

Makerfire BNF Micro FPV Racing Quad

With F303 Betaflight Flight Controller



Version 0.1

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Makerfire BNF Micro FPV drone integrated F3 EVO Brushed FC ,Frsky D8 or Spektrum DSM protocol receiver, 25mW AIO camera, special sauce edition motors and 200mAh battery, this MICRO FPV is capable of flying in the smallest of places with ease and much more like a racing quad than a toy quad.

Key Features

- Fully programmable through Betaflight, using the on board USB port, tune all the parameters, PID's, and rates to your perfect settings
- 64mm motor spacing, four carefully-tuned electric ducted fans
- F3 EVO Brushed flight controller fully programmable through Betaflight
- Built in native Spektrum DSM receiver, compatible with almost ALL Spektrum transmitter,like DX6/DX8/DX9/DX18 etc
- 5.8G AIO 25mW camera, with 10° tilt camera mount
- Special 17500KV sauce edition motors, offer a nice punch
- 35C 200mAh 1S battery, 3 min 40 seconds flight time

Specifications

- Wheelbase: 64mm
- Weight: 22g (without battery)
- Flight Controller: F3 EVO Brushed FC with Native DSM receiver
- Motor: 17500KV 6x15mm Coreless Brush Motor
- Receiver: Spektrum DSM compatible native receiver
- Camera and 5.8G Tx: AIO 520TVL 1/4 Inch Camera 25mW 40CH
- Battery: 3.7V 200mAh Lipo battery with Pico JST connector
- Flight time: 3 min 40 seconds

Native Spektrum DSM Receiver:

Compatible with ALL Spektrum radios or Spektrum compatible transmitter module.No more hacks, just bind and fly!



F3 EVO flight controller:

Fully programmable through Betaflight using the on board USB port! Tune all the parameters, PID's, and rates to your perfect settings!

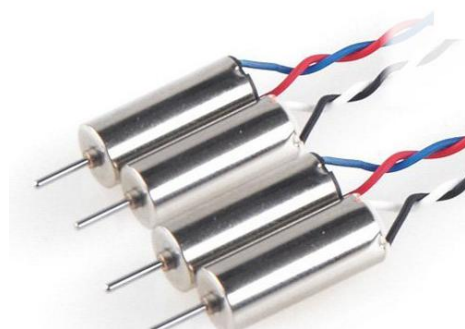


17500kv these motors:

Considerably more powerful than almost all of the motors used for Tiny Whoop style aircraft, without encountering considerable oscillations.



17500KV
65,000 RPM@3.7v



10° tilt camera mount:

Perfect angle for Tiny Whoop flight. At this angle the pilot can still see everything ahead in full-blown fast forward flight.



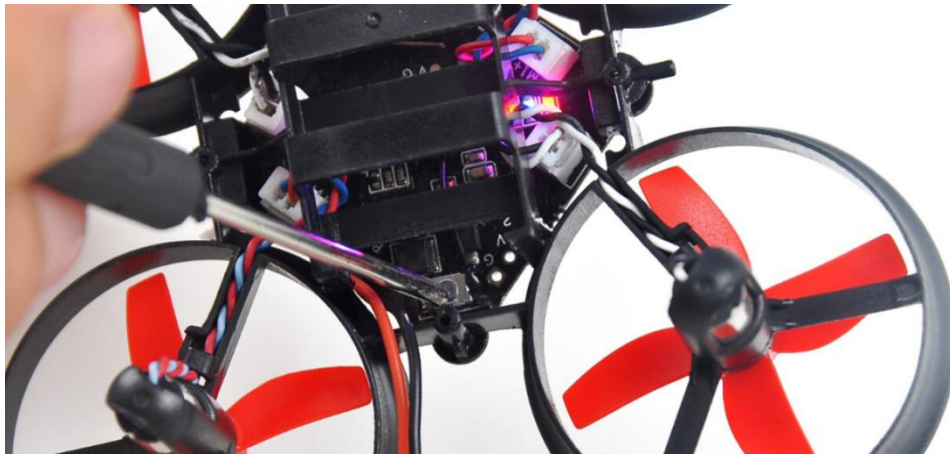
Set up

Getting set up and ready to fly is a quick and simple task. Follow these easy steps and you will be shredding the sky in just a few minutes!

Binding Procedure

Step 1:

Click the bind-button meanwhile powering on the Drone, either by connecting the battery or USB power. Then the receiver will enter bind mode, indicated by rapid blue receiver LED flashing.

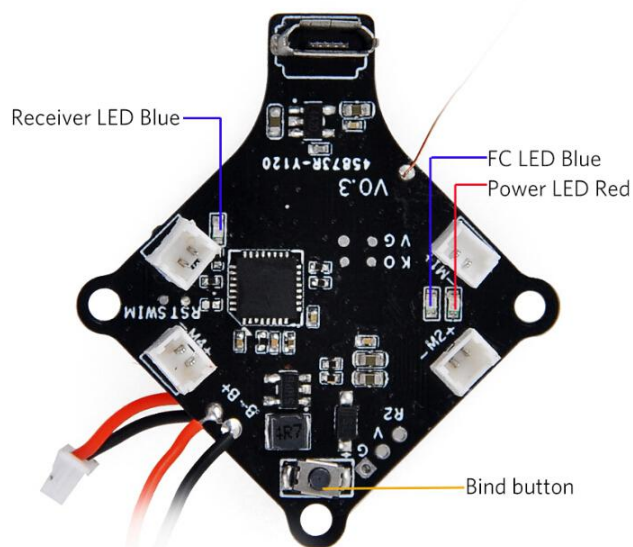


Step 2:

Now, on the radio, hold the bind-button while powering on the radio (or what it takes to enter bind-mode).

Step 3:

The blue receiver LED should stop blinking when the bind is completed.



Step 4:

Only need to bind the radio ONCE.Next time the receiver will bind to the last radio automatically.

If you have problems binding change the TX to DSM2/22ms mode. Normally what you set on the TX is the desired mode and the TX+RX negotiate their capabilities and select a mutually compatible mode.

The receiver in this quad seems unable to do that reliably.

If you still have problems binding take the TX and walk to the other side of the room. This is a solution that Spektrum themselves recommend for some TX+RX firmware combinations. This seems to be the case between my DX8 and this quad

Status LED

This board has 3 LEDs to indicate the status,including RX LED (blue),FC status LED (blue) and FC power LED (red) .

LED color	Description
RX LED solid (blue)	Bind to Transmitter
RX LED flashing (blue)	Enter Bind Mode
Power LED solid (red)	Power On
FC LED solid (blue)	Motor Armed

Flight Controller Set Up

The flight controller board comes pre-flashed with Betaflight and proper settings for the Makerfire FPV Micro Drone already set up but you still need to configure the receiver settings. Also if you upgrade the firmware or reset settings, you will lose the receiver settings and need to set them up again.

CLI Tab Settings

Go to CLI and type this in

```
set motor_pwm_rate=10000
```

```
save
```

Please confirm the setting is correct if the motors spin up when battery is plugged in.

Receiver Settings

Receiver Mode,choose RX_PPM;Serial Receiver Provider,choose SPEKTRUM1024. And click the Save and Reboot button in the lower right corner.

The native DSM receiver is NOT serial. It outputs PPM signal.

The receiver does not follow the Spektrum channel mapping. Instead it outputs AETR1234.

Receiver Mode	
<input checked="" type="radio"/> RX_PPM	PPM RX input
<input type="radio"/> RX_SERIAL	Serial-based receiver (SPEKSAT, SBUS, SUMD)
<input type="radio"/> RX_PARALLEL_PWM	PWM RX input (one wire per channel)
<input type="radio"/> 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.	
<input checked="" type="radio"/> SPEKTRUM1024	
<input type="radio"/> SPEKTRUM2048	
<input type="radio"/> SBUS	
<input type="radio"/> SUMD	

if you cannot seem to bind your controller to the FC board then make sure that these settings are set correctly.

ESC / Motor Settings

ESC/Motor protocol, click and select BRUSHED, switch on MOTOR_STOP(optional)

ESC/Motor Features	
<input checked="" type="radio"/> BRUSHED	ESC/Motor protocol
<input type="checkbox"/>	Motor PWM speed Separated from PID speed
<input checked="" type="checkbox"/> MOTOR_STOP	Don't spin the motors when armed
<input checked="" type="checkbox"/>	Disarm motors regardless of throttle value (When arming via AUX channel)
5	Disarm motors after set delay(Seconds) (Requires MOTOR_STOP feature)
1500	Center value for RC channels
1050	Minimum Throttle
2000	Maximum Throttle
1000	Minimum Command

Other Configuration Section Settings

- Set Minimum Throttle = 1050
- Set Maximum Throttle = 2000
- Set Center Value for RC Channels = 1500
- Feel free to turn off Barometer and Magnetometer if you'd like, as you do not need them

<input checked="" type="checkbox"/>	MOTOR_STOP	Don't spin the motors when armed
<input checked="" type="checkbox"/>	Disarm motors regardless of throttle value (When arming via AUX channel)	
<input type="text" value="5"/>	Disarm motors after set delay(Seconds) (Requires MOTOR_STOP feature)	
<input type="text" value="1500"/>	Center value for RC channels	?
<input type="text" value="1050"/>	Minimum Throttle	?
<input type="text" value="2000"/>	Maximum Throttle	?
<input type="text" value="1000"/>	Minimum Command	?

GPS

Note: Remember to configure a Serial Port (via Ports tab) when using GPS feature.

GPS GPS for navigation and telemetry [?](#)

NMEA Protocol

Auto-detect Ground Assistance Type

0.00 Magnetometer Declination [deg]

Flight Modes Settings

Most pilots will prefer to fly in HORIZON mode as that allows for both stabilization and also flips and rolls. The other modes to use are:

- **ANGLE** - full stabilization, no flips, ideal for first time pilots
- **Rate** - if you do not have ANGLE or HORIZON turned on then the quad is in full rate mode, with no stabilization, giving the pilot full control of the quad at all times. We highly recommend to fly in rate mode with AIR MODE
- **AIR MODE** - spins the props at zero throttle, allowing the quad to maintain its attitude and angle at all times. This mode that allows for advanced aerial maneuvers

- Setup
- Ports
- Configuration
- PID Tuning
- Receiver
- Modes
- Motors
- CLI

Modes

Use ranges to define the switches on your transmitter and corresponding mode assignments. A receiver channel that gives a reading between a range min/max will activate the mo

ARM	<input type="text" value="AUX 1"/> <div style="display: flex; align-items: center;"> <div style="width: 100%; border: 1px solid #ccc; position: relative;"> <div style="position: absolute; top: -10px; left: 50%; transform: translate(-50%, -50%); font-size: 0.8em;">Min: 1300 Max: 2100</div> <div style="position: absolute; bottom: -10px; left: 50%; transform: translate(-50%, -50%); font-size: 0.8em;">900 1000 1200 1400 1500 1600</div> </div> </div>
AIR MODE	<input type="text" value="AUX 1"/> <div style="display: flex; align-items: center;"> <div style="width: 100%; border: 1px solid #ccc; position: relative;"> <div style="position: absolute; top: -10px; left: 50%; transform: translate(-50%, -50%); font-size: 0.8em;">Min: 900 Max: 2100</div> <div style="position: absolute; bottom: -10px; left: 50%; transform: translate(-50%, -50%); font-size: 0.8em;">900 1000 1200 1400 1500 1600</div> </div> </div>
ANGLE	<input type="text" value="AUX 1"/> <div style="display: flex; align-items: center;"> <div style="width: 100%; border: 1px solid #ccc; position: relative;"> <div style="position: absolute; top: -10px; left: 50%; transform: translate(-50%, -50%); font-size: 0.8em;">Min: 900 Max: 2100</div> <div style="position: absolute; bottom: -10px; left: 50%; transform: translate(-50%, -50%); font-size: 0.8em;">900 1000 1200 1400 1500 1600</div> </div> </div>

Accelerometer and Gyro Calibration

Calibrate in Betaflight

- Open BetaFlight and hit “Connect”
- Put a spirit level on a surface and make it level, place the Micro FPV drone on the level surface
- In the first tab, click “Calibrate Accelerometer”



Using radio sticks

- Power up the radio and Micro FPV drone, remaining disarmed for the duration of this process
- Put a spirit level on a surface and make it level, place the Micro FPV drone on the level surface
- For the accelerometer, move the throttle stick up-left and pitch down-center, you will see the blue LED blink for confirmation
- Now for the gyro, move the throttle stick down-left and the pick down-center

AIO FPV Camera Setup

The camera is 600TVL like most larger FPV cameras, but with huge improvements. It performs much better in low light, has clearer colors, and comes with a lens that provides a beautiful 120° field of view.

The 25mw 5.8GHz video transmitter is capable of changing quickly between 40 channels with a single button. Long press changes the band, short press changes the channel, 1 through 8. With a simple linear polarized dipole antenna, it has a slightly shorter range but is much more crash resistant.

Also the camera is 10° tilt mounted. This is the perfect angle for Tiny Whoop flight. At this angle you can see down a bit between the ducts to drop through slots in the foliage of a magnolia tree, but I can still see everything ahead in full-blown fast forward flight.

Operation:

- NTSC/PAL Switch still touch up 2 second
- Short touch flip switch
- Frequency group A~F selected still touch up to 2 second
- Channel CH1~CH8 selected with short touch

Flash Firmware

If you wish to flash a different firmware or update Betaflight to the newest version, please follow these steps.

1. Click the Firmware Flasher tab
2. Select “SPRACINGF3EVO” as the board, and pick the version of Betaflight you wish to flash (latest is 3.0.1)



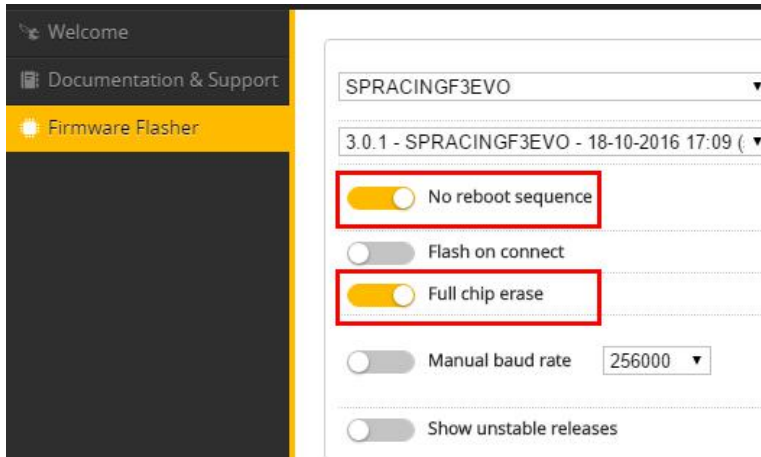
Do not use “SPRACINGF3” or other targets. If no firmware is currently available do NOT attempt to flash. Flashing the wrong firmware can cause the FC to be permanently damaged.

3. Click “Load firmware [Online]” and wait for firmware to download and read release notes before flashing

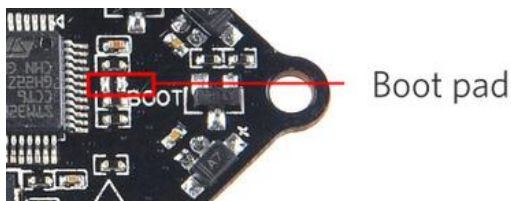
Situations 1:

If you have lost communication with the board and no reboot sequence (also called bootloader) exit, you should do as following:

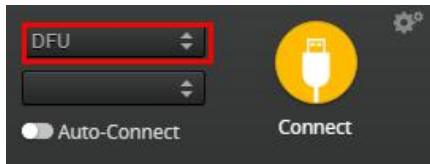
- a: Enable “No reboot sequence”, enable “Full chip erase”



- b: Jumper the BOOT pins and power on the board by connecting USB cable. Then remove the BOOT jumper



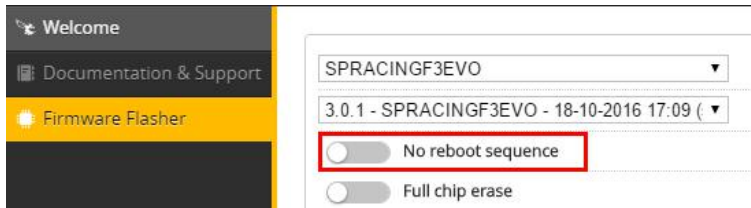
- c: Now DFU will appear in the list of ports and flashing via DFU will be available. Click “Flash Firmware”. After flashing the virtual COM port will appear as “COMxx”



Situations 2:

If reboot sequence (also called bootloader) exit and work well, you could flash the firmware without jumper the BOOT pins. This is the the state when the stock firmware works well and you want to upgrade to the latest version.Do as following.

a:Disable “No reboot sequence”



b: Power on the board by connecting USB cable. You could find the virtual COM port will appear on the up right corner

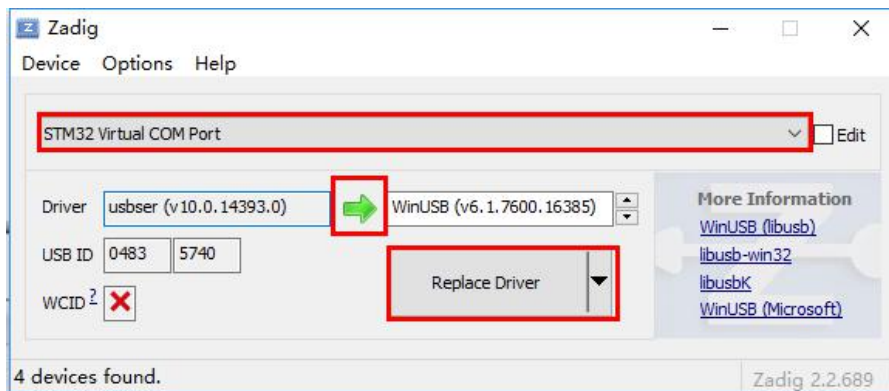
c: Click “Flash Firmware”. First, the board will reboot into DFU mode. Then wait the ST DFU DRIVER Automatic installation. It’s successfully installed when you see the DFU port on the up right corner. Now flashing via DFU will proceed. After flashing the virtual COM port will re-appear

Q: Unable to flash firmware via DFU.

A: Likely the correct DFU drivers are not installed. Put the board in BOOTLOADER mode (jump boot pins, connect USB cable). Then update DFU drivers.

Here is how to update DFU drivers:

Chrome may have problems automatically installed DFU driver for ST devices in DFU Mode on Windows.The solution is to replace the ST driver with a libusb driver.



Download and launch Zadig

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

- a. Options -> List All Devices
- b. Select STM32 Bootloader from the drop down.
- c. Choose WinUSB as the replacement.

- d. Click "Replace Driver". Some times the Replace progress will be slow or no response, you can close it and do it again.
- e. Restart Chrome (make sure it is completely closed, logout and login if unsure)
- f. Now the DFU device should be seen by Configurator
- g. Also you could see USB Flashing section of Betaflight/Cleanflight manual for details.
<https://github.com/cleanflight/cleanflight/blob/master/docs/USB%20Flashing.md>

Binding & Betaflight Setup Procedure with External FrSky RX

a. Turn on transmitter, create new mode and enter setup, the Mode must be D8.



b. Power on the quadcopter by connecting the battery, red LED at the tail of the drone will flash rapidly on receiver after 6 seconds, the receiver is in ready for binding mode. Then turn on the transmitter, enter the binding mode, the red LED will turn solid, this means it has binded successfully with the default mode in SBUS.

Connecting the USB cable will not power on the FrSky RX, so you MUST connect the battery when binding.

Turn on the transmitter for 6 to 30 second to be binded in SBUS mode; Turn on the transmitter after 30 seconds to be binded in PPM mode. The flight controller will default SBUS mode.



c. For each flight, turn on the transmitter firstly, then power on the quadcopter, if the receiver has a solid red LED, this means it is binded correctly, with RSSI and voltage telemetry.



With FrSky RX, there are several different configurations to DSMX RX with Betaflight GUI .

The FrSky receiver is serial. It outputs SBUS signal.

Ports Tab: Switch on Serial RX of UART2. And click the Save and Reboot button in the lower right corner.

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

Configuration Tab:Receiver Mode, choose RX_SERIAL; Serial Receiver Provider, choose SBUS.And click the Save and Reboot button in the lower right corner.

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
- SRXL (XBUS_MODE_B)
- XBUS_MODE_B_RJ01
- IBUS

Note & FAQ

The flight controller board comes pre-flashed with BetaFlight.

This is a Spektrum DSMX/DSM2 compatible receiver. It is not an official Spektrum receiver. The Spektrum, DSMX and DSM2 brand is a trademark of Horizon Hobbies, USA.

Q:Can I enjoy it if i am a drone hobby beginner?

This is not a beginners quad.You will need a decent transmitter.

You will need to know how to use the program Cleanflight / BetaFlight.

Most importantly,you should have 5.8G goggles to enjoy the FPV experience.

Q:What radio control protocols are used by the board?

The DSMX compatible version uses PPM 7 Channel that is compatible will all DSMX and DSM2 Spectrum radios.

Any radio that can take the Orange Rx version module, such as the Turnigy 9X, is compatible with the DSMX version of the board.

Q:I want more information about the brush flight controller.

Makerfire F3 brushed flight controller with native DSM receiver, compatible with All Spektrum radios.(e.g.DX6,DX6i,DX7,DX8)or Spektrum,compatible transmitter module(e.g. Turnigy 9X with Orange Rx module).

Q:What Flight Modes does it have?

The board runs the popular Cleanflight/Betaflight firmware that is fully customizable and includes several different modes: Auto-Level, Horizon (auto-leveling mode with ability to flip), and full manual (rate). You can also enable airMode and be able to control the quad at any speed and attitude

Makerfire team comes with a detailed manual that is reviewed and maintained by the developers and community. No more out-of-date wiki pages and second-hand information from official website.Also you could send email to info@crazepony.com for help.

Flight Controller Official Link:

<http://www.crazepony.com/products/f3-brushed-fc.html>

BNF Micro FPV Drone Official Link:

<http://www.crazepony.com/products/mkf-micro-fpv.html>