F450

DIY Quadcopter ARF Kit

Instruction Manual

* Please be kindly noted that this manual will be updated regularly and please visit RadioLink official website to download the latest version.

Thanks for purchasing RadioLink F450.

To fully enjoy the benefits of this product and ensure safety, please read the introduction carefully and set up the device as described below.

RadioLink Electronic Limited warrants this product purchased directly from RadioLink Electronic Limited or from an authorized dealer or distributor shall be free from defects in material and workmanship under normal usage for a period of one year from the date of purchase (proof of purchase is required).

This limited warranty covers product issues caused by defects in material or workmanship during ordinary consumer use. It does not cover product issues caused by any other reason, including but not limited to issues due to commercial use, acts of nature, third-party installation, misuse, limitations of technology or modification of or to any part of   the equipment.

This warranty does not cover products sold as used, as-is or refurbished and does not extend to a secondary purchaser (warranty is not transferrable). The implied warranty of merchantability is limited to the above identified period of time and shall be limited solely to the replacement or repair, at RadioLink's discretion, of the defective product.

Always use genuine RadioLink products such as our transmitters, receivers and other electronic equipment.

! RadioLink is not responsible for product damage resulting from the usage of non-genuine components.

Contact us by the following methods to summit a request for warranty repairs, general repairs or product questions.

   Email after_service@radioLink.com.cn

   Send message to us on our Facebook page or leave a comment on our YouTube page

   Local Purchase

If purchased from an approved dealer or distributor, you can contact them directly for support.

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

For more information please check our website http://www.radioLink.com and follow our Facebook and YouTube homepage.

RadioLink YouTube

RadioLink Facebook

SAFETY PRECAUTIONS

- Never operate models during adverse weather conditions. Poor visibility can cause disorientation and loss of control of pilots model.
- Never use this product in a crowd or illegal areas.
- Make sure no props installed when setting parameters of Mini Pix (the flight controller) on Mission Planner (MP) or calibrating ESC.
- Always ensure the trim levers at 0 and battery properly charged before connecting the receiver.

- Always check all servos and their connections prior to each run.
- Stay at a certain distance from the aircraft during flight to avoid getting hurt by the components of high-speed rotation (eg. Props, brushless motors)
- After landing off, make sure the aircraft is disarmed and props have stopped moving before getting close to touch the aircraft.
- Always be sure about turning off the receiver before the transmitter.
- When removing battery, **NEVER** pull the wires but please do press the yellow port with one hand and pull the other yellow port with another. If the wrapping materials damaged , the bare wires may cause **DANGER.**
- Follow the instructions of props installation in case of dropping during flight.
- To ensure the best radio communication, please enjoy the flight at the space without interference such as high voltage cable, communication base station or lauching tower.

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.

Water or moisture may enter the transmitter inside through gaps in the antenna or joystick and cause model instability, even out of control. If running in the wet weather(such as game) is inevitable, always use plastic bags or waterproof cloth to cover the transmitter.

Specification
Aircraft
Name: F450   Frame：Plastic

Weight：686g(24.2oz, without battery)   996g(35.13oz, with battery)

Dimension：450mm(17.72")

Max. Flight Speed：100KM/H(Stabilize Mode)   Flight time：18mins

Flight distance：2000M(1.24Miles) -T8FB；3400m(2.11Miles)-AT9S
  (Maximum range tested in unobstructed areas free of interference and may vary depending on local regulations)
Battery：3700mAh 35C 11.1V 3SXT60 LiPo
GNSS: GPS+GLONASS Dual Mode
Operating Frequency：2.4-2.4835GHz（R/C system）；5.725-5.850GHz（Image Transmission system）
OSD Param Setup：Yes   Voltage Display：Yes
Camera
Pixel：130W (Turbowing Cyclops3V3)；800TVL(CADDX Turtle)
Resolution Ratio： 720P/30FPS (Turbowing Cyclops 3V3)；1080P/60FPS (CADDX Turtle)
Video Format：NTSC (Turbowing Cyclops 3V3)；NTSC/PAL(CADDX Turtle)
Memory card：32G(Turbowing Cyclops3V3)；64G(CADDX Turtle)
Transmitter
Operating Frequency：2.4-2.4835GHz
R/C Distance：3.4KM(2.11Miles,AT9S)/2KM(1.24Miles,T8FB)
Operating Voltage：7.4-18V(AT9S)/4.8-18V(T8FB)
Operating Current：90mA@12V(AT9S)/<80mA(T8FB)

Set includes :

Name	Set Version			
	Stand-alone		ARF	
	Standard Version	Image-Trans Version	Standard Version	Image-Trans Version
Transmiter(AT10II/AT9S/AT9S PRO/T8FB/T8S Optional)	0	0	1 piece	1 piece
Receiver(R12DSM/R8FM Optional)	0	0	1 piece	1 piece
Main Plate (Plastic Frame)	1 set	1 set	1 set	1 set
SZ-SPEED 2212 1000KV Motor	4 pieces	4 pieces	4 pieces	4 pieces
FLYCOLOR 30A ESC	4 pieces	4 pieces	4 pieces	4 pieces
GEMFAN 9450 Propeller	8 pieces	8 pieces	8 pieces	8 pieces
FULLYMAX 11.1V 3700mAh 35C Battery	1 piece	1 piece	1 piece	1 piece
RadioLink Mini Pix Flight Controller	1 set	1 set	1 set	1 set
RadioLink M8N GPS TS100	1 piece	1 piece	1 piece	1 piece
Silver GPS Holder	1 set	1 set	1 set	1 set
Battery Fixing Belt	1 piece	1 piece	1 piece	1 piece
Self-locking Nylon Cable	6 pieces	6 pieces	6 pieces	6 pieces
EWRF 5.8G 200mW Image Transmission + Antenna	0	1 set	0	1 set
Camera with memory card (Turbowing/CADDX Optional)	0	1 piece	0	1 piece
RadioLink OSD Module	0	1 piece	0	1 piece
FPV Goggle(FATSHARK/LONGSITE Optional) or FPV Screen of HAWKEYE	0	1 piece	0	1 piece

Content

Chapter 1   Introduction

1.1 Feature Highlights

F450 is equipped with the flight controller RadioLink Mini Pix, fully powered by its functions of Pos-Hold, Auto Flight Mode, Waypoints Mode and RTL, perfectly works with RadioLink GPS with centimeter position accuracy.The Kalman Filter Algorithm applied in Mini Pix ensures the stability and makes F450 suitable even for beginners to practice from Stabilize to AltHold then to PosHold Mode.

The frame is capable of installing multiple devices such as camera, PTZ, thrower, ultrasonic sensor, optical flow module and so on.

The powerful system is assembled with the renowned components in drone industry including GEMFAN propellers, FLYCOLOR ESC,SZ-SPEED motor,FULLYMAX battery, RadioLink transmitter to maxmize the efficiency and offer the best athletic experience with best power.

1.2 About F450

	Main Plate		MINI PIX Flight Controller
	Motor		ESC
	Receiver (R12DSM OR R8FM)		GPS TS100
	Propellers		Battery

1.3 Prepare F450

F450 ARF set is packed by aluminium case with all accessories installed, including parameters of transmitter and fight controller are done setting. When receive the set, all pilots need is to plug fully-charged lithium batteries in the transmitter and the aircraft and then it is ready to fly.

If the aircraft is left unused for a long time, it is strongly advisable to uninstall the propellers with the professional tool packed in the set and to (dis)charge the batteries to best storage status, that is, 3.8V per cell to avoid unexpected damage and to extend the product life span.

1.4 Prepare Transmitter

F450 has two versions, including stand-alone version and ARF version.

① pilots who purchase the stand-alone version, please follow the appropriate transmitter manual to install the receiver and bind the aircraft with the transmitter after receiving F450.

② ARF version includes the standard version with 8CH transmitter T8FB and the advanced version with 10/12CH transmitter AT9S.

Always ensure all batteries have been properly charged prior to using the transmitter. T8FB works with Lithium 2S-4S battery or 4 pieces AA battery while AT9S/AT10II works with Lithium 2S-4S battery or 8 pieces AA battery. To avoid batteries over discharged, alarm of low voltage can be set after connecting plug batteries in transmitter.

T8FB is developed as self-adapted alarm by default and it will automatically give an alarm when the voltage becomes low depending on either 2S or 3S battery pilots use. As to AT9S/AT10II, please press "MODE"to enter the BASIC MENU => Select "PARAMETER"and enter=> Set "TX-ALARM" according to the actual battery used. For example, if batteries used in pilots transmitter is 2S, then it's 4.2V*2S=8.4V when fully charged. As the voltage of a single cell is 3.7V, we usually set the low voltage alarm as 3.7V*2S=7.4V.

Chapter 2 Aircraft Setup

F450 consists of flight controller system, remote controller system, GPS system, power system, image transmission system. This chapter is about the aircraft's components and the feature of each function.

2.1 ARF Version Setup

RadioLink F450 has two versions, including stand-alone version and ARF version.

ARF version means Almost Ready to Fly. Pilots only need to power on the transmitter and the aircraft and unlock the both prior to flight.

2.1.1 Basic Operation of the Transmitter

As the aircraft is controlled to realize all movements by operating the remote controller, it's important to know its basic operation.

Remote controller is also called transmitter and should work with a receiver. Transmitter in a pilot's hand and receiver in an aircraft to work as the flight controller system. Currently transmitters on the market are 2.4GHz （2400MHz~2483.5MHz）.

The 4 basic channels of all transmitters are always the same: CH1- Aileron/Roll; CH2- Elevator/Pitching; CH3-Throttle; CH4-Rudder.

These four basic channels are operated by the two sticks on the transmitter. Most transmitters have not only these 4 channels but also other auxiliary channels such as switches for changing fight modes, controlling PTZ and camera. These commands will be passed to the receiver on aircraft via wireless signal by the emission system of transmitter. So we usually name the channels besides 4 basic ones auxiliary channels.

The left stick controls the throttle by toggling up and down to make aircraft lift and descend vertically and the rudder by toggling left and right to make aircraft turn clockwise and anticlockwise.

The right stick controls the elevator/pitching by toggling up and down to make aircraft forward and backward and the aileron/roll by toggling left and right to make aircraft move left and right horizontally.

Here is a picture showing T8FB as an example while AT9S/AT10II is operated as the same way:

Rudder
Control aircraft to move clockwise/anticlockwise

Throttle
Control aircraft to lift/descend vertically

Aileron/Roll
Control aircraft to move left/right horizontally

Elevator/Pitching
Control aircraft to move forward/backward

Left Stick

Lift

Descend

Anticlockwise

Clockwise

Right Stick

Forward

Backward

Left

Right
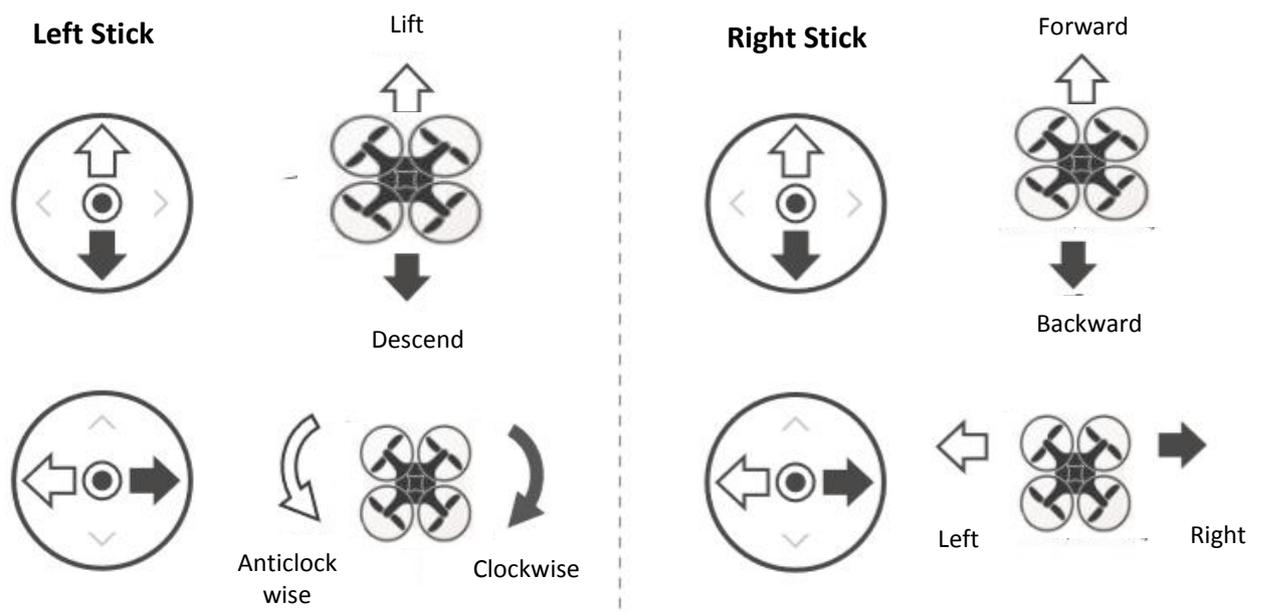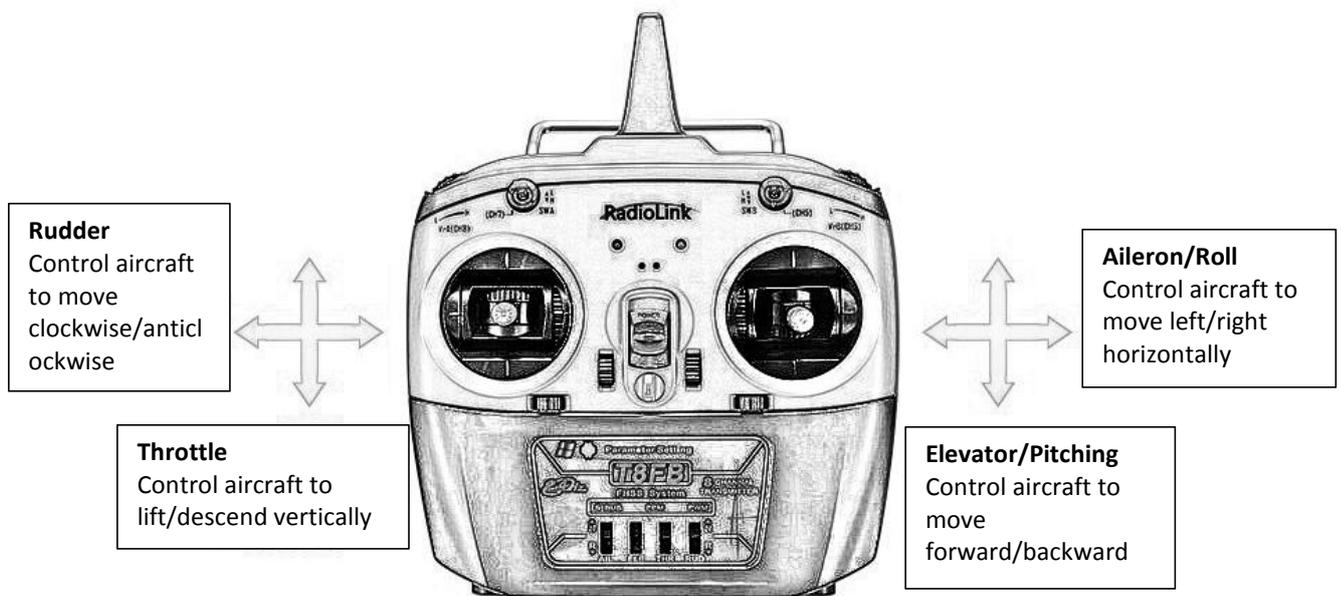
More details about T8FB, please download the manual via the below link:
https://www.radiolink.com/t8fb_bt_manual

More details about AT9S, please download the manual via the below link:
https://www.radiolink.com/at9spro_manual

2.1.2 Arm
2.1.2.1 Arm F450

Power on the transmitter and aircraft, make sure the throttle stick is at the lowest position and press the safety button (Red) till the indicate LED is always on instead of flashing.

2.1.2.2 Arm Transmitter

When the safety button on F450 is always on, pilots have better keep distant from the aircraft to ensure the safety and check the current flight mode. The transmitter can only be armed under the Stabilize Mode and Alt-hold Mode.

Arm and Disarm (Shown with RadioLink T8FB as below. AT9S/AT10II can be (dis)armed as the same way):

Arm with Left Throttle: Toggle the left stick(Throttle) to the right bottom for 2s and a beep sound can be heard from the aircraft. The indicate color on flight controller will be flashing blue. Slightly push the throttle at the Stabilize Mode (If at Alt-hold Mode, the throttle better to be pushed over the central point), the motors and propellers start moving means the aircraft is successfully unlocked.

Disarm with Left Throttle: Throttle to the left bottom for 2s, the motors stop moving.

Note If arming with success at the Alt-Hold Mode, the aircraft will take off only after the throttle gimbal stick is toggle above the central point. When the aircraft reaches a certain height, toggle the throttle stick back to center and it will remain at this height.
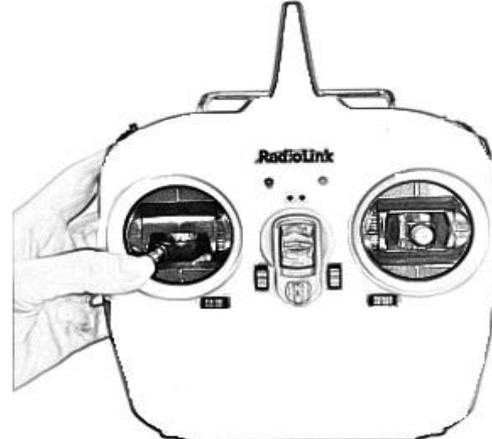
Arm with left   Disarm with left throttle

Arm with Right Throttle: Toggle the left stick to the right bottom while the throttle/right stick to vertical lowest bottom for 2s and a beep sound can be heard from the aircraft. The indicate color on flight controller will be flashing blue. Slightly push the throttle at the Stabilize Mode (If at Alt-hold Mode, the throttle better to be pushed over the central point), the motors and propellers start moving means the aircraft is successfully unlocked.

Disarm with Right Throttle: Toggle the rudder/left stick to the left bottom while the throttle/right stick to vertical lowest bottom for 2s, the motors stop moving.
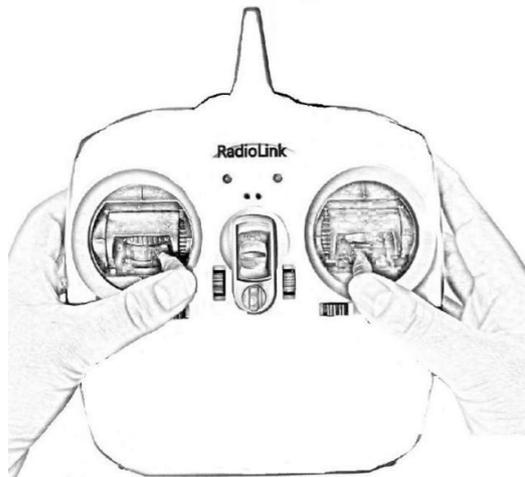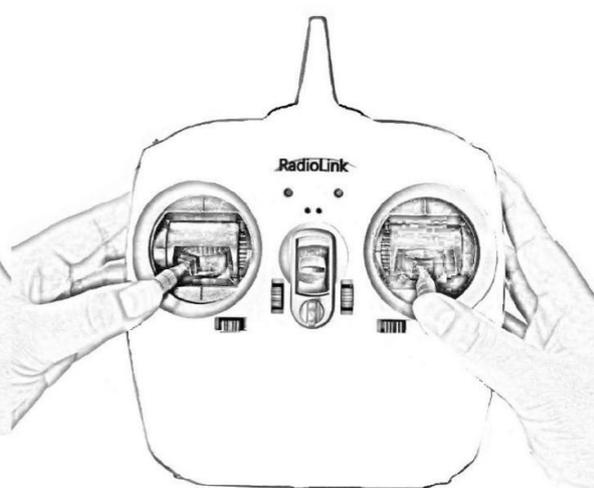
Arm with right   Disarm with right

Note: When the aircraft is to land, it is advised to change the flight Mode to STABILIZE MODE because it will be easier to disarm. Toggle the throttle to the vertical bottom for about 5s till the propellers stop moving then disarm the transmitter as the above steps. Otherwise the aircraft may be repeatedly up and down or rolled over as the result of trying to disarm in a rush.

When the transmitter is successfully disarmed, please make sure to long press the safety button of the aircraft till the RED indicate LED flashes.

At the Alt-hold Mode, the aircraft cannot take off until the throttle is moved over the central point. When the aircraft rises to a certain height, it will remain at this altitude if the throttle is back to the central point.

2.1.3 Flight Modes Introduction

F450 has four flight modes by default: Stabilize Mode, Alt-Hold Mode, Pos-Hold Mode and RTL Mode.

In Chapter 2.1.1 Basic Operation of the Transmitter, the functions of auxiliary channels were mentioned. One of those is to switch the flight mode.

For T8FB,the 3-way switch (SWB on the right) by default, UP is Stabilize Mode, MID is Alt-Hold Mode, DWN is Pos-Hold Mode. Push SWA from up to down to enable RTL Mode.

For AT9S, the 3-way switch (SWC on the right) by default, UP is Stabilize Mode, MID is Alt-Hold Mode, DWN is Pos-Hold Mode. Push SWD from up to down to enable RTL Mode.

2.1.3.1   Stabilize Mode

1)   Pilots use rolling and pitching to control the inclination angle of the aircraft. When the roll/pitch stick is loose, the aircraft will be automatically back to horizontal status. With the windy weather, pilots need to continuously correct the rolling and pitching angle to keep the aircraft at the same position.

2)   Pilots use the rudder stick to control the turning velocity. When the rudder stick is loose, the aircraft will keep the direction.

3)   Pilots use throttle to control the average rotation rate of the motors and need to continuously toggle the throttle to remain the aircraft at the certain height. The throttle input will automatically change according to the aircraft inclination to cohere with height change brought by the aircraft inclination, eg. If the inclination angle is too big, it will automatically increase.

2.1.3.2   Alt-Hold Mode

At Alt-Hold Mode, flight controller will automatically control the throttle to remain the height. The operations of rolling, pitching and rudder are to directly control the turning angle and direction of the aircraft, same as Stabilize Mode.

Comparing with Stabilize Mode, the Alt-Hold Mode is easier to control because the aircraft will remain at a certain height if the throttle stick is at the central point after pilots toggle it over to lift. And they only need to toggle the rolling/pitching stick to make the aircraft move (forward/backward/left/right), which is easier for beginners to practice.

WARNING! Flight controller takes the test result made by barometric altimeter as the height base. If the pressure changes, the height could possibly be incorrect, which is not the actual height. Unless the ultrasonic module is installed to detect the distance and the flight height is less than 20 feet. Ultrasonic sensor can detect flight height more accurately if less than 26 feet.

Stick Operation at Alt-Hold Mode

Throttle stick is to control the rising and descending velocity of the aircraft.

Aircraft remains the height when the throttle is held at middle point (between 40%-60%)

If the throttle is toggled out of this range, the aircraft will be up or down to varying degrees. The max distance of rising or descending is 2.5m/s.

Take-off at Alt-Hold Mode

At Alt-Hold Mode, only the throttle stick is pushed over the central point can the aircraft be lifted. When the aircraft reaches certain height, toggle the throttle stick back at the middle, it will remain at the same altitude.

Landing at Alt-Hold Mode

At Alt-Hold Mode, toggle the throttle slowly to the bottom to land the aircraft. Once landed, the motors won't stop immediately. If pilots disarm the aircraft immediately by pulling the throttle stick to the bottom outside corner, the aircraft will possibly roll over. It's better to wait for 10 more seconds till the aircraft detects landing and the motors stop completely to lock.

2.1.3.3 Pos-Hold Mode

At Pos-Hold Mode, the aircraft will automatically keep current position, direction and altitude. That is, the aircraft will remain the same position if pilots don't toggle sticks. But they can still take rolling and pitching stick to make the aircraft move forward/backward/left/right, as the other flight modes.

To realize the good performance of Pos-Hold mode, the GPS, satellite searching, low disturbance of electromagnetism and low vibration are all very important factors.

When using the Pos-Hold Mode or RTL Mode, pilots have better to wait for 1 minute until the satellite searching of GPS reaches 14 stars or above after powering on the aircraft and the modes will work better. The satellite searching depends on the actual weather and landform.

Note When at Pos-Hold Mode, the aircraft can't be armed if the satellites are less than 9 stars or the accuracy is more than 1.2 meters.

2.1.3.4 RTL Mode

When change to RTL mode, the aircraft will return to the place where it initially took off. By default, aircraft will firstly fly up to the height of at least 15m before returning. Or, if the aircraft is higher than 15m when RTL Mode is on, it will decrease to the height of 15m then return. If pilots enjoy the flight around the obstacles that higher than 15m, make sure to set up the RTL height in Mission Planner. The detailed setup steps please refer to instruction manual of RadioLink Mini Pix downloaded via **:**

https://www.radiolink.com/minipix_manual
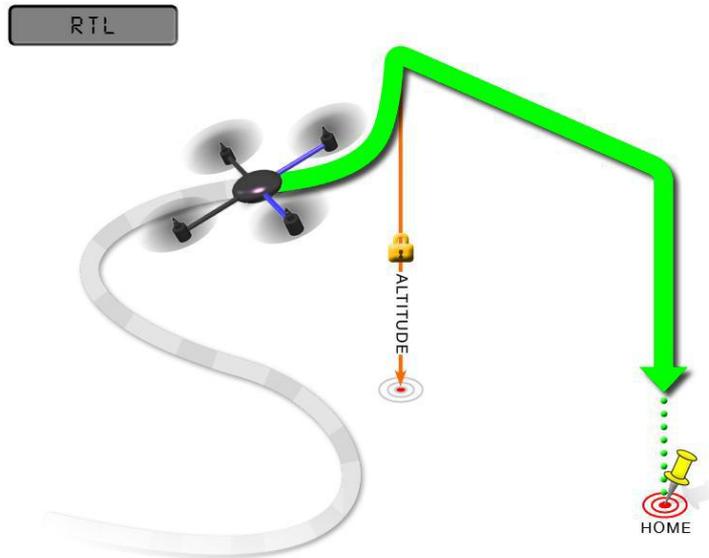
RTL Mode works with GPS, which is indispensable to locate before changing to this Mode. The Mode commands the aircraft to return "HOME"where it takes off. Therefore, "HOME"should always be the place that the GPS locates where the aircraft actually takes off, without obstacles and far away from crowds.

2.1.4 RTL Mode Enabled

Besides manually enabled by pilots (Switch on SWA of T8FB or SWD of AT9S), RTL Mode of F450 can be automatically activated under the below two situations:

a. Signals lost. WOLF QAV 210 will activate the RTL Mode by itself.
b. Low voltage. When the voltage is lower than 10.6V (with 3S lithium battery) after a period of flight, WOLF QAV 210 will activate the RTL Mode by itself. It will automatically rise up to a certain height (15m by default) and then land on the point that it takes off. By the moment, F450 won't move even if pilots toggle the transmitter sticks. Please lock the aircraft once landed and disconnect the battery and get it charged.

2.2 Stand-alone Version Setup

As all parameters of transmitter and aircraft have been set, the ARF version is ready to flight once purchased. But as the stand-alone version doesn't go with a transmitter, **parameters of the transmitter need to be set though that of ARF version has been done.**

Pilots who purchase stand-alone version of F450 need to: install Mission Planner to work with the flight controller, bind the transmitter and receiver and get the parameters set, calibrate the ESC and install the props.

Note: F450 Stand-alone version is also compatible with the transmitter and receiver of the other brand. But please make sure that the receiver is SBUS/PPM supported.

2.2.1 Binding Transmitter to F450

Every transmitter owns a unique ID code. Before using, binding transmitter to receiver on aircraft is a must. When done binding, ID code will be stored in the receiver, no need to rebind.

If pilots' transmitter has done binding with receiver, only need to connect the receiver to the Mini Pix flight controller after receiving the stand-alone version of F450.
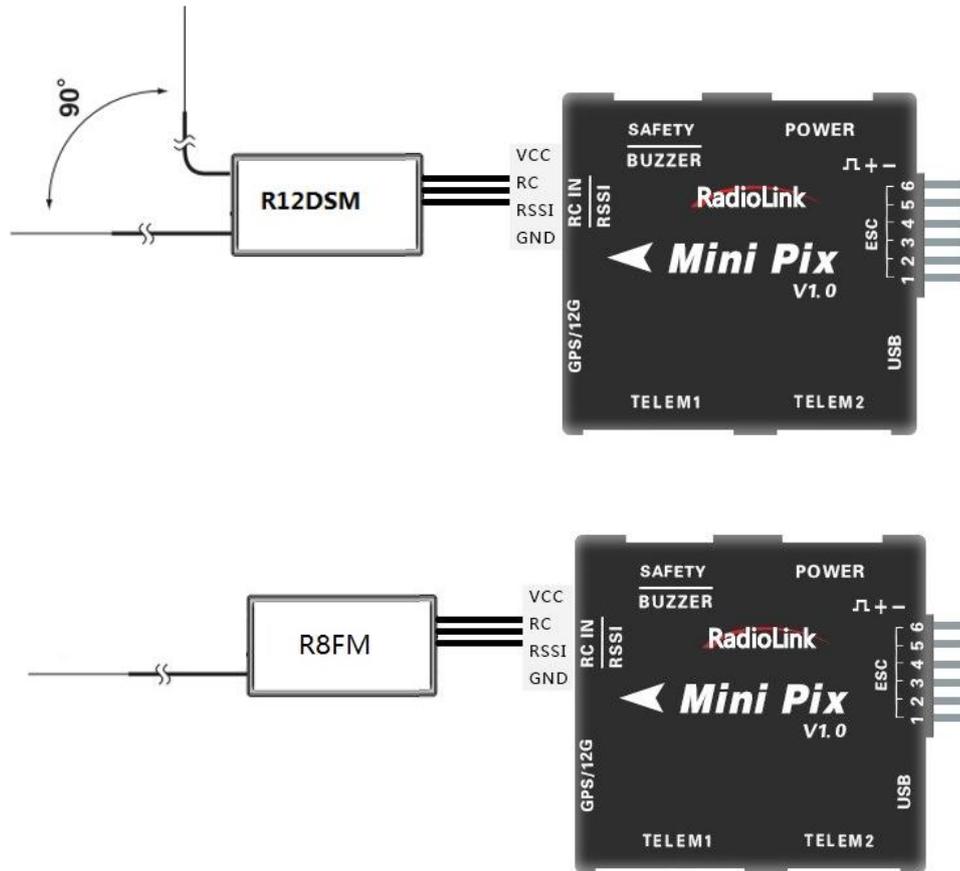
Binding the transmitter to the receiver is essential. Otherwise, the aircraft cannot take off.

RadioLink receivers R12DSM/R6DSM are compatible with transmitters AT9/AT9S/AT10/AT10II while R8FM is compatible with transmitter T8FB.

Binding steps of all RadioLink transmitters and receivers are the same as follow:

（1） Put the transmitter and the receiver together within 1 meter.

（2） Power on the transmitter and the receiver. The receiver will bind to the closest transmitter.

（3） Press the ID SET on the side of the receiver for more than 1s, the flashing LED means binding starts.

（4） When LED stops flashing, binding is complete.

When binding is done, please check if the receiver change to SBUS/PPM output . Generally we use SBUS signal. LED on all receivers from RadioLink is blue/purple means SBUS signal while red means PWM signal. Pilots can short press the binding code twice within 1s to switch the signals output of the receiver.

2.2.2 Installation of Mission Planner

To run the Mission Planner installation, NET. Framework from Microsoft is needed. Link is as below

 https://www.microsoft.com/net/download/thank-you/net462

Download link of Mini Pix Mission Planner:

https://www.radiolink.com/minipix_firmware_

Before setting the parameter, please install the Mission Planner first.

Steps to install the Mission Planner, please refer to the video as below:

https://www.youtube.com/watch?v=twW9CaRlj-U (Starting from 13:00)

2.2.3 Transmitter Parameters Setup

The flight controller of F450 has been set with all necessary parameters before purchasing. For the stand-alone version, please calibrate the transmitter sticks, set the flight modes and Fail Safe.

2.2.3.1 Transmitter Calibration

Before the transmitter sticks calibration in Mission Planner, please make sure the model type selected in transmitter is multi-rotors and the phase is REVERSED. Below detailed steps take AT9S as an example while T8FB can be directly calibrated with sticks. For the calibration of other brands' transmitter, please kindly refer to the its instruction manual.

Press "MODE" for more than 1s to enter the BASIC MENU and choose "MODEL TYPE", rotate the dial to select "MULTIROTORS"and press "PUSH"to save, then "END"to exit.

```
[MODEL TYPE]


RESET: Execute

TYPE: MULTIROTOR

ATLE-2: CH6 or 7

ATL: OFF
```

Note: For AT9S, the throttle phase needs to be set REV while that of T8FB and AT10II are REV by default. Press "MODE"for 1s to enter the BASIC MENU and choose"STEERING REVERSE"and select 3: THROTTLE. Then "PUSH"to select and rotate the dial to "REV" and "PUSH"to confirm then "END"to exit.

```
[ REVERSE ]
                          1:  AILE      NOR
CH3: THRO                 2:  ELEV       NOR
                         →3:  THRO      REV
REV     NOR               4:  RUDD       NOR
                          5:  ATTI      NOR
                          6:  AUX1      REV
CH9 : REV                 7:  AUX2      NOR
CH10: NOR                 8:  AUX3      REV
```

Make sure binding between the transmitter and the receiver is complete before connecting Mini Pix with Mission Planner on computer via USB cable with the Baud Rate of 115200 . The connection between Mini Pix and Mission Planner can be also achieved by data transmission with the Baud Rate of 57600. Then power on the transmitter. Press PUSH to unlock the transmitter if no operation for a long time and it enters standby mode.

Open Mission Planner => select the corresponding Baud rate and port => click to connect => INITIAL SETUP =>MANDATORY HARDWARE => RADIO CALIBRATION =>CALIBRATE RADIO

Note: Ports varies from different computers. Please select the correct port to connect. Connection may fail with several ports in use. Please remove the other connections.

There will be a safety reminder as below shown popping out when pilots click "Calibrate Radio". Please double check before clicking "ok".

Note: It's strongly advised to install the propellers AFTER all parameters setup with the consideration of safety.
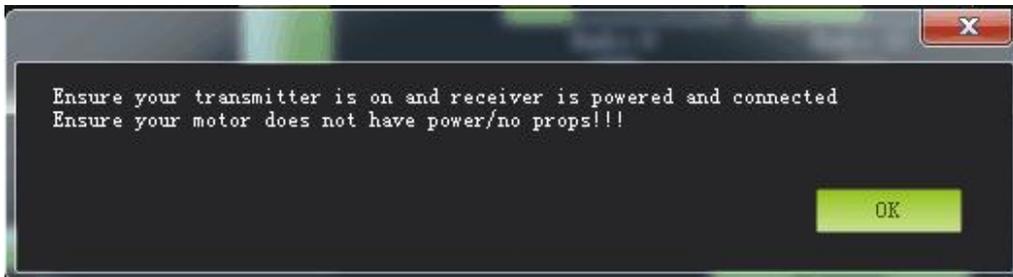
And then click "OK" and move all RC sticks and switches to their ultimate positions so the green bars reach the limits/red lines.
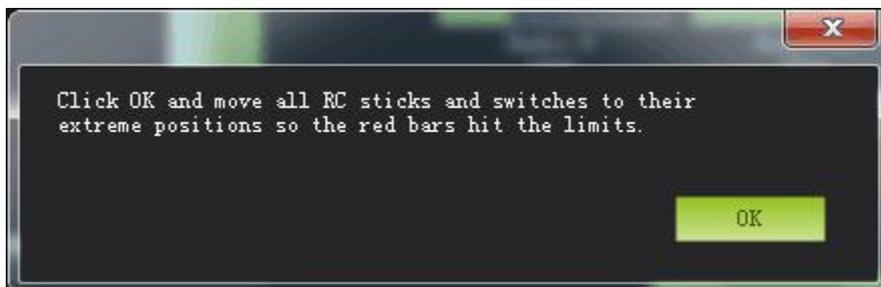
Joysticks can be calibrated as following , both (Ch1 to Ch4) are pushed to the limits(up/down/left/right)
Note: AT9S/AT10II/AT9/AT10 can be calibrated as the below example T8FB

If the green bars do not change when pilots toggle the sticks, please check if the receiver has connected successfully. Also, check if every corresponding green bar for every channel works as listed:

CH1: low position = roll (towards the left), up position= roll (towards the right).

CH2: low position =pitch(upward), up position =pitch(downward).

CH3: low position =reduced speed (downward), up position =speed up(upward).

CH4: low position = yaw (anticlockwise), up position = yaw (clockwise).

After each green bar reaches the limits/red lines, click the green button at bottom right to complete the transmitter calibration.
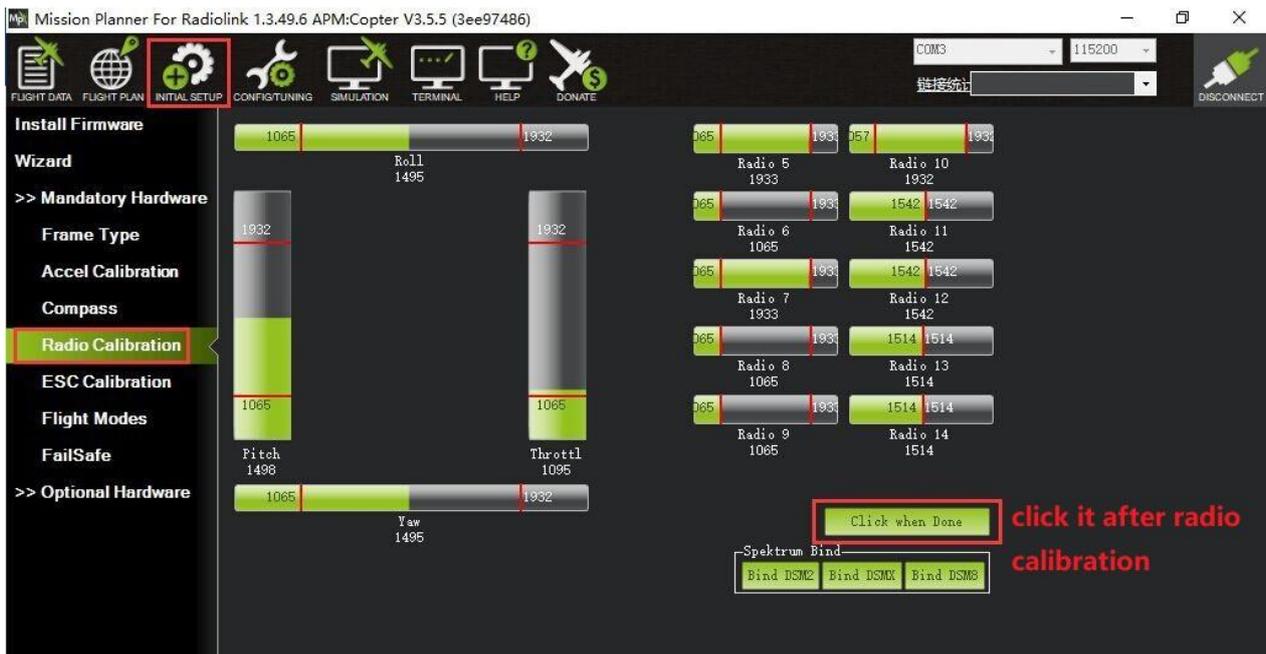
2.2.3.2 Flight Modes Setup

Setup in transmitter

Setup steps of RadioLink transmitter(T8FB/AT9S/AT10II) and flight controller with Mission Planner are as below. For the transmitters from other brands, please select CH5 to set flight modes and SBUS output in receiver.

Mini Pix has various flight modes for option. But F450 is with four flight modes as factory setting by default including Stabilize Mode, Alt-Hold Mode, Pos-Hold Mode and RTL Mode. Therefore, if no other flight modes needed, pilots just set the flight modes in transmitter corresponding to those in flight controller.

The default parameters of T8FB is set as that of Mini Pix. If it is the transmitter model of T8FB purchased with F450, then this part can be skipped as the flight modes are already set identical. Pilots only need to calibrate joysticks and ESC.

Note: The following steps take AT9S as example, AT10II/AT10/AT9 can be set as the same way

1. When binding completed between transmitter and aircraft/receiver, click INITIAL SETUP =>MANDATORY HARDWARE => FLIGHT MODES
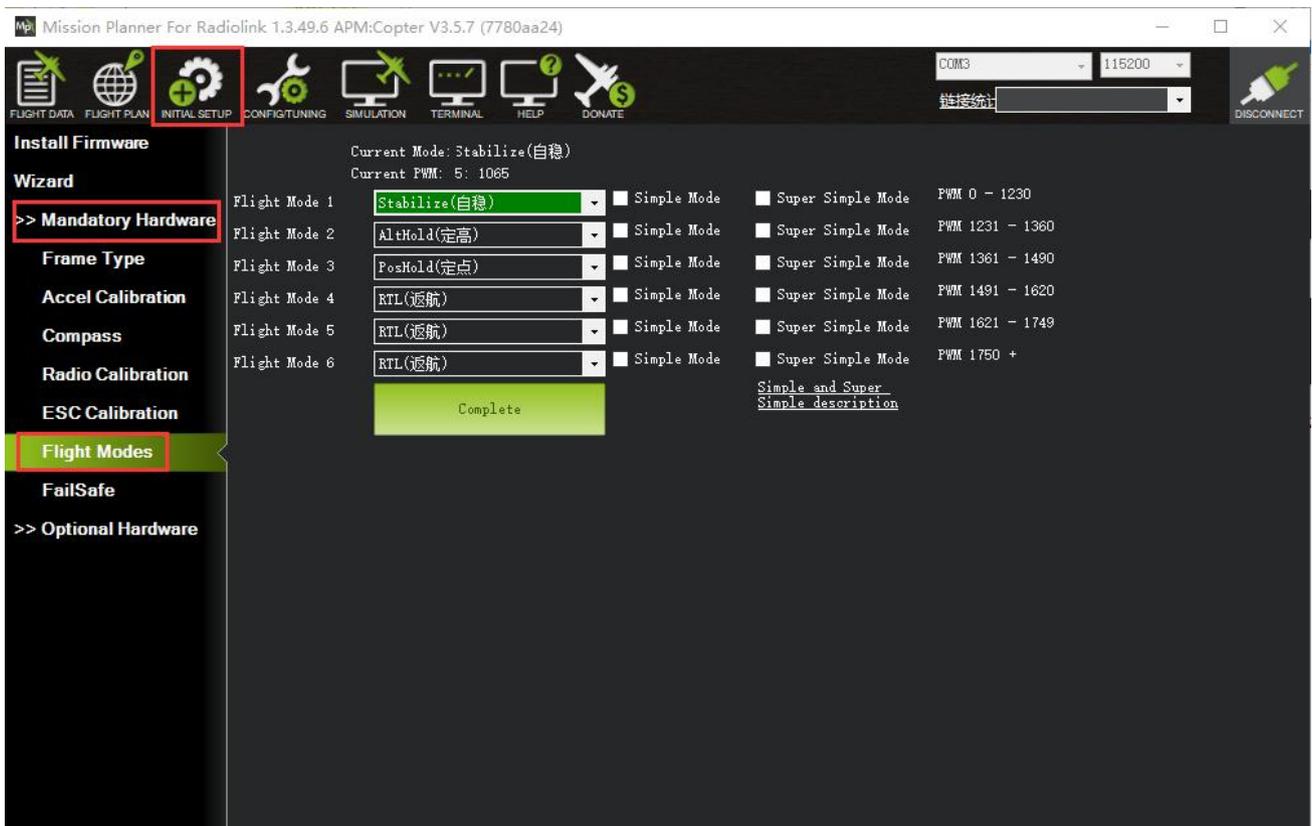
Then power on transmitter => long press MODE to enter BASIC MENU => short press MODE to ADVANCED MENU => press PUSH to enter ATTITUDE

Default channel is CH5 while setting the 3-way switch as SWC and the 2-way switch as SWA or SWD, pilots can personalize the setting basing on own flight habits

Note The PWM value (RATE on the second column as below shown) can be modified with corresponding POSI (eg. UP-UP) while SWT is (ON). Toggle positions of SWC and SWA/SWD to select different POSI.

[ATTITUDE]		
CH: CH5	SW3: SwC	SW2: SwD
- rate -	- posi -	- swt -
STABL. 1%	(UP-UP)	(ON)
PHOLD 26%	(CT-UP)	(OFF)
LOITER 42%	(DN-UP)	(OFF)
ARCO 56%	(UP-DN)	(OFF)
AUTO 71%	(CT-DN)	(OFF)
HOVER 86%	(DN-DN)	(OFF)

▲ Stabilize M.
● Alt-Hold M.
▼ Pos-Hold M.

Push SWD from up to down to enable RTL M.

2. When flight mode 1 in MP is Stabilize, the first ATTITUE on transmitter should be set as Stabilize and the corresponding parameters setup in MP should be set as below:

1) Check the first attitude, if POSI is (UP-UP) . If not, please toggle the switch to the right position with -swt- is on

2) Turn the dial to the percentage rate on the transmitter LCD screen and PUSH to select and turn the dial to modify

3) Check the PWM value of the corresponding flight mode on MP
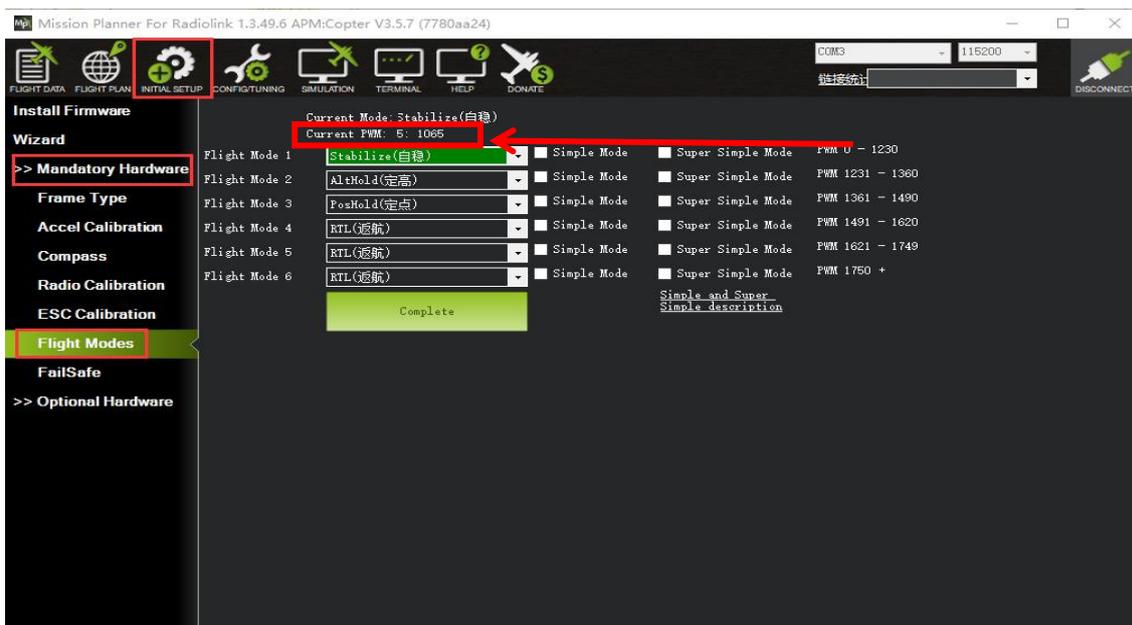
When setting the PWM value on transmitter, the corresponding PWM value on MP will change accordingly. Each flight mode has the PWM range and when the value is within, it means the current mode is set.

Meanwhile, the selected mode on MP will turn dark green. That is , turning the dial on the transmitter to modify the RATE to make sure the corresponding PWM value on MP is within the range. Flight mode 2/3/4/5/5 can be set as the same way.

The 2-way switch is needed when setting Mode 4 to 6. Toggle this switch to the corresponding mode and can be set as the above step 3.

2.2.3.3 Failsafe Setup

The function of Failsafe on Mini Pix is set with MP menu.

Entering the Failsafe menu on MP, a note will pop out to remind no propellers installed for safety.
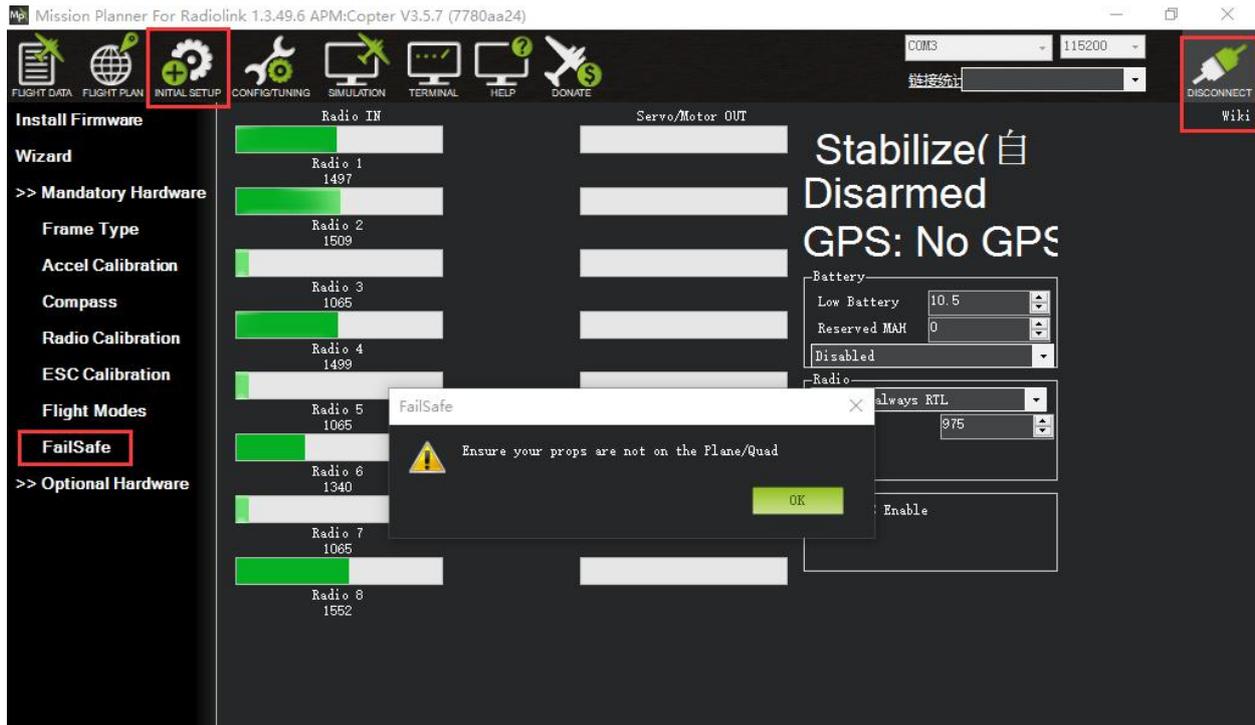
Click OK to setup:
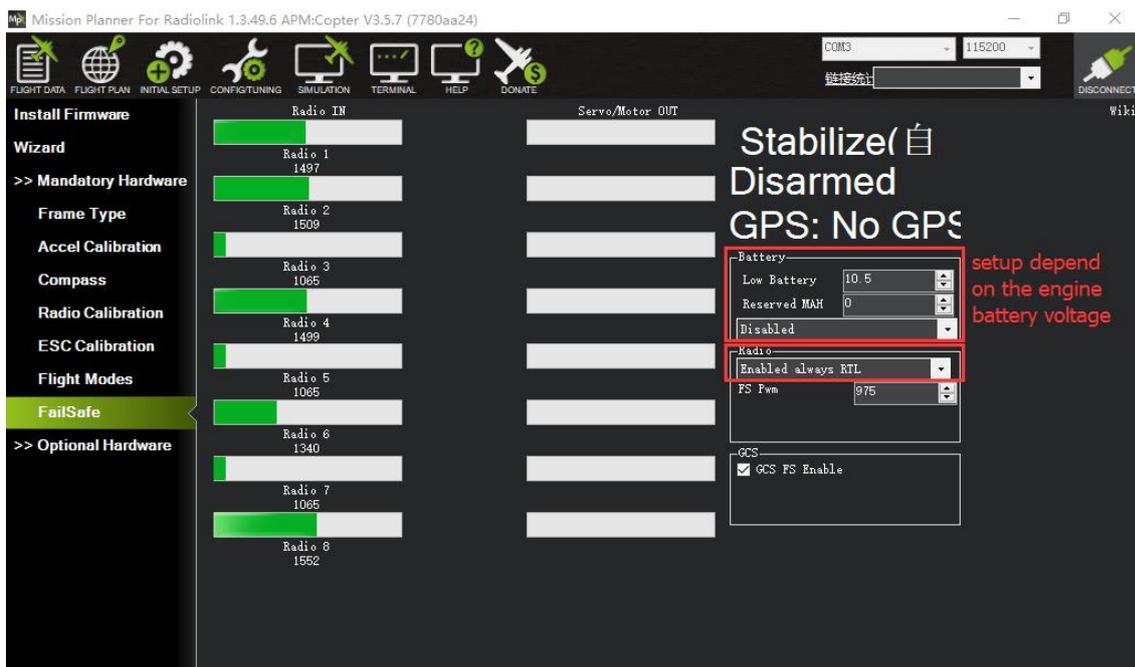
There are different parameters setting such as throttle PWM, battery voltage to enable Mini Pix failsafe function. When the set parameter is reached, eg. If the throttle PWM value or the voltage is lower than the value set, then the failsafe is enabled and the aircraft will take corresponding action such as Return to launch(RTL), Continue to flight and Landing. To ensure the aircraft safety, RTL is normally set as the action following failsafe enabled.

Battery Failsafe Set

Battery failsafe can be set basing on the aircraft voltage consumption, battery volume or flight distance to ensure the aircraft returning when the battery voltage is lower than the set value. This value should be set according to the battery volume. Each battery cell should be 3.7V for long distance flight while the set voltage is 3.7V times battery cell quantity. For example, the voltage value set for 3S battery is 3.7V*3S=11.1V. When it's lower than 11.1V, the failsafe function will be enabled and the aircraft will Return to Launch automatically.

Battery detector needs to be set in MP to realize the RTL mode with low voltage.
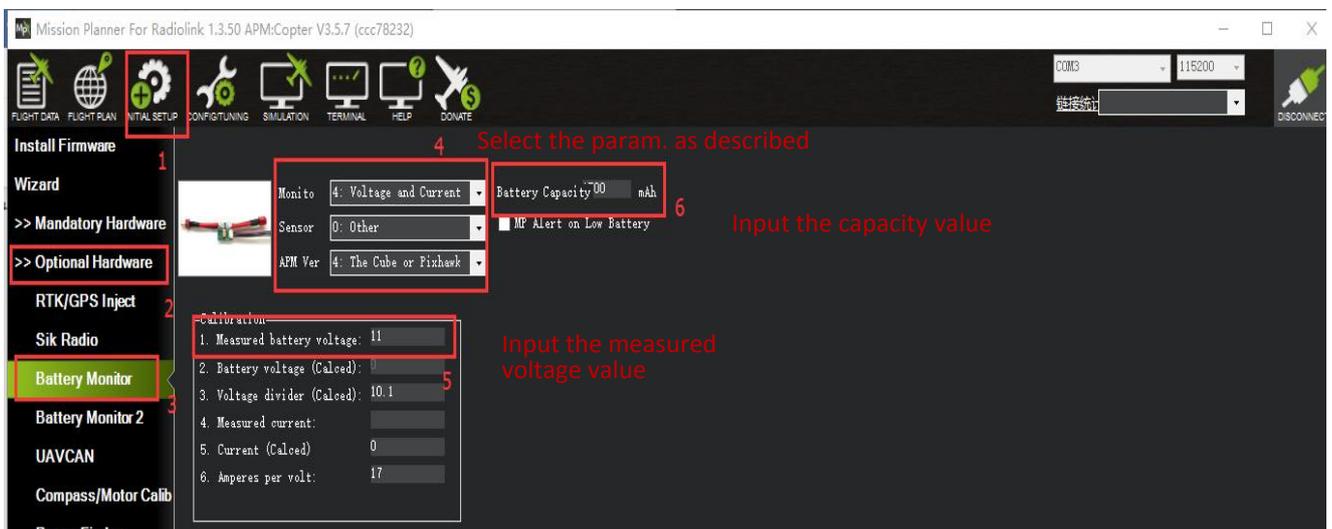
To activate the battery detector:
• Monitor- 4 Battery and voltage
• Sensor- 0: Other
• APM version- 4: The Cube or Pixhawk
To inactivate the battery detector:
• Monitor- 0 disable

When the detector is activated, the data could possibly fail to display. Please disconnect the flight controller from the computer and repower on the flight controller then open the above sheet to input the measured voltage. When **2. Battery Voltage (Caled):** the voltage displayed is same as the input value and no change means setup with success. When different, please reopen the sheet and input the measured voltage.

Note: If fail to setup, the aircraft may be impossible to arm, or buzzer may keep the Dee sound after arming, please reset to correct. If failsafe function is always on, the battery low voltage protection maybe activated and the detected voltage is INACCURATE. Please measure the voltage and input the correct value.

Throttle Failsafe
Transmitter Setup

Pull the throttle trim lever to -120 => Long press MODE to BASIC MENU => Turn the dial to select F/S(FAILSAFE) and push to enter=> Turn the dial to select CH3:THRO => Pull the throttle stick to the bottom

=> Long press PUSH to get the throttle percentage 3% => Press END to the main display => Push the throttle trim lever back to 0. The Failsafe setup is complete.

Mission Planner Setup

After setting failsafe on transmitter, power it off and check the FAILSAFE menu on MP if the PWM value of CH3 is smaller than 975. If yes, than the FAILSAFE function is successfully set. Otherwise, the above steps need to be repeated.

In the RADIO block on the right of the sheet, set ENALBLED always RTL and FS Pwm as 975.
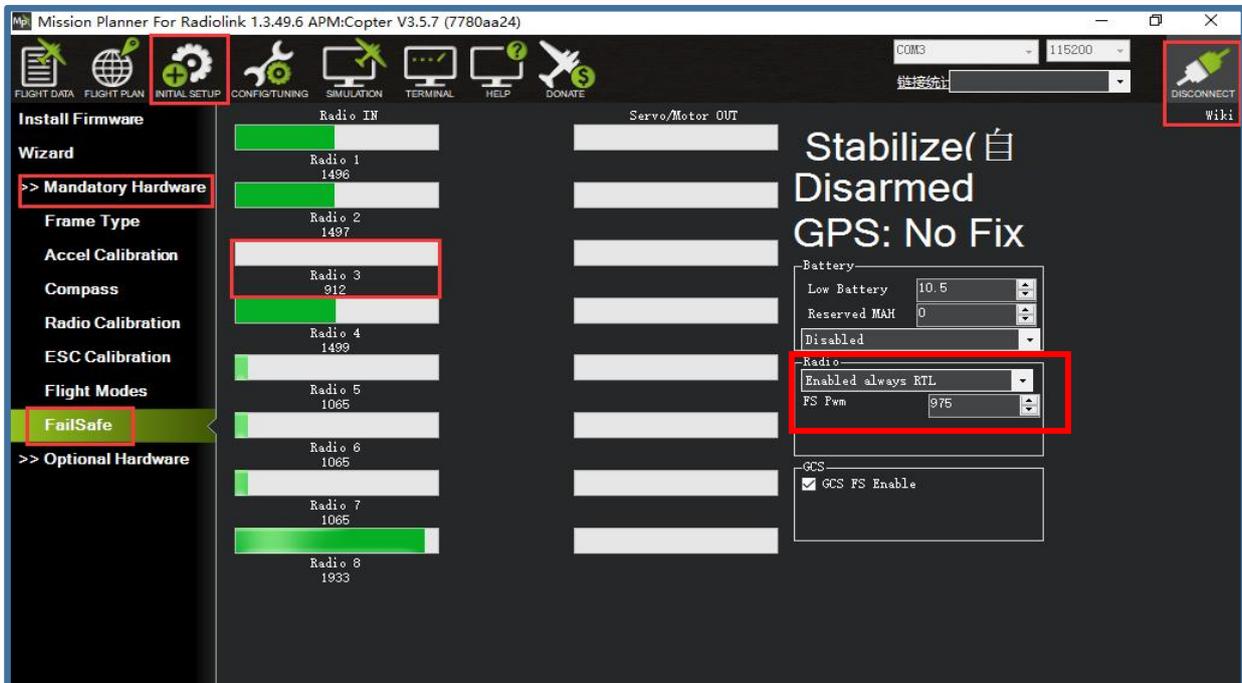
2.2.4 ESC Calibration (First flight)

ESC calibration varies depending on different ESC brands, so it's advised to refer to the ESC instructions. Never install propellers before calibrating ESC for safety.

(1) Make sure the aircraft is well connected and radio calibration is done and can be armed;

(2) Toggle the throttle stick to the highest point and power on the aircraft. When seeing the LED on flight controller is flashing with red/blue/yellow, power it off. The flashing colorful LED means the aircraft is ready to go into ESC calibration mode next time repower.

(3) Repower on the aircraft, wait to check if the LED flashes (about 30s). Then long press the safety button until hearing the musical tone (the regular number of beeps indicating battery's cell count i.e. 3 for 3S, 4 for 4S) and then an additional two beeps to indicate that the maximum throttle has been captured.

(4) Pull the transmitter's throttle stick down to its lowest position, another musical tone will be heard, meaning the Minimum throttle has been captured and the calibration is complete.

(5) Push the throttle a bit to test if the ESC spin. If yes, then the calibration is done with success. If no, please repeat the above steps to recalibrate.

(6) Hold the throttle to Minimum and disconnect the battery to exit ESC calibration mode.

When all the above parameters set, propellers can be installed and arm the aircraft. For the arming steps, please refer to **2.1.2 ARF version Armed**

2.2.5 Propellers Installation

F450 stand-alone version is NO propellers installed for the package reason. So when the above steps are done setting(parameters set, ESC calibrated, arm successfully after powering on), propellers are ready to be installed. Make sure the correct installation of each positive/counter propeller. otherwise the aircraft may fail to take off.

As the image shown below, put the head with camera forward when installing props and make sure propellers on Motor 1 and 2 rotate counter clockwise while that on Motor 3 and 4 are clockwise.
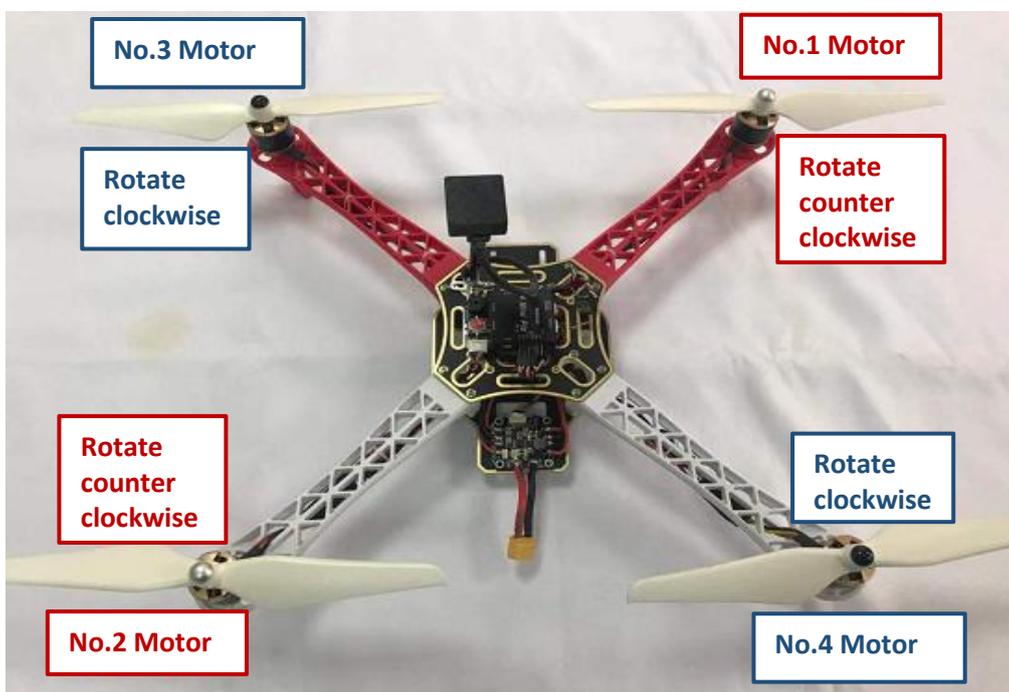
Note: Never install the props before finishing setting parameters of aircraft to ensure the safety.

F450 is equipped with RadioLink MINI M8N GPS TS100 as factory setting. If the Pos-Hold Mode and RTL Mode needed, please go to an open space and wait till the satellites searched to enjoy the flight.

Green indicator on GPS TS100 flashes means satellites searched. It's advised to wait some time (about 1.5-2 mins) for searching satellites at the first flight. And it will be a bit longer in cloudy weather. The quantity of the satellites searched reaches 18 or above will ensure the pos-hold and RTL accuracy.

2.2.6 Note
● When arming with success, make sure to stay a certain distance away from the aircraft to ensure safety.
● Make sure to flight outdoor at an open space
● Gently push the throttle when start the flight: Under Alt-Hold mode, push the throttle a bit higher than the central point and F450 will slowly take off and keep rising if keep pushing the throttle. When F450 reaches a certain height, it will hover if stop pushing the throttle. Pilots can change directions by rolling, pitching and yawing.
● Never get close to the aircraft when propellers are on move to avoid getting hurt.
● Never get close to power off the aircraft until making sure it is disarmed.
● It's advised to be accompanied with experienced pilot for the first flight.

2.3 Charger

F450 ARF version is packed with a charger SKYRC E3 with integrated charging power. It can be directly connected with the power supply of 100-240V and support charging 2S-3S LiPo battery with power of 11W and maximum current of 1.2A.

Charging steps as below
① Connect one end of the charging cable to the SKYRC E3 and the other end to the socket.
② Connect the balance cable of the battery to the charging port of the charger E3 and wait for 2s, the charger will verify the battery voltage and start charging.
③ The LED indicator on the charger always on means it's charging. If it is the 2S LiPo battery, the red LED indicators of 1S and 2S will be always on. If it is the 3S LiPo, then that of 1S,2S and 3S will be always on.
④ When one of the cells is fully charged, the corresponding red LED indicator will turns to green. Same to 2S and 3S LiPo battery.
⑤ When the battery is disconnected after fully charged, the LED indicator will stay green. If it turns red and keep fashing, it means the charger gets ready for the next charging.
Note If the charging battery is disconnected, the charger will automatically stop charging. If the charger is overloaded or short circuit, it will stop with three LED indicators flashing in red.

Charging port of 2S LiPo battery

Charging port of 3S LiPo battery
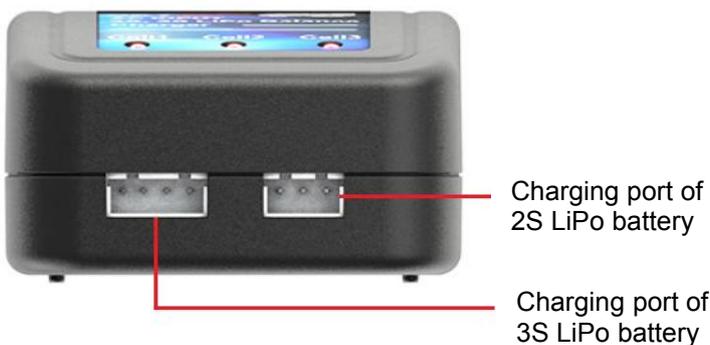
LED Indicator Status	Working Status
Green flashing	Standby
Red on	Charging
Green on	Charging Completed

When the indicator is flashing in RED, it means there's error. Disconnect the cable connection to the power supply and pull out the charging battery.

LED Indicator Status	Errors
Flashing in red once with 1s interval repeatedly	Battery connection in mistake
Flashing in red twice with 1s interval repeatedly	Charger overloaded or short circuit
Flashing in red 4 times with 1s interval repeatedly	Voltage of a single charging cell is over high or over low
Flashing in red 6 times with 1s interval repeatedly	Voltage variation of two simulatneous cells is 300mV

Charger Specification

Input Voltage: 100-240V , 50-60Hz
Battery Type: LiPo
Supporting Cell Qty: 2S/3S
Charging Current: Maximum 1.2A
Charging Accuracy: 0.02V
Power: 11W±10%

Safty Note of Charger Usage
- Never use the chager if the power port or charging port is broken,contact SKYRC manufacturer for maintainence.
- Never charge any other battery types, otherwise charger will be damaged. LiPo battery ONLY.
- Keep the charger in sight whenever it's working. Remember to disconnect the power supply whenver absent to avoid the unforseen danger or loss.
- Never surpass the available specifications like the input voltage range and the maximum charging current.
- Never drop metal or conductive pieces into the charger.
- Never (dis)charge the battery if it is damaged or broken like leaking or out of shape.
- Never mix charging batteries of different type, capacity or factories and be aware of the correct polarities.
- Never remake or dissemble batteries.
- Nerver put the charger or batteries close to inflammables and explosives or (dis)charging on carpets, papers, plastics, leather or wood. Neither when the battery is installed in RC model.
- Avoid direct exposure to sunlight or usage in closed space or high temperature environment as the temperature protection may be activated and stop the charger function.

Chapter 3 Flight

3.1 Visual Flight

At the beginning, it's advised to flight visually by practicing basic movements like flying forward/backward/leftward/rightward and hovering.

For example, beginners can try hovering under the stabilize mode by toggling the joysticks to adjust the aircraft to remain the same position. Then the horizontal 8 training for the next step.

3.2 FPV Flight

Different from visual flight, FPV is first person view with the help of a goggle or a screen. Theoretically, FPV flight is easier than visual flight because pilots can clearly judge the moment to turn or forward with goggle or screen.

3.2.1   FPV Goggle

VR goggles for standard and advanced version of F450 are different. The standard version is equipped with the 3-inch FPV goggle from LONGSITE while the advanced one equipped with 4.3-inch FPV&DVR dual functions goggle from FATSHARK.

Both goggles have built-in image transmission receiver. Pilots only need to bind the goggle with the transmitting module before flight.

User instruction of LONGSITE 3-inch FPV goggle
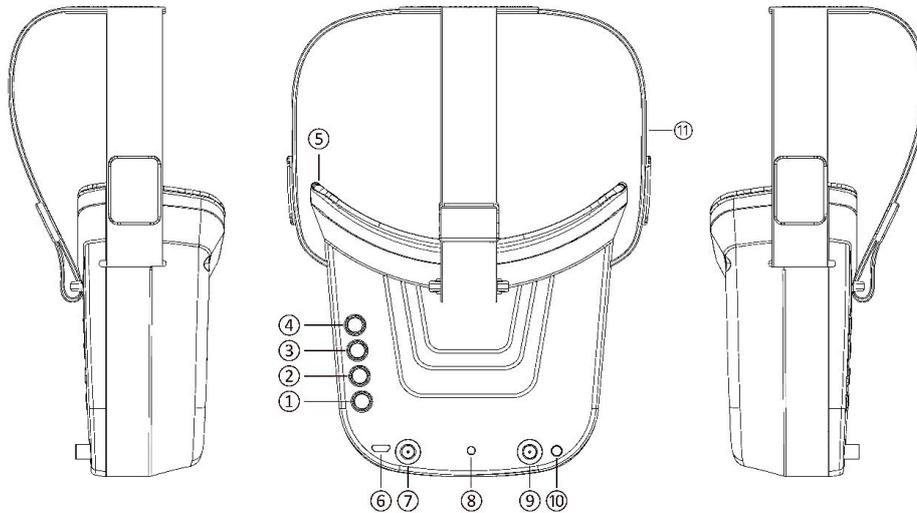
① Short press for menu displays, long press for more than 3s to power on/off.

② Short press for automatic search and channel with best signal will be selected.

③ Short press band+ with circular band changes from A - B- E - F - R.

④ Short press channel+ with circular channel changes from 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8

⑤ Cotton to ensure pleasant wearing

⑥ Mini USB charging port for DC5V only

⑦ Antenna port A: RP - SMA male connector

⑧ Charging indicator: red ON for charging, OFF for fully charged

⑨ Antenna port B: RP - SMA male connector

⑩ Audio port: Output audio signal with transmission mode and video signal with AV mode.

Adjustable headband

Menu instruction:

When under standard mode, press key 1 to enter menu mode.

 When under menu mode:

① Key 1: Select OPT

② Key 2: Back to standard mode

Wireless Frequency Table(MHz)								
	CH1	**CH2**	**CH3**	**CH4**	**CH5**	**CH6**	**CH7**	**CH8**
Band A	5865	5845	5825	5805	5785	5765	5745	5725
Band B	5733	5752	5771	5790	5809	5828	5847	5866
Band E	5705	5685	5665	5645	5885	5905	5925	5945
Band F	5740	5760	5780	5800	5820	5840	5860	5880
Band R	5658	5695	5732	5769	5806	5843	5880	5917

User instruction of FATSHARK 4.3-inch Recon V2 FPV&DVR dual function goggle

Top View

Bottom View

Antenna
Connector

Five-Way
Button

Band+   CH+
Scan   CH-

Channel
Buttons

DVR SD
Card Slot

Power
Switch

2600 mAh
18650
Lithium

USB
Charge
Port
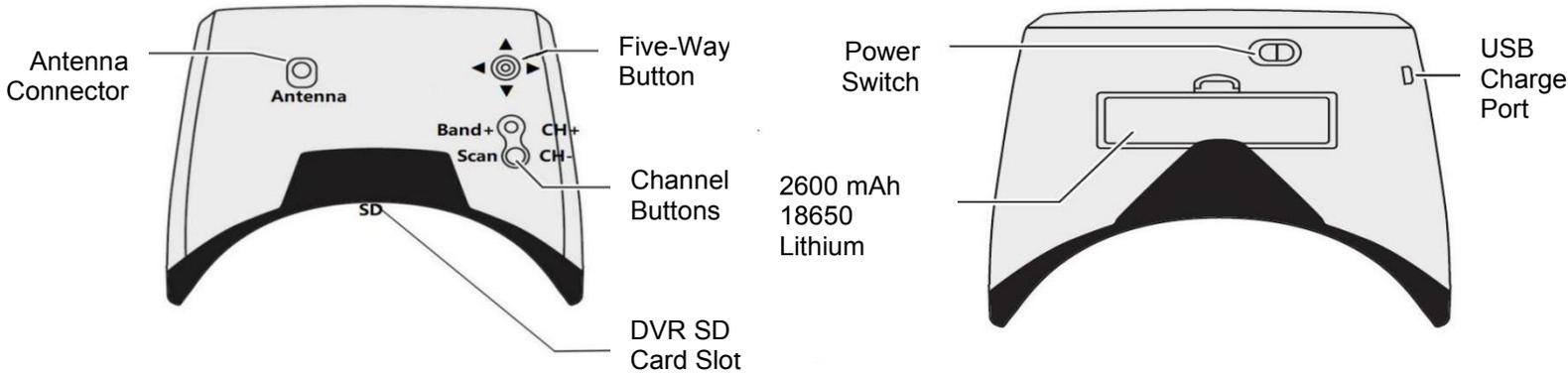
◆ Brightness/ Contrast: Slide the 5-way button left and right or forward and back for contrast and brightness adjustment.

◆ Channel Selection: Short press channel Up(CH+)/Down(CH-) to select from Ch1 to Ch8; Long press (CH+) for 1s to change band Fat Shark(FS)/ RaceBand/ Band A/B/E; Long press (CH-) to enable auto scan active channel.

◆ DVR Recording: Vertically press the 5-way button and a short beep will be heard with a red REC displayed on the goggle screen and flashing means recording starts. A long beep after another vertical press of the 5-way button means recording off with the red REC disappear. Long press the 5-way button to enter the DVR menu. This DVR has no auto save recording file function and needs to be saved by stop recording manually.

FATSHARK 4.3-inch Recon V2 Frequency Table

Name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Fat Shark /IRC	5740	5760	5780	5800	5820	5840	5860	5880
Race Band	5658	5695	5732	5769	5806	5843	5880	5917
Band A	5865	5845	5825	5805	5785	5765	5745	5725
Band B	5733	5752	5771	5790	5809	5828	5847	5866
Band E	5705	5685	5665	5645	5885	5905	5925	5945

When flight with FPV, pilot select the preferred frequency transmission channel with the above table or choose the automatic searching to pair the frequency.

3.2.2   FPV Camera Instruction

Cameras equipped with F450 standard version and advanced version are different.

That of the Standard version is Turbowing Cyclops 3 V3 720P FVP&DVR dual function camera while that of the Advanced version is 1080P FVP&DVR dual function camera with 60 frame/s.

Instruction of Turbowing Cyclops 3V3 720P FVP&DVR dual function camera

Button

SD Card
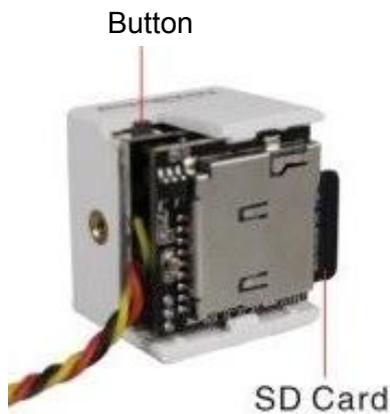
Enable Recording Function:

Short press the button to start or stop recording. The flashing red ledindicates recording while always on indicates stop recording.

After inserting TF card, the recording duration will be displayed at the lower right of the output image. For example, if "49:00:00"is displayed, it meaning the recording duration will last 49 minutes more.

Turbowing Cyclops 3V3 PWM signal input can be connected with the PWM signal from receiver and controlled by it. When the PWM signal enters from that less than 1700us to larger than 1700us, a pulse will be output to simulate the effect of pressing recording button.

Pin Distribution

No.	Port Definition/ Function
1	+5V Voltage input
2	Voltage/video signal output
3	Video signal output

Instructions of CADDX Turtle 1080P FVP&DVR dual function camera
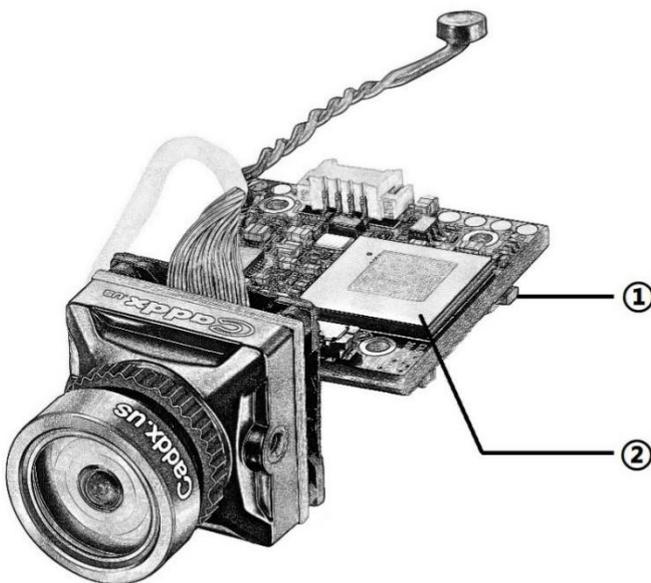
① **Recording Button**
     Short press the button to start or stop recording.   The flashing red led indicates recording while always on indicates stop recording.

② **SD Card Slot**
     TF card is needed to insert into the slot when recording function is enabled.

     The maximum memory capacity of SD card supported by CADDX Turtle camera is 64G. The resolution ratio of video is 1080P 60 frames/s with the voltage range of 5V-20V and the current of 160mA@12V.

Thank you again for choosing RadioLink product.