

20190622

02 FEATURES

- STM32 F405 MCU allows the FC to run the PID looptime and gyro with higher frequency.
- The SPI ICM-20602 which integrates accelerometer and gyro (with the running frequency can be set to 32KHz) is adopted.
- 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 (BAT 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.
- Board load 12V BEC, the output current can reach 2A. It can supply power for graphic transmission, 12V LED lamp and other equipments.
- Switch module of board load graphic transmission(VTX) can use remote control to control switch of graphic transmission.

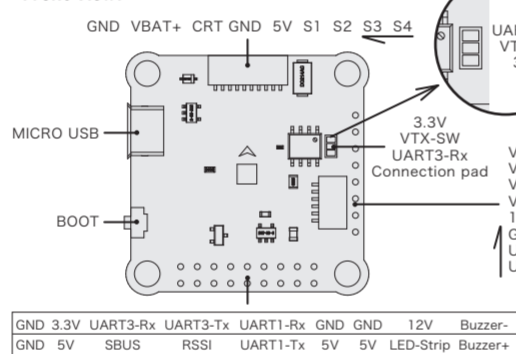
03 Layout & Different Ports of the FC

- **Name:** F4-G3 Flight Controller
- **Size:** 36x36mm
- **Mounting Holes:** 30.5x30.5mm
- **Firmware Version:** OMNIBUSF4SD
- **12V:** 12V output
- **VBAT+:** Battery Voltage Input/Output Port; When the VBAT + beside CRT input battery voltage, the other VBAT + will output battery voltage, this port is connected to the battery positive (after connecting battery voltage, flight control can also monitor battery voltage in real time, meanwhile, the voltage monitoring scale value inside flight control software is set to 110)
- **CRT:** current monitoring port. It's connected to the current signal output port of the external voltmeter (at this point, please set the scale value for current monitoring on the FC software as per the voltmeter's instructions.).
- **GND:** Ground wire of the FC.
- **5V:** 5V output (it's provided not by the FC but by the Hobbywing XRotor Micro 60A 4in1 BLHeli-32 DShot1200 ESC or an external 5V BEC).
- **S1/S2/S3/S4:** throttle signal output ports. S1 for ESC#1, S2 forESC#2, S3 for ESC#3 and S4 for ESC#4.
- **Video-IN/OUT:** input/output port of the on-board OSD video signals.
- **3.3V:** 3.3V output (it will be available only if the FC inputs the voltage of 5V first).
- **UART1/ UART3/ UART6...** Tx, Rx: UART serial port.
- **SBUS:** SBUS signal input (the SBUS port has a built-in signal inverter, so if signals need to be inverted, please connect the signal wire to this SBUS port. In case signals needn't be inverted or your receiver has an inverter, then please connect the signal wire to the Rx of UART1/UART3/UART6.)
- **RSSI:** RSSI signal input.
- **LED-Strip:** for outputting control signals to control the WS2812B LED strip.
- **Buzzer+ & Buzzer-:** for connecting the buzzer's "Positive/Negative" poles.
- **TF-Card:** TF-card slot.
- **MicroUSB:** MicroUSB port.
- **Boot:** Bootloader button.
- **VTX-SW:** The signal input of picture transfer switch module(level signal input,default 12V,compatible with 3.3V/5V). When 3.3V-VTX-SW-UART3-Rx Connection Pad is completely disconnected,picture transfer switch module Can be opened or closed by input signal through this port.
- **3.3V - VTX-SW - UART3-Rx Connection pad:** 3.3V and VTX-SW or VTX-SW and UART3-Rx is affiliated welding spot. Short connection is connected, otherwise disconnected. When neither 3.3V nor UART3-Rx is connected, it is completely disconnected.

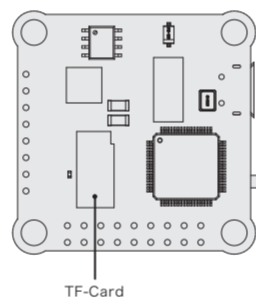
Note:

- 1) No matter use VTX-SW to input signal, or UART3-Rx of FC to input signal, the picture transfer switch module can only control 12V next to Video-OUT output or close.
- 2) 3.3V - VTX-SW - UART3-Rx Connection pad can only choose short connect 3.3V and VTX-SW or VTX-SW and UART3-Rx. It cannot short connect all together, otherwise it will damage flight control.
- 3) Under default status, VTX-SW connects 3.3V(Use tin short connection or OR resistance short connection when leaving factory). VTX switch module is open (Meanwhile VTX-SW pad output 3.3V voltage,do not weld other equipments to the pad, or else equipments or flight control could be damaged). When 3.3V - VTX-SW - UART3-Rx Connection pad completely disconnected, input signal through VTX-SW, otherwise 12V next to Video-OUT will not output voltage(picture transfer switch module is closed.)

Front View:



Back View:



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 WARNINGS

- 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 and not get soldering tin on any electronic components if necessary. 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 is regulated/fixed. If the joint pins is 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.
- This user manual is based on the operation manual for Betaflight and only for reference. For more detailed information, please refer to the original Betaflight manual. Due to firmware update or other reasons, the descriptions for functions may differ, so please always take the official Betaflight manual as standard.

05 How to this FC to Connect 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/SBUS 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

Because the OMNIBUS firmware doesn't invert the SBUS signals itself, so an external inverter is needed; the hardware of this flight controller integrates an inverter. If you're planning to use a SBUS receiver, please solder the GND/Power/Signal Wire of the receiver to the GND/5V/SBUS or GND/5V/UART1-Rx points (if the SBUS receiver has a built-in inverter or an external inverter) on the FC first, 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, then you can see the LED on the Spektrum satellite receiver flashes rapidly, 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 use VTX Switch module

In CLI: Type: **resource**

Locate UART TX/RX pad resource ID you are using. We wired to RX3 in this demo. RX3 is B11 Note the name of resource and ID. " resource SERIAL_RX 3 B11 "

Next we will clear that pad from its assigned resource.

Type: **resource SERIAL_RX 3 NONE**

Next we will set the Custom Mode Switches. We will set up 1 switch Copy and past these Commands into CLI:

Type: **set pinio_box = 40,41,42,43**

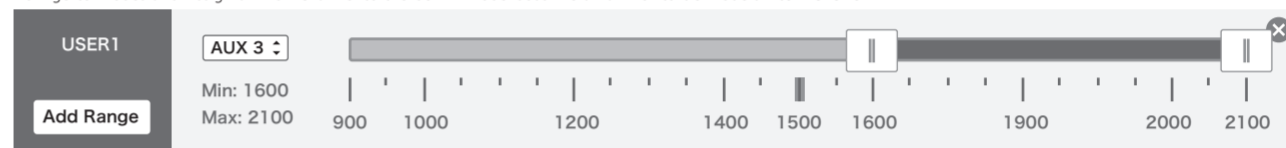
aux 2 40 2 1600 2100 0

Next we need to assign the Resource ID to the Custom Mode switch. Using the Resource ID from above. "B11"

Type: **resource PINIO 1 B11**

Type: **save** in CLI and then press enter. Your FC will reboot after applying changes.

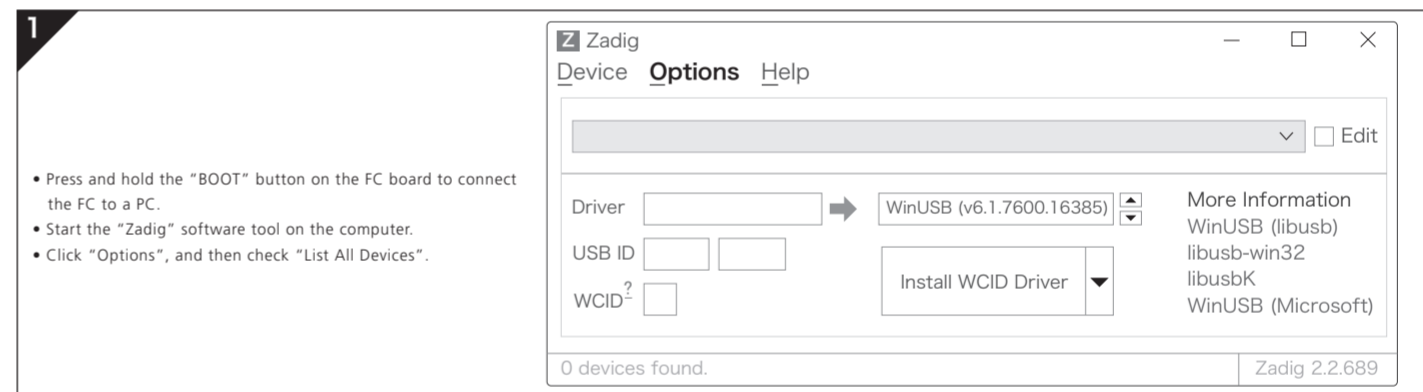
Now go to Modes and Assign an AUX channel to the USER1 mode. Just like an arm or turtle mode switch. Click SAVE.



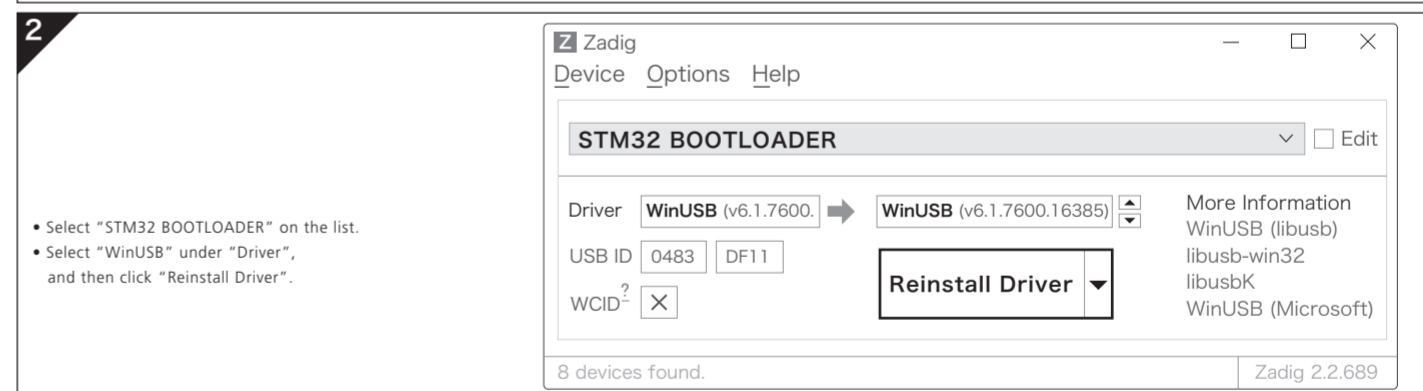
Now flip the switch and test. 12V will be output if you are providing power. Meanwhile, The indicator light of picture transfer switch module nearby 3.3V - VTX-SW - UART3-Rx Connection pad is on(Red).

07 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.



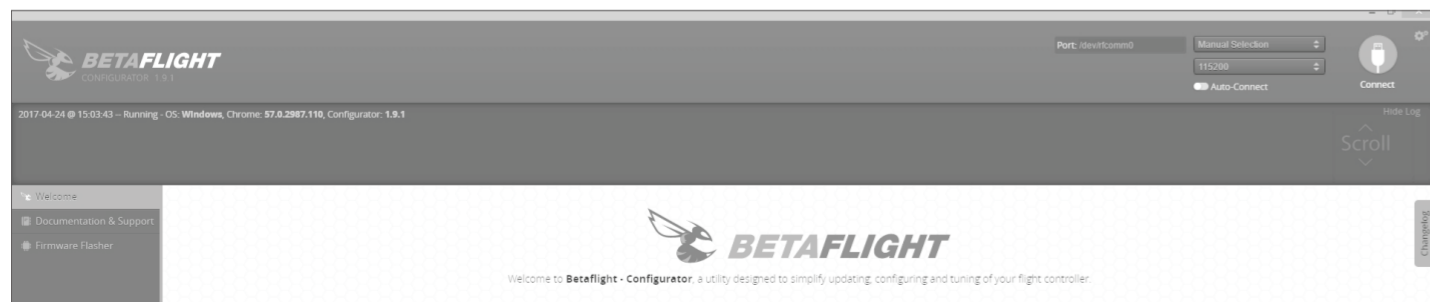
- Press and hold the "BOOT" button on the FC board to connect the FC to a PC.
- Start the "Zadig" software tool on the computer.
- Click "Options", and then check "List All Devices".



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

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.

Please visit the following websites to download the latest version of Betaflight software:

<https://github.com/betaflight/betaflight-configurator>

<https://github.com/betaflight/betaflight-configurator/releases>



- 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.

08 More Info

Please refer to the following websites:

<http://dronin.org/>

<https://www.betaflight.com/>

<https://github.com/betaflight/betaflight-configurator>

<https://github.com/betaflight/betaflight-configurator/releases>

<https://github.com/betaflight>

<https://github.com/betaflight/betaflight>

<https://github.com/betaflight/betaflight/releases>

<https://github.com/betaflight/betaflight/wiki/Board---OMNIBUSF4>