

# RadioLink Micro Racing Drone F110S

(Altitude Hold by Inertial Navigation)

## User Manual



## Introduction

Thank you for purchasing Radiolink mini racing drone -- F110S.

In order to fully enjoy the benefits of this racing drone and ensure flight safety, please read the instructions carefully and set up the device as described below, when we write this instruction, we try our best to use the familiar and simple words to make it easy for beginners to understand the name and formulation.

Please refer to the manual or call our after-sales (+86-0755-88361717) or log in BBS (such as [www.rcgroups.com](http://www.rcgroups.com), <https://www.facebook.com/Radiolink-1455452961436694/>) to check the issues related answer to questions if you have any questions.

Due to unforeseen changes in production procedures, the information contained in this manual is subject to change without notice.

More information please check our website as below:

<http://www.radiolink.com>

## After-Sales Information

Any technical updates and manual corrections will be available on our website. If you do not find the answers to your questions there, please via email for the most rapid and convenient response.

### FOR AFTER-SALES SERVICE:

Please start here for getting more service.

[www.radiolink.com](http://www.radiolink.com)

Phone: +86-755-88361717

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### Note: About flying

While you are getting ready to fly, if you place your transmitter on the ground, be sure that the wind won't tip it over. If it is knocked over, the throttle stick may be accidentally moved, causing the engine to speed up. Also, damage to your transmitter may occur.

### Warning!!!

**This product is not a toy and is not suitable for children under the age of 18. Adults should keep the product out of the reach of children and exercise caution when operating this product in the presence of children.**

Please don't fly in the rain!

Rain or moisture may enter the transmitter internal through gaps in the antenna or joystick flight and cause your flight to instability even out of control. If inevitable will fly in the wet weather (such as game), please be sure to use plastic bags or waterproof cloth to cover your transmitter, please don't flight if there is lightning.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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## 1. Features Highlights

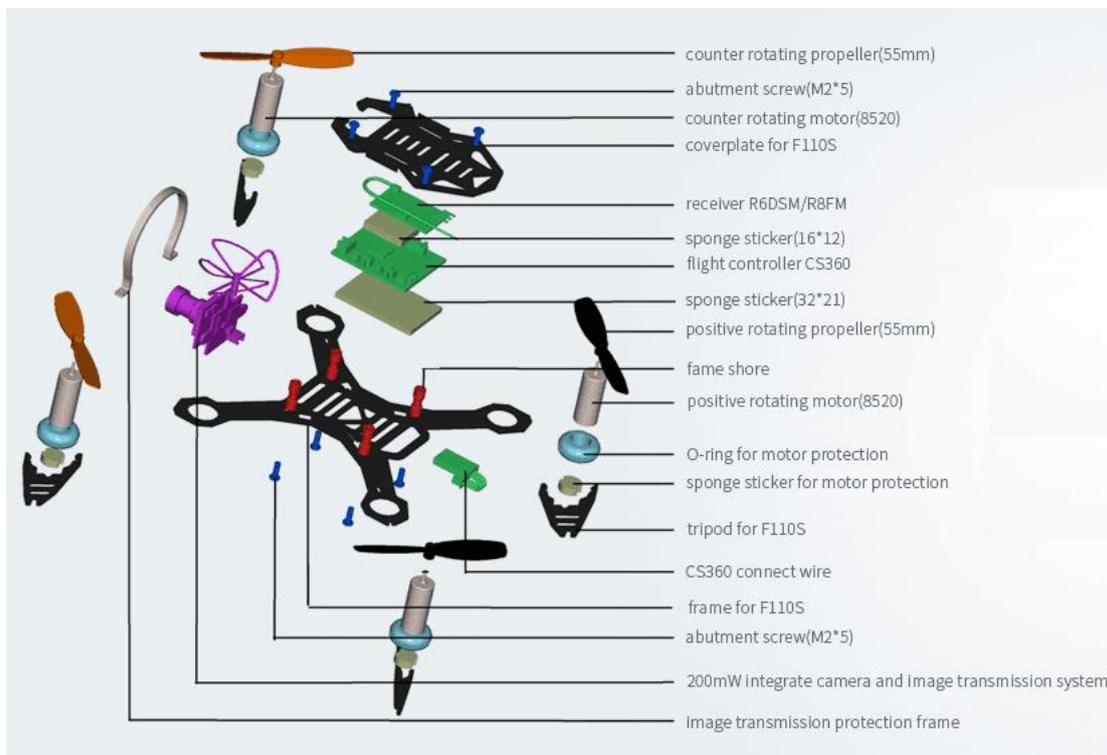
(1) Altitude accuracy by inertial navigation system, not only fly in angle mode even under super-speed but also Altitude Hold stably even at the lower than 50 centimeters altitude or faced with fluctuations in airflow, such as during takeoff, under braking, or after extended flying.

(2) Can throw and start to fly in any angle and fly in angle mode even under high-speed.

(3) Head Front Forward Point Without Compass: Drone head always towards the same direction if not move rudder stick, otherwise the head direction will change according to rudder stick move.

(4) PID Parameter Tune Automatically: F110S, controlled by Radiolink brand new mini racing drone flight controller CS360, different from other flight controllers that need to set PID tuning before use, gets the perfect parameters and flight angle automatically.

(5) Assembled as building block makes the RC students exercise their DIY ability and free from lengthy mobile games.



## Specification

- |   |  |
|---|--|
| (1) Weight (including all the parts) : 170g   | Frequency: 2.4GHz                      |
| (2) Size(without propeller) : 110mm×44mm  | Propeller diameter: 55mm               |
| (3) Flight controller CS360 size: 32.5*21.5mm   | Coreless motor: 8520                   |
| (4) Material: carbon main plate   | Support transmitters: all support SBUS |
| (5) Charger: USB charger (1A/2A charging current)   | Flight environment: outdoors/indoors   |
| (6) Flight Time: 6 to 8 min (1S 600mA Li-Po battery)                                      |  |
| (7) Operating Temperature: depends on your battery  |  |
| (8) Low battery alarm: have (the green LED of FC will be blinking if low battery voltage) |  |
| (9) Control distance: 1000 meters air (with R8FM) / 600 meters air (with R6DSM)           |  |

## 2. Compatible with Remote Controllers

F110S compatible with RadioLink remote controllers AT10, AT10II, AT9, AT9S and T8FB. F110S will sell with receiver R6DSM or R8FM (you can buy F110S with R6DSM or F110 with R8FM from our dealer).

R6DSM compatible with RadioLink remote controllers AT10, AT10II, AT9, AT9S.

R8FM compatible with RadioLink remote controller T8FB.

### 3. Preparing Before Flight

#### 3.1 Charge

First, please keep your battery is 4.2V to ensure your F110S with enough power to fly, you can charge your battery by CM120 if not fully charged.

#### Professional Designed LiPo Battery Charger CM120

##### Energy Supply Station

Brand new designed LiPo battery charger CM120, designed for 1S LiPo battery. Inherit the high precision of CB86PLUS, make the charging safer, battery which charged by CM120 is more powerful can flight about five to eight minutes.

Charging current can setup 1A or 2A by toggle the switch as you need.



Red LED indicate charging mode and green LED indicate the battery is fully charged.

CM120 use universal USB connector, so you can use computer or power bank for mobile phone as the power supply for CM120.

Pay attention: ensure the voltage output of power supply is not higher than 5V.

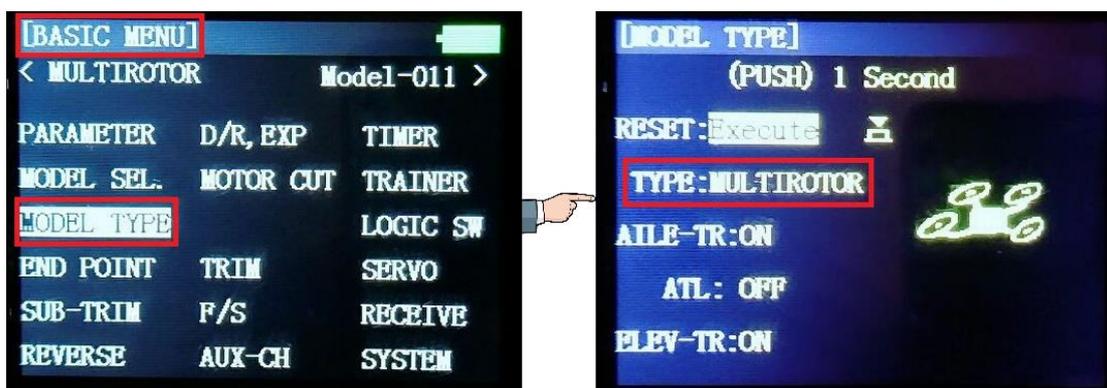
#### 3.2 Remote Controller Setup

##### Setup If Controlled by AT9S/AT9/AT10/AT10II

(1) Please turn on AT9S/AT9(DC 7.4~18V) or AT10/AT10II (DC 7.4~15V) first.

(2) Make sure the model type of AT9S/AT9/AT10/AT10II is multirotor model, and the CH3(throttle) is reverse.

##### Setup in BASIC MENU--MODEL TYPE--MULTIROTOR

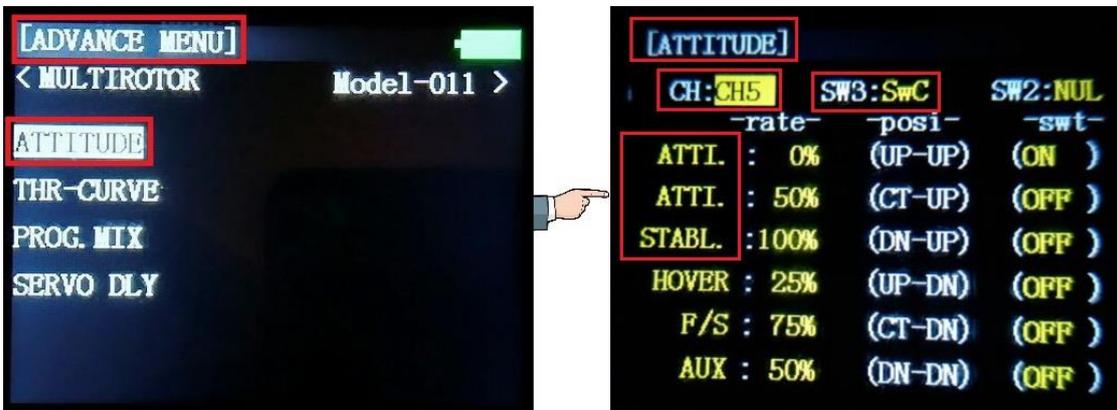


##### Back to BASIC MENU---REVERSE--setup 3: THRO REV



Setup in ADVANCE MENU--ATTITUDE--CH:CH5, SW3: SwC

Setup both up and center position of SwC ATTI. Model and down position STABL. mode.



▲ Altitude Hold Mode (Low-speed)  
● Altitude Hold Mode (High-speed)  
▼ Stabilize Mode



▲ Altitude Hold Mode (Low-speed)  
● Altitude Hold Mode (High-speed)  
▼ Stabilize Mode

**AT9S/AT9/AT10/AT10II:** SwC at the up position means that F110S will flight in Altitude Hold Mode (Low-speed) and at the center position means that F110S will flight in Altitude Hold Mode (High-speed), if SwC at the bottom position means that F110S will flight in Stabilize Mode.

### Setup If Controlled by T8FB

Please turn on T8FB (DC 4.8~18V) first.

If you need change parameters, please connect T8FB and computer via a universal android USB cable, setup details please read the T8FB user manual (you can download from our website [www.radiolink.com](http://www.radiolink.com)).

**T8FB:** SwB at the up position means that F110S will flight in Altitude Hold Mode (Low-speed) and at the center position means that F110S will flight in Altitude Hold Mode (High-speed), if SwB at the

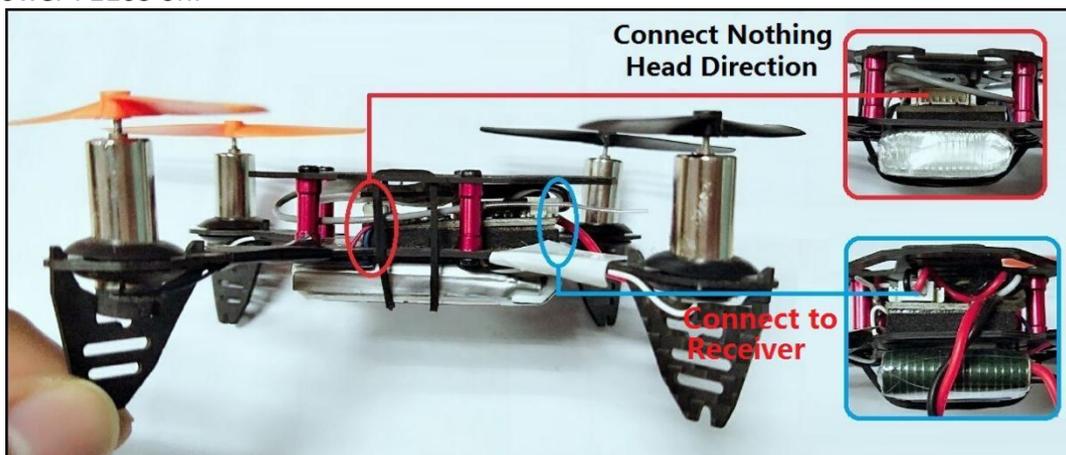
bottom position means that F110S will flight in Stabilize Mode.



### 3.3 Power on and Bind

#### 3.3.1 Power On

(1) Orange propellers default indicate the head direction, if you change the propellers, you can make sure the head direction by check the flight controller CS360(like the picture), make sure before power F110S on.



(2) Please put the F110S on a level surface, the green LED will blink after power on about 2 seconds, do not move F110S when green LED blinking.

(3) F110S finished the calibration after green LED off.

**Attention:** Head direction have been determinate, if you put not same as the direction that when you calibrate, it will back to the same direction automatically when F110S start to fly, that we called Head Front Forward Point Without Compass.

#### 3.3.2 Bind

F110S sells with receiver R6DSM or R8FM.

(1) Place the transmitter and the receiver close to each other within 1 meters.

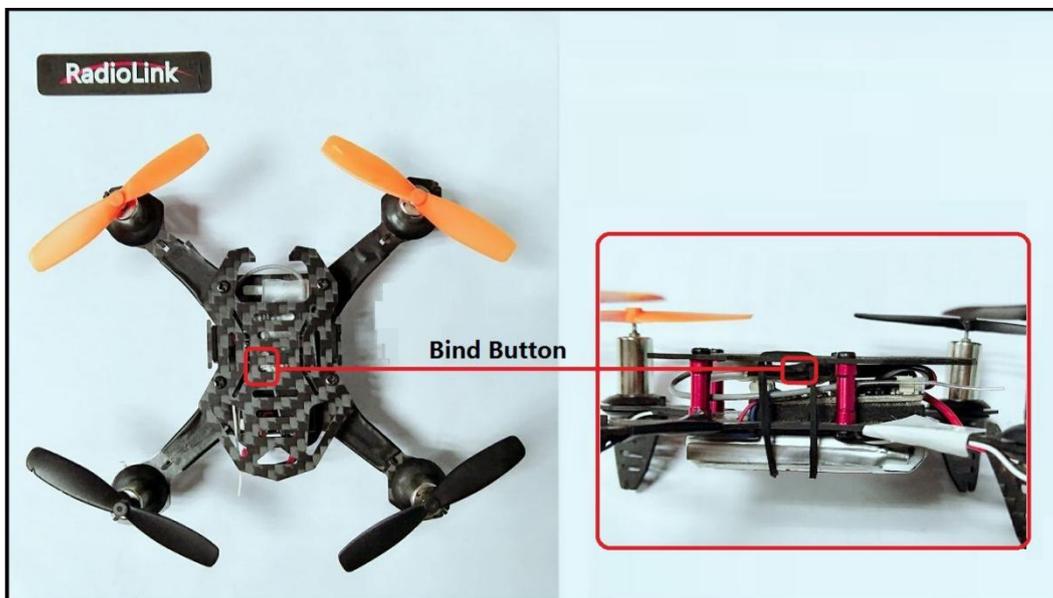
(2) Turn on the transmitter, then power on the R6DSM or R8FM.

(3) Connect R6DSM or R8FM to flight controller CS360(it defaults connect).

(4) There is a black button on the R6DSM and R8FM, press the binding button twice in two seconds and release, receiver light starts blinking, after about 8 times blinking, match code success when receiver signal LED always on!

**Attention:** If your transmitter is AT10II, it will default that the channel is setup 12CH, you have to setup channel from 12CH to 10CH in SYSTEM menu because R6DSM is a 10 channels receiver. (AT9, AT9S and AT10 are the same)

F110S now just support S-BUS signal, both R6DSM and R8FM support S-BUS and PPM signal, please make sure that the LED of R6DSM/R8FM is blue which shows R6DSM/R8FM output S-BUS signals.



Both R6DSM and R8FM can recognize signal by check the bind LED. Blue/purple LED indicates S-BUS signal and red LED indicates PPM signal.

If you need change signal from PPM to S-BUS, please short press the ID SET switch two times within 1 second, the signal is changed from SBUS to PPM. The red LED indicates the PPM and blue/purple indicates S-BUS.

### 3.4 How to Disarm (Use T8FB as an example)

Throttle on left stick: move the left stick to the lower right corner, keep about 2 seconds till green LED on.



Throttle on right stick: move the left stick to the lower right corner and the right(throttle) stick to the lower position, keep about 2 seconds till green LED on.



**Disarm Gesture**

### 3.5 How to Arm:

Move the throttle stick to the lower position and rudder stick, keep about 2 seconds till green LED off.



**Arm Gesture**

### 4. Low Voltage Alarm

The green LED of flight controller CS360 is blinking all the time indicate that the voltage of F110S

is lower than 3.8V (we default F110S is ready to alarm if the battery lower than 3.8V), please prepare for charge your battery.

## 5. Flight Controller CS360 Introduction

The flight controller CS360 combine Kalman filtering technology with inertial navigation altitude hold algorithm. The inertial navigation blending gyro, accelerometer and barometer make F110S Altitude Hold stably even at the lower than one-meter altitude or faced with fluctuations in airflow.

Brand new self-developed flight controller system CS360, breaking the defects of Euler angles singular value, using rotation vector algorithms ensure the F110S can fly with pretty high-speed even under Altitude Hold mode.

The power supply of CS360 support 1S(4.2V).

When use 1S battery: the camera will have powered by the 1S battery directly.

Size of PCBA: 21\*32\* 1.2mm.

## 6. Read Before Use F110S

### 6.1 Read Before Start to Flight in Stabilize Mode

- (1) Please keep the throttle stick smoothly to avoid F110S suddenly drastically up and down.
- (2) Put the throttle stick to the lower position immediately to let motor stop work when F110S knock something.
- (3) Let the motor be perpendicular to F110S plate.



### 6.2 Read Before try the Throw and Fly Mode

- (1) Make sure you can control F110S skillful and at a pretty wide-open space to try the Throw and Fly Mode.
- (2) Make sure the head direction and then throw and fly the F110S.
- (3) Push the throttle stick when throw your F110S out and try your best throw it upward.
- (4) F110S can correct attitude and direction automatically. If you throw F110S too hard, it may fly to a direction all the time because of the inertia, you can correct the direction by move sticks.

## 7. Flight Mode

F110S is default three flight modes. RC freshman can practice from Altitude Hold Mode (High-speed) -- Altitude Hold Mode (Low-speed)—Stabilize Mode, easy to achieve from beginner to professor.

### 7.1 Altitude Hold Mode (Low-speed)

AT9S/AT9/AT10/AT10II: Move SwC to the up position that keeps F110S work in Altitude Hold Mode

(Low-speed).

**T8FB:** Move SwB to the up position that keeps F110S work in Altitude Hold Mode (Low-speed).

### 7.2 Altitude Hold Mode (High-speed)

**AT9S/AT9/AT10/AT10II:** Move SwC to the center position that keeps F110S work in Altitude Hold Mode (High-speed).

**T8FB:** Move SwB to the center position that keeps F110S work in Altitude Hold Mode (High-speed).

### 7.3 Stabilize Mode

**AT9S/AT9/AT10/AT10II:** Move SwC to the bottom position that keep F110S work in Stabilize Mode.

**T8FB:** Move SwB to the bottom position that keep F110S work in Stabilize Mode.

Altitude Hold Mode (Low-speed) will slower and with less angular variation when flight than Altitude Hold Mode (High-speed) and Altitude Hold Mode (High-speed) slower and with less angular variation when flight than Stabilize Mode.

Suggest that RC beginners practice with Altitude Hold Mode (Low-speed) at the very begging.

## 8. Calibration

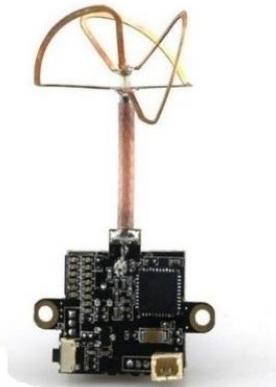
Level calibration have finished when you received the F110S, you can re-calibrate if you need.

**Level Calibration:** Please put the F110S on a level surface, the left stick to the lower left position and the right stick to the lower right position, keep about 3 seconds, the green LED will blink once, then calibrate success.

## 9. Components

Components of F110S					
V1: F110S without FPV					
Items	Photo Image	Quantity	Items	Photo Image	Quantity
F110S micro racing drone(RTF, with main plate, a flight controller CS360, a receiver R6DSM/R8FM, 4 motor and 4 propeller)		1	1S LiPo battery charger CM120		1
1S 600mAh 25C LiPo battery		1	Packing Box		1
Propeller		4			
V2: F110S with FPV (Add a 200mW 5.8G 200mw integrate camera and image transmission system on the basic of version that without FPV)					
200mW 5.8G integrate camera and image transmission system		1			

## 10. Details about FPV

**5.8G 40CH AIO FPV CAMERA**

**Features:**

FPV tuned light camera  
 come with video transmitter  
 and clover leaf antenna  
 FOV150°, 8g, 40ch with RaceBand

**Button Function:**

Short press (Apr. 1 sec or less): Change channels 1-8  
 Long press (More than 1.5 sec): Change bands A-B-E-F-R  
 Long+ press (More than 3 sec): Change NTSC/PAL System

\* NTSC or PAL (selectable; Blue LED on = NTSC;  
 Blue LED off = PAL) \*

**Specs:**

AIO FPV camera realize 25mW 40ch 5.8GHz TX, circular polarization clover leaf antenna and great CMOS killer 800TVL FPV camera all 3 functions in one limit size and weight unit. Aluminum case and easy mounting design make it great for smaller scale FPV race drones. It's perfect for NTSC and PAL as built-in one button switch!

Product Specification									
Model		5.8G 25mW 40Channels RF Camera							
1	Video Format characteristics	Value							NTSC/PAL
		Min	Typ	Max	Unit				
	Out Frequency	5645		5945	Mhz				
2	Out Power	12	13	14	dBm				
3	Operating Voltage	3	3.7	5.5	V				
4	Supply Current		0.45		A				
5	operating Temperature	-20		85	°C				
6	Image sensor				1/3 CMOS				
7	Resolution Lines				800TVL				
8	Weight		8		g				
9	Antenna	5.8GHz Band Circular Polarization Clover Leaf							
9	FOV	150° Horizontal							
9	Dimensions(LxWxH)	26x20x18mm							
10	Frequency channel list(MHZ)								
11	Band \ CH	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
12									
13	A	5865	5845	5825	5805	5785	5765	5745	5725
14	B	5733	5752	5771	5790	5809	5828	5847	5866
15	E	5705	5685	5665	5645	5885	5905	5925	5945
16	F	5740	5760	5780	5800	5820	5840	5860	5880
17	R	5658	5695	5732	5769	5806	5843	5880	5917