Flyduino KISS Flight Controller V2 Manual v1.0

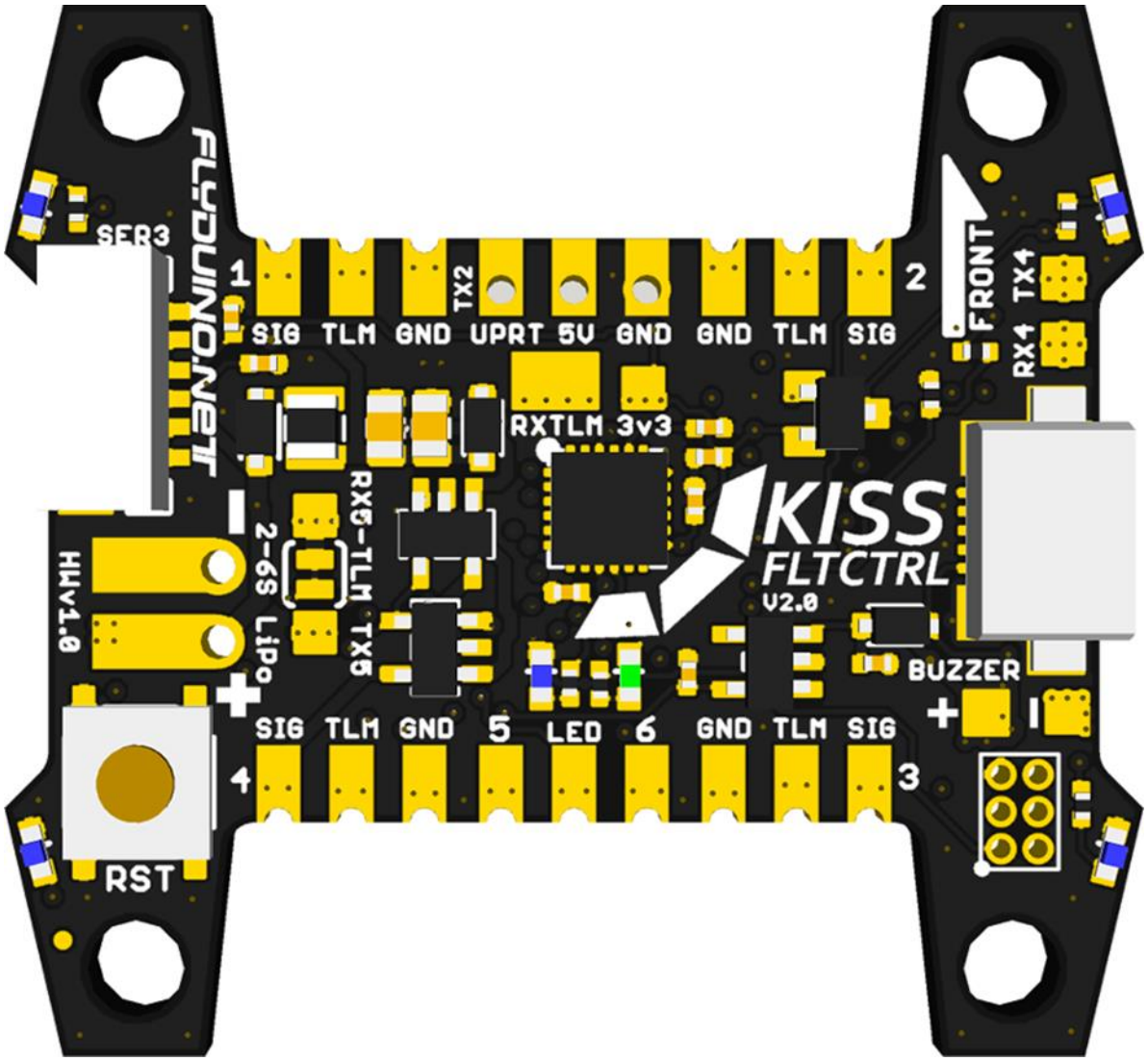

image: Upper / Top Side

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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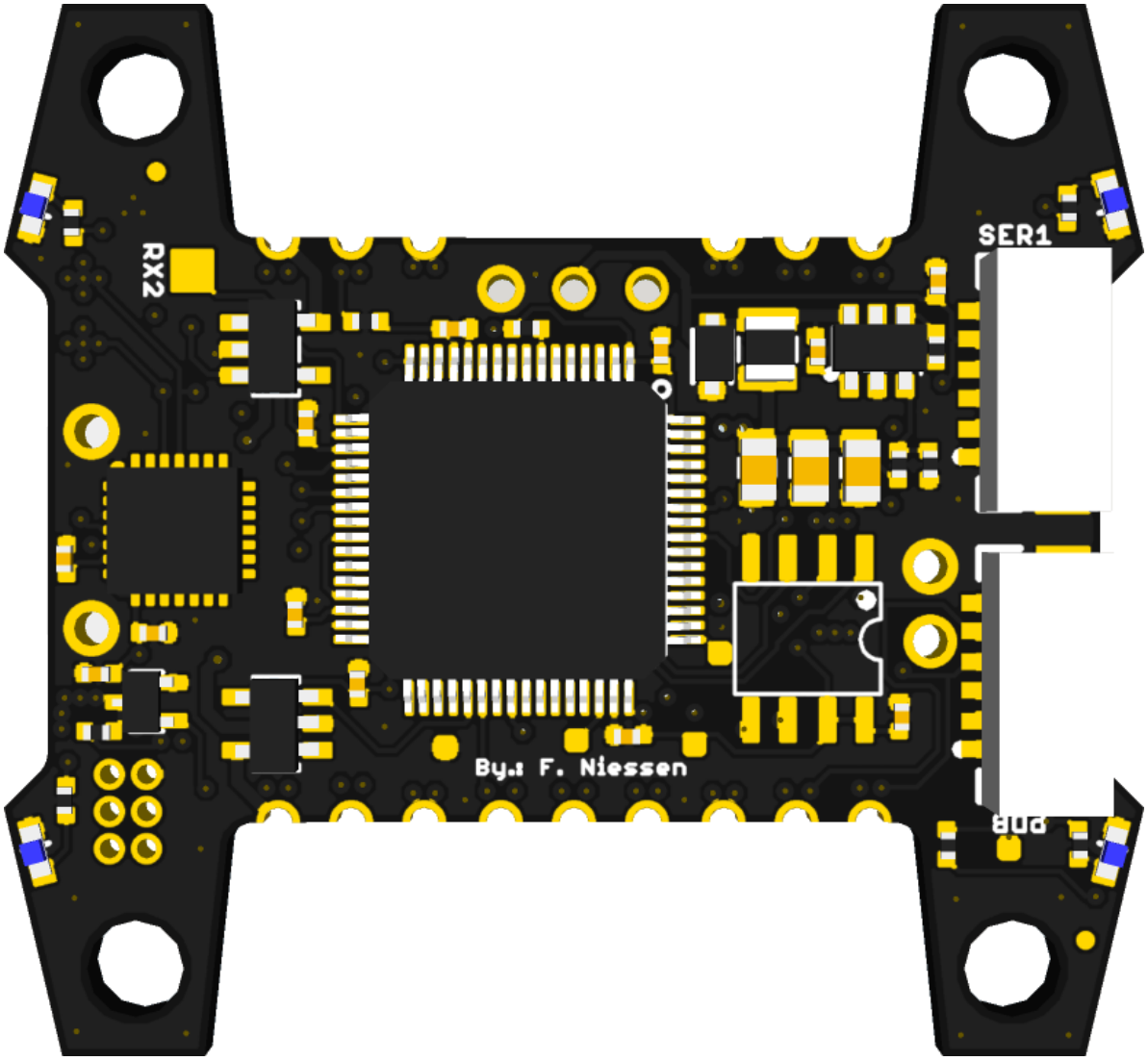


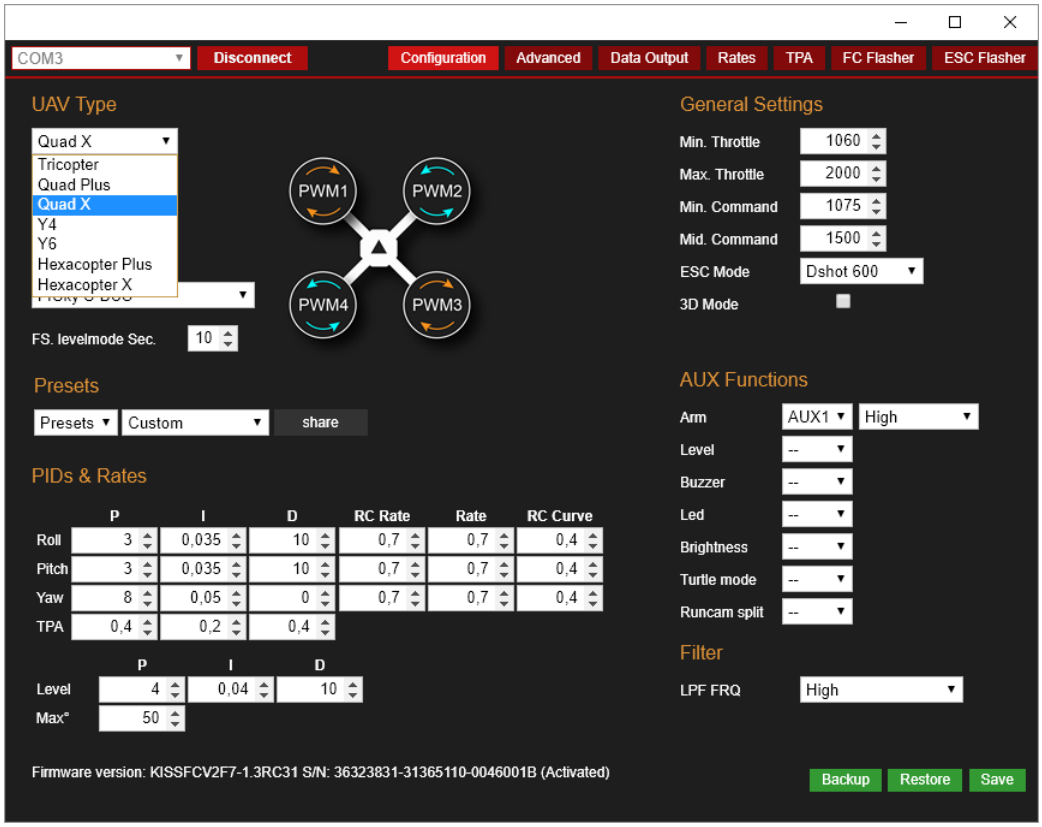
Image: Lower / Bottom Side

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.

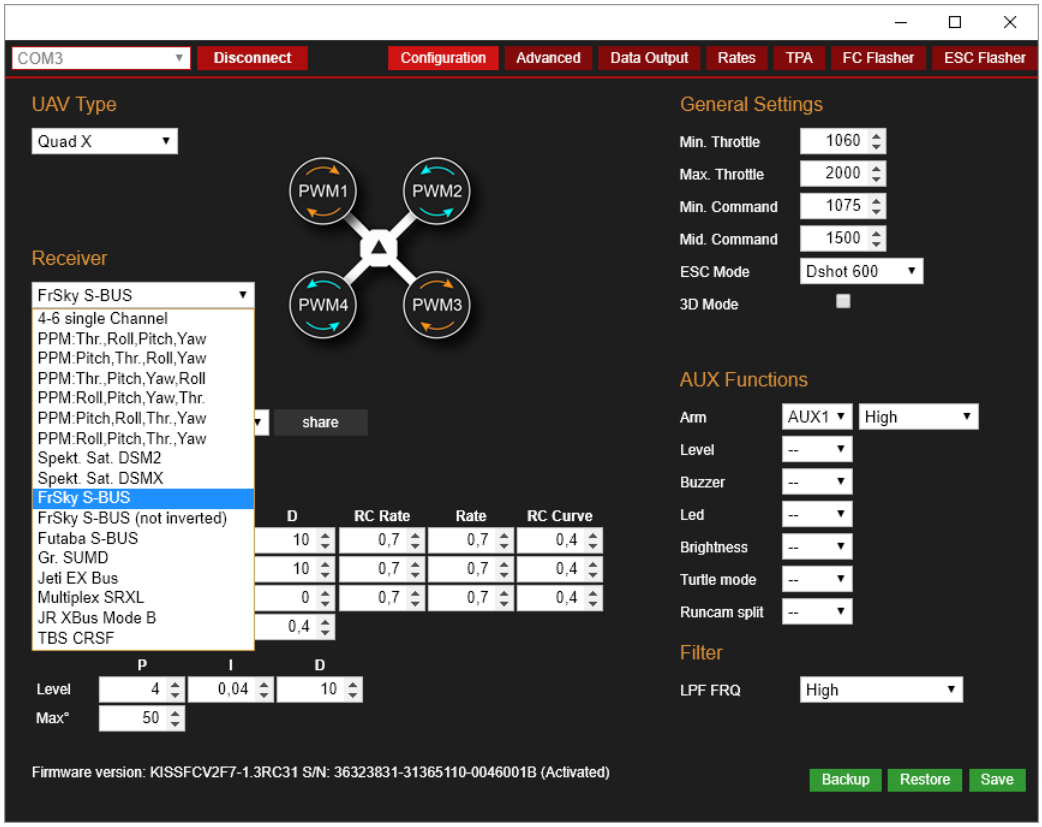
Supported Copter Frames

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



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



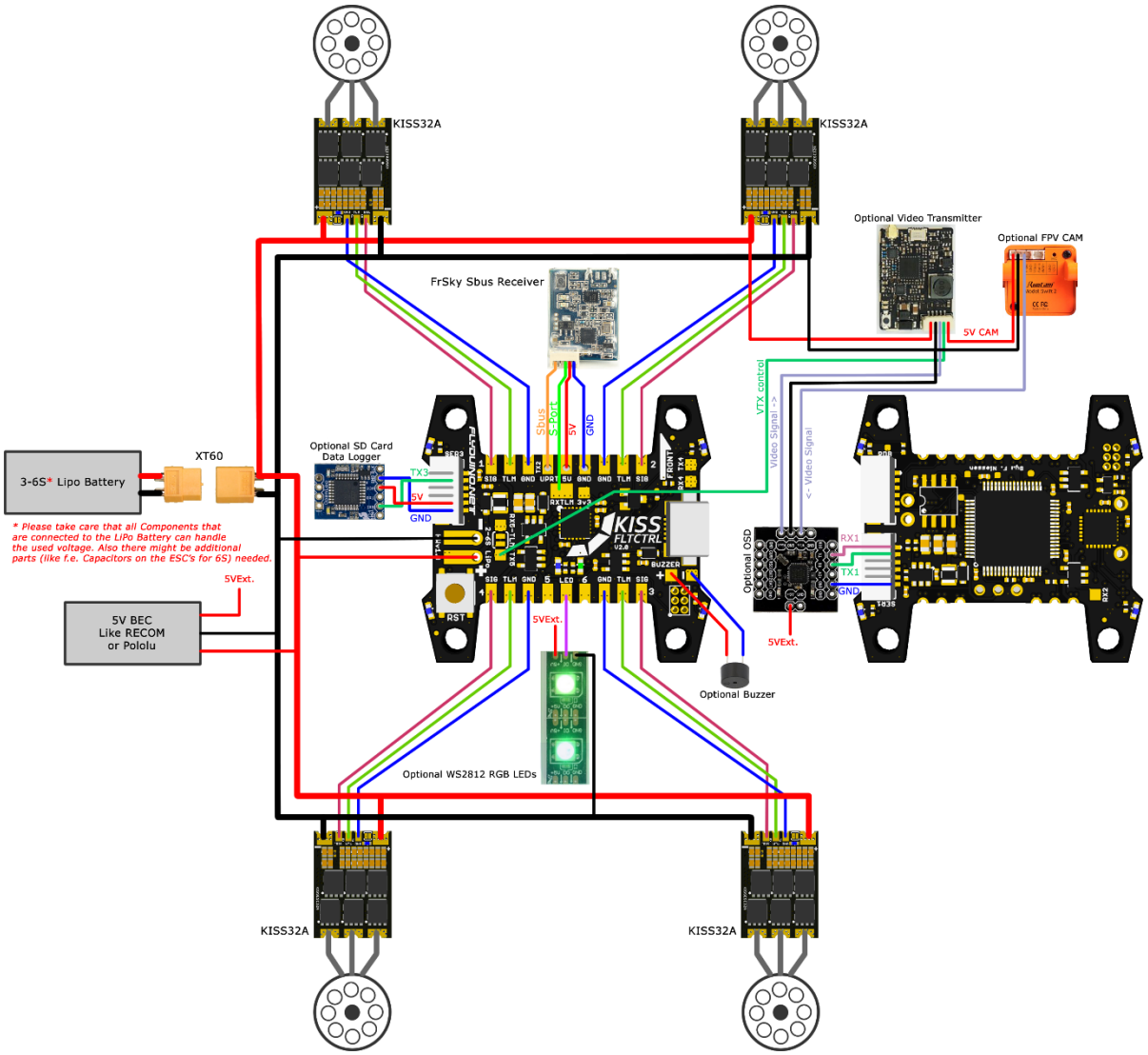
There are 8 Receiver inputs and channels: 4 for the sticks and 4 AUX channels 1-4

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

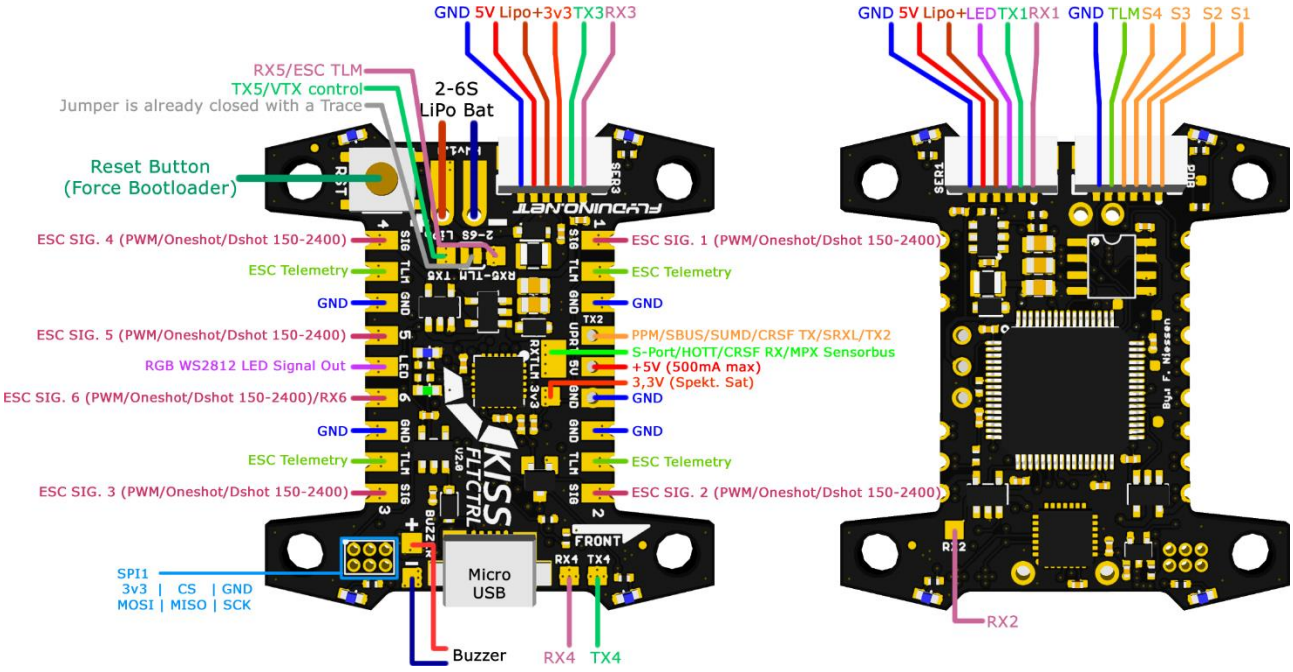
There are 6 ESC outputs for 2-6 Motors.
The first 4 ESC Outputs are in place for use on the most common QuadX Copter type
Here's a recommended wiring diagram:



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

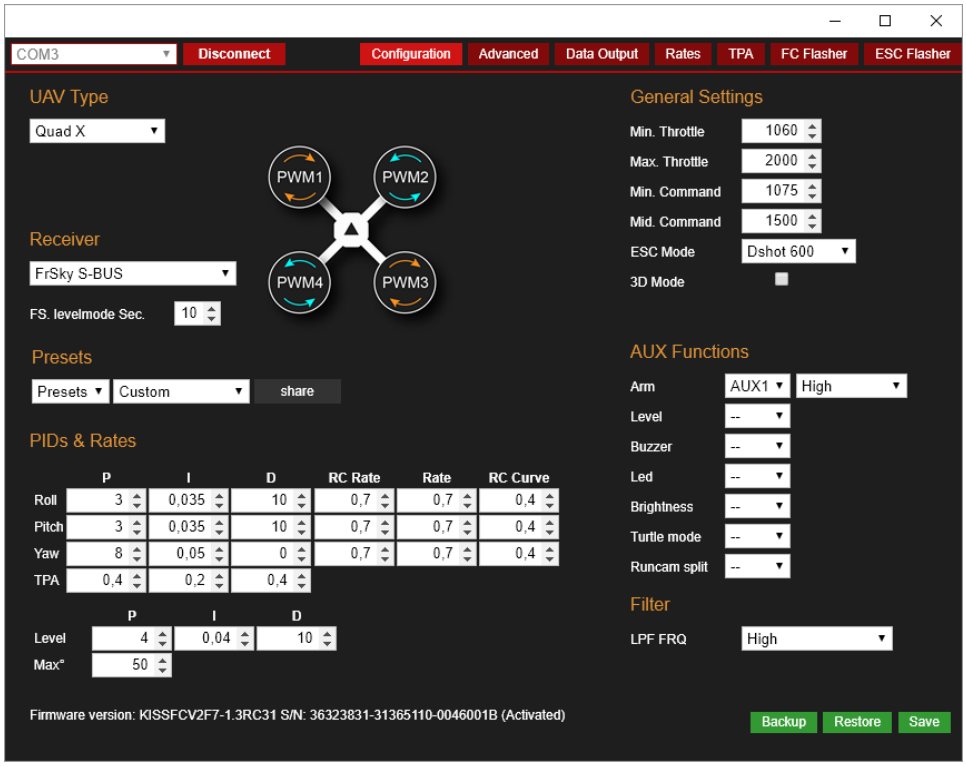
All available pins and connections:

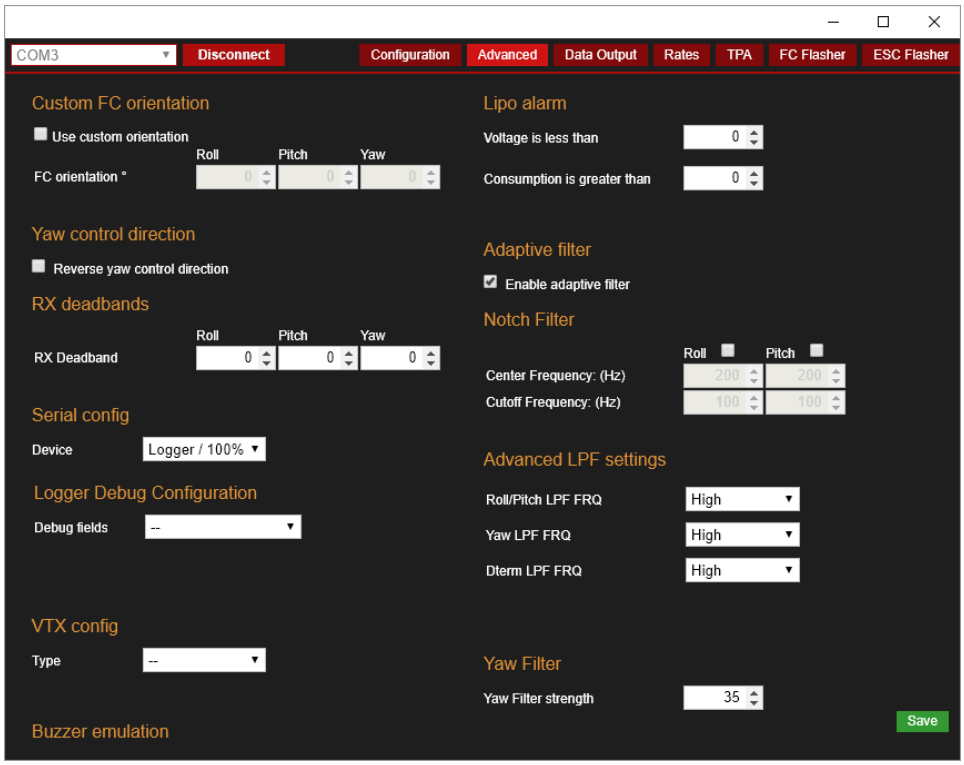


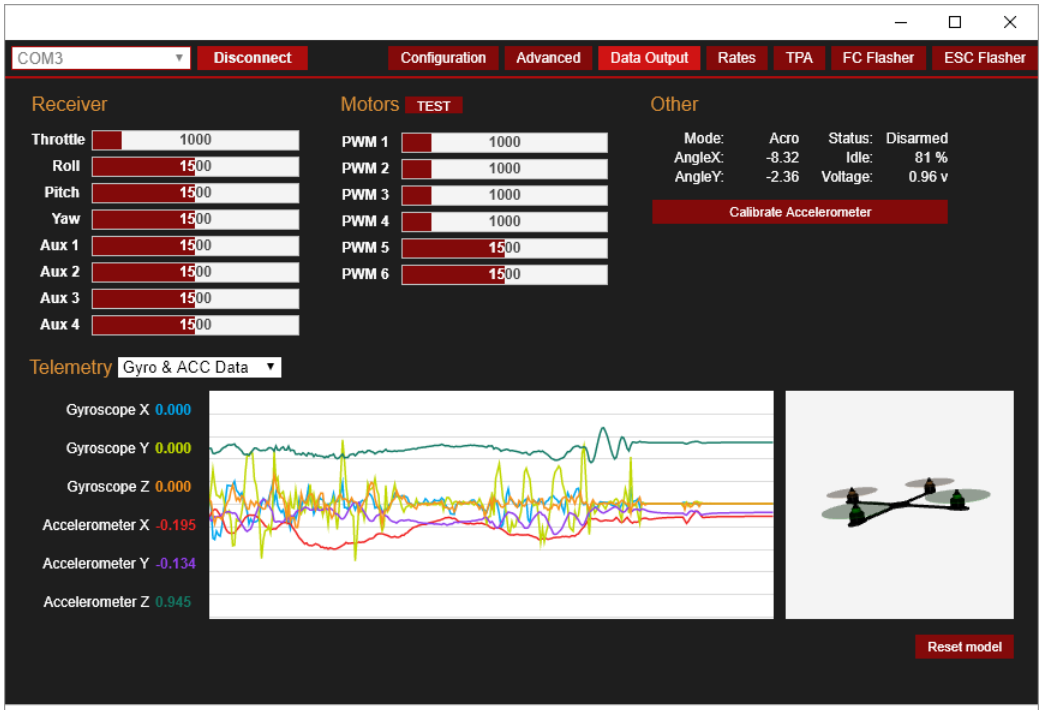
The 6pin sockets (SER1, SER3 and PDB) are used with the KISS Distribution board cable. (6pin 1mm)
e.g..:

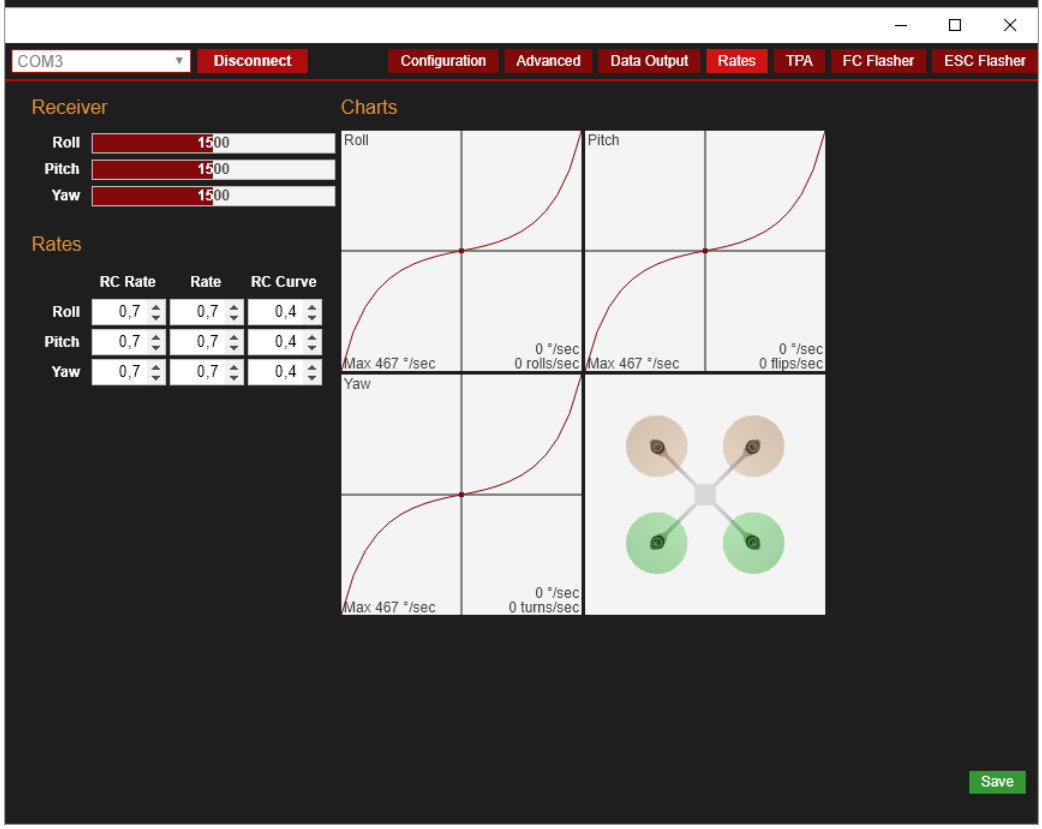
GUI (Graphical User Interface)

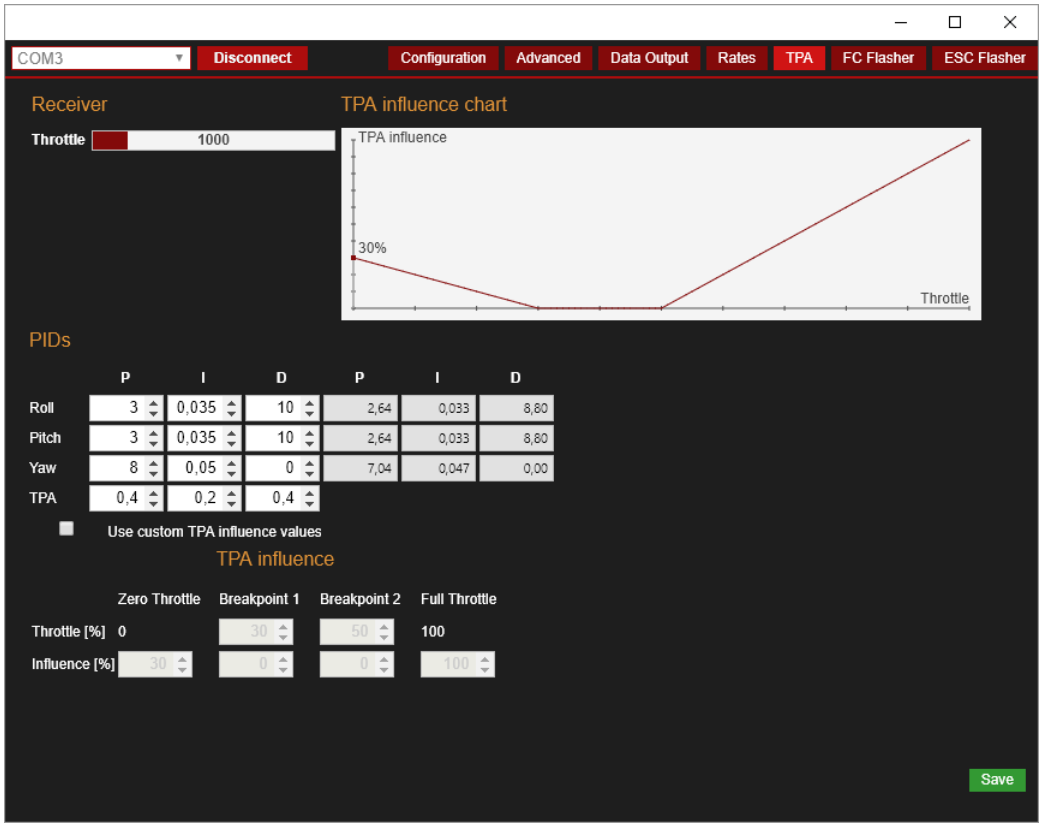
The GUI (versions for Win, Mac, iOS and Android available) consists of 7 pages: The „Welcome“ page with all connections, the „Configuration“ page for the settings, “Advanced” for advanced settings, the „Data Output“ for Sensorgraphs, Rates, TPA and the two Flasher tabs.

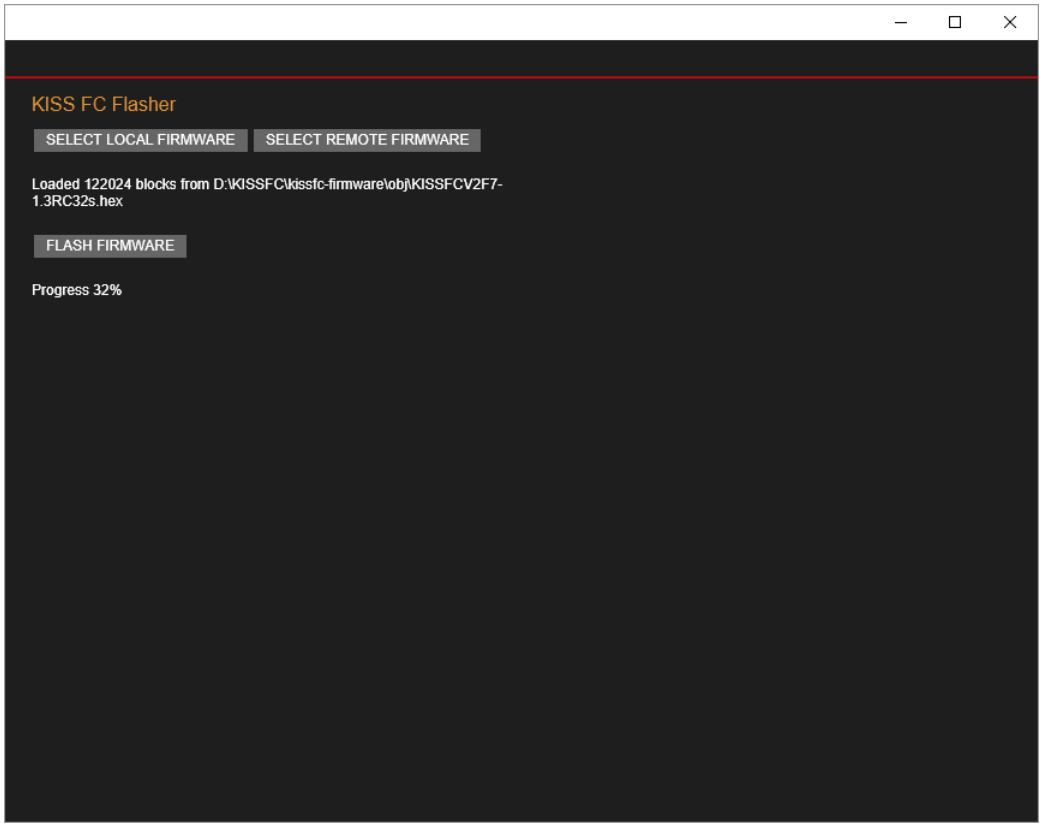


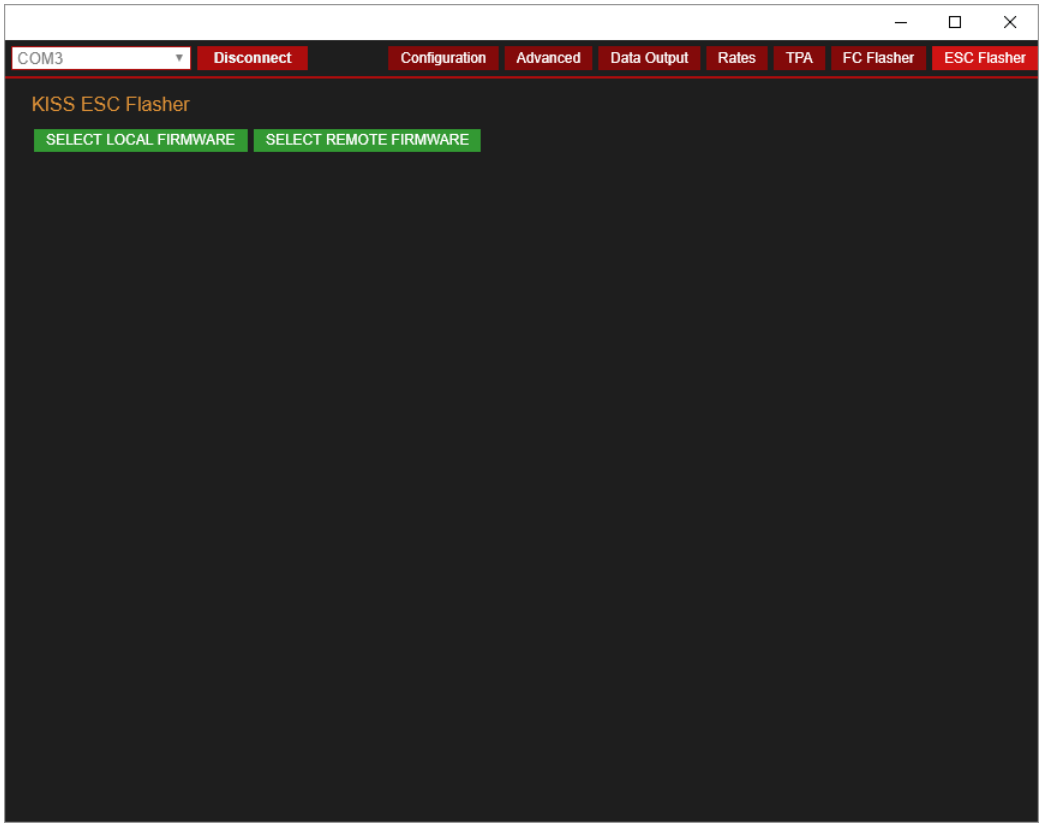



COM3
Disconnect
Configuration
Advanced
Data Output
Rates
TPA
FC Flasher
ESC Flasher
Receiver
Throttle 1000
Roll 1500
Pitch 1500
Yaw 1500
Aux 1 1500
Aux 2 1500
Aux 3 1500
Aux 4 1500
Motors TEST
PWM 1 1000
PWM 2 1000
PWM 3 1000
PWM 4 1000
PWM 5 1500
PWM 6 1500
Other
Mode: Acro
Status: Disarmed
AngleX: -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 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
Roll
Max 467 °/sec
0 °/sec
0 rolls/sec
Pitch
Max 467 °/sec
0 °/sec
0 flips/sec
Yaw
Max 467 °/sec
0 °/sec
0 turns/sec
Save


COM3
Disconnect
Configuration
Advanced
Data Output
Rates
TPA
FC Flasher
ESC Flasher
Receiver
Throttle
1000
TPA influence chart
TPA influence
30%
Throttle
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%

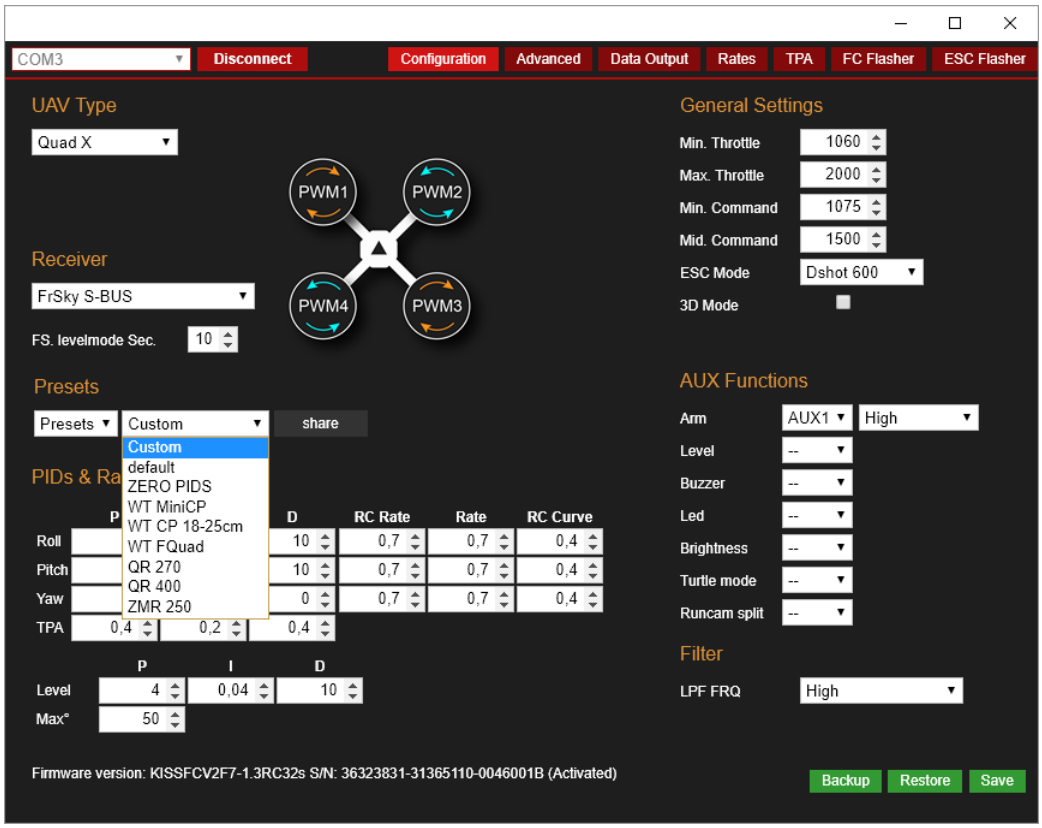


Note: If you press the Reset (RST) Button after you connected the FC to your PC, the GUI will automatically switch to the “Flasher” tab once you connect it.

Installation & Setup

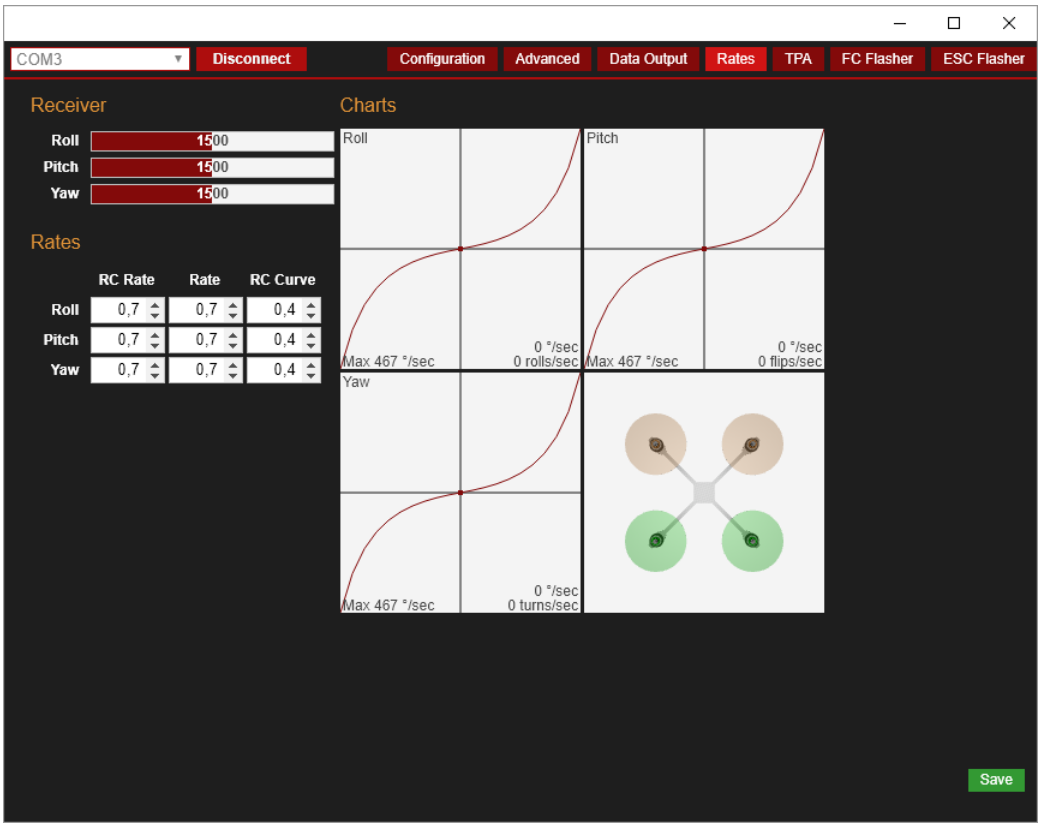
Just plug in the FC via Micro USB connection to your PC. Drivers should be installed automatically on WIN7-10.
After the installation is complete, unplug the FC from the USB, plug it in again and hold the FC firm and level for at least 5 seconds!
The green LED will be lit constantly while the blue LED 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



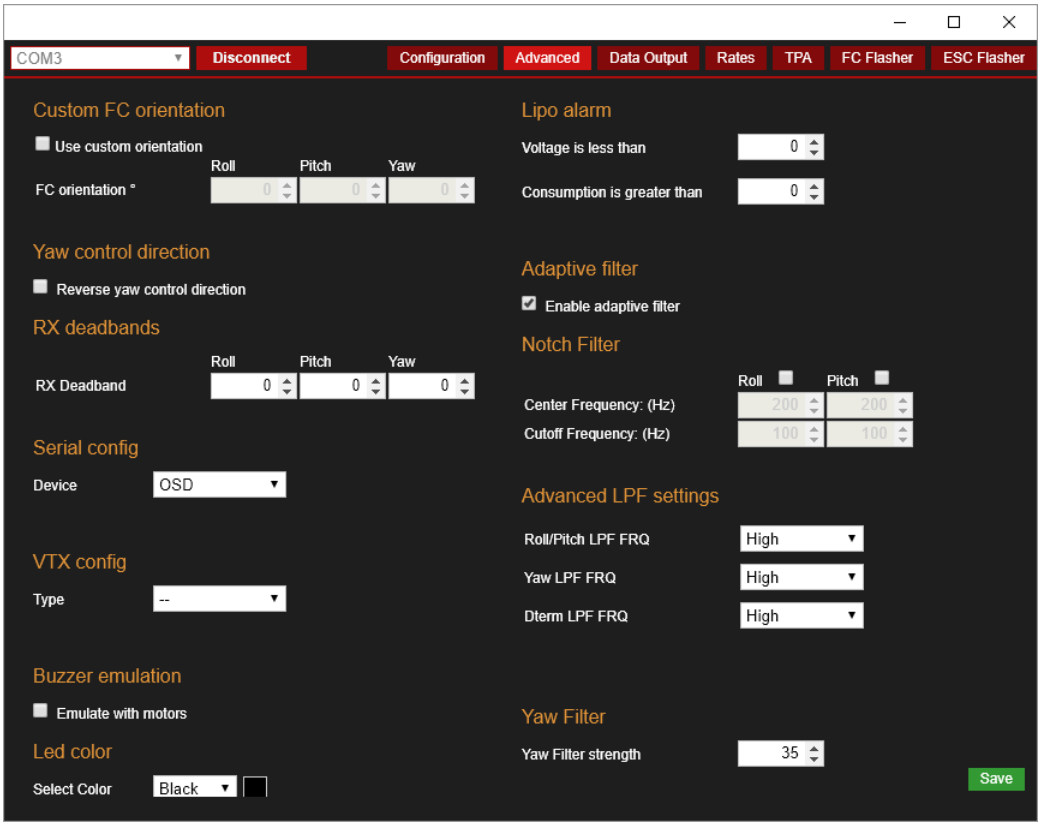
Adjust your settings with care! Only use small steps to increase or decrease the numbers and only one at a time. To make a start easier the GUI offers pre-defined PIDs for several setups tested by skilled pilots. More presets will be available once user share theirs.

PID and Rate Tuning



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.

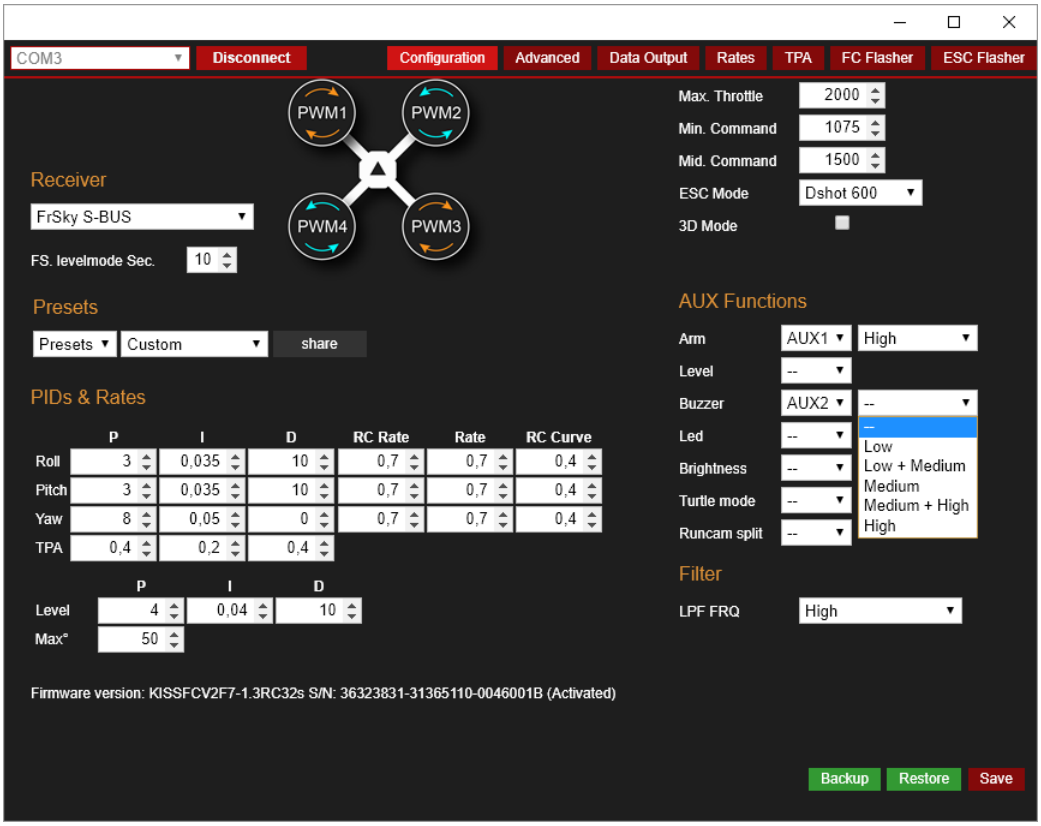
Filters and oscillations



The 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.

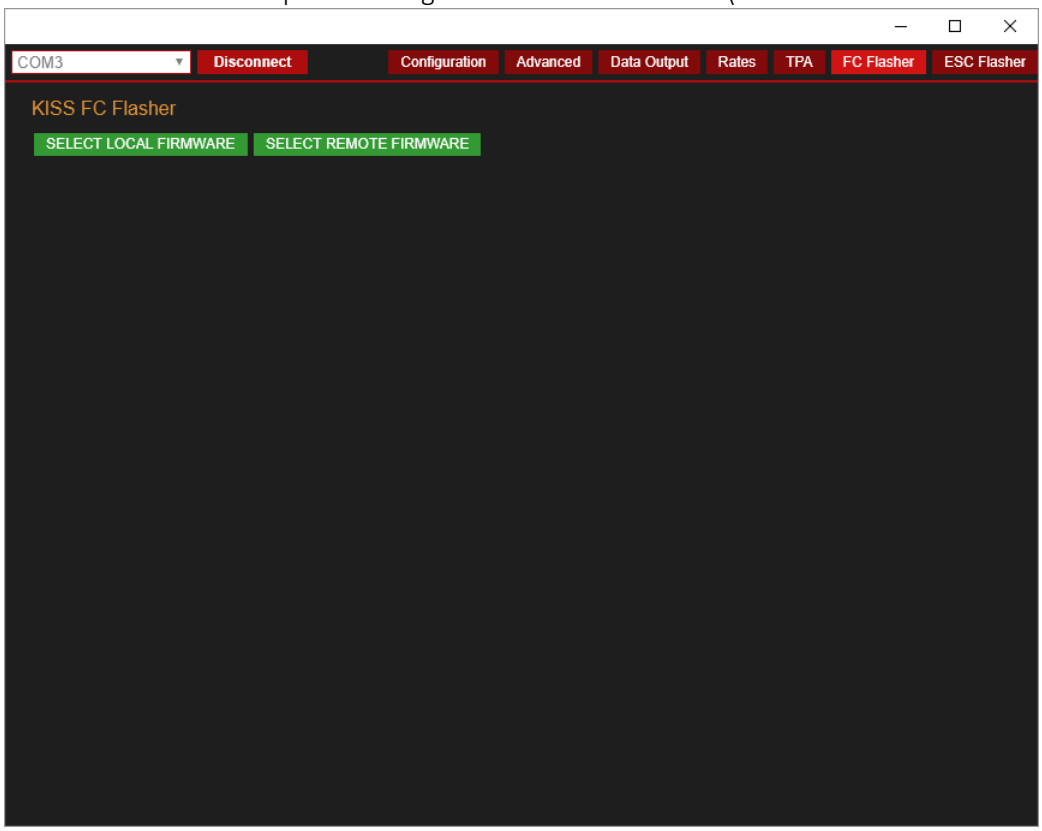
AUX Channel Settings



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.

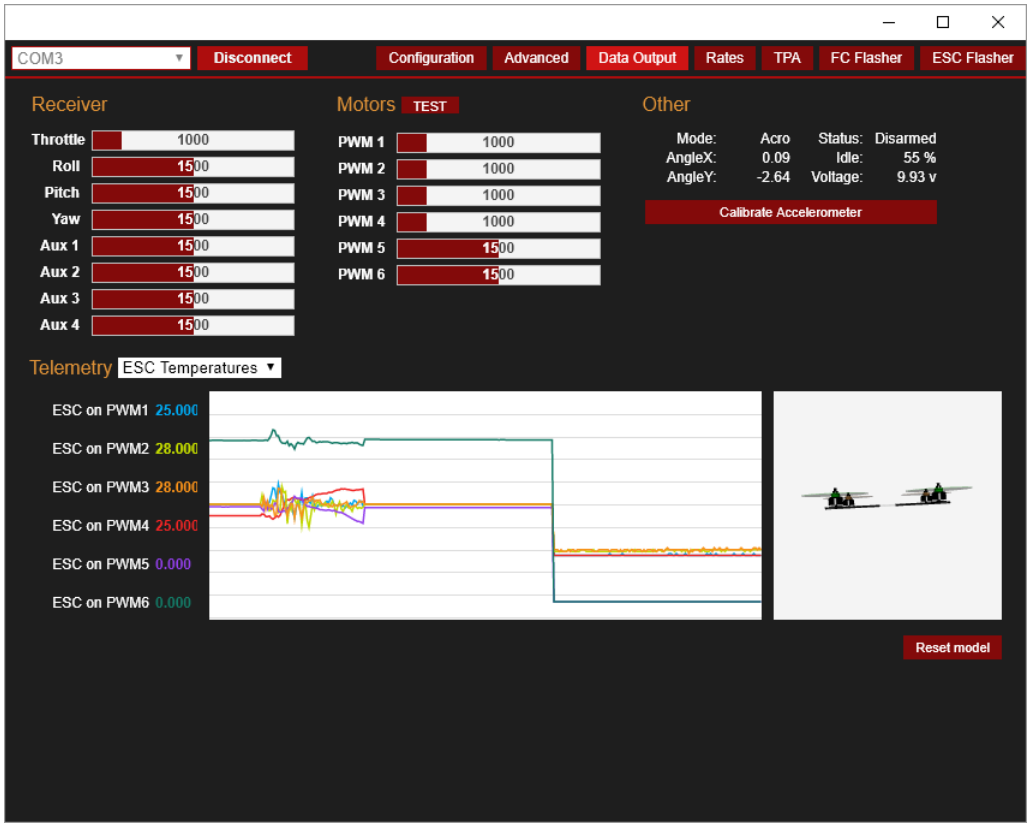
Important! After flashing the FC you might need to reboot and connect it to the PC with internet connection. It will read your serial number and activate the FC. If the FC is not activated you will see the blue LED flashing once every second.

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



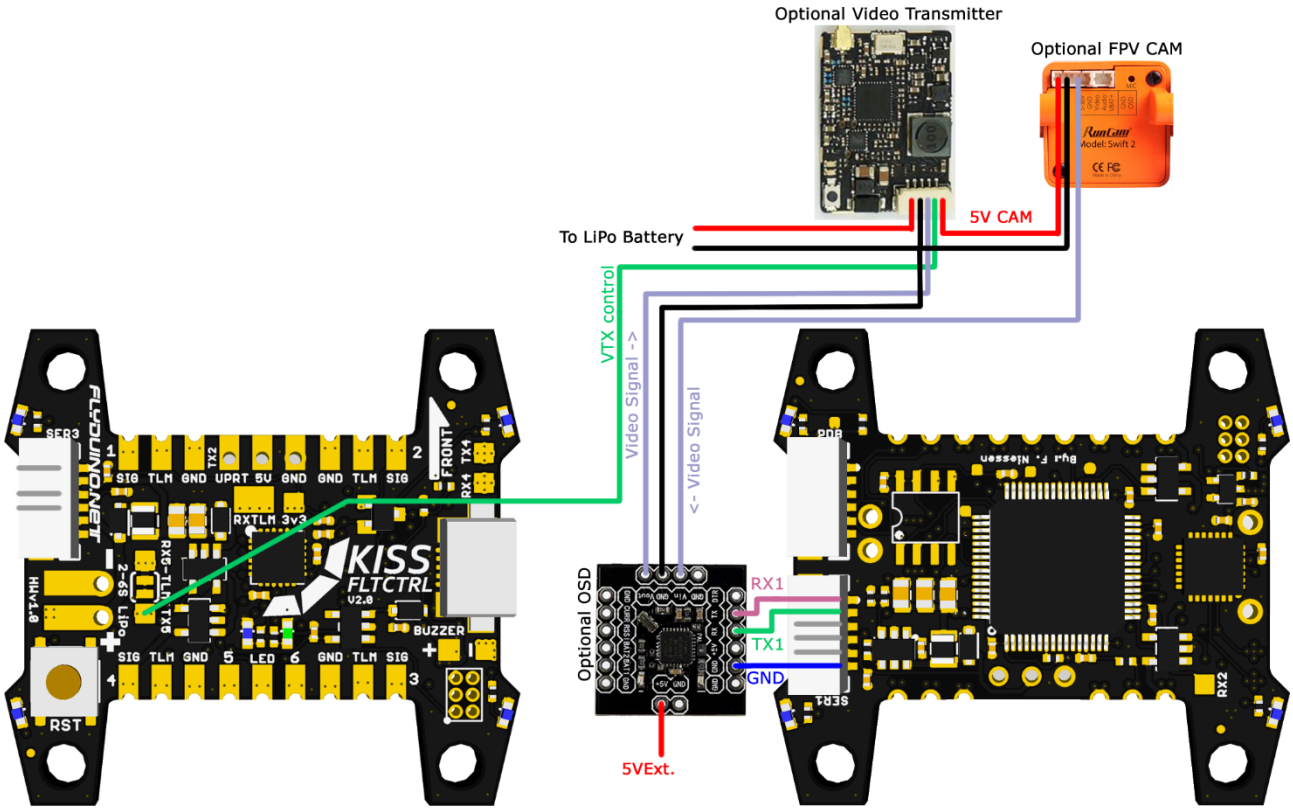
Telemetry of the KISS FC and ESC24A can be viewed on the „Data Output“ page.
- external Modules for Telemetry and OSD, e.g. KISS ESC 24A/32A Telemetry via OSD

External Modules

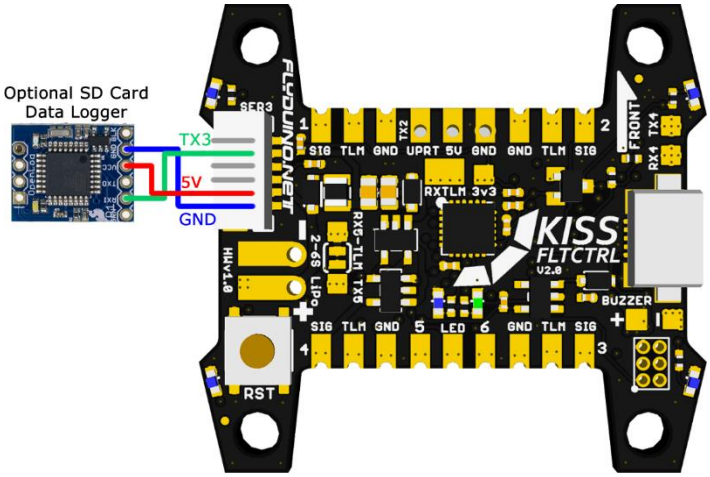
Connecting the MinimOSD – special firmware required.

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 amplifyed 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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