



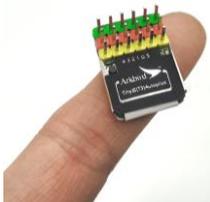
### ARKBIRD-Tiny3 (T3) Product Features:

ARKBIRD System is a high-accuracy autopilot designed for fixed-wing, which has capability of auto-balancing to ease the manipulation while flying.

(Extreme small, only 1.8 \* 1.5cm, weight only 1.7 grams),

Super stable , plug and play. Capable of high-precision control of level flight, 3D flight, etc., combined with GPS, it can achieve RTH(return to home), fence mode (Out of area or under safe altitude, it returns automatically, best helper for beginner), etc;

When only be connected to the steering wheel , used as a taxiing rectifying gyro, It corrects the airplane off tracking tendency, and accurately responds to the direction of the rocker steering action. for Electric Ducted Fan (EDF) and Jet power scale model airplane and so on.



- 1.Controls the steering angle of the steering wheel.
- 2.Can be installed flat wise or sidewise, suitable for small aircraft.
- 3.One button auto-leveling, stick back to center, plane can fly levelly.
4. One button RTH (return-to-home), lost radio signal return-home.
5. Hover mode Regard the hover position as balance position, nose up and keep steady;
6. Fence mode Out of rectangle area or safe height, it returns

automatically, best helper for beginner

7.Semi-Balance Mode When the CH1 and CH2 of rocker is less than 50%, the plane is in Balance Mode. When the rocker is more than 50%, the plane is in Gyro Mode.

### Reminding:

For the first installation, please power up after a **wire check**. Forcible satellite search will be entered (incontrollable) every time you power up. You can cancel it manually and adjust rudder angle directions in **Manual Mode** and **auxiliary control** in Balance Mode. A **Neutral Point Check** for the sensor is necessary. Also, you need a **fail-safe protection** for the receiver in case your autopilot loses control when returning home.

For the first flight, we suggest taking off with "Manual Mode". Check if the aircraft flies normally after switching to "Balance Mode" in a level flight. Then switch to "RTH Mode" and check the autopilot by using parameter (see the last chapter in the instructions: **Notes for Balance and RTH**). Please keep an eye on the important parameters during the flight (Vibration value, Satellite number, Speed and Altitude).

When the maiden flight test is done, Balance Mode can be used freely for taking off the autopilot, or you can use extended functions such as waypoints, cruise flight or fence mode.

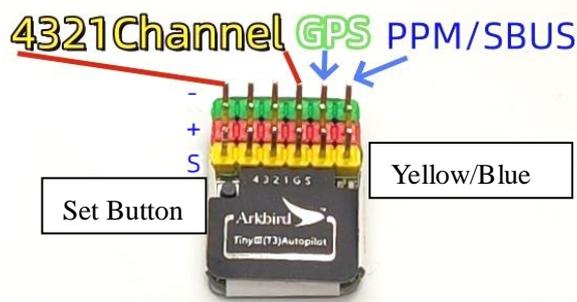


Please read carefully before operating and pay close attention to the details and important parameters. Contact [Arkbird@foxmail.com](mailto:Arkbird@foxmail.com) for supports.



|  |     |         |
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1. Wiring

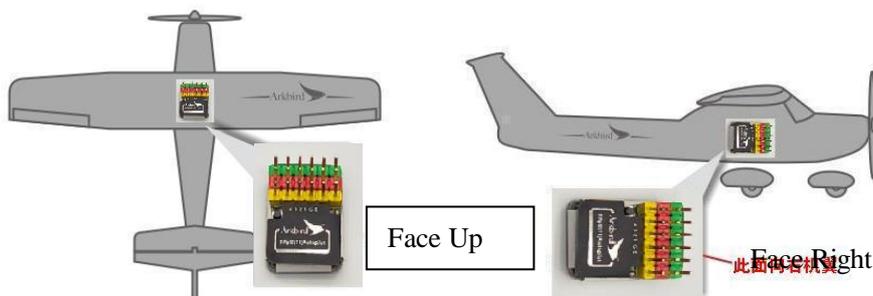


( Power 4.8V-7V )

|      | Ordinary  | Fly-Wing      | V-Tail       | Taxiing Rectifying |
|------|-----------|---------------|--------------|--------------------|
| CH 1 | Aileron Y | Right surface | Aileron Y    | Rudder PWM         |
| CH 2 | Elevator  | Left surface  | Right V-Tail | Landing gear PWM   |
| CH 3 | ESC       | ESC           | ESC          | Landing gear out   |
| CH 4 | Rudder    | Rudder        | Left V-Tail  | steering wheel     |

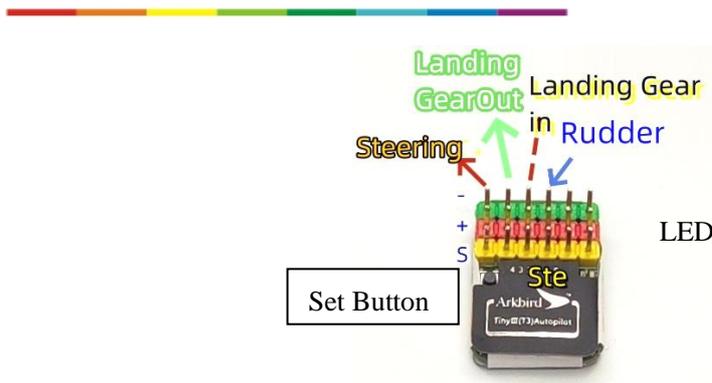
( Check carefully before power on, incorrect wiring will damage the autopilot permanently! )

1. The pins of RX in & Servo out shall stay forward (toward flying direction), the side with 4P dip switch shall be upward or vertical installed toward right wing. (Default is level installation)
2. The GPS module sticker should face the sky on one side. The red light on the module remains on when the GPS is not positioned; When connected and already located, the indicator light flashes.
3. While using on 3-channel plane, connect channel 1 output to rudder to steering.
4. When only connecting to the steering wheel, connect output 1 to the Receiver's Rudder output and output 2 to the Receiver's landing gear output. At this time, output 4 automatically recognizes as Taxiing Rectifying Gyro (if output 2 is not connected, the stabilizing rudder will stay on)



2 ways of installation

## 2. Controls the steering angle as Taxiing Rectifying Gyro( 2 Way )



1. Connect receiver's channel 4(Rudder PWM) to Pin 1, receiver's landing gear channel to Pin2(if not connected , the correcting will be enabled continuously),

Autopilot's channel 3 is output to landing gear, Autopilot's channel 4 to wheel steering servo, Autopilot automatically detects PWM input in 5 seconds after power on.

2. Connect the receiver SBUS/PPM to the Autopilot's SBUS/PPM port. (At this time, channels 5 and 6 cannot connect to other functional loads (such as landing gear, flaps, brakes, navigation light switches, etc.) Channels 5 and 6 are the tuning channels. Switch the lever 5 times in channel 6 to enter the menu, and select the corresponding setting option based on the number of lever switches in channel 5.

The 7th channel of the SBUS/PPM receiver (cannot be changed) is landing gear Channel , to enabled or disable the channel for front wheel correction,

After the landing gear is lowered for 5 seconds, the correction is enabled. if there is reversed control logic of the landing gear, **press the setting button 5 times** to enter calibration, and then turn the landing gear channel **up and down 5 times** to adjust the reverse direction (the same method is used when the problem occurs in the SBUS/PPM connection).

If the Gyro correction direction needs to be adjusted(Move the nose to right and the outputs make the go right more), lightly **press the setting button 5 times** (yellow on and blue off) to enter the waiting time for setting the direction (yellow and blue flashing quickly). At this time, turn the direction Rudder input joystick to the left or right. After setting it, the yellow and blue lights will stop flashing; If the direction has not been changed, please operate again and input the other side of the joystick.

### Attention!!!

① If the aircraft is lifted and the pitch or roll angles > 40 degrees, the correction will immediately stop;

② If using the PPM/sbus port. Correction requires switching 5, 6 channels 11 times to enabled (See page 11), otherwise is Autopilot balance rudder output.

③ If using the PPM/sbus port, When using the aileron (CH [1]), the correction will immediately stop;

④ If the aircraft altitude is greater than 5m, the correction will immediately stop (when GPS is connected);

⑤ The landing gear channel is lowered (CH7 for PPM/sbus, second pin for PWM connection), and the correction is activated after 5 seconds;

So you can observe the mechanical position of the steering servo by flipping the aircraft and

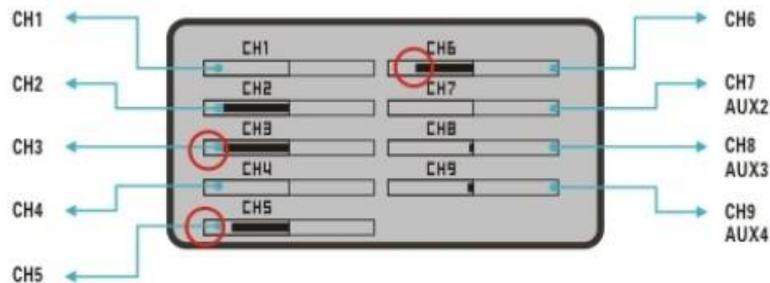
stopping the correction. If there is no correction, please check if the correction mode is enabled in PPM/sbus mode, if the installation direction is correct (recalibrate the sensors), if the landing gear channel is lowered, and if the ailerons are returned to the center.

### 3. Switch Modes through CH5 and CH6:



#### Check CH5 and CH6 reverse through radio monitor :

push throttle, CH5 and CH6 to 0%, the CH3, CH5, and CH6 status shown on radio shall be like picture below (Or check through servo).

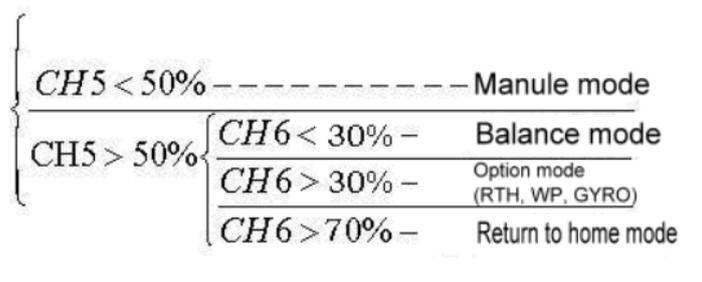


Use CH5 and CH6 to switch flight mode.

- 1) While CH5 is less than 50%, it switches to **Manual Mode**;
- 2) While CH5 is more than 50% and CH6 is less than 30%, it switches to **Balance Mode**;
- 3) While CH5 is more than 50% and CH6 is between 30% -70%, it switches to **Optional Custom Mode**; The default is Fence mode, which can be adjusted to other modes(**Hover\ Semi-Balance**)
- 4) While CH5 is more than 50% and CH6 is more than 70%, it switches to **Return Mode**;  
(If there is no GPS, it will be Custom mode too)

Fence area: if it flies out of a distance of 120 meters or is 25 meters below the safe altitude, it will trigger a return takeover.

(Pay attention to the lack of maneuverability of high-speed aircraft , which may crash. it is recommended to use a single wing low-speed training aircraft.)



#### 4. Set Mix, Reverse, Custom modes

##### 1 ) Set the correction Direction :

Press the setting button 5 times (yellow on and blue off ) to enter the waiting mode for setting the direction (yellow and blue flashing quickly). At this time, toggle channels 1, 2, or 4 stick to the edge for setting the Direction for that channel;

##### 2 ) Neutral Check :

Neutral point alignment needed under first installation, not used for weeks, or temperature variation is more than 10 degrees.

**Long press the settings button** on the flight control for 5 seconds, or swipe CH5 12 times through the settings menu to enter the calibration waiting mode. The aileron will automatically fill to the right to indicate waiting for flattening. (The LED light alternates between yellow and blue, flashing slowly);

Put the autopilot paralleled to the ground (Please prop up if there is a landing gear), and **move CH1 left and right** to do 3-seconds neutral point check. Aileron will be back to center once finished.

##### 3 ) Use CH5 CH6 to Set Mix, Reverse, Custom modes

1) **Set the channels 5 and 6 to low position** (manual mode), and the control levers of aileron CH1, lift CH2, and direction CH4 to center;

2) **Switch the CH6-channel five times** within five seconds to enter the setting mode (at this time, the yellow and blue lights are on simultaneously)

3) **Then Switch the CH5 channel** several times to enter different settings:

> Switch 2 times (yellow off/blue on ) - set the mix mode (Normal – Fly wing- V tail) cycle;

> Switch 3 times (yellow on/blue off ) – wait to set the of one channel direction and set the rudder amount to **25%** (minimum);

Wait with alternating yellow and blue flashing quickly. At this time, **move one channel to the edge** (aileron CH1 to the right edge, lift CH2 lever, and direction CH4 to the right edge), and set the amount of **that channel to 25%**; If the balance mode quantity is reversed, please repeat this step and turn the rudder quantity to another direction;

> Switch 4 times (yellow off/blue on ) - set the direction of the channel rudder and set the rudder to **50%**; (Same as above)

> Switch 5 times (yellow on/blue off ) - set the direction of the channel rudder and set the rudder to **75%**; (Same as above)

> Switch 6 times (yellow off/blue on ) - set the direction of the channel rudder and set the rudder to **100%**; (Same as above)

(For example, if the elevator needs to be set in reverse and the elevator amount is 75%, first Switch the 6-channel rudder amount 5 times, then Switch the 5-channel rudder amount 5 times, and then pull the elevator **all the way down.**)

> Switch 7 times (yellow on/blue off ) - Set the custom mode to balance mode;

> Switch 8 times (yellow off/blue on ) - set the custom mode to electronic Fence mode;

>Switch 9 times(yellow on/blue off ) - set the custom mode to Hover mode;( regard the hover position as balance position)

>Switch 10 times(yellow off/blue on )-set the custom mode to Semi-balance mode;( When the CH1 and CH2 of rocker is less than 50%, the plane is in Balance Mode. When the rocker is more than 50%, the plane is in Gyro Mode.)

>Switch 11 times(yellow on/blue off ) - effective when connecting to PPM or SBUS, activate the 4th channel steering correction function:

If enabled, the fourth channel will lock the direction and generate a continuous rudder when moving the nose (please connect to the steering wheel servo). It can be disabled by setting the input of the **CH 7 channel** (which is considered to be the landing gear channel) to high.

>Switch 12 times(yellow off/blue on )- enter Neutral point alignment;

More than 12 times, both lights remain on and exit the setting.

## 5. Manual Mode



**Radio Stick and SUB-TRIM back to center, set radio travel range as 100%.**

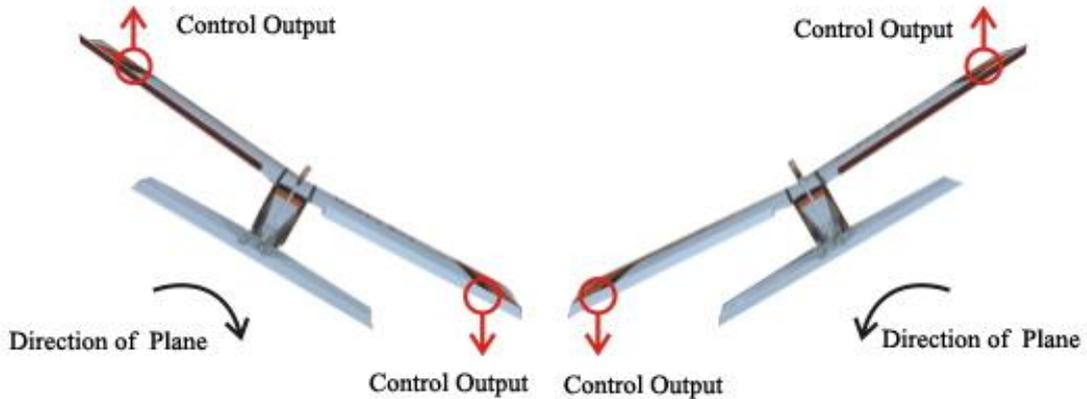
Switching to Manual Mode, Arkbird will not participate control, set **manual control's reverse** through radio, adjust plane's CG and travel angle.

## 6. Reverse Balance Mode assistant Control



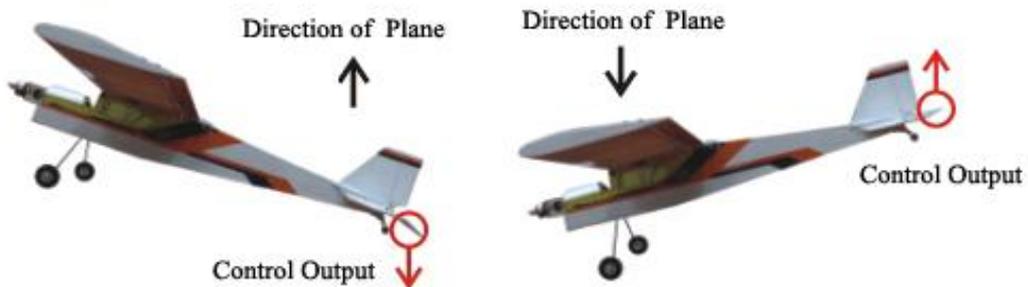
Switching to Balance Mode, by pushing CH5 to 100% and CH6 to 0%, if the neutral point is correct, rudder, aileron and elevator shall be at the neutral position, otherwise please check the neutral point again.

1. **Aileron:** When rolling the plane to right, aileron shall produce a left compensation automatically, make plane go back horizontal. On the contrary, when rolling to left, aileron will produce a right compensation. Please see as below:



If the compensation direction is not correct, please adjust the Roll inverse.

2. **Elevator:** When pitching up the plane, elevator shall produce a down compensation automatically. On the contrary, when pitching down, elevator will produce an up compensation. Please see as below:



If the compensation direction is not correct, please adjust the Pitch inverse.

3. **Rudder:** When yawing the plane to right, rudder shall produce a left compensation automatically. On the contrary, when yawing to left, rudder will produce a right compensation.

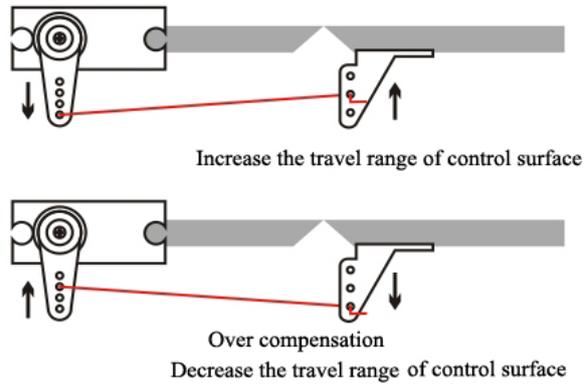


If the compensation direction is not correct, please adjust the Rudder inverse.

### 7. Adjust output travel range:

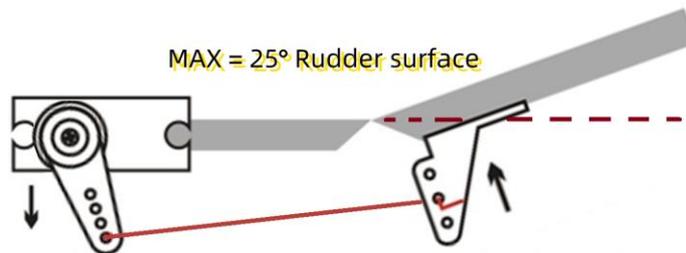


Please setup stick angle volume on **RC Transmitter as 100%**, **fine tuning back to middle**, and change stick volume by adjusting Roll/Pitch/Yaw Potentiometer knobs or plane's control surface.



Please adjust the sensitivity and adjust the mechanical rudder hole and by turning the 5/6 channel.

Adjust the output of the **25 degree control surface** corresponding to the joystick as shown in the following figure:



Please increase control value when the stability not good enough under Balance Mode (drift even stick back to center),

Decrease control value when the plane swings,.

Please fly under Manual Mode while the first flight, switching to Balance Mode at safe altitude, turning back to Manual Mode and landing on any unexpected situation.

## 8 GPS and Return to Home Instruction



While switching to **RTH Mode** (CH5 to 100% and CH6 to 100%), it will adjust the flying height to safe height to go home.

If the **throttle safe** is enabled and **when height and distance is within 30m**, there will be no throttle output, to avoid any hacking while adjusting. (Refer to OSD menu)

During RTH mode throttle will increase if altitude is low, or speed is slow, decrease if altitude is high, or speed is faster than set safe speed.

Once lost GPS satellite, switching to RTH, the plane will **go home automatically based on the home angle of last position before out of signal**. Within radio range, please switch to Balance Mode and land.

Please keep an eye on the quantity of GPS signal and voltage value, fly carefully. Please note if the quantity of satellite is less than 7, the positioning might not be correct.

## 9 Fail-Safe to RTH mode



Fail-Safe is a **receiver's function** to preset position when receiver is out of signal. Some receivers can set in the radio menu, and some save the current position through receiver (probably through a button).

Please refer to the manual of receiver. Set the fail-safe position the same as Return-to-Home Mode through CH5 and CH6 (CH5>50%, CH6 > 70%). And then turn off the radio to check if it switches to Return-to-Home Mode.

(Note: No need to set fail-safe from channel 1 to channel 4 as these four channels are controlled by autopilot under Return-to-Home Mode, which is not relevant to receiver.)

## 10 Other FAQ:

**Q: The fourth channel always has rudder output, does not return to the center.**

A: Check if the steering correction function is enabled and turn off this mode;

**Q: After the steering lock function is activated, the rudder drifts in one direction.**

A: Check the installation direction and recalibrate the sensor. Fine tune the steering input on the remote control;

**Q: Both lights are on and off at the same time, and there is still rudder when the balance mode joystick returns to the center.**

A: Check the installation direction and recalibrate the sensor. If it still does not work, it may be due to sensor damage;

**Q: The throttle has a output, or when the throttle lever is at its lowest position, the throttle beeps and does not work.**

A: This is an incorrect setting for the ESC electric throttle stroke. Please unplug the propeller, fine tune the throttle channel on the remote control to return to the center, and set the rudder to 100%. Then directly plug the electrical adjustment into channel 3 of the receiver, and refer to the electrical adjustment manual to calibrate the electrical adjustment stroke.

**Q: Cannot locate home, "Waiting GPS Home"**

A: Seeing OSD "Waiting GPS Home" proves GPS wiring is OK, otherwise, please check GPS wiring.

GPS's white antenna shall face up; keep GPS away from Video TX and Camera. Some inferior Video TX's antenna will affect GPS, too. You can try to remove the casing of GPS, or put a layer of tin foil paper under GPS to enhance the performance.

GPS can only work Outdoors, First time about 5-10 minutes, next power on of the same day it would take less than 10seconds to locate.

**Q: Plane tilts under Balance Mode / Manual Mode, can I adjust the radio TRIM?**

A: First time installation, do a **neutral point alignment**. Radio stick and SUB-TRIM back to center, adjust plane's CG and travel angle to make plane balanced.

Arkbird can produce compensation when CG & travel angle is not appropriate, but it is not mechanical stable, there would be hidden trouble under RTH mode. So firstly make sure plane can fly stably in horizontal under Manual Mode.

**Q: Inaccurate Return-To-Home**

A: Adjust remote control rudder angle to 100% and sub-trim back to center. Check carefully in reference to the "Debugging Skills for Balance and RTH Mode" chapter of our instructions.

Make ground video recordings. These data will tell you if the control values are proper and will help you judge which parameter needs to be sub-trimmed.

**Attention:**

**Please read through carefully:**

1. The design purpose of autopilot is to keep balance of flight, it is not able to manipulate plane or prevent stall. You must have sufficient experiences of fixed wing to control the flight.
2. The autopilot is only for small-scale RC model. For safety concern, please do not install in plane for aerial photography which might fly over crowd.
3. Please install the autopilot depends on your demands and check the condition before flying every time.
4. Any equipments and electric products on the plane couldn't be completely reliable, please using this system following the instruction. The system provider is not responsible for any direct or indirect loss and consequence caused by using this product.



03.12 First Release

