

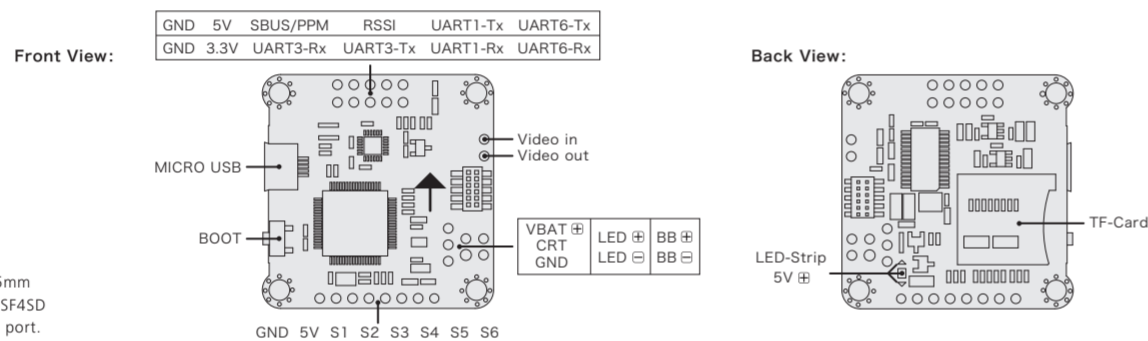
20171028

02 FEATURES

- STM32 F405 MCU allows the FC to run the PID looptime and gyro with higher frequency.
- SPI Sensor MPU6000 includes an accelerometer and a gyro.
- Onboard OSD microchip which supports the DMA mode allows users to adjust its parameters via the Betaflight software. (Note: the OSD is controlled by the F4 MCU.)
- The FC which supports Betaflight firmware & allows parameter adjustment via Betaflight software is more applicable to FPV race.
- TF-card which can record and save more flight/black box data allows users to adjust the setup of their aircraft easily.
- Compatible with various receivers like SBUS, SUMH, SUMD, SPEKTRUM1024/2048, XBUS, PPM and etc.
- LED strip signal output port allows users to adjust the color & flash mode of the LED strip via the FC.
- Volt/Amp monitoring port allows users to check the battery voltage (VBAT+ port) and current (CRT port) (extra current meter is needed).
- Buzzer output port allows users to connect external buzzer(s) to the FC for warning or informing the flight status of the aircraft.
- Micro USB port allows users to connect the FC to a PC to flash firmware and adjust parameters.

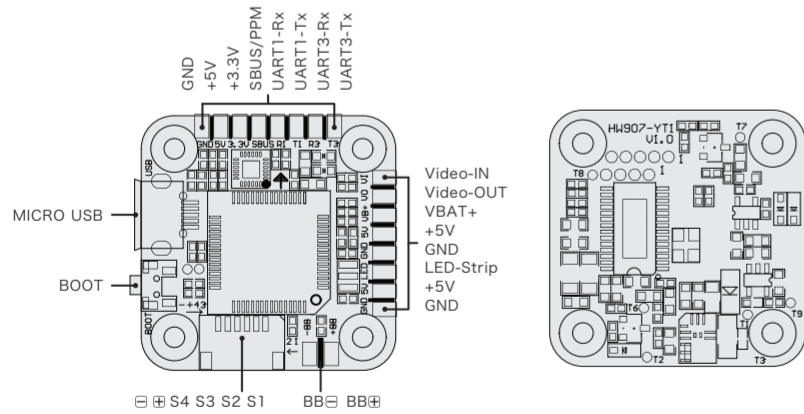
03 Layout & Different Ports of the FC

1 F4 Flight Controller



- Name: F4 Flight Controller
- Size: 35x35mm
- Mounting Holes: 30.5x30.5mm
- Firmware Version: OMNIBUSF4SD
- VBAT+: voltage monitoring port.
- CRT: current monitoring port.
- BB+ & BB-: pins for connecting the "positive/+" & "negative/-" of the external buzzer.
- The FC can output "control signals" to control the WS2812B LED strip. If you short connect the upper two pins of the three pins in the box marked with "LED-Strip 5V+" on the backside of the FC, then the "LED+" can also output these "control signals". If you short connect the lower two pins instead of the upper two pins, then the "LED+" can provide a voltage of 5V to support a LED which doesn't exceed 5V@1A coming on solid. (Note: for the FCs with the firmware from version 3.1.7, you need to key in "resource led_strip a8" first and then save on the CLI (Command Line Interface) of the Betaflight software and then press the "Enter" button on the keyboard if you want to use the LED function.)
- When using a 4-in-1 tower ESC, the "Voltage scale" and "Scale the output voltage to milliamps (1/10th mV/A)" (in the Betaflight software) should be set to "110" and "300" respectively. (Note: if there is any deviation, then you can adjust those values accordingly.)

2 F4 Nano Flight Controller



- Name: F4 Nano Flight Controller
- Size: 27*27mm
- Mounting Holes: 20*20mm
- Firmware Version: OMNIBUSF4SD
- BEC: 5V@1A
- BB+, BB-: pins for connecting the "positive/+" & "negative/-" of the external buzzer.
- LED-Strip: the FC outputs "control signals" to control the WS2812B LED strip. (Note: for the FCs with firmware from version 3.17, you need to key in "resource led_strip a8" first and then save on the CLI of the Betaflight software and then press the "Enter" button on the keyboard if you want to use the LED function.)
- VBAT+: battery voltage output port.
- Video-IN/OUT: video input/output port of the onboard OSD microchip.

04 How to Adjust Parameters

The Betaflight software (as shown below) is needed whether you're planning to adjust parameters (of the FC) or flash firmware, you can download it from this website: <https://github.com/Betaflight>.



You need to run this software in Google Chrome, because it's an extended software of Google. In regard to the software, you can download it from the Google App Store or this website: <https://github.com/betaflight/betaflight-configurator>.

After connecting the FC to a computer, you can click to enter relevant web pages (as shown below) and download the software if you need.

- Latest CP210x Drivers can be downloaded from [here](#).
- Latest STM USB VCP Drivers can be downloaded from [here](#).
- Latest Zadig for Windows DFU flashing can be downloaded from [here](#).

You can start to adjust relevant parameters after you successfully connect the FC to the Betaflight software.



Thank you for purchasing this HOBBYWING product! We strongly recommend reading through this user manual before use. Because we have no control over the use, installation, or maintenance of this product, no liability may be assumed for any damage or losses resulting from the use of the product. We do not assume responsibility for any losses caused by unauthorized modifications to our product. Besides, we have the right to modify our product design, appearance, features and usage requirements without notification.

We, HOBBYWING, are only responsible for our product cost and nothing else as result of using our product.

01 CAUTIONS

- Read through this user manual before use.
- Ensure all wires and connections are well insulated before connecting the unit to related devices, as short circuit will damage it.
- Please ensure to solder all the wires & connectors well if necessary and not get soldering tin on any electronic components. We won't be responsible for any damage resulting from soldering and installation.
- Never use the joint pins beyond the ones included in the product box to fix or connect the FC (Flight Controller), ESC and image-transferring board, because the heights from pins to sockets between image-transferring board and FC, FC and ESC board are regulated/fixd. If the joint pins are too short, then they will cause the PCBs to deform; if they are too long, then they will affect the connection between pins and sockets and cause damage to relevant devices.
- We won't be responsible for the damage or losses resulting from users' carelessness.
- Never fly the aircraft near crowd, we won't assume any losses resulting from the crash of the aircraft.
- Never use this unit near heat, moisture, strong acid or alkali and under other environmental conditions that bad for electronic components.
- The unit is ready-to-use (it's flashed with firmware before leaving the factory), we won't be liable for any damage resulting from firmware flashing which is carried out by users.
- The FC firmware is an open-source program, users can search relevant technical information on the internet and we won't provide any technical support beyond the FC hardware.

05 How to Connect this FC to Different Receivers

1. How to Set a PPM Receiver

If you're planning to use a PPM receiver, then please solder the GND/Power/Signal Wires of the receiver to the GND/5V/PPM points (on the FC) first, and then set the "Receiver Mode" on the receiver to "PPM RX Input" on the "Configuration Interface" of the Betaflight software.

2. How to Set a SBUS receiver

If you're planning to use a SBUS receiver, then please solder the GND/Power/Signal Wires of the receiver to the GND/5V/SBUS points (on the FC) first, and then push the "Serial Rx" option button under "UART1" from Gray to Yellow on the "Ports Interface" of the Betaflight software. And set the "Receiver Mode", "Serial Receiver Provider" on the receiver to "Serial-based Receiver", "SBUS" respectively on the "Configuration Interface" at last.

3. How to Set a Spektrum 1024/2048 Receiver

If you're planning to use a Spektrum DSM2/DSMX receiver, then please solder the GND/Power/Signal Wires of the receiver to the GND/3.3V/UART3-Rx points (on the FC) first, and then push the "Serial Rx" option button under "UART3" from Gray to Yellow on the "Ports Interface" of the Betaflight software. And set the "Receiver Mode", "Serial Receiver Provider" on the receiver to "Serial-based Receiver", "SPEKTRUM1024/2048 (1024 for DSM2, 2048 for DSMX)" respectively on the "Configuration Interface" at last.

How to bind the Spektrum receiver and transmitter:

Please key in the following codes on the CLI (Command Line Interface) of the Betaflight software.

- Key in "set spektrum_sat_bind= 9", and then press the "Enter" button on the keyboard.
- Key in "set spektrum_sat_bind_autorst= 0", and then press the "Enter" button on the keyboard.
- Key in "save", and then press the "Enter" button on the keyboard.
- Please wait for the FC to restart, disconnect the FC from all the power supplies (including the USB port), and re-connect the FC to the power supply, you will see the LED on the Spektrum satellite receiver flashes rapidly, then turn on the transmitter to bind the transmitter and receiver. If the LED dies out and then comes on solid, then it means that the binding is succeeded. Otherwise, change the number in the code "set spektrum_sat_bind = 9" to any other number (from 1 to 9) and try again.

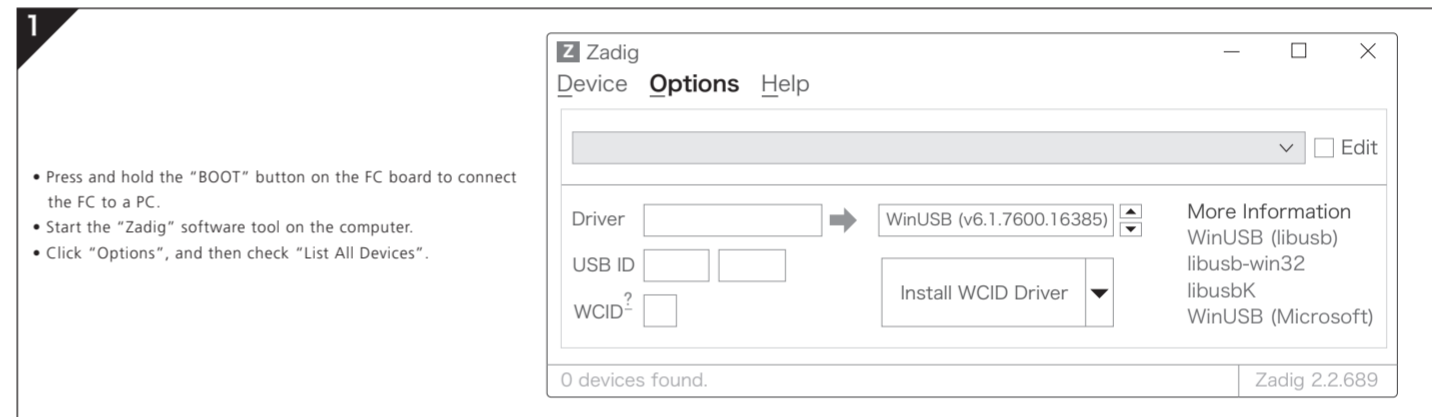
Please connect the FC to the Betaflight software, and key in the following codes on the CLI (Command Line Interface) of the Betaflight software after successfully binding the transmitter and receiver.

- Key in "set spektrum_sat_bind = 0", and then press the "Enter" button on the keyboard.
- Key in "save", and then press the "Enter" button on the keyboard.

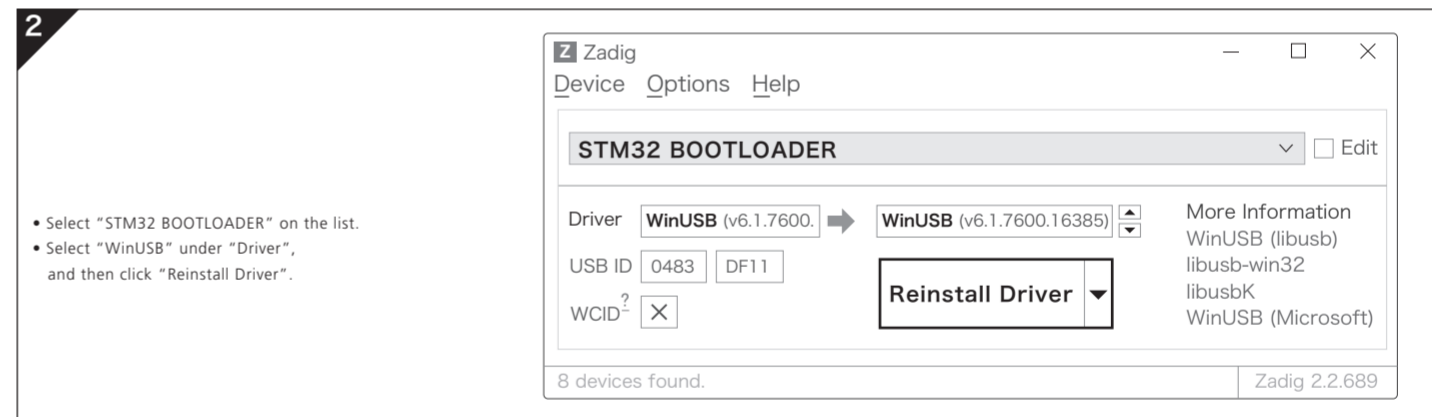
After that, you can use your spektrum satellite receiver to receive signals.

06 How to Flash the Firmware

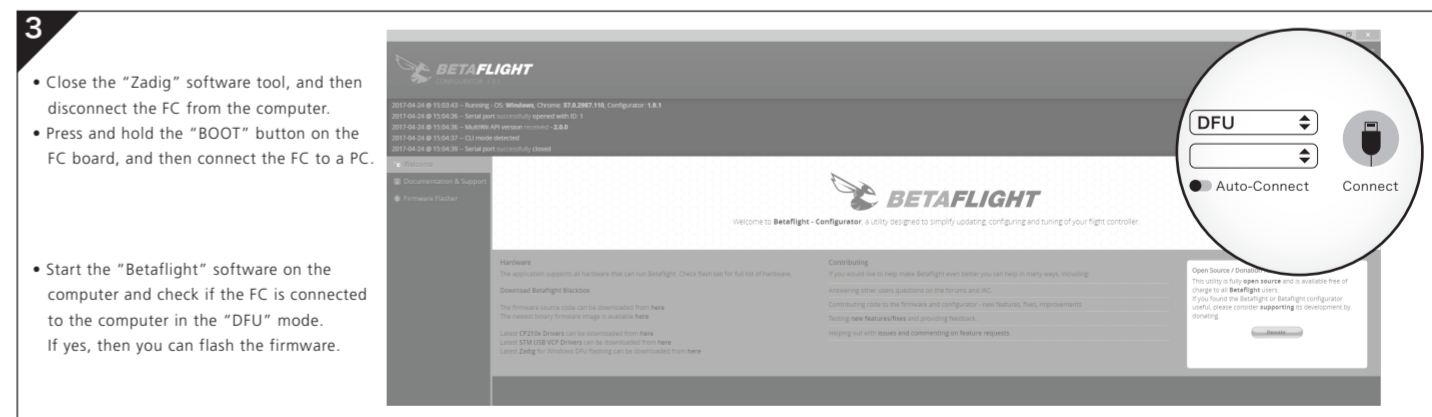
You need to enter the so-called "DFU" mode when flashing the FC firmware. A software tool called Zadig (you can download it from this website: <http://zadig.akeo.ie/>) will be needed to switch the driver (of the FC) to the "DFU" mode. In order to switch the driver, you need to take the following steps.



- Press and hold the "BOOT" button on the FC board to connect the FC to a PC.
- Start the "Zadig" software tool on the computer.
- Click "Options", and then check "List All Devices".



- Select "STM32 BOOTLOADER" on the list.
- Select "WinUSB" under "Driver", and then click "Reinstall Driver".



- Close the "Zadig" software tool, and then disconnect the FC from the computer.
- Press and hold the "BOOT" button on the FC board, and then connect the FC to a PC.

- Start the "Betaflight" software on the computer and check if the FC is connected to the computer in the "DFU" mode. If yes, then you can flash the firmware.



- For avoiding any damage to the FC, please do not flash the unit with any firmware besides "OMNIBUSF4SD".
- The firmware flashing can be carried out in the "online" mode or the "offline mode", click this link: <https://github.com/betaflight/betaflight/releases> to download the offline firmware if necessary.

07 More Info

- if necessary, please refer to the following websites:
- <http://dronin.org/>
- <https://github.com/betaflight>
- <https://github.com/betaflight/betaflight>
- <https://github.com/betaflight/betaflight/wiki/Board---OMNIBUSF4>
- <https://github.com/betaflight/betaflight/releases>