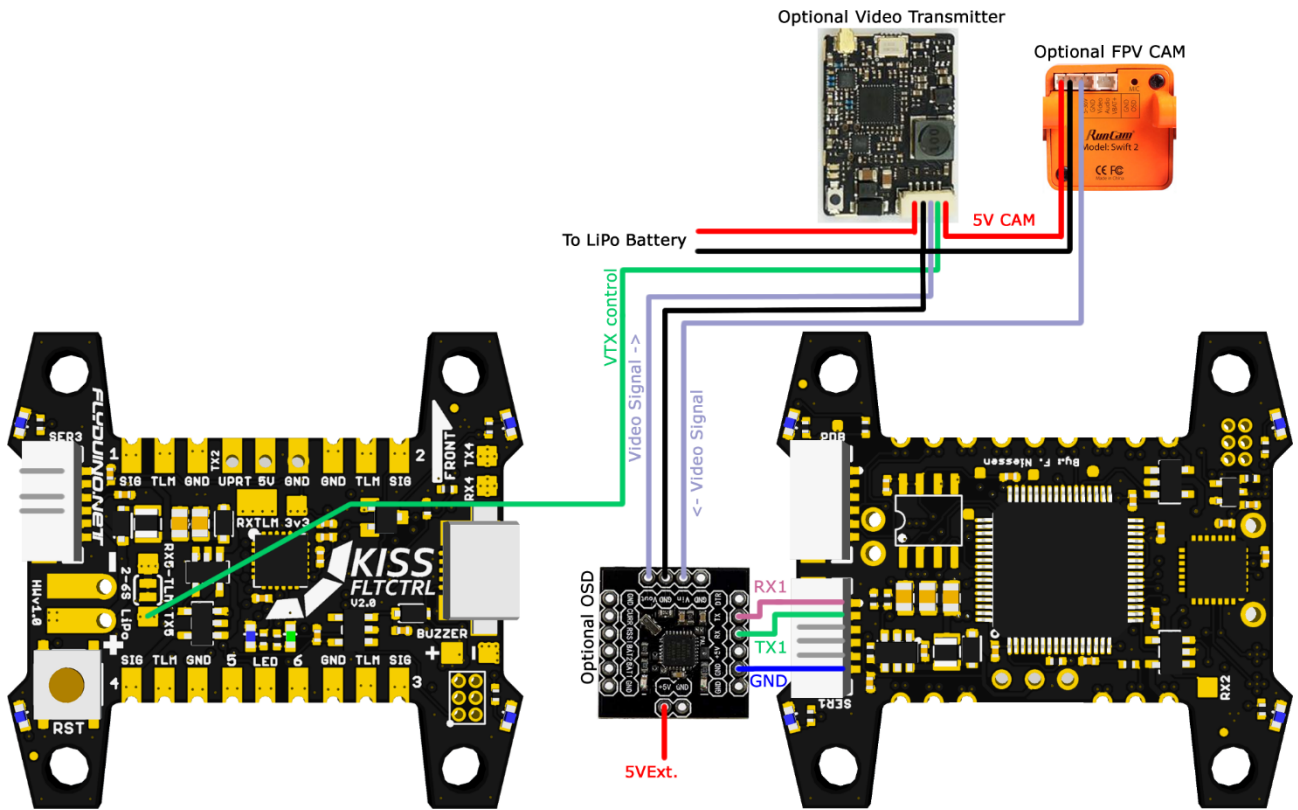
External Modules

Connecting the MinimOSD – special firmware required.

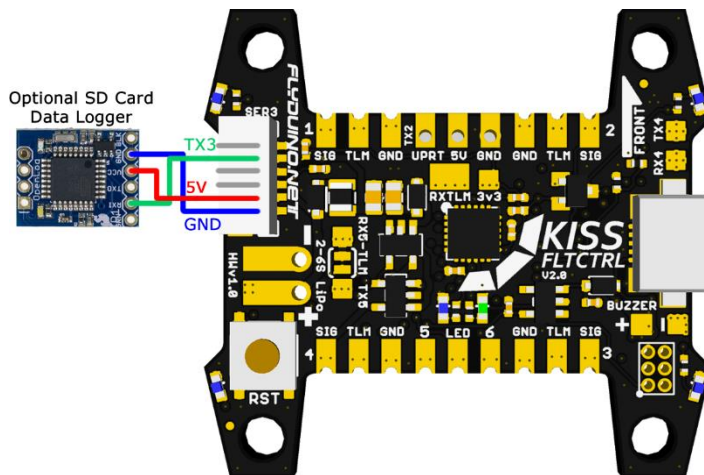
Tutorials: Getting started with Arduino. We recommend using Arduino IDE v1.0.5

<https://www.arduino.cc/en/Guide/HomePage>

Connect a Minim OSD and FPV System:



Connect a flight data logger (open log)





Technical data

- STM32F722RET6 MCU, ARM-Cortex M7 with FPU running at 216Mhz
- MPU6000 Gyro and ACC Sensor
- Integrated DCDC converter for direct LiPo battery input (2-6S 6-30V) max 500mA on 5V
- The first four ESC outputs are amplified to 5V Signal with very fast drivers (for a clear Dshot signal)
- CP2102 USB-UART USB controller for simpler updates with the KISS Bootloader



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