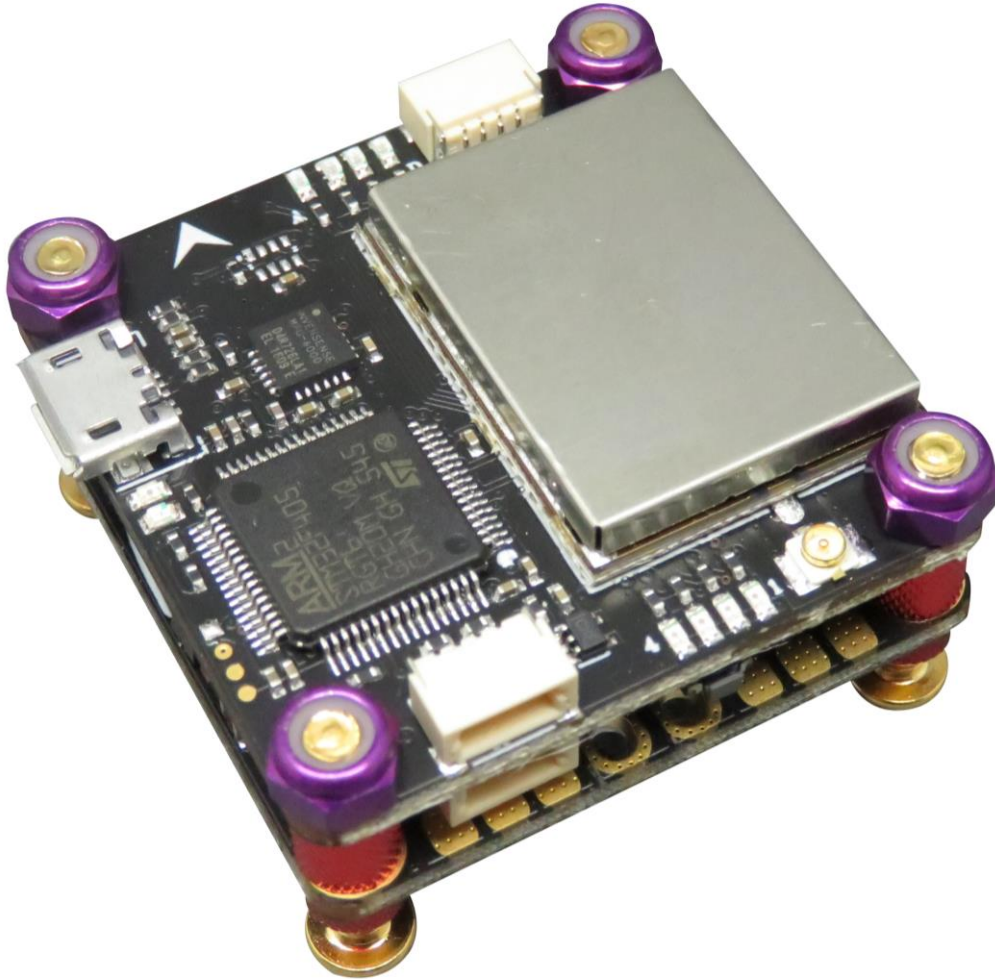


FlyTower F4 Instructions



Warning

Instructions for using

- 1, Please install ANT (must be DONE) before debugging or testing VTX (and OSD) , or lead to VTX not working properly.
- 2, please use proper tools to install FlyTower .It is easy to damage the PCB components by using sharp tools. (warning: Bear in mind that screws do not install too tight between every layer, so as not to destroy the PCB and electronic components).
- 3, When you debug or test flight control Please remove all the propeller; Try not to test indoors, So as not to cause safety accidents. Install the propeller before a test flight, please check again.
- 4, Please check and adjust ESC plate welding, thus brings all the losses and problems, or you should face the consequences.
- 5, Please do not fly your drone near the crowd, for all the losses from the crashed aircraft, you should face the consequences.
- 6, For your safety, please do not use more than 4s battery, Using more than 4s battery would cause safety risk, we will not undertake any responsibility.
- 7, Before power on, please check the positive and negative pole again to make sure whether there is a short circuit .(you also have to check that whether there is a short circuit between your motor cables and you drone's body).
- 8, Please use original screws and fixings to install FlyTower.

Product specifications

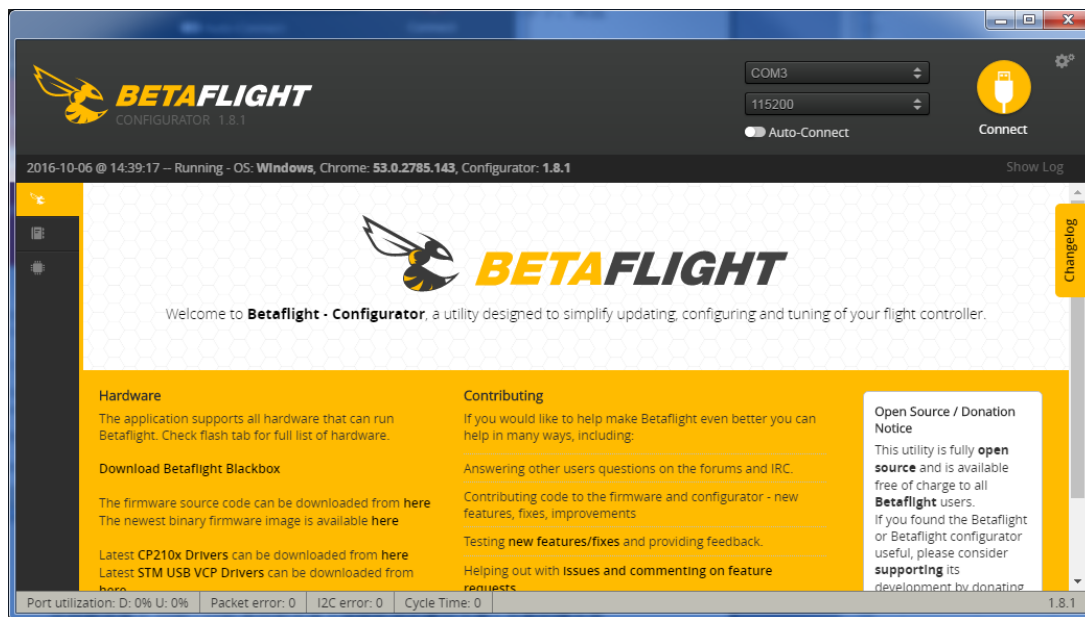
4 in 1 ESC	PDB	Integrated
	Battery Monitoring	Integrated
	FC Power	Integrated
	Operating Voltage	2-4S Lipo
	Maximum continuous operating current	4*40A
	Maximum instantaneous operating current	4*45A(5 Seconds)
	Oneshot 125/42/ Dshot 150/300/600	YES
	BlheliSuite Configurable	YES
	Firmware Vision	BLHeli_S/Dshot 150/300/600 16.5(L_H_00)
	Board Size	36*36mm
	weight	10g
FC&VTX Board	Firmware Vision	Betaflight 3.1(OMNIBUSF4SD F4SD)
	Configure	BetaFlight
	VTX Power	25/200/400mW(MAX 800mW)
	CH	40CH
	OSD Firmware	Betaflight OSD
	Video Camera Voltage	Any stand by 5V Video Camera
	Board Size	36*36mm
	weight	11.4g
FlyTower F4	Any Board weight	21.4g
	total weight	28.7g
	Installation height(Add air-cooling fin)	15mm/20mm
	Screws	M3*18mm
	Recommended Rack Plate Thickness	Not more than 3MM (3mm above the appropriate extension of the screw)

The FlyTower F4 board was designed basing on OMNIBUSF4SD (Betaflight) FC and highly integrated with OSD,BEC,4 in 1 BLHeli_S/Dshot 600 ESC and VTX(25/200/400mW).It gives you all the features what you need in FPV, which makes you easily get into FPV racing.

- ★ Practical - Easy to access connectors
- ★ Configurable - Choose to use connectors
- ★ Stackable - Mount our 4 in 1 ESC
- ★ Compact - Only 36x36x15mm.(Add air-cooling fin MAX 36*36*20MM)
- ★ Weight - 28.7 grams and 2 stack boards
- ★ Professional - Symmetrical, Neat and Tidy and Easy to install in any racing drone
- ★ 36x36mm board with 30.5mm mounting holes
- ★ STM32 F405 MCU, Runs Betaflight firmware(supported from v3.1)
- ★ SD card slot
- ★ Use MPU6000 as Acc & gyro over SPI Bus
- ★ STM32 controls OSD chip over SPI in DMA mode, less CPU using, faster rate
- ★ Micro USB socket

- ★ 1x 4pins JST-SH sockets (PPM, PWM, SERIAL RX, GPIO, ADC, 3V, 5V, GND)
- ★ The on-board pins are easily connected to our next 4 in 1 ESC &PDB board
- ★ Internal VTX (40CH) (25/200 / 400MW adjustable power video transmission)
- ★ 1x 4pins JST-SH sockets with BUZZER & WS2811 RGB LED
- ★ 1x 4pins JST-SH socket for Video transmission
- ★ 1 IPX sockets easy connect the external antenna
- ★ 4x 3 Pads for motor output
- ★ 1x2 Pads for batter in easy solder

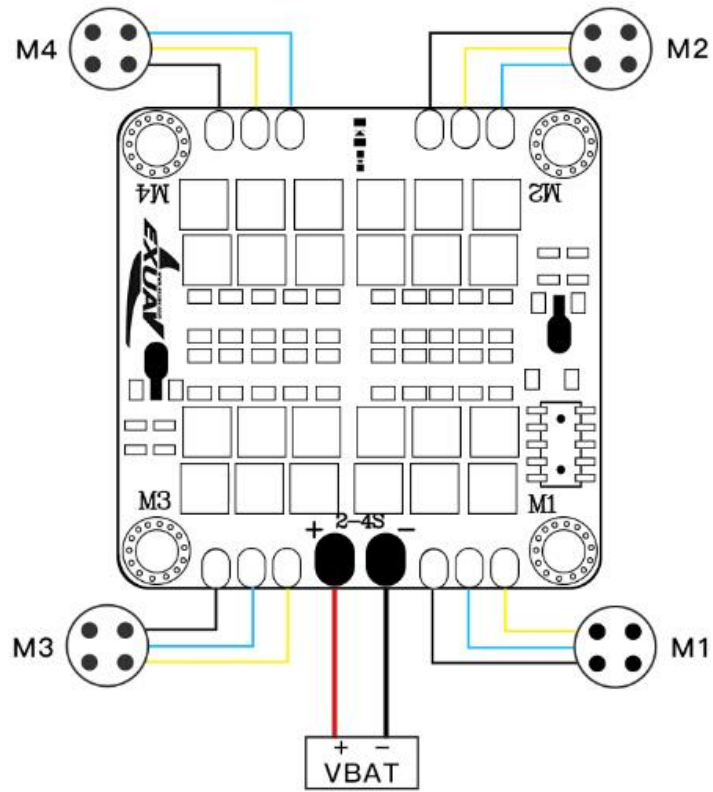
1, Betaflight



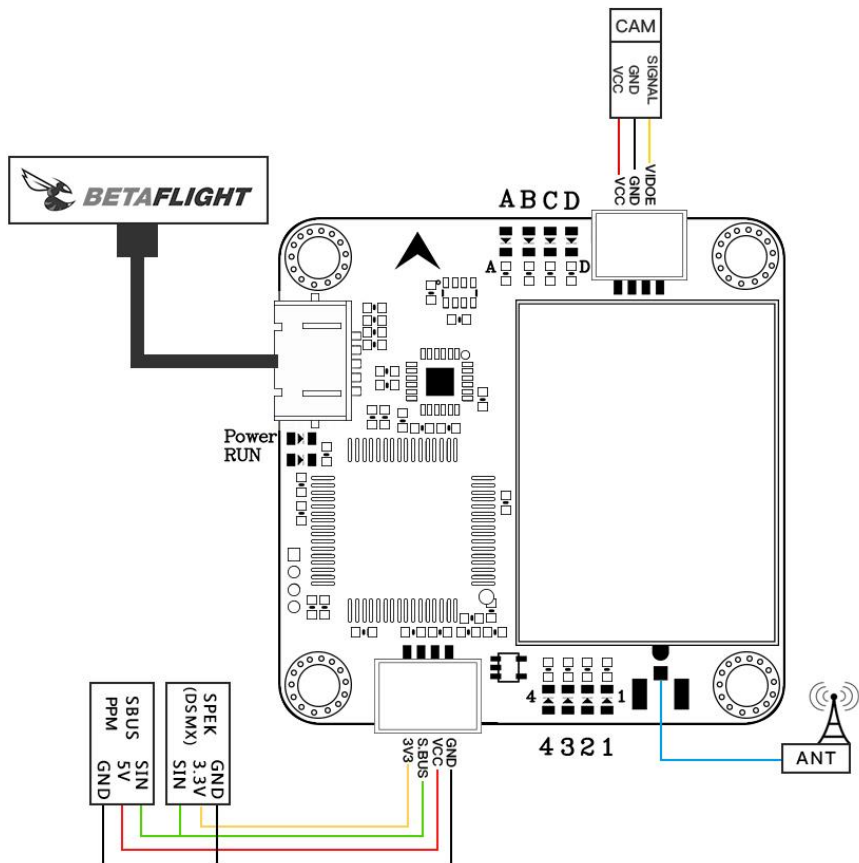
<https://github.com/Betaflight>

The hardware connection diagram

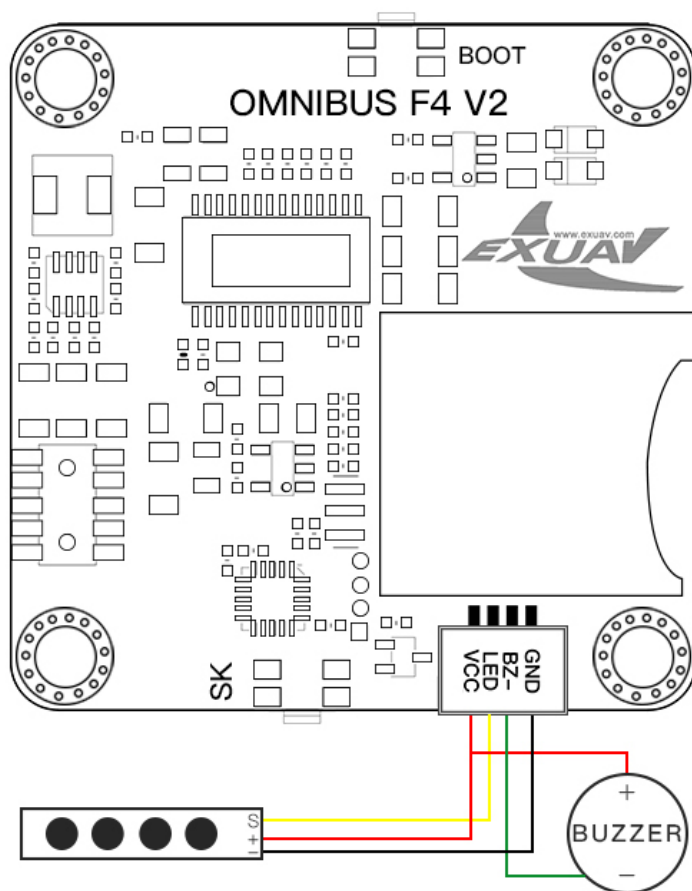
1,4 in 1 Board



2, FC board Top layer



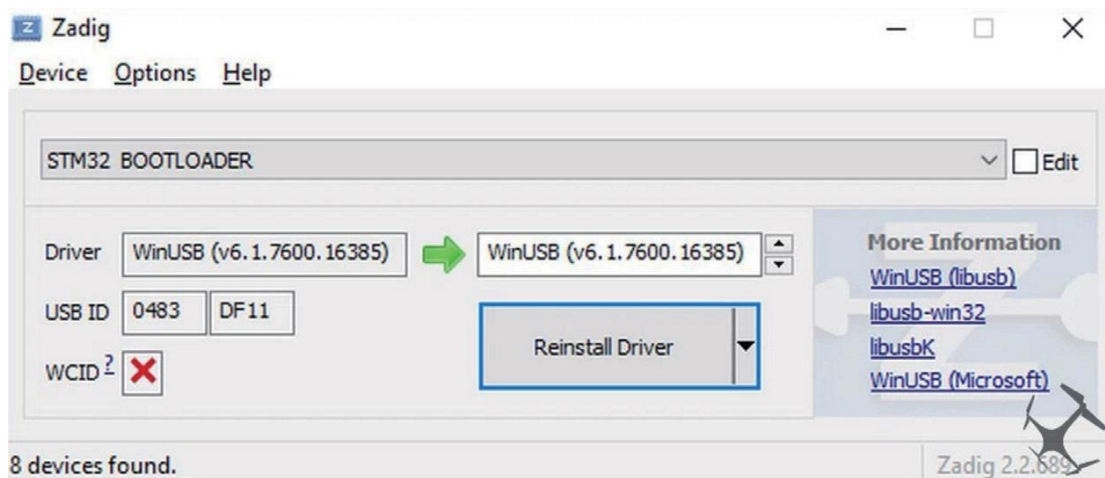
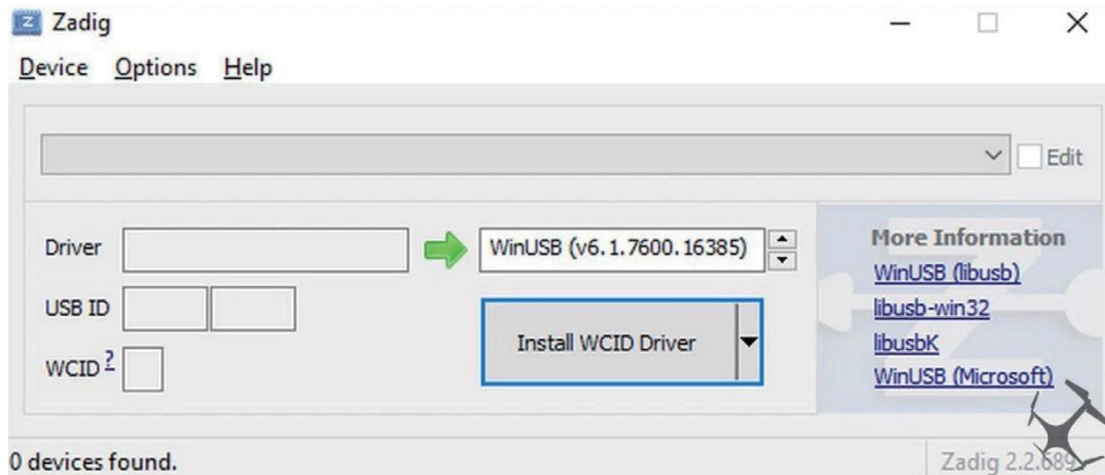
3, FC Bottom layer



How to use the onboard USB port updated firmware in GUI on windows

To flash the firmware you have to enter the so called DFU mode. On Windows 10 I had to use a tool called Zadig (download and start it) to be able to switch drivers for DFU mode to work. In order to switch drivers you have to take the following steps.

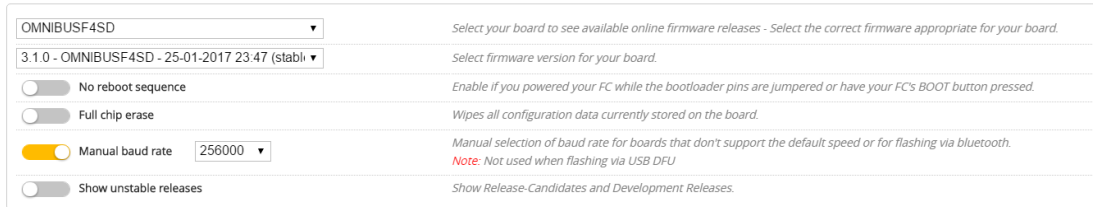
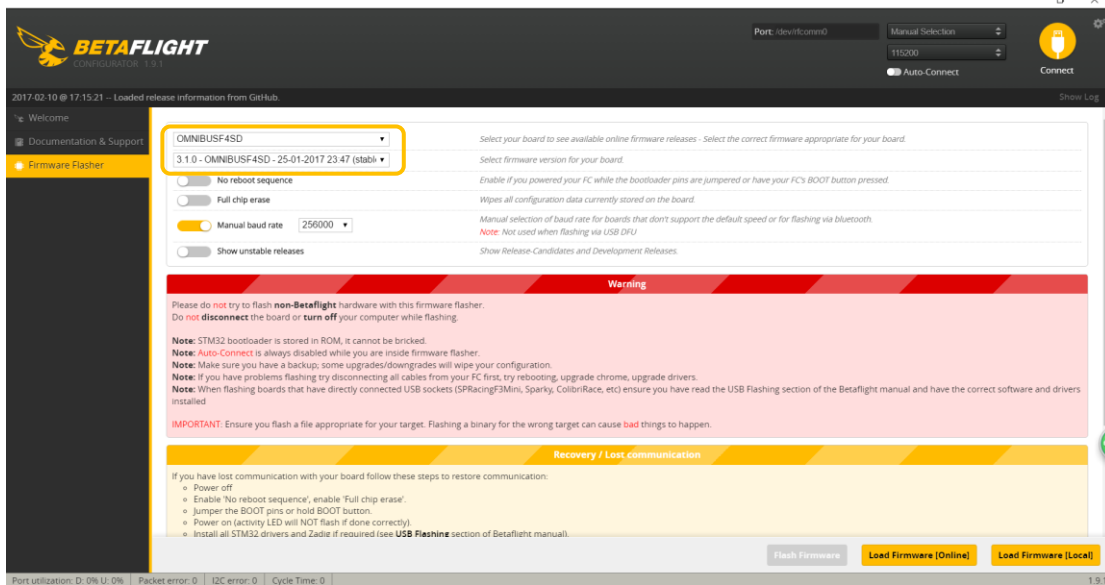
Down: <http://zadig.akeo.ie/>



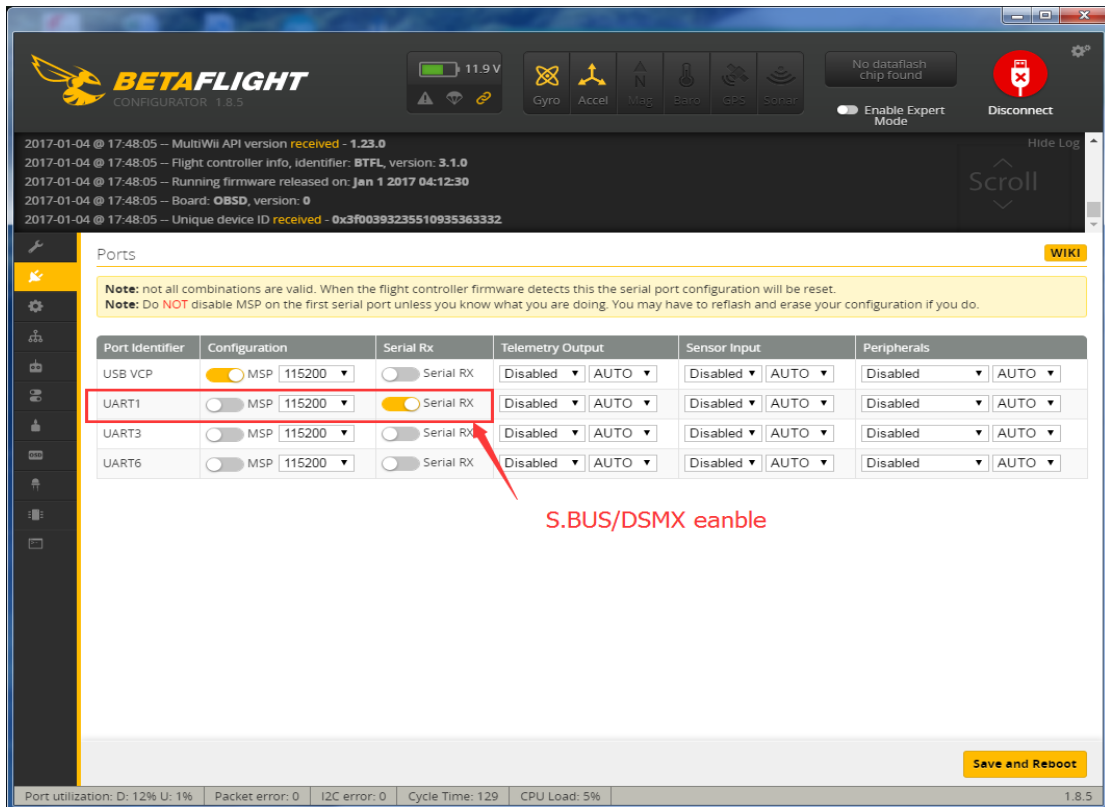
- Push BOOT button on the flight controller.
- Plug-in the USB cable (the red LED should not be as bright as normally).
- Fire up Zadig and hit “Options” and then “List All Devices”.
- From the list choose “STM32 BOOTLOADER”.
- Under “Driver” choose “WinUSB” on the right and hit “Reinstall Driver”.
- Close Zadig, disconnect the flight controller, close all Google Chrome instances.

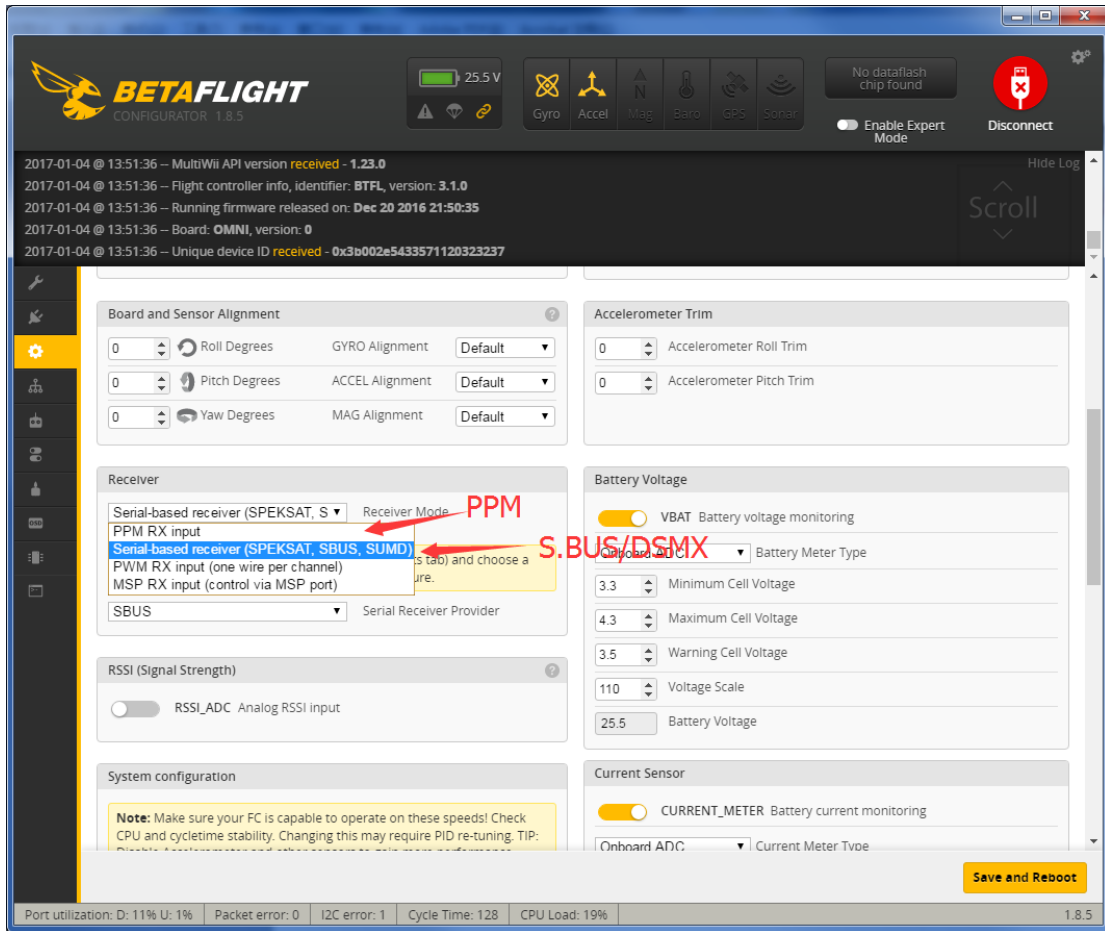
Schematic drawing software settings

How to use and upgrade FC firmware



How to set S.BUS/PPM/DSMX RC IN



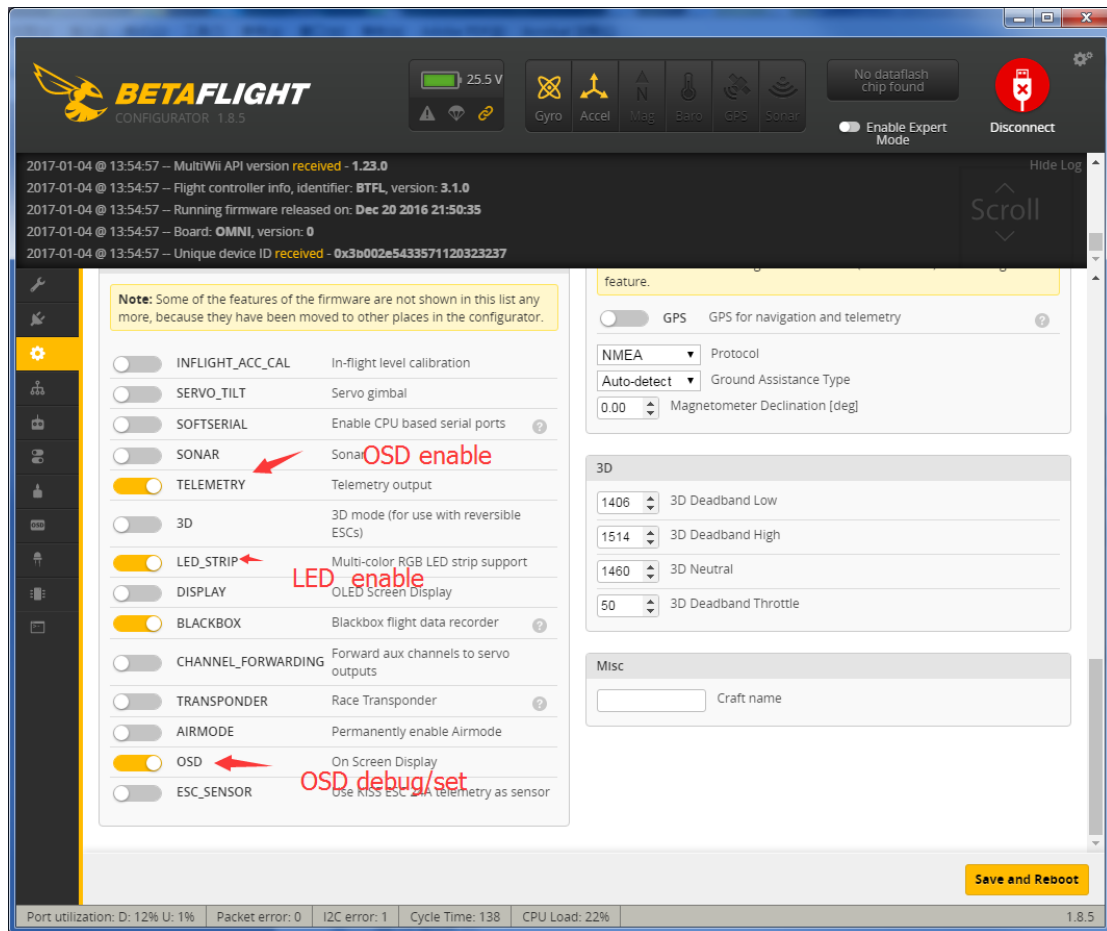


The screenshot shows the Betaflight configurator interface. At the top, there's a status bar with a battery icon showing 25.5 V and various sensor status icons (Gyro, Accel, Mag, Baro, GPS, Sonar). A log window displays system messages: "2017-01-04 @ 13:51:36 - MultiWii API version received - 1.23.0", "2017-01-04 @ 13:51:36 - Flight controller info, identifier: BTFL, version: 3.1.0", "2017-01-04 @ 13:51:36 - Running firmware released on: Dec 20 2016 21:50:35", "2017-01-04 @ 13:51:36 - Board: OMNI, version: 0", and "2017-01-04 @ 13:51:36 - Unique device ID received - 0x3b002e5433571120323237".

The main configuration area is divided into several sections:

- Board and Sensor Alignment:** Includes Roll Degrees, Pitch Degrees, and Yaw Degrees, each with a corresponding alignment type (GYRO, ACCEL, MAG) and a dropdown menu set to "Default".
- Accelerometer Trim:** Includes Accelerometer Roll Trim and Accelerometer Pitch Trim, both set to 0.
- Receiver:** Features a dropdown menu for "Receiver Mode" currently set to "Serial-based receiver (SPEKSAT, S)". A red arrow points to this dropdown with the text "PPM". Below it, another dropdown menu is set to "Serial-based receiver (SPEKSAT, SBUS, SUMD)". A red arrow points to this dropdown with the text "S.BUS/DSMX". Other options include "PPM RX input", "PWM RX input (one wire per channel)", "MSP RX input (control via MSP port)", and "SBUS".
- Battery Voltage:** Includes a toggle for "VBAT Battery voltage monitoring" (checked), a dropdown for "Battery Meter Type" (set to "Onboard ADC"), and input fields for "Minimum Cell Voltage" (3.3), "Maximum Cell Voltage" (4.3), "Warning Cell Voltage" (3.5), "Voltage Scale" (110), and "Battery Voltage" (25.5).
- Current Sensor:** Includes a toggle for "CURRENT_METER Battery current monitoring" (checked) and a dropdown for "Current Meter Type" (set to "Onboard ADC").

At the bottom right, there is a yellow "Save and Reboot" button. The bottom status bar shows: "Port utilization: D: 11% U: 1% Packet error: 0 I2C error: 1 Cycle Time: 128 CPU Load: 19% 1.8.5".



The screenshot shows the Betaflight configurator interface. At the top, there's a status bar with a battery icon showing 25.5V and various sensor icons (Gyro, Accel, Mag, Baro, GPS, Sonar). Below that, a log window displays system messages. The main area is divided into two columns of settings. The left column contains a list of features with toggle switches. The right column shows detailed settings for selected features like GPS, NMEA, and 3D. A 'Save and Reboot' button is at the bottom right. A status bar at the very bottom shows system metrics like port utilization, packet error, I2C error, cycle time, and CPU load.

Feature List (Left Column):

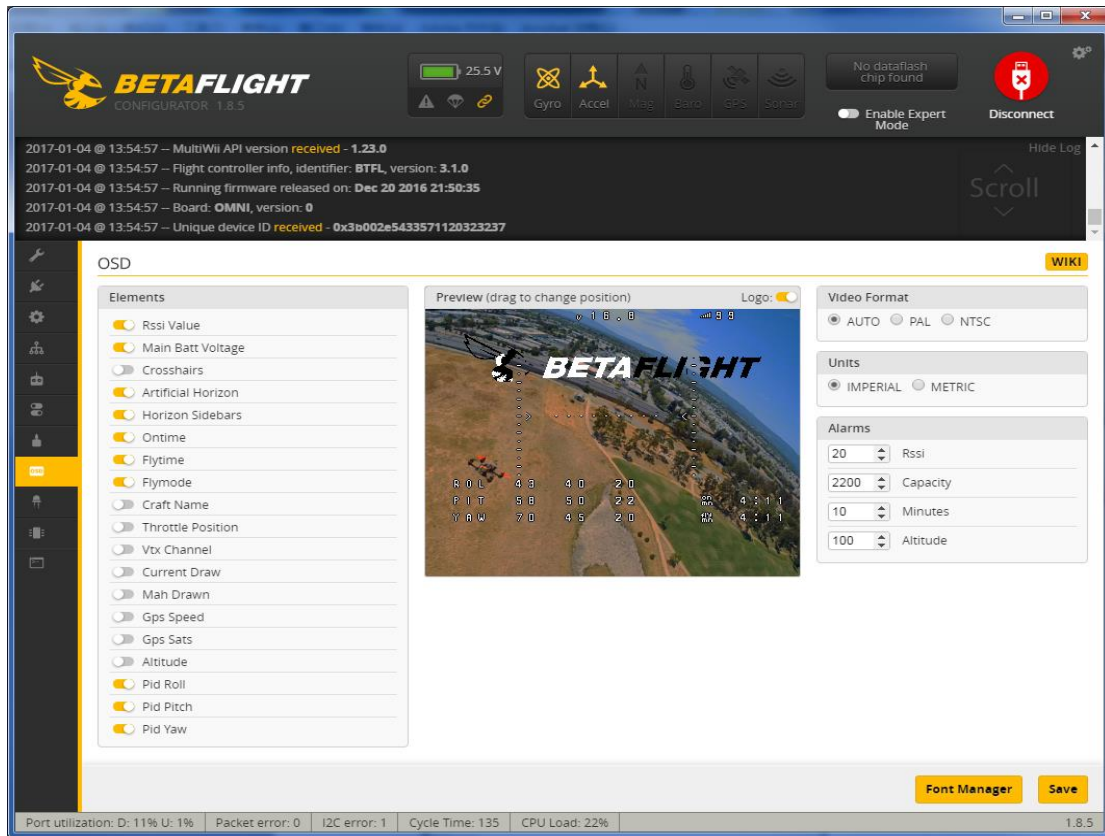
- INFLIGHT_ACC_CAL In-flight level calibration
- SERVO_TILT Servo gimbal
- SOFTSERIAL Enable CPU based serial ports
- SONAR Sonar **OSD enable**
- TELEMETRY Telemetry output
- 3D 3D mode (for use with reversible ESCs)
- LED_STRIP Multi-color RGB LED strip support **LED enable**
- DISPLAY OLED Screen Display
- BLACKBOX Blackbox flight data recorder
- CHANNEL_FORWARDING Forward aux channels to servo outputs
- TRANSPONDER Race Transponder
- AIRMODE Permanently enable Airmode
- OSD On Screen Display **OSD debug/set**
- ESC_SENSOR Use Miss ESC 24N telemetry as sensor

Feature Details (Right Column):

- GPS GPS for navigation and telemetry
- NMEA Protocol
- Auto-detect Ground Assistance Type
- 0.00 Magnetometer Declination [deg]
- 3D**
 - 1406 3D Deadband Low
 - 1514 3D Deadband High
 - 1460 3D Neutral
 - 50 3D Deadband Throttle
- Misc**
 - Craft name

Status Bar (Bottom): Port utilization: D: 12% U: 1% Packet error: 0 I2C error: 1 Cycle Time: 138 CPU Load: 22% 1.8.5

OSD setting and upgrade firmware



BETAFLIGHT CONFIGURATOR 1.8.5

25.5 V

No dataflash chip found

Disconnect

2017-01-04 @ 13:54:57 -- MultiWii API version received - 1.23.0
 2017-01-04 @ 13:54:57 -- Flight controller info, identifier: BTFL, version: 3.1.0
 2017-01-04 @ 13:54:57 -- Running firmware released on: Dec 20 2016 21:50:35
 2017-01-04 @ 13:54:57 -- Board: OMNI, version: 0
 2017-01-04 @ 13:54:57 -- Unique device ID received - 0x3b002e5433571120323237

OSD WIKI

Elements

- Rssi Value
- Main Batt Voltage
- Crosshairs
- Artificial Horizon
- Horizon Sidebars
- Overtime
- Flytime
- Flymode
- Craft Name
- Throttle Position
- Vtx Channel
- Current Draw
- Mah Drawn
- Gps Speed
- Gps Sats
- Altitude
- Pid Roll
- Pid Pitch
- Pid Yaw

Preview (drag to change position) Logo:

Video Format

AUTO PAL NTSC

Units

IMPERIAL METRIC

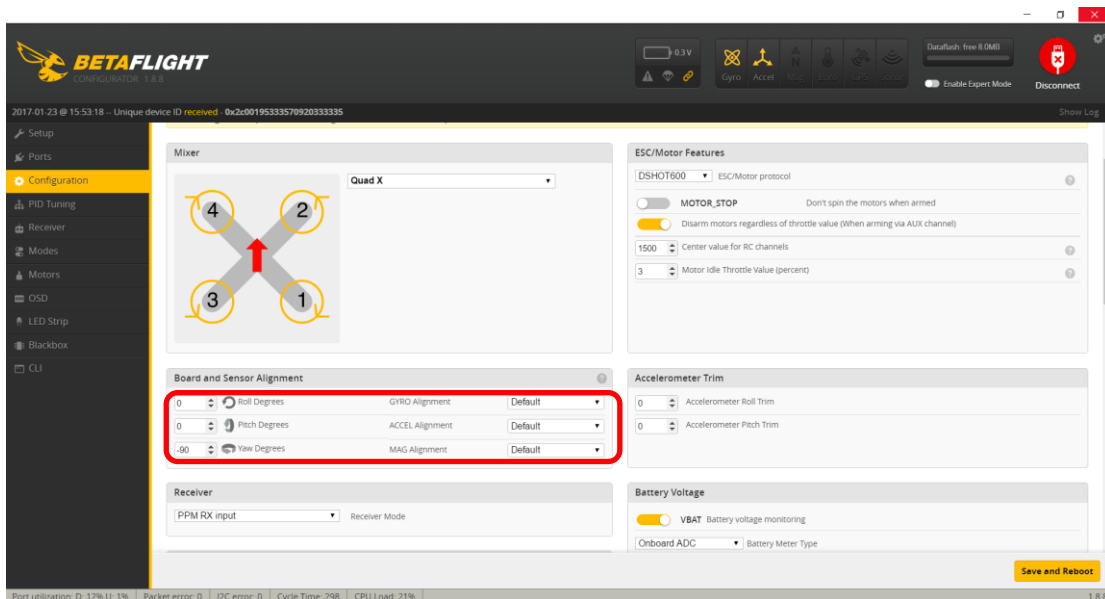
Alarms

20 Rssi
 2200 Capacity
 10 Minutes
 100 Altitude

Font Manager Save

Port utilization: D: 11% U: 1% Packet error: 0 I2C error: 1 Cycle Time: 135 CPU Load: 22%

1.8.5



BETAFLIGHT CONFIGURATOR 1.8.5

0.3 V

Dataflash: free 8.0MB

Disconnect

2017-01-23 @ 15:53:18 -- Unique device ID received - 0x2e019533570920333335

Setup
 Ports
Configuration
 PID Tuning
 Receiver
 Modes
 Motors
 OSD
 LED Strip
 Blackbox
 CLI

Mixer

Quad X

Board and Sensor Alignment

Roll Degrees GYRO Alignment: Default

Pitch Degrees ACCEL Alignment: Default

Yaw Degrees MAG Alignment: Default

Receiver

PPM RX input Receiver Mode

ESC/Motor Features

DSHOT600 ESC/Motor protocol

MOTOR_STOP Don't spin the motors when armed

Disarm motors regardless of throttle value (When arming via AUX channel)

1500 Center value for RC channels

3 Motor Idle Throttle Value (percent)

Accelerometer Trim

Accelerometer Roll Trim

Accelerometer Pitch Trim

Battery Voltage

VBAT Battery voltage monitoring

Onboard ADC Battery Meter Type

Save and Reboot

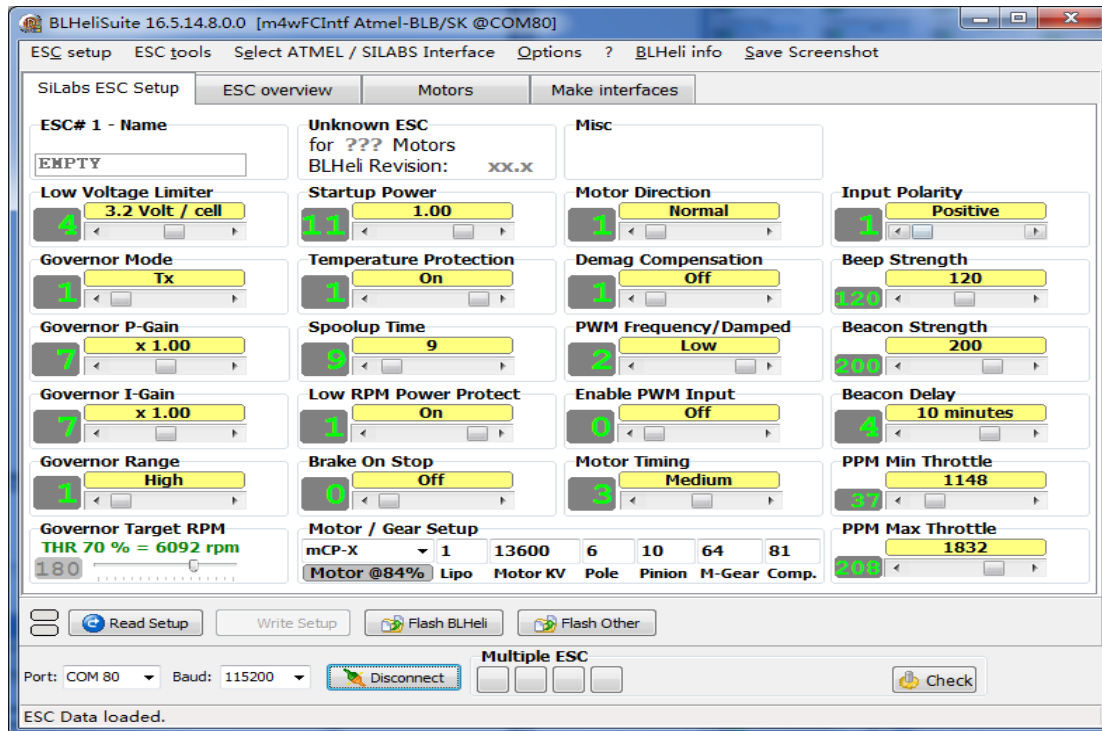
Port utilization: D: 12% U: 1% Packet error: 0 I2C error: 0 Cycle Time: 298 CPU Load: 21%

1.8.5

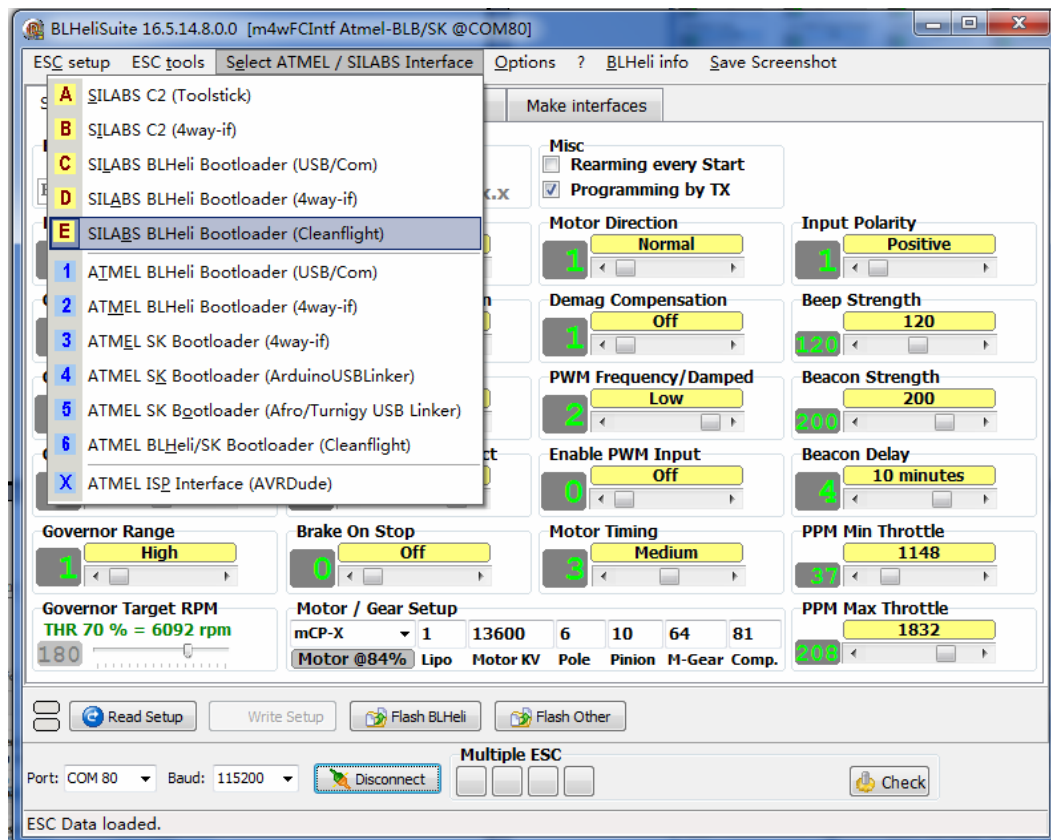
Noticeboard : The direction of YAW is -90° and please open the switch of accelerometer to make sure that the direction of your sensor in RC is right.

ESC use and upgrade firmware

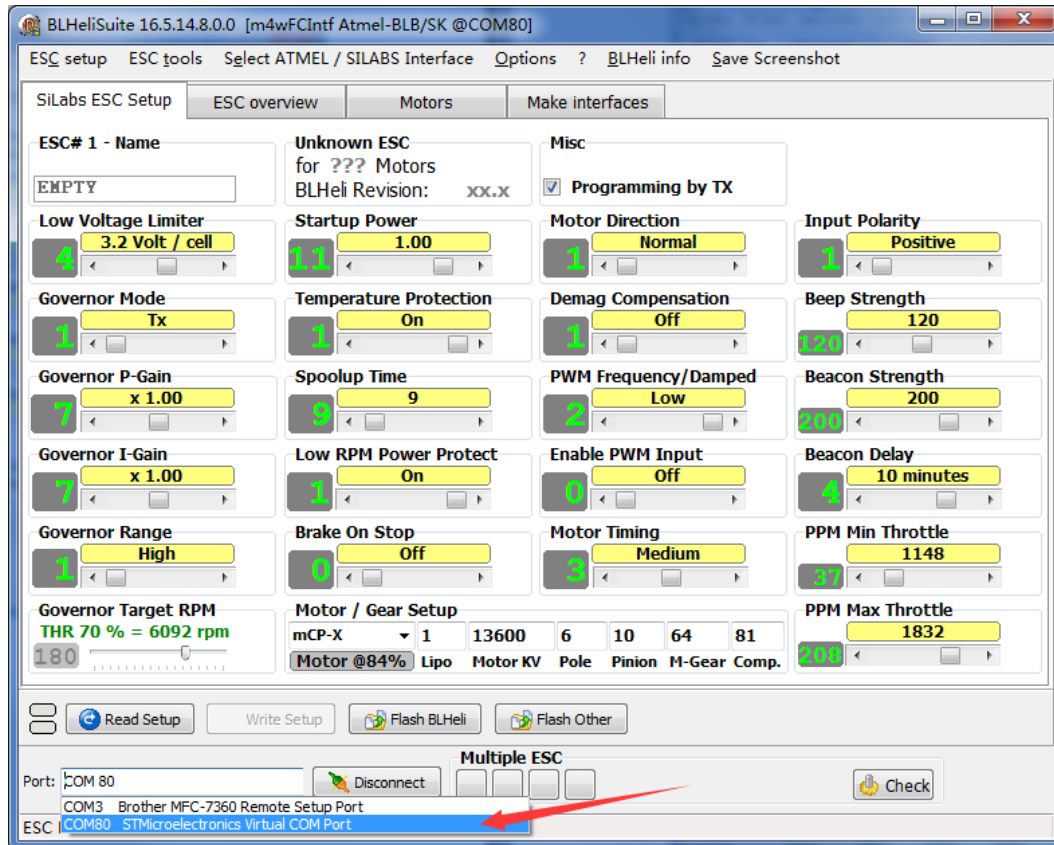
1. Open



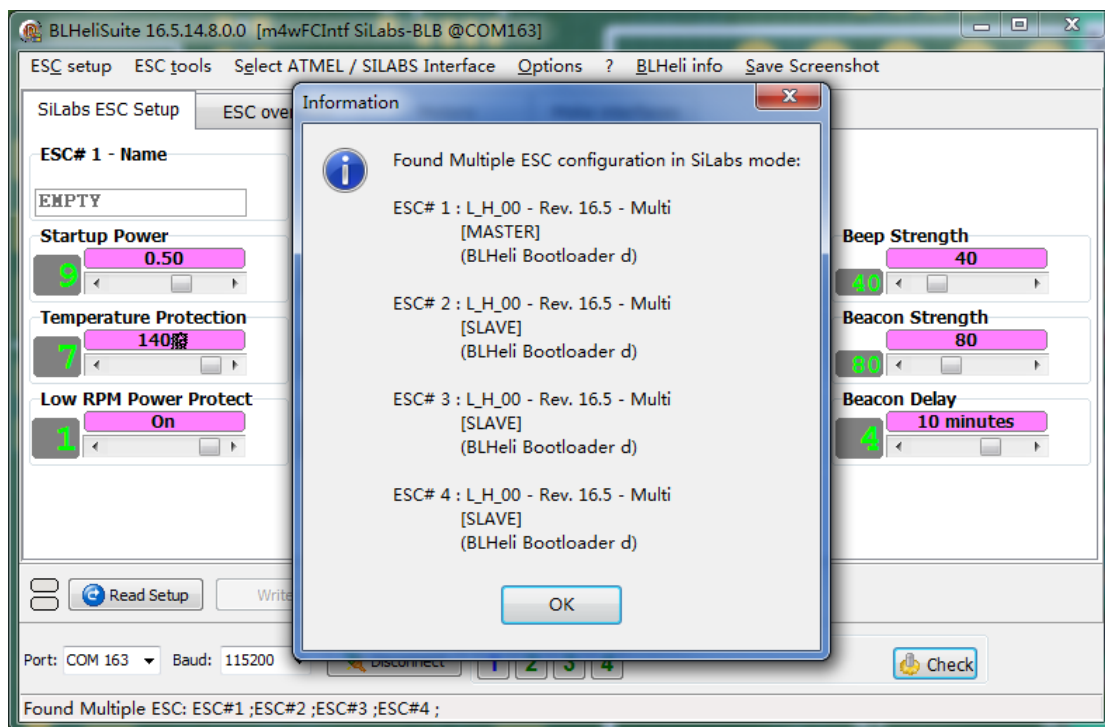
2. Choose



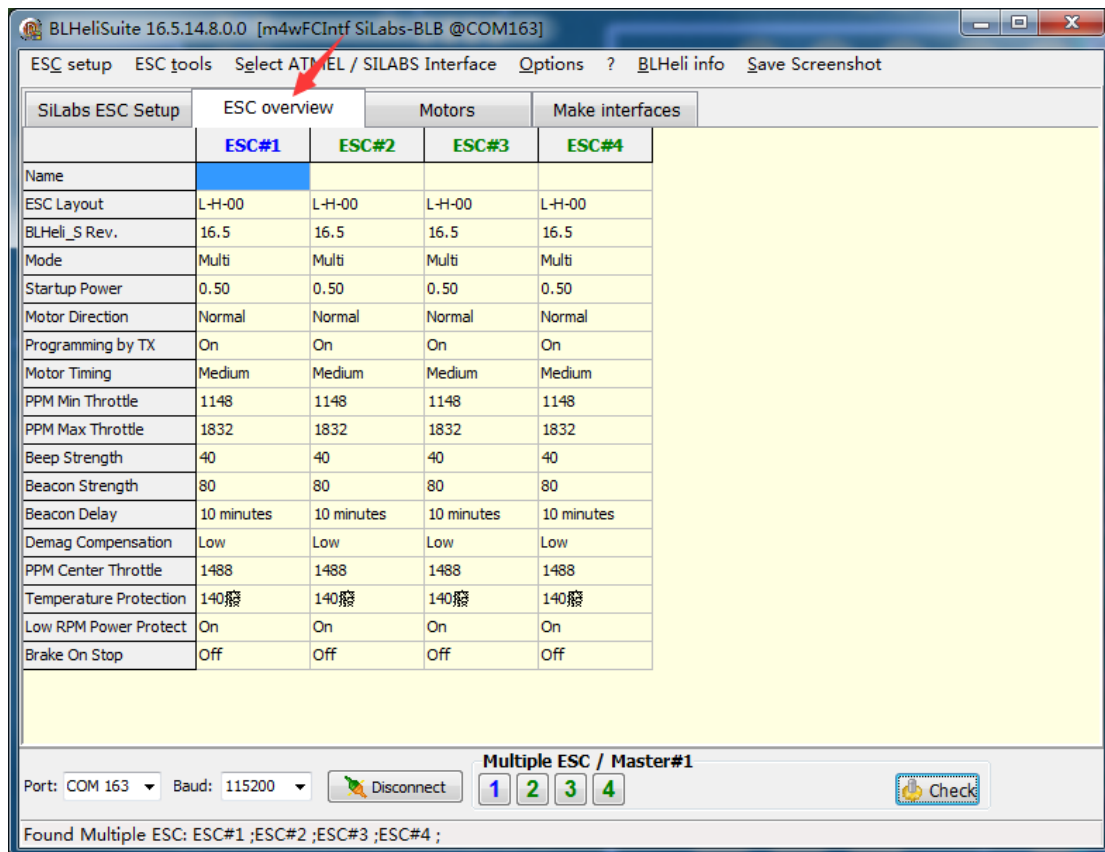
3. Choose a port



- 4, Connect USB cable to FlyTower F4 FC Board
- 5, Click connect
- 6, Connect BAT Power to ESC board
- 7, Check ESC Information
- 8, Check Flash information



9, For more information view



BLHeliSuite 16.5.14.8.0.0 [m4wFCIntf SiLabs-BLB @COM163]

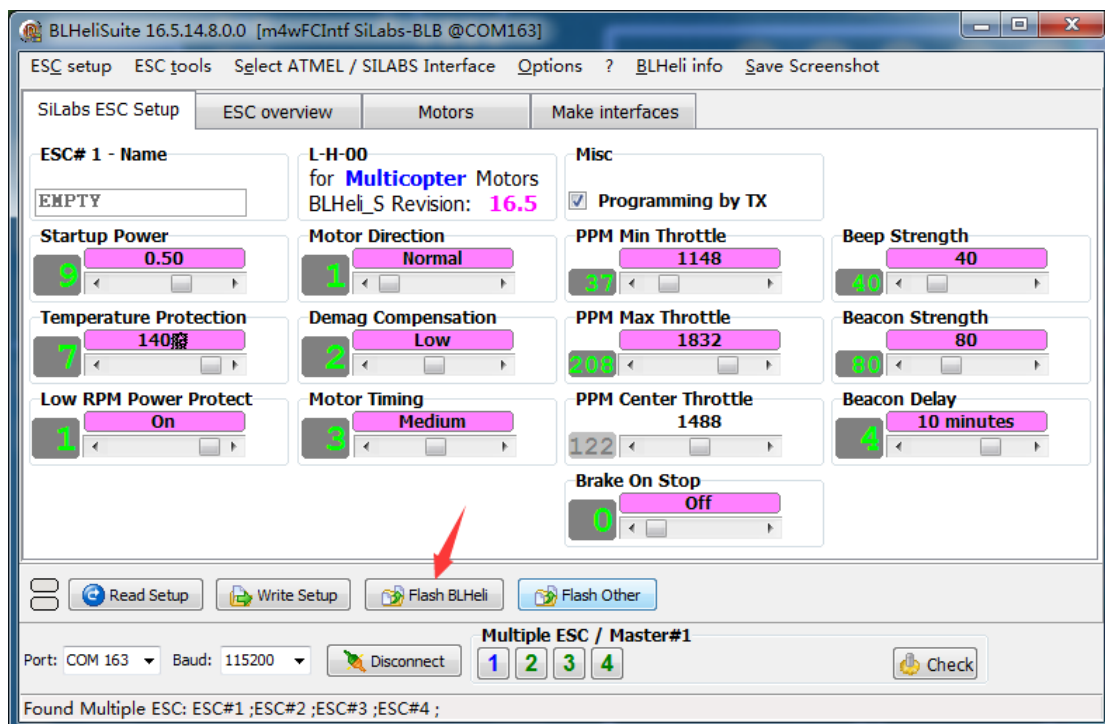
ESC setup ESC tools Select ATME^L / SILABS Interface Options ? BLHeli info Save Screenshot

SilLabs ESC Setup	ESC overview			
	ESC#1	ESC#2	ESC#3	ESC#4
Name				
ESC Layout	L-H-00	L-H-00	L-H-00	L-H-00
BLHeli_S Rev.	16.5	16.5	16.5	16.5
Mode	Multi	Multi	Multi	Multi
Startup Power	0.50	0.50	0.50	0.50
Motor Direction	Normal	Normal	Normal	Normal
Programming by TX	On	On	On	On
Motor Timing	Medium	Medium	Medium	Medium
PPM Min Throttle	1148	1148	1148	1148
PPM Max Throttle	1832	1832	1832	1832
Beep Strength	40	40	40	40
Beacon Strength	80	80	80	80
Beacon Delay	10 minutes	10 minutes	10 minutes	10 minutes
Demag Compensation	Low	Low	Low	Low
PPM Center Throttle	1488	1488	1488	1488
Temperature Protection	140 °C	140 °C	140 °C	140 °C
Low RPM Power Protect	On	On	On	On
Brake On Stop	Off	Off	Off	Off

Port: COM 163 Baud: 115200 Disconnect 1 2 3 4 Check

Found Multiple ESC: ESC#1;ESC#2;ESC#3;ESC#4 ;

10, Upgrade Flash for ESC



BLHeliSuite 16.5.14.8.0.0 [m4wFCIntf SiLabs-BLB @COM163]

ESC setup ESC tools Select ATME^L / SILABS Interface Options ? BLHeli info Save Screenshot

SilLabs ESC Setup ESC overview Motors Make interfaces

ESC# 1 - Name: EMPTY

L-H-00 for Multicopter Motors BLHeli_S Revision: 16.5

Misc: Programming by TX

Startup Power: 0.50

Motor Direction: Normal

PPM Min Throttle: 1148

Beep Strength: 40

Temperature Protection: 140°C

Demag Compensation: Low

PPM Max Throttle: 1832

Beacon Strength: 80

Low RPM Power Protect: On

Motor Timing: Medium

PPM Center Throttle: 1488

Beacon Delay: 10 minutes

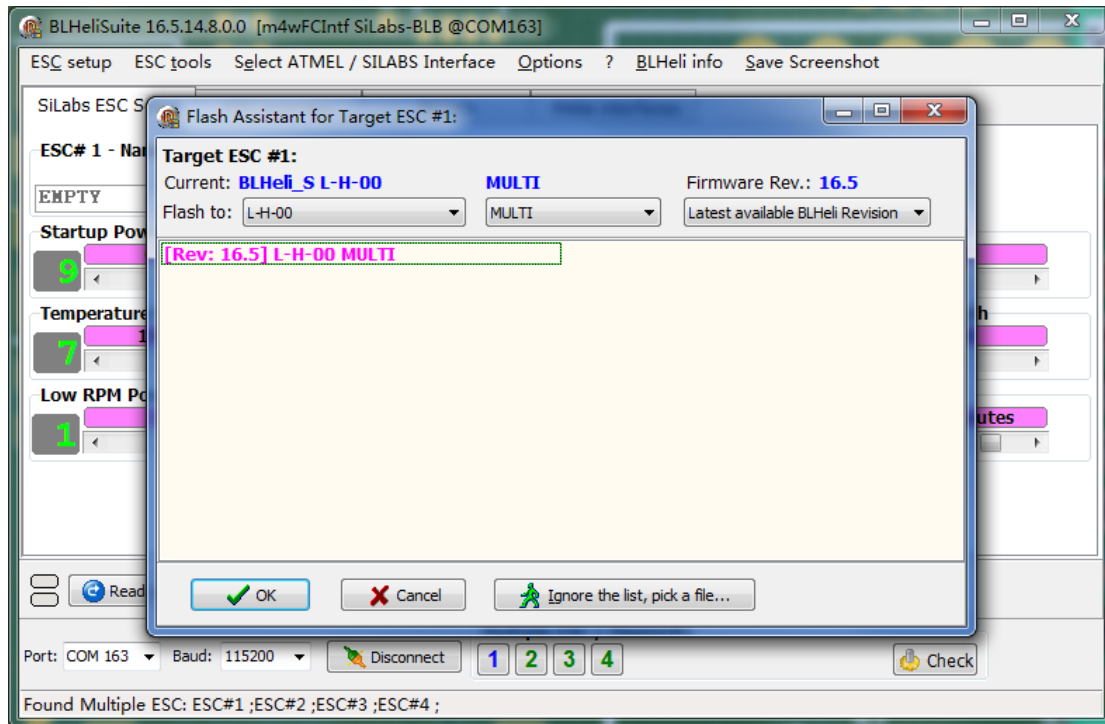
Brake On Stop: Off

Read Setup Write Setup Flash BLHeli Flash Other

Port: COM 163 Baud: 115200 Disconnect 1 2 3 4 Check

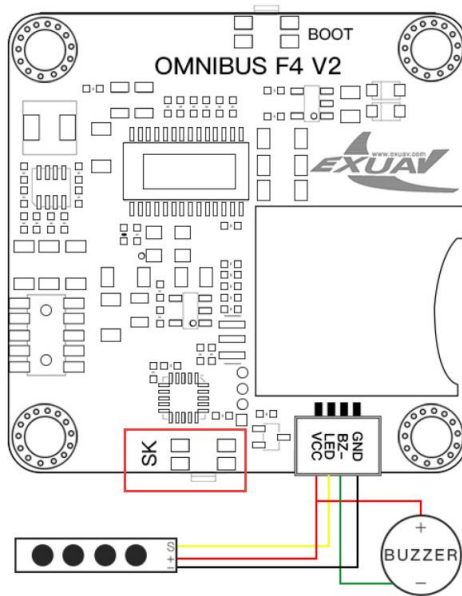
Found Multiple ESC: ESC#1;ESC#2;ESC#3;ESC#4 ;

11, Choose ESC Firmware and upgrade



VTX use and settings

- 1, VTX key switch Instructions (print on VTX on FC and VTX board has a small error), just follow this picture:
- 2, Channel switch: short press SK, CH1-CH8 in there group, the current channel lights flash 1HZ , and short click to jump to the next CH. For example, the current state of CH1, short press SK, CH1 flash. And then press SK, jump to CH2 flash, continue to press SK, CH3 flash. This process to do the cycle of CH1-CH8 (4 lights show the 8 CH channels, detailed description of the following table). 5 seconds later the setting will exit without touching SK.
- 3, Frequency group switch: long press 2 seconds SK, A-E where the band group slow flash 1HZ, and then click on the SK for a long time, after the release will jump to the next group. For example, the current working state is A group CH1 status. Long press SK two seconds and release the A slow flash 1HZ, and then long by two seconds SK release, jump to B slow flash 1HZ. The second process is same as above. Do A-E polling, note here: (A-B-C-D to indicate that the E band, A-B 2 lights all bright). Similarly, do not touch the SK, 5 seconds after the automatic exit settings. Follow up will launch 60 channel BC, CD, AC, AD, BD channels, etc.
- 4, Power switch: fast short press SK two times, then A-E frequency group under the condition of full bright light and continue to quick press twice at SK,, then began to switch power, the corresponding power is 25mW 200mW 400mW frequency light: bright 1 is the minimum power, bright 2 is a medium power, the 3 is bright the maximum power.



Detail channel and frequency table :

Band A A bright lights	CH1 1 bright lights	5865	Band B B bright lights	CH1 1 bright lights	5733
	CH2 2 bright lights	5845		CH2 2 bright lights	5752
	CH3 3 bright lights	5825		CH3 3 bright lights	5771
	CH4 4 bright lights	5805		CH4 4 bright lights	5790
	CH5 1, 2 brights light	5785		CH5 1, 2 brights light	5809
	CH6 2, 3 brights light	5765		CH6 2, 3 brights light	5828
	CH7 3, 4 brights light	5745		CH7 3, 4 brights light	5847
	CH8 1, 2, 3, 4 brights light	5725		CH8 1, 2, 3, 4 brights light	5866
Band C C bright lights	CH1 1 bright lights	5705	Band D D bright lights	CH1 1 bright lights	5740
	CH2 2 bright lights	5685		CH2 2 bright lights	5760
	CH3 3 bright lights	5665		CH3 3 bright lights	5780
	CH4 4 bright lights	5645		CH4 4 bright lights	5800
	CH5 1, 2 brights light	5885		CH5 1, 2 brights light	5820
	CH6 2, 3 brights light	5905		CH6 2, 3 brights light	5840
	CH7 3, 4 brights light	5925		CH7 3, 4 brights light	5860
	CH8 1, 2, 3, 4 brights light	5945		CH8 1, 2, 3, 4 brights light	5880
Band E AB bright lights	CH1 1 bright lights	5362	Band F BC bright lights	CH1 1 bright lights	5658
	CH2 2 bright lights	5400		CH2 2 bright lights	5695
	CH3 3 bright lights	5436		CH3 3 bright lights	5732
	CH4 4 bright lights	5473		CH4 4 bright lights	5769
	CH5 1, 2 brights light	5510		CH5 1, 2 brights light	5806
	CH6 2, 3 brights light	5547		CH6 2, 3 brights light	5843
	CH7 3, 4 brights light	5584		CH7 3, 4 brights light	5880
	CH8 1, 2, 3, 4 brights light	5620		CH8 1, 2, 3, 4 brights light	5917