Flier Air ESC User's Manual

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1. Introduction

Thank you for purchasing Flier products. We highly recommend that you read this manual carefully and abide by the recommended operating procedures in order to avoid injury or damage to this component or another high power brushless component.

Flier is not responsible for misuse of this product, nor for any damage or incidental losses or indirect losses the purchaser may cause. Flier has no responsibility for the consequences of modification of this product without Flier authorization. We reserve the right to change the design, features, functions and operating requirements of our products without any advanced notice.

2. Features

① Designed for airplane and other brushless motor applications.
② 2S to very high 22S voltages.
③ Two-way communication while connected to the computer.
④ Firmware upgradable.
⑤ Function values can be set by transmitter, Prog-Box or USB PC linker.
⑥ Suitable for Li-MH/LiPo, Ne-Cd/Ne-MH, and FiFe batteries.
⑦ Ability to set cell voltage at which the controller's cut-off engages: 2.0 to 3.6 V for Li-MH/Li-Po, 4 to 1.0 V for Ne-Cd/Ne-MH, and 2.2 to 2.8 V for LiFe.
⑧ 0° to 30° timing settings available.
⑨ Three types of throttle curves.
⑩ Automatic detection of the throttle range, or a fixed value can be set manually.
⑪ Automatic power cut-off within 3 seconds if no radio signals are detected.
⑫ Brake system has 6 levels.

3.How to use the ESC

1). Connect the motor and receiver according to above diagram. If it is an ESC without BEC (i.e. OPTO), an external 5V power supply needs to be connected to the receiver.

2.) Connect the ESC to the battery pack. (Correctly use the Anti-spark wire while connecting the ESC to battery pack).

3). Then you will hear " DoMiSol Sol" or "DoMiSol MiSol" melody.
(If you don't hear the first complete three beeps "DoMiSol", please check your motor connection.If you don't hear the last "Sol" or "MiSol" sound, please check your receiver connection or your remote control. The last one beep "Sol" means the ESC is Break On mode. The last two beeps"MiSol" means the ESC is Break Off mode.)

**4).** Push the trigger and then the motor will start to work.

4.Diagram for wire connection
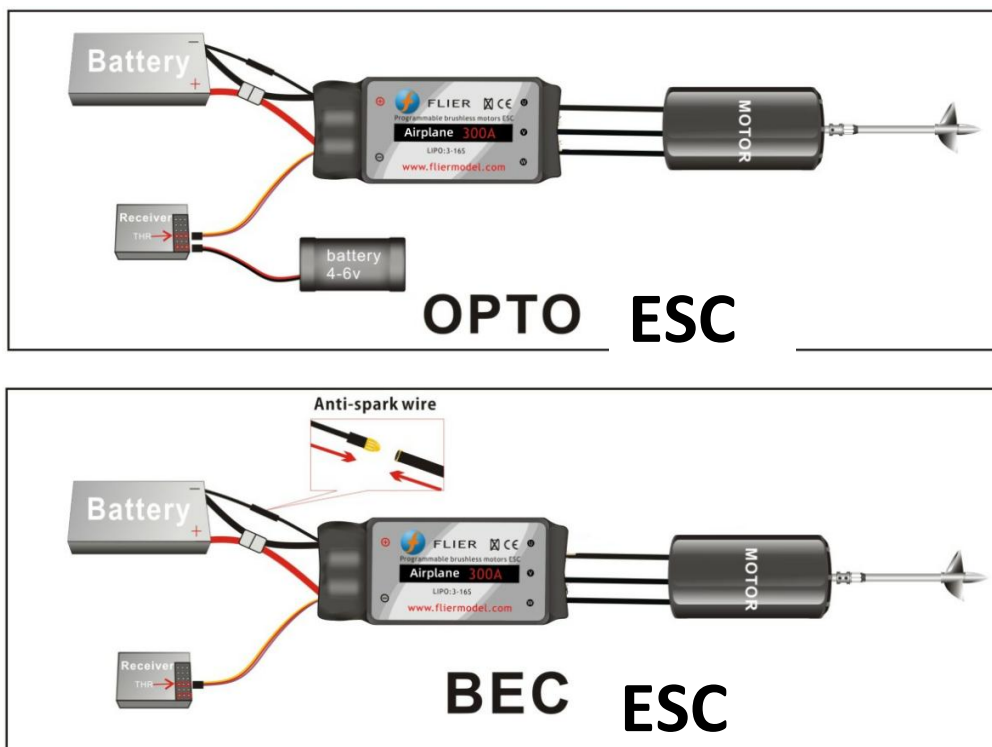
5.Anti-spark Wire Connection

The anti-spark wire must be correctly installed to prevent damage to the ESC. The anti-spark wire can be identified as the thin black wire with a resistor installed along its length. Follow next steps to use the anti-spark wire correctly:

First, separate the two halves of the spark wire at the bullet joint at the resistor. Next, solder the free end of the anti-spark wire(Part A) to the bullet connector of the black (negative) wire from the battery. And then connect the red (positive) battery wire to the ESC first, then connect the small black resistor wire via the bullet connector at the resistor. Finally, connect the black (negative) battery wire to the ESC.

Part A

Separate here

Part A
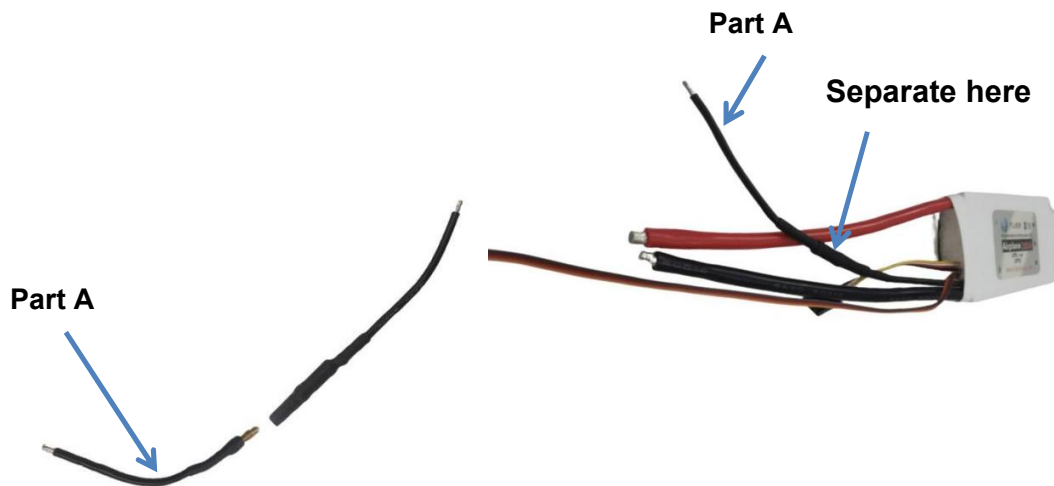
6.Function Values (Default values underlined)

   ①   **Brake:** Off, Extra Soft, Soft, Medium, Hard, Extra Hard.

   ②   **Timing:** 0°, 1°, 2°, 3°, 4°,…..30°.

   ③   **Frequency:** 8 KHz, 16 KHz, 32 KHz.

   ④   **Acceleration:** Soft, Medium, Hard.

   ⑤   **Accumulator type:** NiCd/NiMh, Li-Ion/Li-Pol, LiFe.

   ⑥   **NiCd/NiMH cut-off:** 5% of voltage while connecting.

⑦ **Cell number:** <u>Auto</u>, 2S to 24S.

⑧ **Li-Ion/Pol cut-off:** 2.0V, 2.1V, 2.2V, 2.3V, 2.4V, 2.5V, 2.6V, 2.7V, 2.8V, 2.9V, <u>3.0V</u>, 3.1V, 3.2V, 3.3V, 3.4V, 3.5V.

⑨ **LiFe cut-off:** 2.2V, 2.3V, 2.4V, <u>2.5V</u>, 2.6V, 2.7V, 2.8V.

⑩ **Cut-off type:** <u>Slow</u>, Hard.

⑪ **Initial point:** <u>Auto</u>, Fixed 1.0mS, Fixed 1.1mS, Fixed 1.2mS, Fixed 1.3mS, Fixed 1.4mS, Fixed 1.5mS.

⑫ **End point:** <u>Auto</u>, Fixed 1.7mS, Fixed 1.8mS, Fixed 1.9mS, Fixed 2.0mS.

⑬ **Throttle curve:** Logarithmic, <u>Linear</u>, Exponential.

⑭ **Rotation direction:** <u>Left</u>, Right.

⑮ **Timing monitor:** <u>On</u>, Off.

7.Changing the function values

There are three ways to change the function values. The easiest method is by using the Program Box accessory. A limited number of function values can be changed by using the transmitter. Finally, function values can be changed by using a PC with the supplied USB cable.

7.1 Changing a function value with the Program-Box

If you have a Flier Program Box, you can change any function very simply:
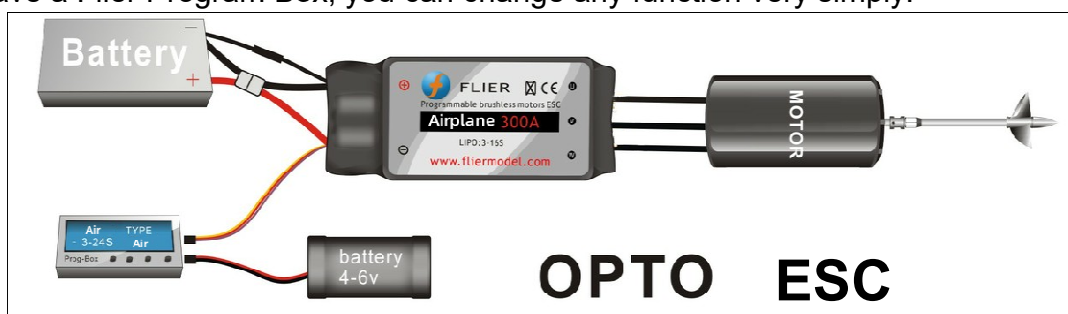
(Figure 1)
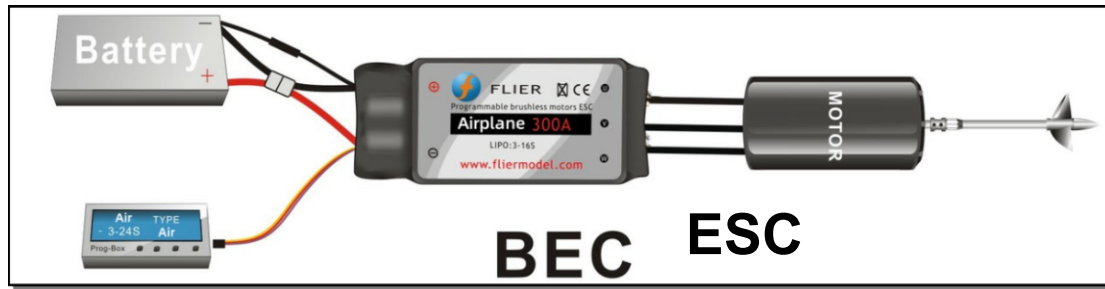
(Figure 2)

1) Connect the ESC to the Program Box using the 4 pin cable provided. Make sure that the colored wires are correctly aligned. OPTO ESC see Figure 1 and BEC ESC see Figure 2.

2) Connect the ESC to the motor.

3) Turn the ESC on; a triple beep will indicate a successful connection. "ESC Data OK" will be displayed on the Program-Box LCD screen.

4) After 1 second it will enter the MODE TYPE function setting automatically; the ESC MODE TYPE cannot be changed.

5) Press the "Forward" button to advance to the second function: CONTROLER TYPE. The ESC controller type will be displayed on the screen but this function cannot be changed.

6) Use the "Forward" button to select the desired function followed by "←" and "→" to enter the desired value.

7) Pressing the "Back" button will return the screen to the previous function.

8) When the settings are done, the LCD screen on the Program-Box will displays "Sending Data to ESC".

9) Turn off the power to the ESC, then re-start the power to inspect whether the function values were written properly to the ESC.

10) Turn off the power and disconnect the Program-Box.

⚠️ Note：if the ESC you are setting is no BEC, you will have to power to the Prog-Box via another 3pin connector.(See Figure 1.)

7.2 Throttle Calibration and Changing function values with the transmitter

Throttle calibration can be performed using the transmitter. Also, Some simple function values for this ESC can be changed or set by using the transmitter. First, we'll explain how to carry out throttle calibration, and then we'll discuss how to use the transmitter for Changing parameter settings.

Throttle Calibration:

Ideally, the throttle pulse width from the receiver ranges from 1.0ms (the minimum throttle achievable by the transmitter) to 2.0ms (the maximum throttle achievable by the transmitter), corresponding to motor speeds of 0% to 100%. However, due to individual device variations, both the minimum and maximum throttle values may deviate. The maximum throttle might not be exactly 2.0ms, and without throttle calibration, the motor may not reach 100% speed at the maximum throttle or already reach 100% motor speed at 80% throttle position. In such cases, throttle setting or calibration becomes necessary. Our ESC can be set to a fixed throttle travel directly through computer software, allowing it to be close to the remote's travel without calibration. However, for advanced users who require precise throttle control, it is still recommended to perform throttle calibration.

To ensure that your ESC can fully utilize the throttle travel, it is recommended to perform throttle calibration in the following situations:
- When using the ESC for the first time.
- After replacing the remote controller or receiver.
- After adjusting ESC settings or upgrading firmware.
- When the throttle travel is inappropriate even be set.
Before performing throttle calibration, please ensure that the ESC's power and motor wires are correctly connected, but do not power it on yet. Ensure that the receiver is connected properly and powered on. Additionally, confirm that the ESC parameters Forward Point/Reverse Point or Set Ini/End Point are set to Auto (factory default value).

- If your ESC software is for airplanes and the motor rotates in one direction, the calibration steps are as follows:

1. Maximum Throttle Calibration:

   1.1. Set the throttle of the remote controller to the maximum position (greater than 1.65ms) and hold it steady. Then power on the ESC; you will hear three beeps: "Do Mi Sol."

   1.2. Keep the throttle steady for about 4 seconds, after which you will hear four beeps: "Do Do Sol Sol." At this point, the position of the throttle is the calibrated maximum throttle.

   1.3. Immediately move the throttle to the Minimum point (below 1.5ms). this will store the calibrated throttle.

   1.4. You can then disconnect the ESC from power, and the maximum throttle calibration will be successfully completed.

2. Brake Mode Adjustment:

   After completing step 1, the ESC's brake mode will switch (i.e., if it was originally in brake mode on, it will change to brake mode off; if it was originally in brake mode off, it will change to brake mode on.). If the brake mode does not meet your expectations after calibration, please perform maximum throttle calibration again (i.e., repeat step 1).

3. Minimum Point Throttle:

   The Minimum point throttle does not require manual calibration; the ESC will automatically detect the throttle position when powered on. Each time you power on, if the throttle value is below 1.5ms, that position will be set as the Minimum point. It is recommended that you set the throttle to the minimum position before powering on each time.

Changing function values:

Currently, there are 3 parameters that can be adjusted using the transmitter:

1. Brake mode: Includes two modes, on and off.

2. Motor Timing Degrees: Includes four adjustable values: 0-7°, 8-15°, 16-23°, and 24-30°.

3. Frequency (PWM): Includes three adjustable values: 8kHz, 16kHz, and 32kHz.

The adjustment process is the same as throttle calibration.please ensure that the ESC's power and motor wires are correctly connected, but do not power it on yet.

Set the throttle of the remote controller to the maximum position (greater than 1.65ms) and hold it steady. Then power on the ESC; you will hear three beeps: "Do Mi Sol."

Keep the throttle steady for about 4 seconds, after which you will hear four beeps: "Do Do Sol Sol." This indicates that the ESC has entered the setup mode. At this point, if you need to adjust the brake mode, set the throttle to the minimum position. If the current mode is Brake On, it will switch to Brake Off, and if the current mode is Brake Off, it will switch to Brake On.

Next, keep the throttle at full position. You will hear 8 different tones, each sounding 5 times, with the 8 tones playing in a loop. Each tone represents an adjustable parameter. When you hear a specific tone, set the throttle to the minimum position to adjust the corresponding parameter. If you keep the throttle at full position, the parameter will be skipped. The table below lists all adjustable parameters and their corresponding tones.

Sound count	Sound	Parameters	Note
1	♪ × 5	0° timing	recommended for 2 poles and common motors
2	♪♪ × 5	13°timing	recommended for 4 pole motors
3	♪♪♪ × 5	24° timing	recommended for 4 pole motors
4	♪♪♪♪ × 5	30° timing	recommended for 10 pole and outrunner motors
5	♪-- × 5	8 kHz	default setting for the lowest efficiency loss
6	♪--♪ × 5	16 kHz	recommended for low internal motor resistance
7	♪-♪ × 5	32 kHz	recommended for low motor inductance
8	♪--♪-♪× 5	No use	The parameter is reserved for future use.

* "-" represents a long tone, and "--" represents an even longer tone.

For example, if you need to set the ESC to 13° timing, keep the throttle at full position until you hear the "♪♪" tone 5 times, then set the throttle to the minimum position to save the parameter.

Once the parameter is successfully adjusted, the tone will stop, and the setup mode will exit automatically. You can then power off the ESC. If you need to adjust other parameters, you will need to re-enter setup mode.

If you miss a parameter, you can wait for the next loop to make adjustments. Please note that the brake mode setting does not loop. If you miss this setting, you will need to power off and restart the ESC.

7.3 Changing a function value by using a PC

ESC function values can also be changed by using a PC with a USB connection and our proprietary USB Linker driver.
You have to install the USB Linker' driver if your computer is under Windows 7, otherwise no need to. But ESC programming software must be installed before you can change the ESC function values with your computer.

Installation of USB Linker' driver:

Example for Windows XP:

1. Plug the USB Linker into the computer USB port. The PC will display "Found new hardware". Click the "Next" button.
2. Click "Next" when prompted by "Install from a list or special position (Advanced).
3. Click "Search for the best driver in these locations" and click "Include this location in the search". In the search dialog specify the location of the USB driver that is located in the CD or driver download folder "USB Driver".
4. Open the Windows Device Manager.
5. Find "Ports (Com & LPT) in the list and click the + sign to the left.
6. Find the line "Prolific: USB-to-Serial Comm, Port (COMX)" .The "x" value is the COM port number that was assigned to the USB serial converter. This is the port that will be selected in the Flier ESC Computer Linking Software. Make note of it.

Installation of Flier ESC Programming Software:

The installation of the Flier ESC Programming Software is the same as the installation of any Windows software: simply open the setup file and install it according to the prompts. The software can be run after the USB Linker connects to the computer.

Overview of Flier ESC Software Interface:
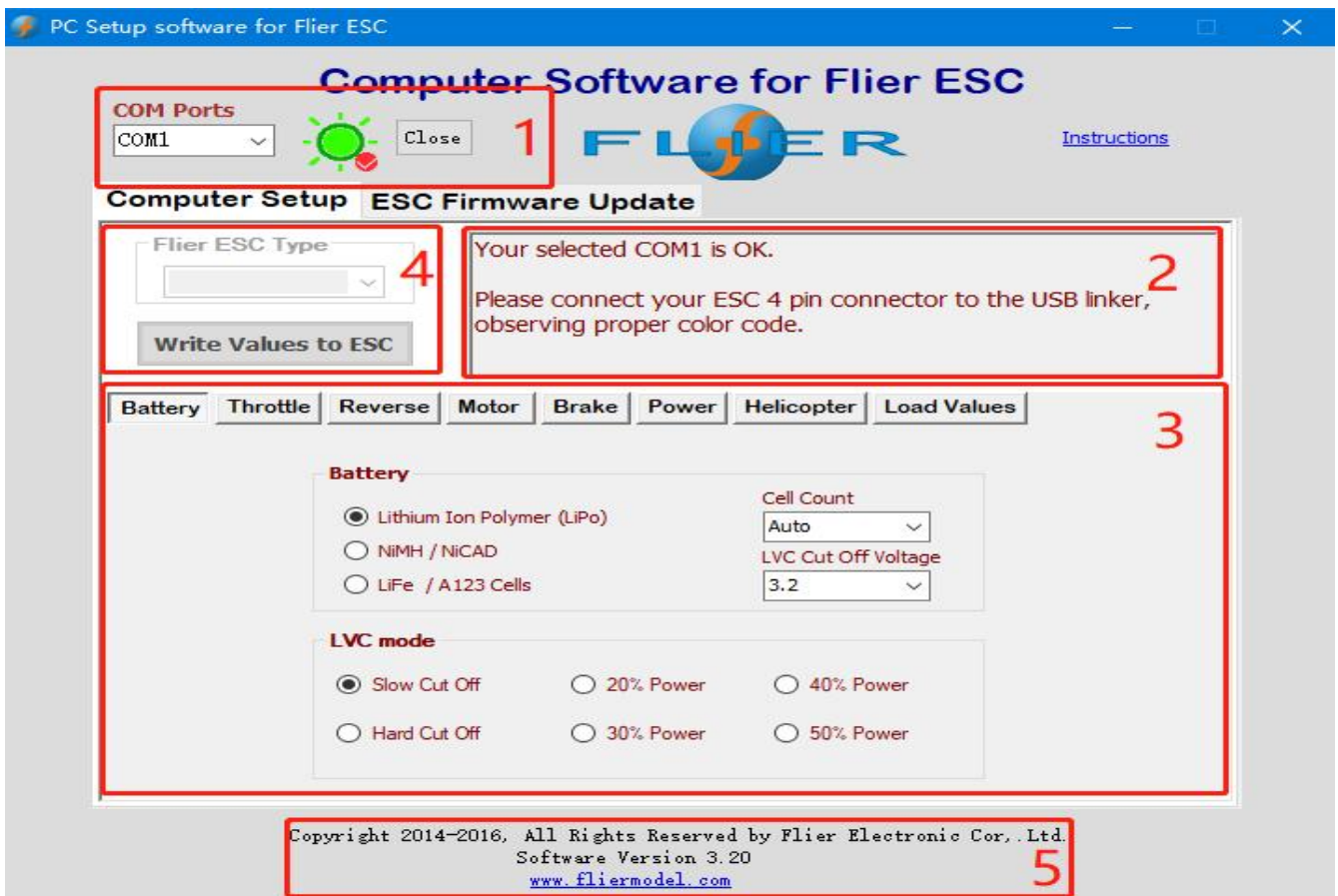
1) The top-left of the interface is Select "COM Ports".The light next to the port indicates whether the port is working or not. If the light is on(Green), it means the port is working. If the light is off(Gray),it means the port is not working.. The button next to it can temporarily open/ close the port.)

"Select COM Port": Usually, the software will automatically select the port after running. But sometimes due to too many ports on the computer, there will be a selection error, then we need to select the port manually.

2) The top-middle of the interface is a text box. it can display some messages of the software progress.

3) The middle main area of the interface is the program area. You can program the setting value of the ESC here.

4) The "Flier ESC Type" on top-left of the interface would display ESC type once you connect ESC to the PC correctly. And below "Write Values to ESC" is a write data button. You can press it to save the setting value into the ESC.

5) The bottom of interface displays the copyright and company website information.

How to program the ESC by PC:

1) This is very important. Disconnect the battery, motor and receiver. In other words, disconnect all connections from the ESC.

2) Plug the Flier USB linker into your computer and run the Flier programming software.

3) You can see a interface which the above mention(Figure 3).

4) Check that the COM port is the one you saw earlier when you installed the driver. If it is incorrect, please manually select the correct COM port.

5) Connect the 4-pin wire to the 4-pin wire of the ESC, making sure that wires of the same color are connected together, otherwise the ESC may be damaged. If the connection is correct, the Flier ESC type will be displayed in the "ESC type" . If it is not displayed correctly, you can unplug the USB linker and plug it back in until it is displayed correctly.

6) All parameters in the ESC will be displayed on the computer software. Modify the parameters that need to be changed, or click "Load Factory Default" to load all factory default.

7) After completing the adjustment. Click on "Write values to ESC" in the upper left corner and all parameters will be written and stored in the ESC immediately.

8) Disconnect the 4pin wires, and reconnect it to check that the parameters you just changed have been recorded in the ESC.

9) Disconnect the 4-pin wire and exit the Flier ESC computer software,

10) Unplug the USB linker. Your ESC is now programmed.

8.Updating the Firmware:
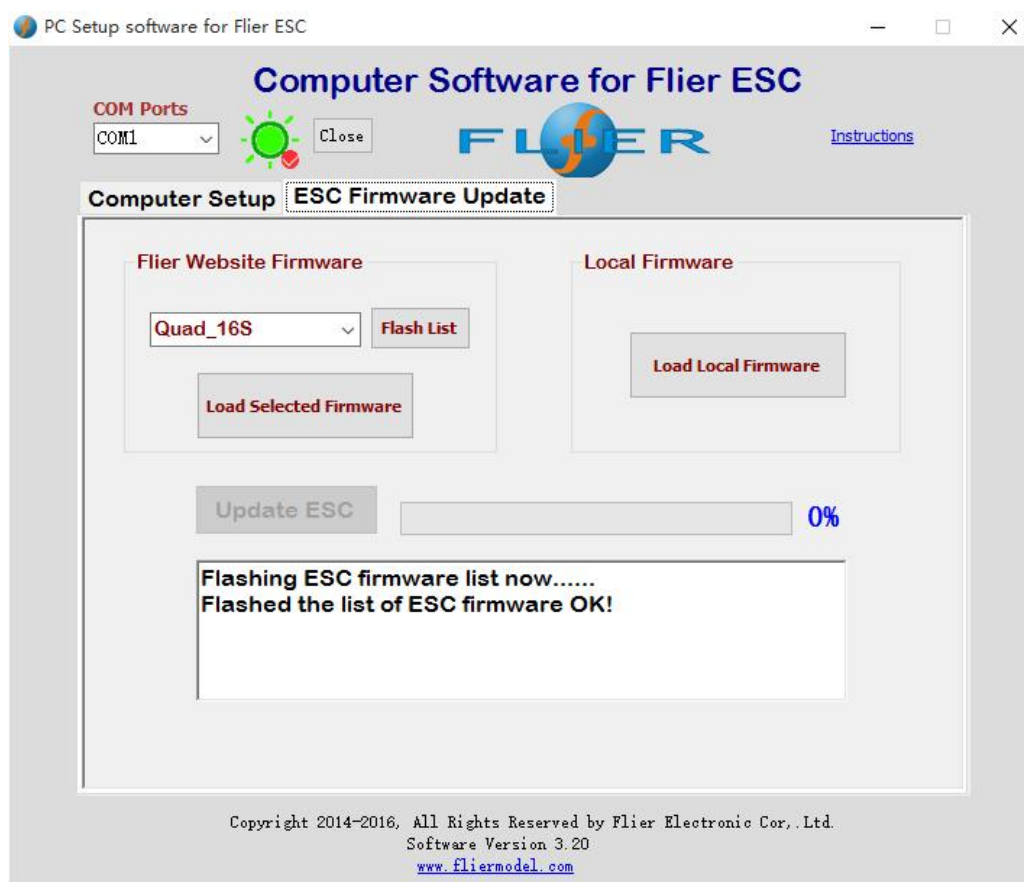
(Figure 4)

1) Disconnect all the connections to the ESC. Insert the USB cable into the USB port of the computer, and run the software. Please kindly notice whether the right port is selected.

2) If it's your first time running this software, or you can't find the needed firmware in the list, please press the "Flash List" button next to it, then all the firmware will appear in the list. Close the software and rerun it. See Figure 4.

3) Choose the firmware which you need, the next step is to click the "Load Selected Firmware" button. "File read OK!" message will appear.

4) Disconnect the all wires of the ESC ,include power wires motor wires and BEC wires.

5) Plug the 4-pin wire of the ESC into the 4-pin of USB wire. pay attention to color correspondence."Connect OK, Pl....." message should be displayed.

6) If no message or any errors, please unplug the 4-pin wire and then repeat step 5 until the correct message is displayed.

7) Click the "Update ESC" button. The firmware will be updated now.

8) Wait until "update to 113 pages, errors pages 0....." appears, which means the firmware has been updated successfully

9) You can disconnect the 4-pin wire of the ESC from the USB Linker now.