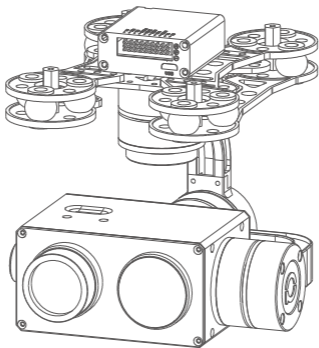




## User manual

### Z10TIR

10x Zoom EO + IR Dual Sensor Object Tracking Camera Gimbal



Images are for reference only, please subject to the actual product.

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## Gimbal Introduction

Z10TIR is a pinpoint-precision professional 3-axis gimbal with a 10x 1080P optical zoom camera which features high stability, small size, light weight and low power consumption. The 3-axis gimbal based on FOC motor control technology, adopts pinpoint-precision encoder in each motor.

The speed of Z10TIR gimbal is adjustable, LOW speed mode is used for large zoom range, the control will be more accurate; Fast speed mode is used for small zooming range, which makes the gimbal control sensitive and quick. Also the one-key to center function will allow the gimbal return to initial position automatically and rapidly.

Z10TIR supports PWM, S.BUS and serial command control, suitable for close range remote control or remote data command control.

## Object Tracking Function

### 1. Function description

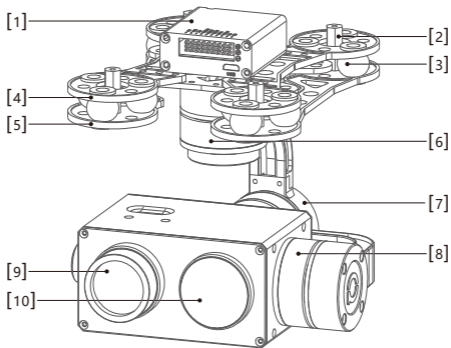
Build-in normalization, cross-correlation and tracking algorithm, combining with object missing recapture algorithm, achieve stable track of the target.

Support custom characters of user OSD, adaptive gate, cross cursor, tracking information display.

### 2. Tracking Performance

- 1) Update rate of deviation pixel 50Hz
- 2) Output delay of deviation pixel <15ms
- 3) Minimum object contrast 5%
- 4) The minimal signal-to-noise ratio (SNR) 4
- 5) Minimum object size 16\*16 pixel
- 6) Maximum object size 160\*160 pixel
- 7) Tracking speed 32 pixel/frame
- 8) The mean square root values of pulse noise in the object position <0.5 pixel
- 9) Object memory time 100 frames

## Gimbal Description



[1] Control box

[2] Gimbal fixed copper cylinder

[3] Damping ball

[4] Upper damping board

[5] Lower damping board

[6] YAW axis motor

[7] Roll axis motor

[8] Pitch axis motor

[9] Thermal imager camera

[10] 10x HD zoom camera



Please make sure that the motor is not stopped by any object during the rotation, if the gimbal is blocked during rotation, please remove the obstruction immediately.

## Packing list

Gimbal\*1



Screw pack\*1

Screw pack\*1  
(M3\*5mm button head hexagon screw\*4)

Copper cylinders\*4

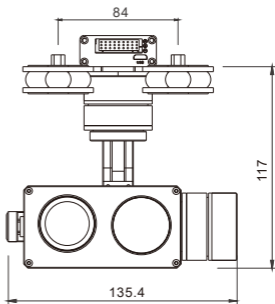
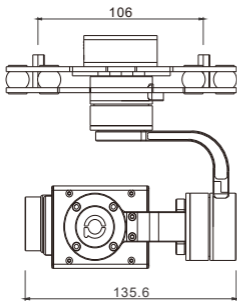


Damping balls\*12

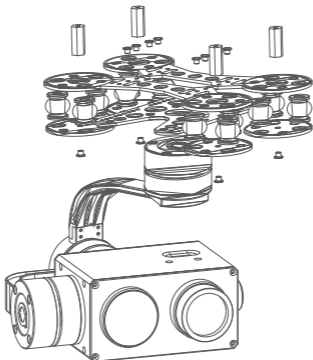


## Gimbal Dimension

Unit : mm



## Installing



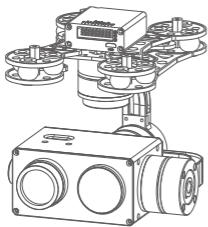
### Mechanics@Electronic Characteristics

Input voltage	3S~ 4S	Idle current	450mA@12V
Dynamic current	550mA@12V	Working environment temp	-10°C ~ +60°C
Temp	-30°C~+80°C	Weight	750g
Size	L135.6 *W 135.4*H117mm		

### Working Characteristics

Pitch/Tilt: Pitch angle range of action : $\pm 90^\circ$
Roll: Roll angle range of action : $\pm 85^\circ$
Yaw/Pan: Yaw angle range of action : $\pm 170^\circ$
Vibration angle: Pitch/Roll: $\pm 0.01^\circ$ , Yaw: $\pm 0.01^\circ$

## Connection of Control Box and Wiring Instruction

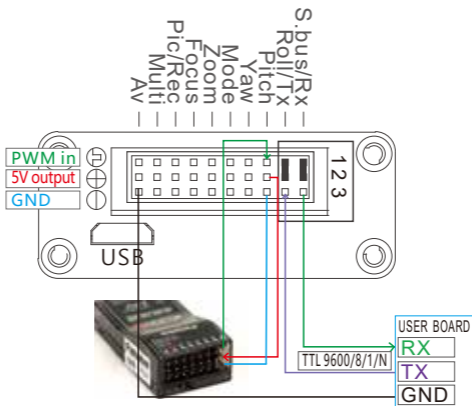


HDMI: micro HDMI OUTPUT

1080P 60fps default

SD card: max 128G, class10

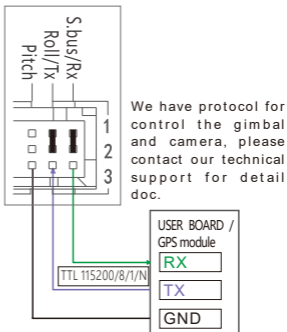
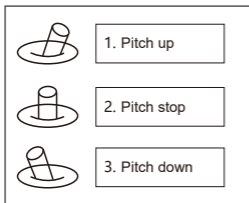
FAT32 or exFAT format



S.bus/Rx: connect to Rx2 for track function.

Roll/ Tx: connect to Tx2 for track function.

Pitch: PWM in, pitch control

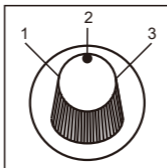


Yaw: PWM in, Yaw control





Mode: Change the speed / home position



Position 1: Lowest speed for pitch and yaw.

Position 2: Middle speed for pitch and yaw.

Position 3: Highest speed for pitch and yaw. The speed is continuously quickly from 1 to 3.

One click: Home position.

Two click: Look down.

Three click: Yaw not followed by frame.

Four click: Yaw followed by frame.

Five click: Restore the factory settings.

(Click = from 2 to 3 and back to 2 quickly)

ZOOM: Zoom the camera

Focus: Focus the camera



1. Zoom tele



2. Stop zoom



3. Zoom wide



1

Switch 2 to 1: IR color white hot, black hot, pseudo color



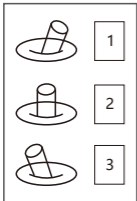
2



3

Switch 2 to 3: Picture in Picture. EO+IR , IR+EO, EO only, IR only.

## Pic /Rec picture / Start record, stop record



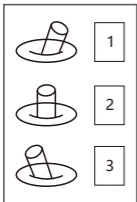
Switch 2 to 1:

Start record / stop record. start record, the OSD display rec hh:mm:ss ; stop record, the OSD display STBY.

Switch 2 to 3: Take a picture.

OSD display ' REC IMG' a second.

## Multi: Tracking control



Position 1 exit the tracking

Switch 1 to 2: Display the cross cursor. Adjust the object to the cross cursor.

Switch 2 to 3: Start tracking. Change the object during tracking.

Switch 3 to 2: Display the cross cursor, use Pitch/Yaw to adjust the cross cursor.

Switch 2 to 3: Start tracking.

AV: NO AV output this model.

## 640 19mm Thermal Imager Parameter

<b>Horizontal FOV</b>		32°
<b>Vertical FOV</b>		24°
<b>Diagonal FOV</b>		39.4°
<b>Detective Distance(M an:1.8x0.5m)</b>		559meters
<b>Recognize Distance(M an:1.8x0.5m)</b>		140meters
<b>Verified Distance(M an:1.8x0.5m)</b>		70meters
<b>Detective Distance(Car:4.2x1.8m)</b>		1714meters
<b>Recognize Distance(Car:4.2x1.8m)</b>		428 meters
<b>Verified Distance(Car:4.2x1.8m)</b>		214 meters
Thermal Imager Spec	<b>Working mode</b>	Uncooled long wave (8μm~14μm) thermal imager
	<b>Detector pixel</b>	640*480
	<b>Pixel size</b>	17μm
	<b>Focusing method</b>	Athermal prime lens
	<b>Emissivity correction</b>	0.01~1
	<b>NETD</b>	≤50mK (@25℃)
	<b>MRTD</b>	≤650mK (@characteristic frequency)
	<b>Image enhancement</b>	Auto adjust image brightness and contrast ratio
	<b>Color palette</b>	Black, white, pseudo color
	<b>Auto Non-uniform correction</b>	Yes (no shutter)
	<b>Digital zoom</b>	1x, 3x
	<b>Sync correct time</b>	Yes
	<b>Temperature type</b>	Temperature bar ( pseudo color display) max temp, min temp, FOV center temp
<b>Temperature warning</b>	-20℃~120℃	
Thermal Object Tracking	<b>Update rate of deviation pixel</b>	25Hz
	<b>Output delay of deviation pixel</b>	<3ms
	<b>Minimum object size</b>	16*16 pixel
	<b>Maximum object size</b>	128*128 pixel
	<b>Tracking speed</b>	±32 pixel/frame
	<b>Object memory time</b>	100 frames (4s)

## Camera Introduction

Z10TIR has 2 mega effective pixels, supports 10x optical autofocus, possess HD 1080P video. There are two video streams in the camera, one is 1080P 30FPS, local H.264 compression, stored in the device SD card, another video output 1080p60FPS HDMI HD signal for the wireless transmission, according to the characteristics of UAV photography application, we design fast auto-focus speed ,small size, and support PWM, S.BUS and serial command control.

## Camera Features

- Excellent 1080p (1920 x 1080) HD image quality
- 1/2.9" high-performance CMOS sensor, 2MP, high picture quality and high sensitivity
- Powerful zoom capability - 10x optical zoom, 12x digital zoom, excellent autofocus  
Performance: fixed aperture is F1.6 with a focal length range of 4.7-47mm
- Video output pixel (H) x (V) : 1920 x 1080
- VFM 1080p/25, 1080p/30, 1080p/50, 1080p/60,720p/25, 720p/30, 720p/50, 720p/60
- Day /night function (on, off, automatic)
- Multiple white balance models
- Powerful low noise effect and excellent noise reduction performance
- Support for ultra-low illumination: 0.05Lux@F1.6 (color), 0.01Lux@F1.6 (black)White), 0Lux (IR)
- The signal-to-noise ratio is greater than or equal to 52dB
- Image effects (e-flip, black and white, mirror, image GAMMA, e-mist, numbers Wide dynamic)
- Electronic shutter
- Support OSD function display

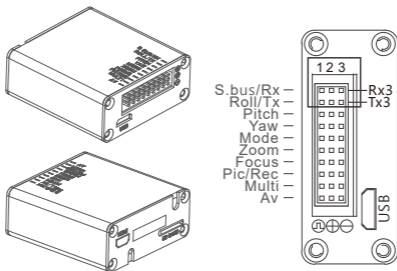
## Camera Characteristic

Model	Model No.	Z10TIR
	Type	10x 2MP 1/2.9" CMOS ICR day and night type HD integrated movement
CMOS	Picture size	6.3mm (Type 1/2.9)
	Effective pixel	2.13 M p
	Progressive scanning	Support
	Output video	1920H x 1080V / 25fps 1920H x 1080V / 30fps 1920H x 1080V / 50fps 1920H x 1080V / 60fps 1280H x 720V / 25fps 1280H x 720V / 30fps 1280H x 720V / 50fps 1280H x 720V / 60fps
lens	Lens optical zoom	10X
	Focus distance	4.7~47mm ± 5%
	Field of View	D:WIDE 61.11° ± 5% TELE 7.65° ± 5% H:WIDE 35.2° ± 5% TELE 4.12° ± 5%
	Aperture	F1.6

PC client, android APP, ios APP please contact technical support get more.

Technical support QQ: 3320249240

## GPS Information Display and Serial Port Control Wiring Diagram



To use the serial port function, please use the jumper cap to connect RX1 and RX2, TX1 and TX2.

External serial port TX connect with TX3. External serial port RX connect with RX3. External serial port GND connect with GND of wiring box.

**Note: The signals in the black square are all TTL serial ports. Do not connect 5V and GND to serial data Interface!**

The output of data radio stations (TTL 3.3 V) directly controls the gimbal and camera movements, in which the gimbal actions include:

- 1, Yaw control and angle output, pitch control and angle output, speed setting, angle setting, stop, return to Home;
- 2, camera actions include: zooming, focusing, start record, stop record, taking photos, record / photo Switch, zoom times information output, etc;
- 3, when there is no respond on the command from the control box, you need to enter the enquiry command to obtain the status of camera gimbal;
- 4, serial port baud rate 115200, 8-bit data bit, 1 stop bit, no check bit, HEX.

For specific protocols, please contact us for technical support.