ZYX ◆ FLIR

User Manual

V1.00

2016.07.26 Revision

Contents

Warning and Disclaimer

Please DO NOT adjust the gimbal or change its mechanical structure!

Before leaving the factory, ZYX FLIR gimbal has been adjusted to fit the camera. Based on the setup procedures, you can achieve a fabulous flight experience. Please **do not** adjust the gimbal or change its mechanical structure. Moreover, **do not** add any external component to the camera. It is highly suggested to apply to the original battery to avoid malfunctions of internal wirings or performance degradations.

In order to ensure the safety of flight control system after powering up, we recommend you to remove all the propellers and use non-power-supply for the gimbal. Keep the entire components far from children and flammable & combustible materials!

Because we have no control of the use, mounting, assembly and modification processes, TAROT will not assume any legal responsibility for the injury or damage.
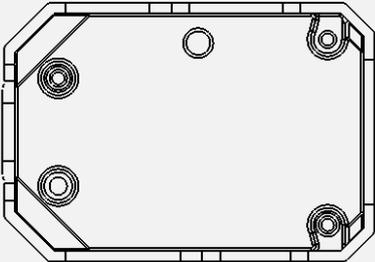
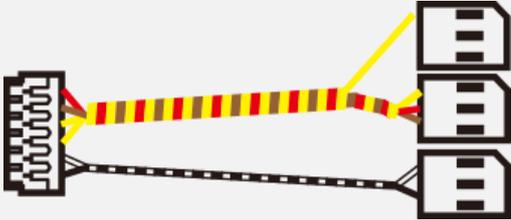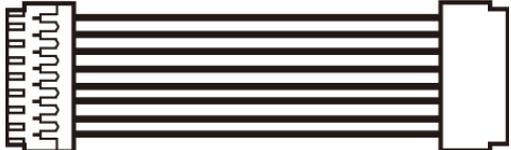**ZYX FLIR ONLY supports FLIR Thermal Imaging Camera.**

I. Product Introduction

ZYX FLIR, a great 3-axis gimbal for model aircraft enthusiasts, can be widely applied to various model aircraft activities and entertainments. With unique internal wiring design, built-in IMU gimbal control module, specialized servo drive module, this gimbal is able to support Pan Follow (PF) mode and First Person View (FPV) mode.

II. Product List

1. Package Contents

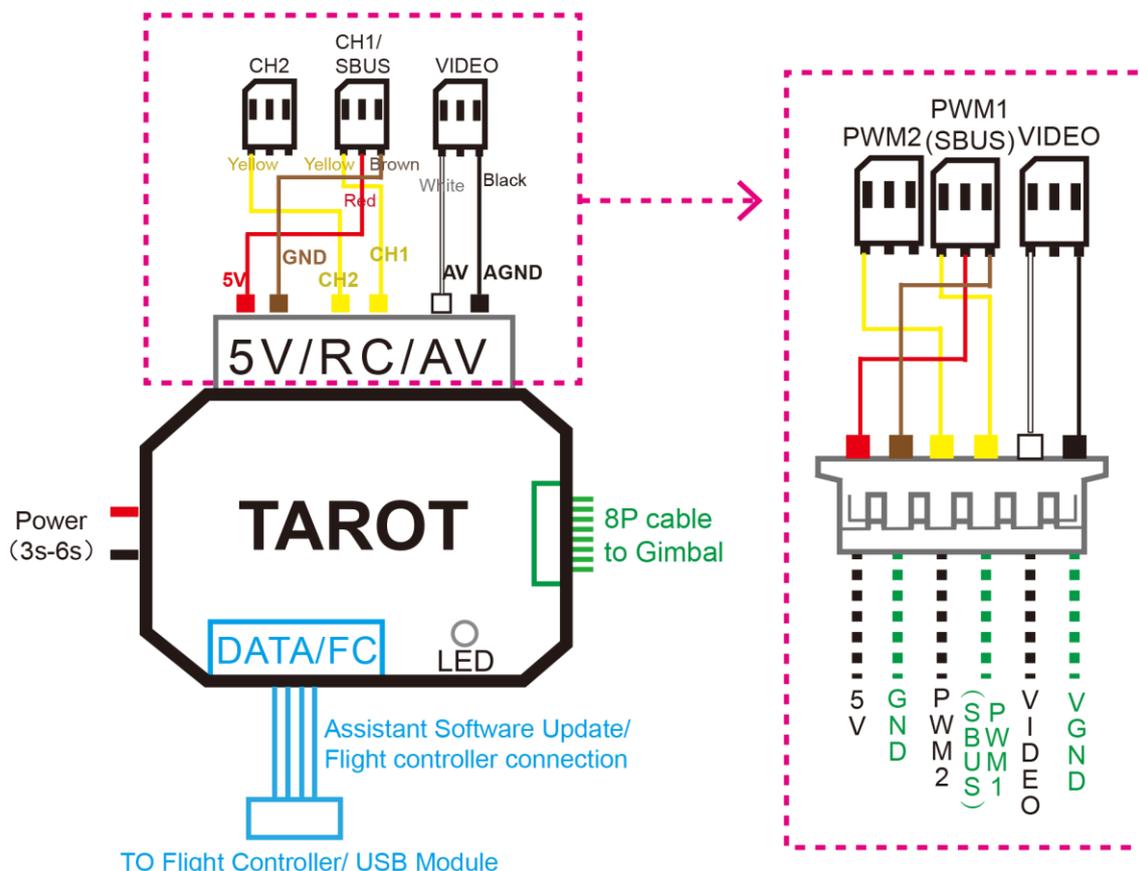|	
Gimbal *1 With unique internal wiring design, built-in IMU gimbal control module, specialized servo drive module, this gimbal is able to support Pan Follow (PF) mode and First Person View (FPV) mode.	
Gimbal Main Controller Module*1	
Main Components Pack	
5V OUT & Receiver & AV Cable*1	
Gimbal Main Controller & Gimbal Connection Cable*1	
USB Module*1	
Connection Cable to Flight Controller*1	
Charging & AV-OUT Cable*1	

III. Mounting & Configuration

1. Gimbal Controller Wiring Diagram & Descriptions

Wiring Diagram

说明：

Battery	Power Supply:3S-6S Li (11V-26V)
	* If you choose a battery to power up the gimbal and multi-rotor, please make sure this battery meets requirements of both components.
Receiver	1、 **Common Receiver**: connect it to the CH1/SBUS and CH2 Channel in the gimbal main controller. Also, set Receiver Type and corresponding channel in the assistant software.
	2、 **FUTABA SBUS or SBUS-2**: connect it to CH1/SBUS channel in the gimbal main controller. **MAKE SURE CH2 IS UNCONNECTED**. Also, set Receiver Type and corresponding channel in the assistant software.
	3、 If you have 5V power supply to the receiver, please disconnect the 5V power of CH1/SBUS channel.
Video	Connect the video wireless transmission module to AV out port. **DO NOT** misconnect signal and video cable.
Flight Controller	Gimbal can work independently without Tarot ZYX-M Flight Control Module, but its

	performance might be influenced. For instance, angle offset might occur when the accelerated state lasts for a long time. If you are pursuing a perfect performance, please connect the gimbal and Tarot ZYX-M Flight Control Module to the DATA/FC channel of gimbal controller through the special cable in main components pack.
Camera	Connect the camera through Charging & AV-OUT Cable.

2. Gimbal Working Mode

You should select a three-positioned or two-positioned switch in R/C for working mode. Please connect the corresponding port of the receiver to CH1/SBUS or CH2 of the gimbal controller. Set RC MAPPING in the assistant software. For different positions, use endpoint fine tune function to set. Please refer to the MODE Channel section in assistant software for detailed information.

Attentions:

When the **MODE port is unconnected**, the gimbal can only work in the DEFAULT mode. Moreover, during flight, if the MODE is unconnected suddenly, the working mode would remain the same before disconnection.

After powering up the gimbal, if **the receiver is unconnected**, it works on DEFAULT MODE.

About the Working Mode:

	Pan Follow (PF) Mode	FPV Mode
Descriptions	The angles of Roll and Pitch keep unchanged, while the angle of Pan axis changes according to the head of the multi-rotor.	The angles of Roll, Pitch and Pan axis change according to the attitude of the multi-rotor.
Tx Control	Under Control	Under Control
Attitude Stability	√	√
Vibration Reduction	√	√

2. Working Mode Setup

Choose a **two-positioned or three-positioned** switch:
Take the three-positioned switch as an example: Position 1 refers to FPV Mode; Position 3 corresponds to AL

Mode.Position 1 and Position 3 can be exchanged.
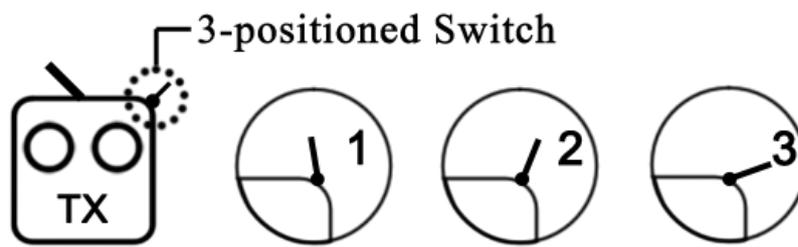
IV. Flight Test

Steps:

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1. Please ensure all the wirings are correct and the power supply is in great condition.

2. Turn on the transmitter.

3. Powering up the gimbal and keep it still. After self-check and sensor initialization process, gimbal angle corresponds to INIT ANGLE in the assistant software.

4. Switch from different working modes to check the rotation direction in ROLL, PITCH, and PAN axis.

TIPs:

Before flight test, please ensure:

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1. Correctly mount the camera into the gimbal and the gimbal onto the landing gear.

2. All the wirings are correct.

3. The camera and transmitter have correctly set.

Gimbal Self-check and Sensor Initialization:

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1. After powering up the gimbal, it enters self-check procedure. When RED, YELLOW, BLUE lights flash twice at the same time, self-check finishes.

2. After self-check process, camera lens face straight down, it enters sensor initialization process. Keep the gimbal still in this process. Initialization will last for a relatively long time if the sensor deviation or drifts are large.

3. After sensor initialization process finishes, gimbal angles corresponds to INIT ANGLE in the assistant software.

V. ZYX FLIR Assistant Software

## 1. Drive & PC Assistant Software Installation and Setup

①Please download the drive and PC assistant software from http://www.tarotrc.com//
②Run the drive program under USB Driver folder, and finish the installation procedures step by step.
Windows x86: "CP210xVCPInstaller_x86.exe";
Windows x64: "CP210xVCPInstaller_x64.exe";
③Connect the USB module to the computer, and finish the installation.
④Run the assistant software ZYX FLIR.EXE and set the parameters.

2. Introduction

ZYX FLIR, the three-axis gimbal, could support the camera to stabilize its positions on the roll, tilt and pan axis.

You could adjust receiver type, working mode, angle range and other options in the assistant software.

First of all, please connect gimbal controller to the PC through a USB cable. Choose a correct COM port and click the "Connect".
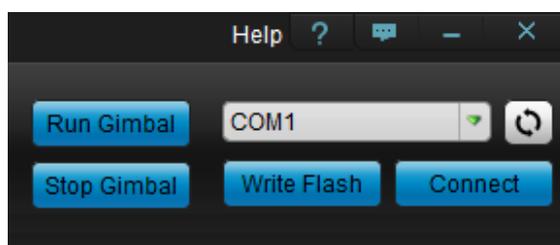
If the connection is successful, the gimbal would stop rotating to protect your device.
After finish parameters setup, click "Run Gimbal". Push sticks and toggle switches to ensure the gimbal works correctly.
When finish parameters setup, you should click "Write Flash" to ensure all the parameters have written to the gimbal. Moreover, the gimbal will automatically run the parameters you have saved in the flash next time.

3. Basic Setup

1. **Receiver Unconnected**: set gimbal mode in Default Mode of assistant software.

2. **Receiver Connected**: set gimbal mode in MODE channel of the receiver.

FPV Mode: The direction of the gimbal and directions (roll, tilt and pan) of the multi-rotor are the same.

PF Mode: The head of the multi-rotor and the gimbal are in the same direction.

Methods to Connect the Receiver:

1. Common Receiver: connect it to the CH1/SBUS and CH2 Channel in the gimbal main controller.

2. SBUS-2: connect it to CH1/SBUS channel in the gimbal main controller. **MAKE SURE CH2 IS UNCONNECTED**.

Receiver Type

Covention ▼

Default Mode

FPV ▼

Max Rotation Speed

Roll	0 ↕
Tilt	0 ↕
Pan	0 ↕

Init Angle

Roll	0 ↕
Tilt	0 ↕
Pan	0 ↕

Init Angle stands for the initial angle of each direction after the gimbal has been powered up. For instance, if you want the tilt direction of the camera is on -45 degree, you should enter -45 on the corresponding box.

Angle Range of Roll: -50°~+50°

Angle Range of Tilt: -120°~+80°

Angle Range of Pan: -125°~+125°

Please press "ENTER" button after modifying the parameters.

The maximum rotation speed the gimbal can reach.

When pushing sticks to the maximum but the rotation speed is lower, you could increase the value of Max Rotation Speed to enhance the rotation speed;

When pushing sticks gradually but the rotation speed is too fast, you could decrease the value to slow down the speed.

Max Rotation Speed Range of ROLL: 0~200(degree/sec)

Max Rotation Speed Range of TILT: 0~200(degree/sec)

Max Rotation Speed Range of PAN: 0~200(degree/sec)

Please press "ENTER" button after modifying the parameters.

Angle Limit

	Min	Max
Tilt	0 ↕	0 ↕
Pan	0 ↕	0 ↕

Motor Torque

Roll	0 ↕
Tilt	0 ↕
Pan	0 ↕

Angle Range of Rotation on each Direction of the Gimbal

If the gimbal rotates to or over the extreme value, it would stop rotating until the value goes within the range.

The Extreme Range of Tilt: -120°~+80°

The Extreme Range of Pan: -125°~+125°

Please press "ENTER" button after modifying the parameters.

It relates to the response speed of the gimbal. When it becomes too small, the stability deteriorates. When it turns too large, self-oscillation occurs.

Methods to adjust: if vibration occurs, please decrease the parameters until it disappears.
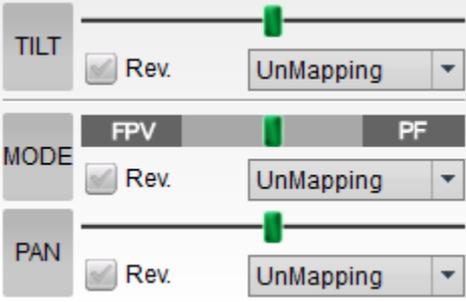
Input Range: 0~200

Please press "ENTER" button after modifying the parameters.

Attention: it has been adjusted to an appropriate value before leaving factory. If vibrations do not occur, please do not modify this value.

4. Channels

(1) RC Mapping

|	
TILT Rev. UnMapping MODE FPV PF Rev. UnMapping PAN Rev. UnMapping	**Tilt Channel** Push the stick, and observe the rotation direction of the gimbal and the moving direction of the cursor. **Mode Channel** This channel controls gimbal working mode. Choose a three-positioned or two-positioned switch to control the working mode of the gimbal. Map it into Mode Channel. Toggle the switch to the position, the cursor should be in the corresponding area. **Pan Channel** Push the stick, and observe the rotation direction of the gimbal and the moving direction of the cursor. **FPV Mode**: the direction of the gimbal and directions (roll, tilt and pan) of the multi-rotor are same. **PF Mode**: the head of the multi-rotor and the gimbal are in the same direction.

(2) Control Mode
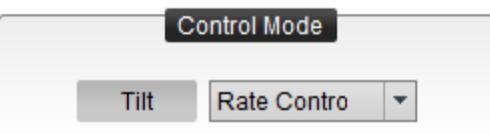
Control Mode Tilt Rate Contro	**Methods to control gimbal rotation by R/C (tilt only).** Push sticks to observe the moving direction of the cursor and rotation direction of the gimbal. **Rate Mode**：The position of the stick is corresponding to the rotate speed of the gimbal. **Angle Mode**：The position of the stick is corresponding to the angle of the gimbal.

5. Tools

Please calibrate sensors when the output of gyro is far from zero while the gimbal is stationary.

Methods to calibrate

It is necessary to keep the gimbal in the stationary state. Click "Calibrate Sensors". When "Calibration is successful" shows on status bar, the calibration procedures finishes.

Calibrate Gimbal Angles

Please keep tilt, roll and pan axis perpendicular to each other during calibration.

6. Firmware Update

Update Procedures:

(1)Download the latest version of Firmware Upgrade package from http://www.tarotrc.com.

(2) Connect the gimbal with the assistant software through a USB cable.

(3) Unzip the upgrade package and click "Open Firmware" to choose the firmware you have unzipped,

(4) Click "Start Upgrade" and wait for finishing.

Attention:

If something wrong occurs during update, please check the connection and power supply. Also, make sure you have correctly installed the drive program. You can repeat upgrading for several times until your device is broken.

Moreover, you could screenshot the upgrade procedures and send your concerns or problems through the feedback on the top right corner of the assistant software.

VI. Troubleshooting

Angle is not level.	1. Error of sensors is too large.	1. Calibrate sensors.
	2. Tx is not centered.	2. Center the Tx.
Gimbal vibrates.	1. The camera is not screwed down.	1. Screw down the camera and lens screws.
	2. Motor torque is too large.	2. Decrease motor torque value slightly.
Image of the video is not stable enough.	1. Vibration is too large; 2. Damping ball is not fixed. 3. Motor torque is too small.	1. Reduce the vibration of the multi-rotors; 2. Tightly fix the damping balls. 3. Slightly increase the value of motor torque.
Red light blinks quickly.	1. Connection cable between gimbal controller and its main body becomes loose. 2. Gimbal stall protection goes far beyond ten times.	1. Check and fix the wiring cables; 2. Make sure whether or not there is resistance to gimbal rotation. Then, power cycle the gimbal.

VII. Specifications

Input Power	3S-6S Li (11V-26V)
Working Current	30mA（@25V） 50mA（@12V）
Stall Current	350mA（@25V） 700mA（@12V）
Working Environment	-20℃~+50℃
Weight	162g
Dimensions (with FLIR)	79mm *98 mm *95.5mm
Max Controllable Rotation Speed	TILT: ±200 deg/s ROLL: ±200 deg/s PAN: ±200 deg/s
Controllable Rotation Range	TILT: -120 deg ~ +80 deg PAN: -125 deg ~ +125 deg ROLL: -50 deg ~ +50 deg
Attitude Control Accuracy	±0.02 °
Supported Camera	FLIR Thermal Imaging Camera
Assistant Software Supporting Platform	Windows XP/VISTA/7/8

VIII. Port Descriptions

Gimbal Main Controller Port	
PWR	Power Port
DATA/FC	Gimbal Main Controller Assistant Software Update & Gimbal Data Input Port
5V/RC/AV	5V Power Output & Receiver Input & AV-OUT Port
Motor Drive & Sensor Module Port	
DEBUG	Debug Port. Do not connect any external device.

IX. LED Indicators

<table>
<tr><td colspan="2" align="center">Gimbal Main Controller LED Indicators Status</td></tr>
<tr><td align="center">RED & BLUE lights blink twice.</td><td>POST (Power On Self-Test) Status.</td></tr>
<tr><td align="center">RED & BLUE lights are constantly on.</td><td>POST (Power On Self-Test) fails.</td></tr>
<tr><td align="center">BLUE light turns off.</td><td>Flight Controller Disconnects.</td></tr>
<tr><td align="center">BLUE light is constantly on.</td><td>Flight Controller Connects.</td></tr>
<tr><td align="center">BLUE light blinks.</td><td>Flight Controller connects and flight data are available.</td></tr>
<tr><td align="center">RED light blinks.</td><td>1. Line Fault.
2. Gimbal stall protection goes far beyond ten times.</td></tr>
<tr><td colspan="2" align="center">Motor Drive & Sensor Module Indicators Status</td></tr>
<tr><td align="center">BLUE light blinks once.</td><td>POST (Power On Self-Test) Status.</td></tr>
<tr><td align="center">BLUE light is constantly on.</td><td>POST (Power On Self-Test) fails.</td></tr>
</table>