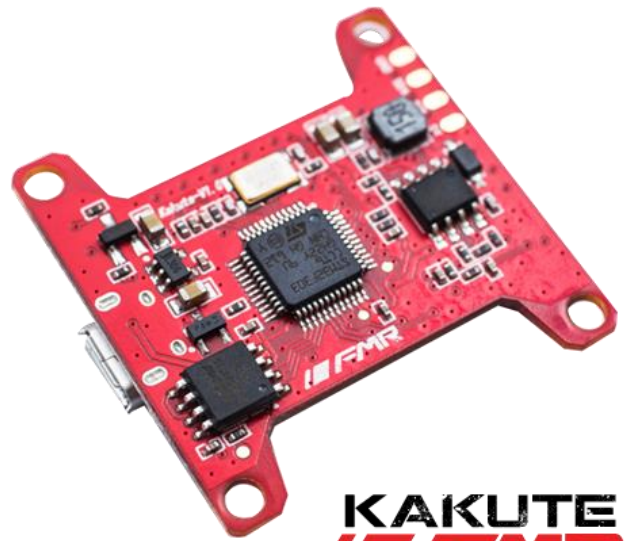


KAKUTE

Flight Controller Manual

Features:

- Recessed, sideways pin headers. Also enables soldering of all wires directly to pads without use of any pin headers.
- Dedicated Boot button for easy firmware flashing.
- Reinforced solder pads for trouble-free direct soldering.
- Extremely low profile design.
- Input voltage 7v to 42v. Power the board directly from flight pack up to 6S (on 'BAT' pad only!).
- VIN + VBAT merged - A single wire to power the board will provide voltage input and Telemetry/OSD voltage data.
- Filtered voltage output - output 5v 800mA (and 3.3v 150mA where applicable) to power peripherals such as GPS, RX, BLACKBOX, OSD. 5v/3.3v RX selectable.
- Cleanflight support (RACE target).
- BLHeli flashing supported by hardware
- Raceflight ready
- Betaflight ready



Specifications:

- STM32F303CCT6(256kB flash) 32-bit processor
- MPU6050 Gyro/Accelerometer
- High quality, gold plated PCB
- Micro USB connector for programming
- Dimensions: 36x36x6mm (includes USB in height)
- Mounting Holes: 30.5mm square to center of holes
- Weight: 4.2g

Package Includes:

- 1x Kakute Flight Controller
- 1x 2.54mm Pitch pin headers
- Quick Start Guide

Warranty & Return Policies :

Technical staff of our after-sales service centre will examine the returned product to identify the problem.

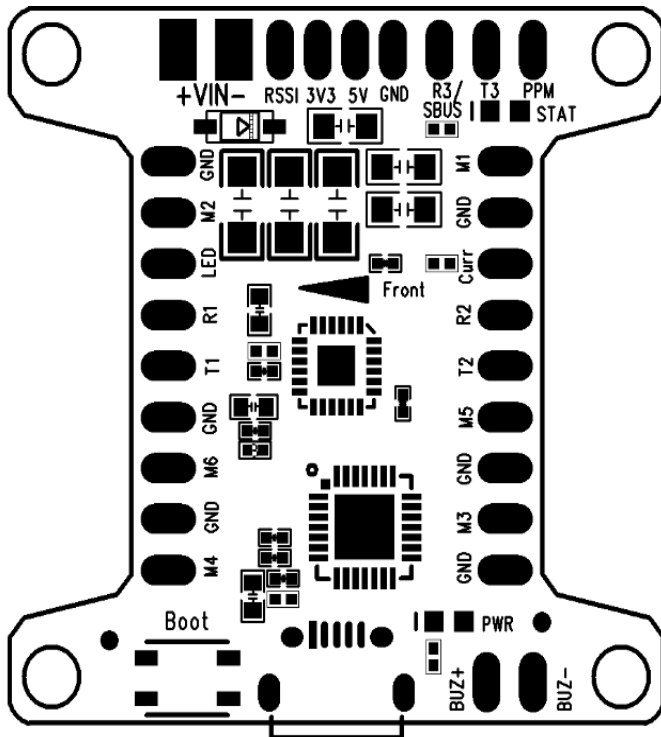
In the case of product failure due to defective material or manufacturer workmanship within the 60 days from the date of purchase, the product will be repaired or replaced (decided by the manufacturer) with no charge to the customer, returning shipping cost are at the expense of the customer under all circumstances.

Crash/accidental damage or overload of the on-board regulator (too many devices connected drawing too much current) will not be accepted as a warranty claim.

Returned items should include the original packaging and any accessories originally supplied. Please Contact your supplying dealer for support and warranty claims.

Board Layout:

Top

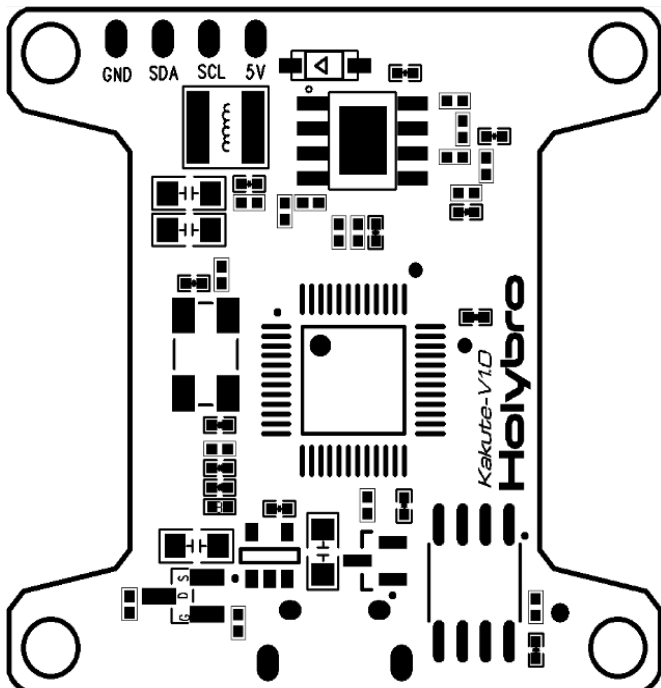


Pin

Function

VIN+	Battery+, Input Voltage 7-42v
VIN-	Battery-
RSSI	RSSI
3V3	3.3V Output 150mA
5V	5V Output 800mA
GND	Ground
R3/SBUS,T3	UART3 RX/SBUS or other serial connections, UART3 TX
PPM	PPM Input
M1	PWM Output (Motor 1)
GND	Ground
Curr	Current Sensor
R2,T2	UART2 RX, TX
M5	PWM Output (Motor 5)
GND	Ground
M3	PWM Output (Motor 3)
GND	Ground
BUZ-	Buzzer+
BUZ+	Buzzer-
M4	PWM Output (Motor 4)
GND	Ground
M6	PWM Output (Motor 6)
GND	Ground
R1,T1	UART1 RX, TX
LED	Digital LED Output
M2	PWM Output (Motor 2)
GND	Ground

Bottom



Pin

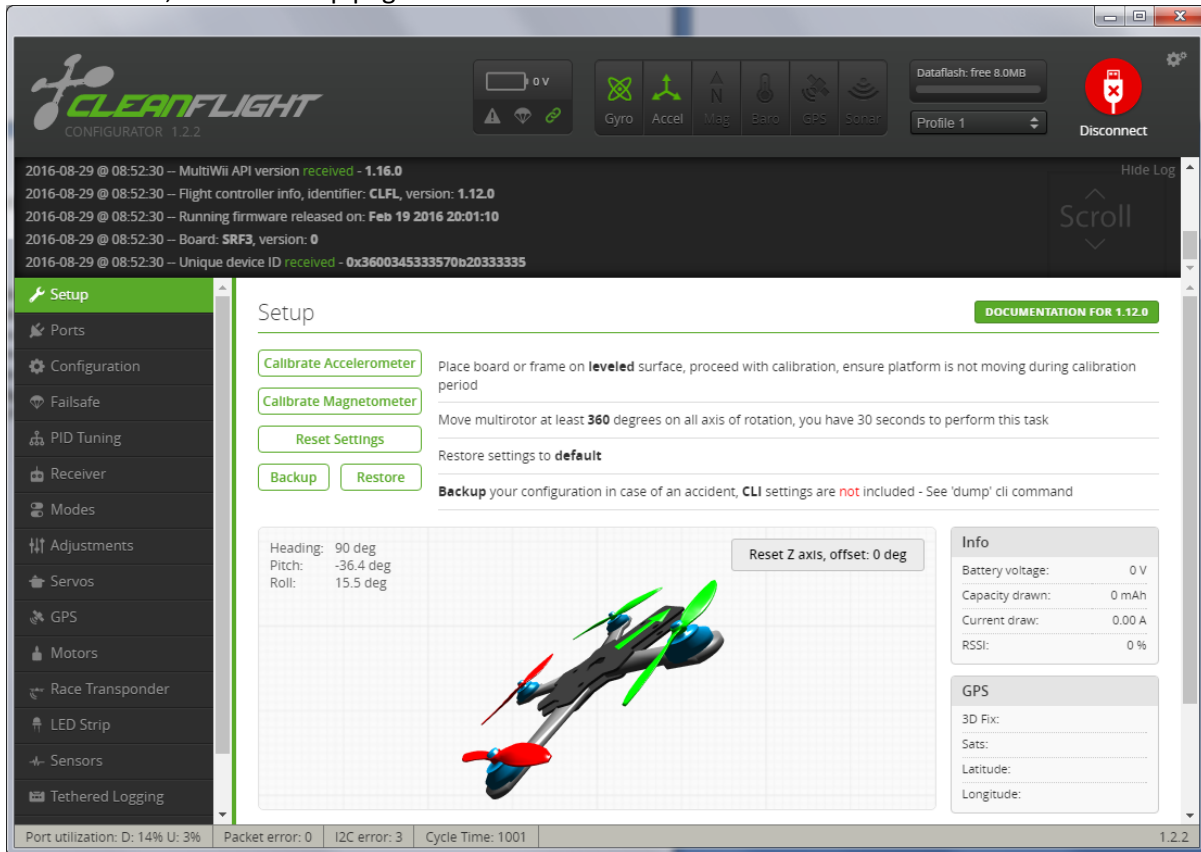
Function

5V	5V output 800mA
SCL	I2C Bus
SDA	I2C Bus
GND	Ground

Software/ Firmware / Installation guide:

Initial Setup:

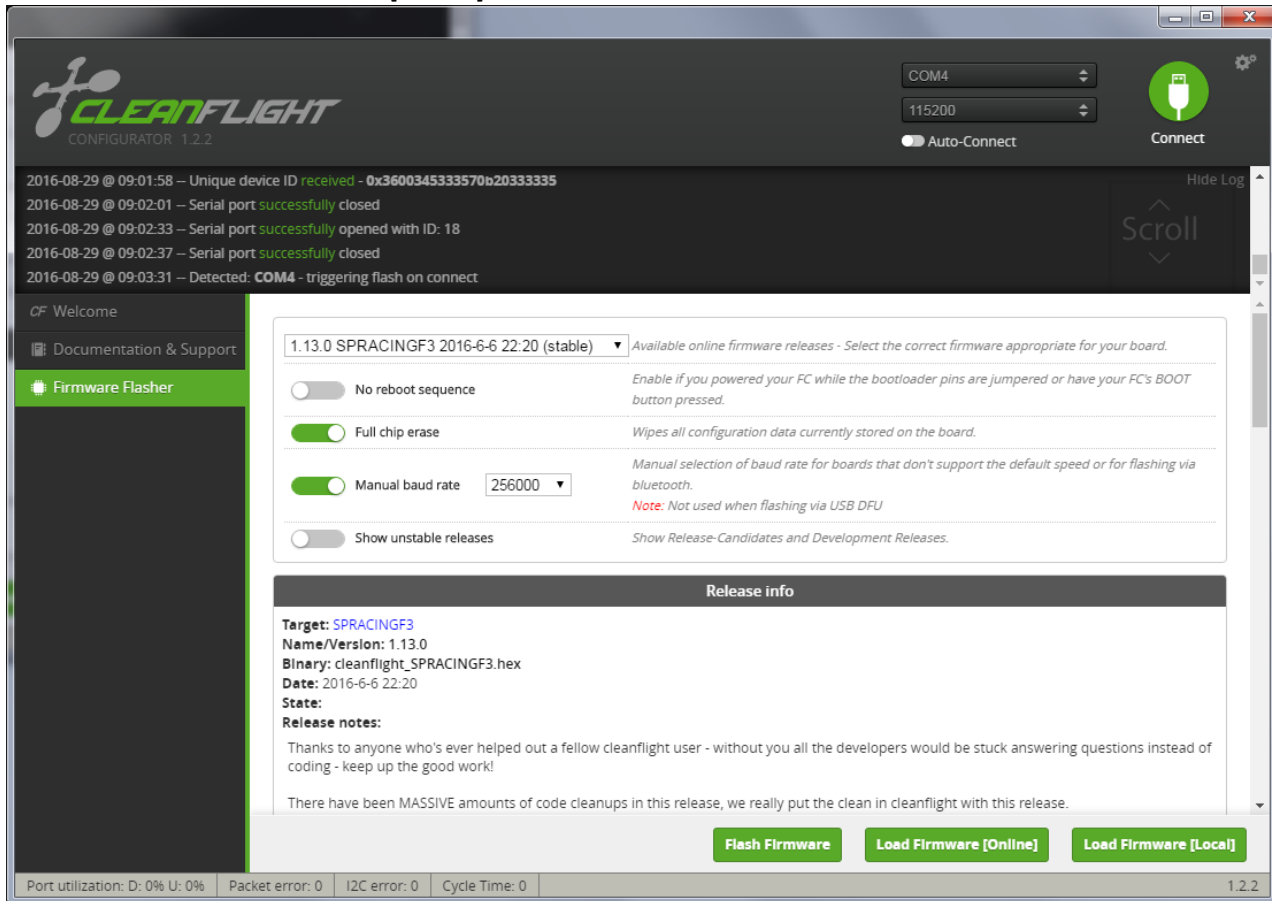
- Install latest Silicon Labs CP2102 USB to UART Bridge VCP Drivers
<http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpcdrivers.aspx>
- Install and launch the Cleanflight Configurator tool
<https://chrome.google.com/webstore/detail/cleanflight-configurator/enacoimjcgeinfnnnpajinjgmkahmfgb>
- Connect Katute to computer via USB cable.
- On the Cleanflight Configurator select the correct COM port if it is not automatically detected.
- Click Connect, and the Setup page should come into view:



However before installing the FC and configuring Cleanflight we recommend you always flash to the latest available firmware (See next Page)

Firmware installation:

- Click Disconnect if you're still connected
- Select Firmware Flasher
- Ensure the 'No reboot Sequence' option is off
- Enable 'Full chip erase'
- Enable & Set 'Manual baud rate' to 256000 or alternatively 115200 if 256000 fails
- From the 'Choose Firmware / Board' drop down menu ensure you select the latest firmware for the 'SPRACINGF3' target, for example '1.13.0 SPRACINGF3 2016-6-6 22:20 (stable)' as below:
- Click on 'Load Firmware [Online]' and after a few seconds the latest release info release notes will appear



- Click on 'Flash Firmware' and the flashing process will begin:

Recovery / Lost communication

If you have lost communication with your board follow these steps to restore communication:

- Power off
- Enable 'No reboot sequence', enable 'Full chip erase'.
- Jumper the BOOT pins or hold BOOT button.
- Power on (activity LED will NOT flash if done correctly).
- Install all STM32 drivers and Zadig if required (see **USB Flashing** section of cleanflight manual).
- Close configurator, Close all running chrome instances, Close all Chrome apps, Restart Configurator.
- Release BOOT button if your FC has one.
- Flash with correct firmware (using manual baud rate if specified in your FC's manual).
- Power off.
- Remove BOOT jumper.
- Power on (activity LED should flash).
- Connect normally.

Flashing ...

Flash Firmware Load Firmware [Online] Load Firmware [Local]

DO NOT UNPLUG THE USB PORT WHILE FLASHING, WAIT UNTIL YOU SEE 'Programming: SUCCESSFUL' displayed:

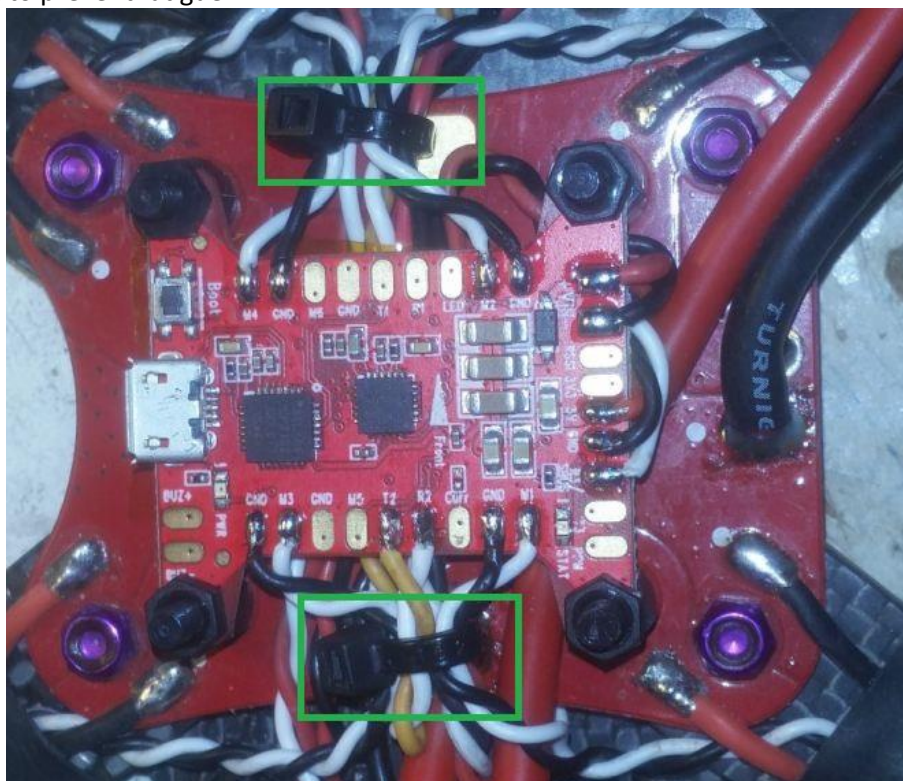
Programming: SUCCESSFUL

Hardware Installation:

For ease of installation we recommend you apply solder to all required headers and twist + tin all cables prior to soldering the wires to the PCB:



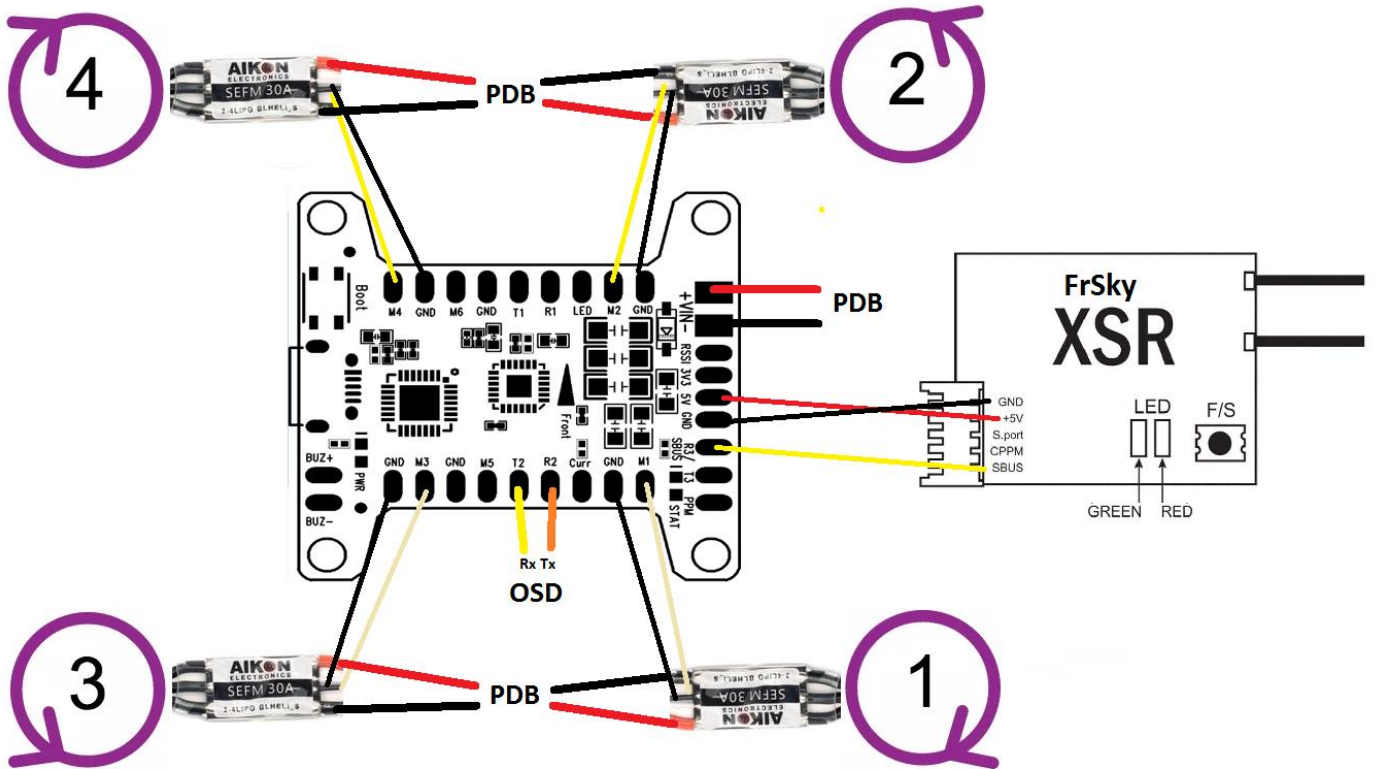
When using soldered connections in high vibrate environments using some form of wiring support is recommended near the solder joint to prevent fatigue:



Wiring Diagrams:

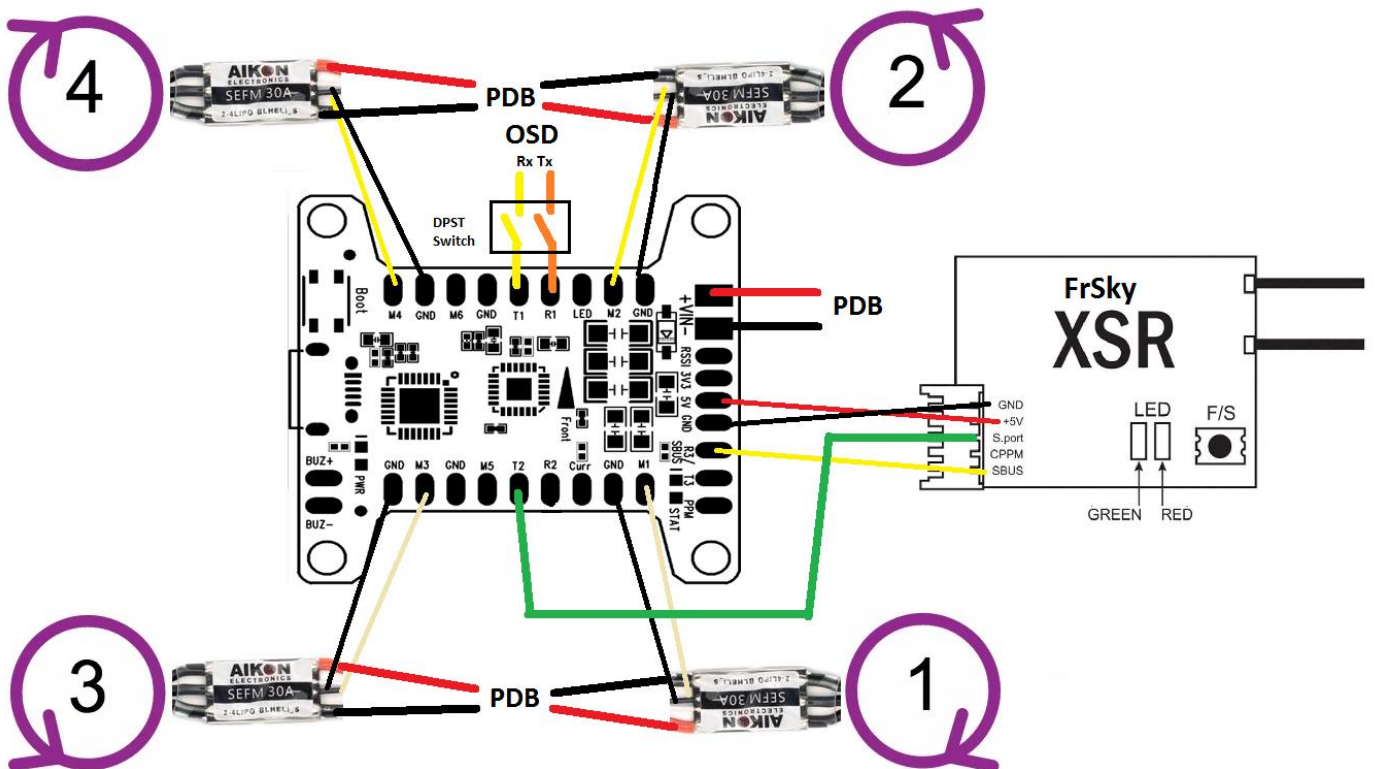
The following two diagrams are recommended for a typical FPV 'X' quadcopter. Be sure to take note of the front '^' arrow for correct board orientation

Wiring diagram with SBUS & OSD connected:



Wiring diagram with FrSKY S.Port Telemetry, SBUS & OSD connected

Note: A DPST switch is required when using UART 1 with OSD as UART1 is shared with the USB port as both cannot be used concurrently.



Basic Cleanflight Setup:

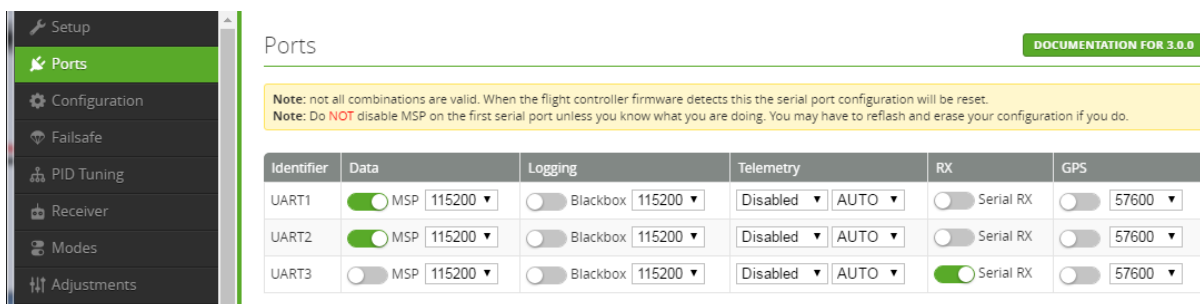
Once the FC is installed, **REMOVE ALL PROPELLERS**, power up your quadcopter, bind your receiver & connect to Cleanflight - the Setup page will come into view

Accelerometer Calibration:

- Place the quadcopter on a flat, level surface
- On the Setup page, click the 'Calibrate Accelerometer' button & wait until process is completed
- Pick the quad up and point it at your monitor. Click the 'Reset Z axis' button and ensure the 3d model mimics any movement of the quad you make (this ensures board orientation is correct)

Serial Port Configuration A (Only for those using a Serial Rx and optional OSD):

- Select the 'Ports' Tab.
- If you're using an SBUS or Spektrum based Serial receiver you must enable 'Serial Rx' on UART 3
- If you plan to use a Minim OSD (not covered in this guide), you must also enable 'MSP' on UART2
- Click 'Save and Reboot'



Ports DOCUMENTATION FOR 3.0.0

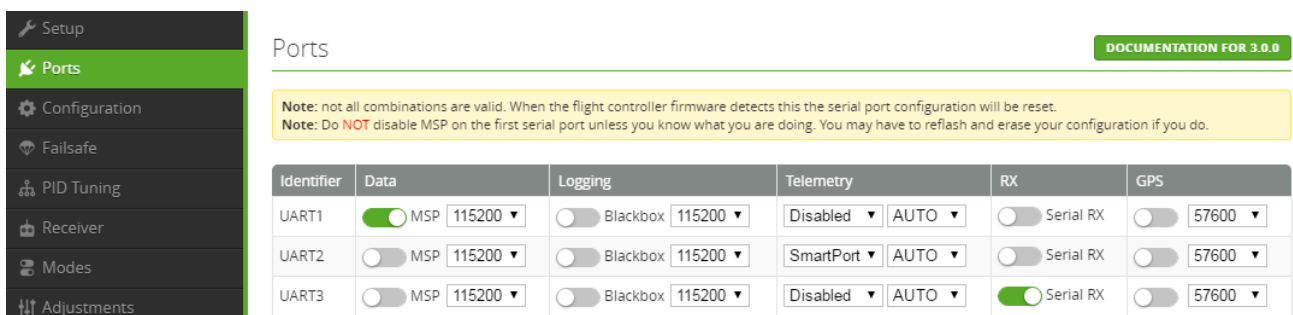
Note: not all combinations are valid. When the flight controller firmware detects this the serial port configuration will be reset.
Note: Do NOT disable MSP on the first serial port unless you know what you are doing. You may have to reflash and erase your configuration if you do.

Identifier	Data	Logging	Telemetry	RX	GPS
UART1	<input checked="" type="checkbox"/> MSP 115200 ▾	<input type="checkbox"/> Blackbox 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/> Serial RX	<input type="checkbox"/> 57600 ▾
UART2	<input checked="" type="checkbox"/> MSP 115200 ▾	<input type="checkbox"/> Blackbox 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/> Serial RX	<input type="checkbox"/> 57600 ▾
UART3	<input type="checkbox"/> MSP 115200 ▾	<input type="checkbox"/> Blackbox 115200 ▾	Disabled ▾ AUTO ▾	<input checked="" type="checkbox"/> Serial RX	<input type="checkbox"/> 57600 ▾

Serial Port Configuration B (for FrSKY S.port Telemetry + SBUS and optional OSD):

Note: On this board, UART1 MSP is shared with the USB port to connect to the GUI for configuration. As such only UART 2 or 3 can be used for S.port + SBUS. OSD can still be connected via UART1 as it uses the MSP protocol but a DPST Switch is required to isolate the OSD when using the USB port as they cannot be used concurrently.

- Select the 'Ports' Tab
- On UART 2 under Telemetry select 'SmartPort' & 'Auto'
- On UART 3 Enable 'Serial Rx'
- Click on Save and Reboot
- Select the 'Configuration' Tab
- Scroll down to the 'Other Features' Box and enable 'TELEMETRY'
- Click on Save and Reboot
- On your Taranis's Telemetry page select 'Discover new sensors' and all the new telemetry info will appear.



Ports DOCUMENTATION FOR 3.0.0

Note: not all combinations are valid. When the flight controller firmware detects this the serial port configuration will be reset.
Note: Do NOT disable MSP on the first serial port unless you know what you are doing. You may have to reflash and erase your configuration if you do.

Identifier	Data	Logging	Telemetry	RX	GPS
UART1	<input checked="" type="checkbox"/> MSP 115200 ▾	<input type="checkbox"/> Blackbox 115200 ▾	Disabled ▾ AUTO ▾	<input type="checkbox"/> Serial RX	<input type="checkbox"/> 57600 ▾
UART2	<input type="checkbox"/> MSP 115200 ▾	<input type="checkbox"/> Blackbox 115200 ▾	SmartPort ▾ AUTO ▾	<input type="checkbox"/> Serial RX	<input type="checkbox"/> 57600 ▾
UART3	<input type="checkbox"/> MSP 115200 ▾	<input type="checkbox"/> Blackbox 115200 ▾	Disabled ▾ AUTO ▾	<input checked="" type="checkbox"/> Serial RX	<input type="checkbox"/> 57600 ▾

IMPORTANT: DO NOT DISABLE MSP on UART 1! DOING SO WILL DISABLE USB COMMUNICATION AND REQUIRE THE BOARD TO BE REFLASHED BY JUMPERING THE BOOTLOADER PINS (not covered in this guide).

Receiver Configuration:

- Select the 'Configuration' tab
- Scroll down to the 'Receiver Mode' box and select your applicable type (RX_SERIAL or RX_PPM)
- If using a serial receiver, In the 'Serial receiver Provider' box you must select the appropriate receiver type
- Click 'Save and Reboot'
- Select the 'Receiver' tab
- Verify your RC Transmitter stick inputs are controlling the associated Roll/Pitch/Yaw/Throttle bars and in the correct direction (sticks left / down = lower number, up / right = higher number), If your inputs are controlling the wrong channel, change the channel map to suit – for example, to swap Roll/Yaw, AETR1234 becomes RETA1234. (R=Rudder or Yaw, E = Elevator or Pitch, T= Throttle and A = Aileron or Roll)
- Use the subtrim on your RC Tx to ensure Roll/Pitch/Yaw channels are exactly 1500 when sticks are centred & 1000/2000 at maximum deflection.

Receiver Mode

RX_PPM PPM RX input

RX_SERIAL Serial-based receiver (SPEKSAT, SBUS, SUMD)

RX_PARALLEL_PWM PWM RX input (one wire per channel)

RX_MSP MSP RX input (control via MSP port)

Serial Receiver Provider

Note: Remember to configure a Serial Port (via Ports tab) and choose a Serial Receiver Provider when using RX_SERIAL feature.

- SPEKTRUM1024
- SPEKTRUM2048
- SBUS**
- SUMD
- SUMH
- XBUS_MODE_B
- XBUS_MODE_B_RJ01
- IBUS

Channel Map

AETR1234

RSSI Channel

Disabled

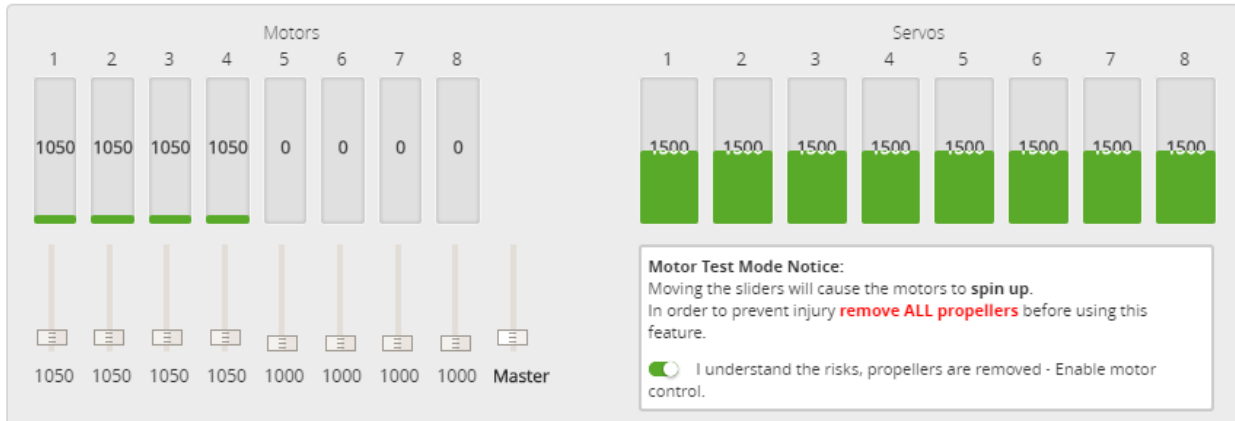
Roll	1500
Pitch	1500
Yaw	1500
Throttle	885
AUX 1	1500
AUX 2	1500
AUX 3	1500
AUX 4	1500

If you can't quite get your Pitch/Roll/Yaw inputs exactly 1500 after adjusting sub trims, we recommend adding some deadband equal to the amount of error in your sticks (2-4 is usually required with a Taranis + XSR)

RC Deadband	Yaw Deadband
3	3

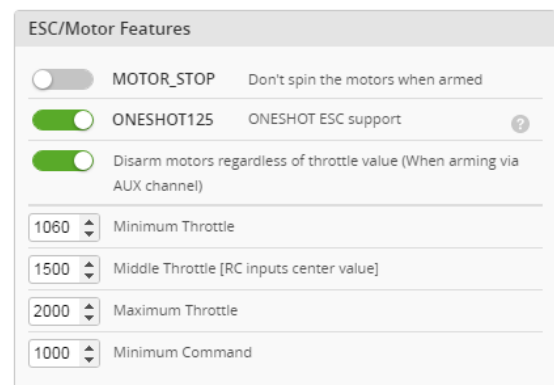
Motor Setup:

- Select the 'Configuration' tab
- IF your ESC's support it, enable 'ONESHOT125' in the 'ESC/Motor features' box
- Select the 'Motors' Page
- **REMOVE ALL PROPELLERS**
- Connect the battery if it isn't already
- Enable Motor Test Mode
- Click on the 'Master' slider once
- Using the Arrow keys on your keyboard, use the up/down arrow to slowly increase the master slider until all motors start rotating consistently.
- Add 10 to this value to get the value for 'Min Throttle' (for example in the picture below, all motors started rotating at 1045, were consistent at 1050 hence my Min Throttle would be 1060)



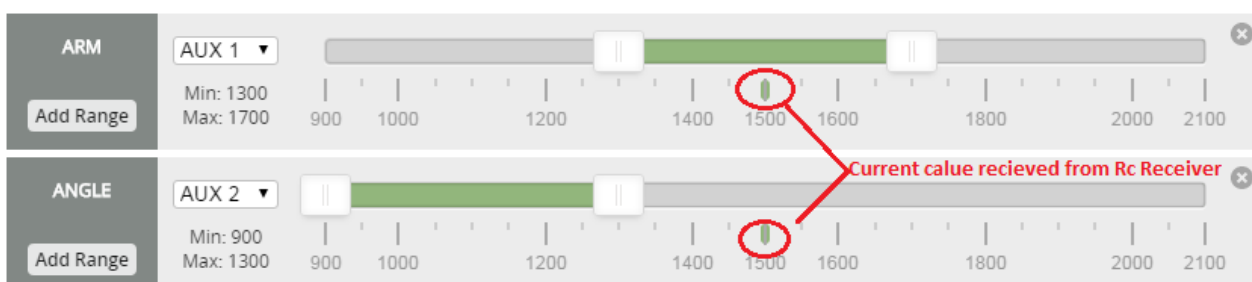
If all motors don't start rotating within 5 units of each other than an ESC calibration is necessary – refer to your ESC's manual.

- Select the 'Configuration' tab
- In the 'ESC/Motor Features' box Enter the Min Throttle value you just worked out
- Set Max Throttle to 2000
- Click on Save and Reboot.



Flight Mode Setup:

- Select the 'Modes' tab
- Click on 'Add Range' on both 'ARM' and 'ANGLE' modes
- Assign a switch on your radio to output on channel 5 (AUX 1 in CF)
- Now when you move the switch you assigned the small green bar under the slider should also move.
- Set the switch to the position where you want the quad to be armed and then drag the slider to cover the small green bar.
- Repeat this process for Angle on channel 6 (AUX 2)
- Click on Save and Reboot



Congratulations you are now ready to fly!