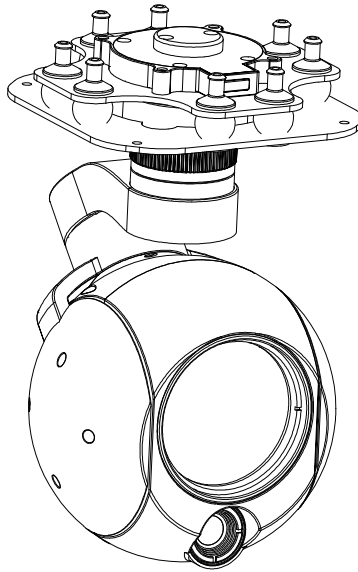
AT9-50 AI IR Object Tracking Gimbal Camera

User Manual



For more details please scan the QR code or visit our website:
www.viewprotech.com

Disclaimer and Warning

Congratulations on purchasing your new Viewpro product. Please read this entire document carefully. Failure to read or follow instructions and warnings in this document may result in damage to your Viewpro product. Disassemble the gimbal camera by user is not permitted, which may cause the camera does not to work normally.

Viewpro accepts no liability for damage, injury or any legal responsibility incurred directly or indirectly from the use of this project. The user shall observe safe and lawful practices including, but not limited to, those set forth in the manual.

Legends



Warning



Important Note

Precautions

1. Please keep the camera in a dry environment to avoid fogging of the lens due to excessive humidity. If the lens is foggy, turn it on for a while and wait for the fog to dissipate.

2. The camera uses an infrared thermal imaging lens, please do not aim it at strong energy sources, such as the sun, laser beams, lava, etc. The temperature of the object observed by the lens must be less than 800°C, otherwise the camera will be burned and irreversible damage will be caused.

3. When cleaning the camera lens, be sure to use a soft and dry cleaning cloth to wipe the lens surface.

4. Do not touch the coating on the surface of the infrared lens directly with your hands or with hard objects, otherwise the coating will be damaged and the image will be blurred.

5. Do not plug or unplug the TF card when power on; after plugging and unplugging the TF card, please make sure that the TF rubber plug is tightly covered to prevent the power-on self-check from failing.

6. Please ensure that there isn't any obstacle while the motor rotating.

7. The pin insertion interface of control box cannot be connected with power supply in case the control board will be burned.

1.Product Introduction

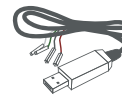
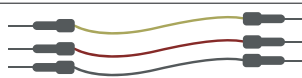
1.1 Introduction

AT9-50 is a high-precision 3-axis stabilized payload camera with dual (9mm/50mm) uncooled VOx IR thermal cmaera. The resolution is 640x512 anf pixel size of 12μm.

AT9-50 supports thermal image multi-color palette switching, photo and video onboard recording, AI detection of vehicles & human and stable target tracking, real time video streaming (1080p/720p optional).

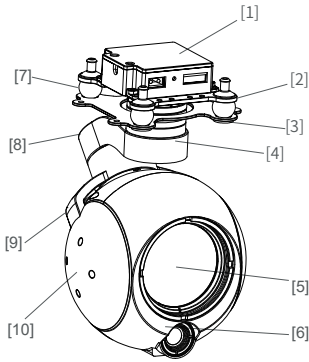
AT9-50 is widely used in industrial UxS applications such as surveillance, search&rescue and inspction.

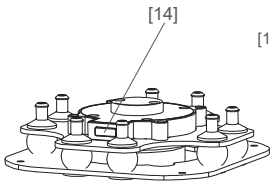
1.2 Packing List

Gimbal (Standard Version) ×1		Gimbal (Viewport Version) ×1	
Aluminum Cylinder ×4		USB to TTL line ×1	
M3 screw ×8			
Power Line ×1			
PWM Control line ×1			
Serial port/S.bus Control lin ×1			
Connect serial port line ×3			
Ethernet line ×1			

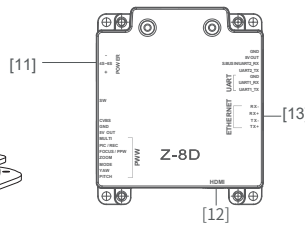
2.Installation Instruction

2.1 Overview





Viewport



Control Box

[1] Control box
[2] Upper damping board
[3] Lower damping board
[4] Yaw axis motor
[5] Infrared thermal camera 1
[6] Infrared thermal camera 2
[7] Damping ball
[8] Roll axis motor
[9] TF card slot
[10] Pitch axis motor
[11] 4S~6S power interface
[12] Micro HDMI interface
[13] Ethernet interface
[14] Viewport unlock button



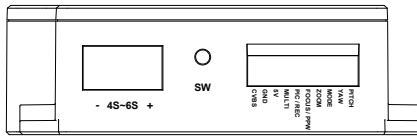
- Please ensure that there isn't any obstacle while the motor rotating.
- Please remove the obstacle immediately if gimbal camera is blocked during rotation.



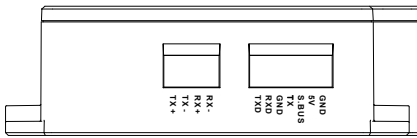
- Don't put the infrared thermal camera towards the sun in case any burn to the camera.

2.2 Control Box Printing

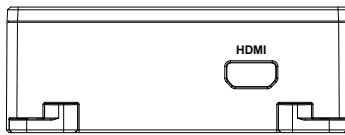
Left Side



Right Side

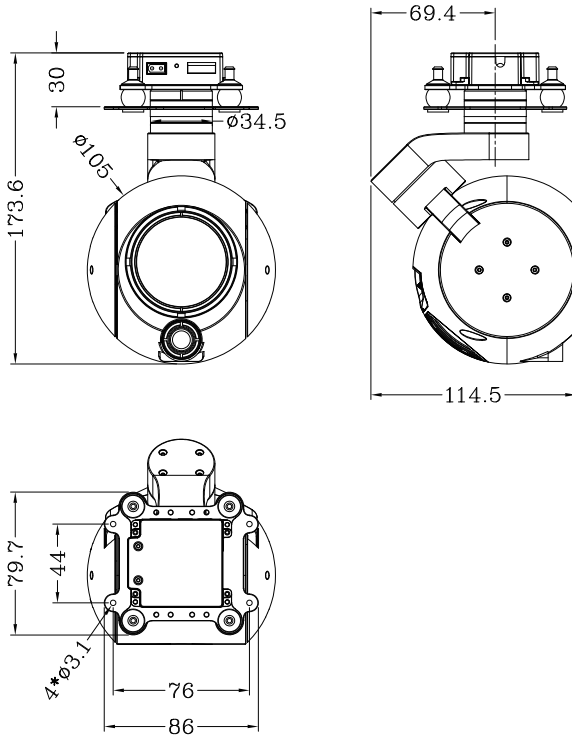


Front Side



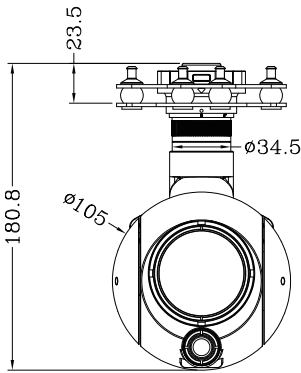
2.3.1 Device Dimensions (Standard Version)

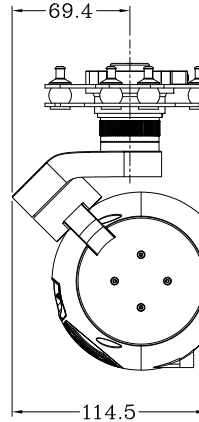
Unit: mm

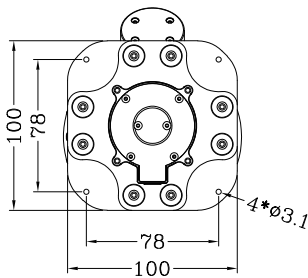


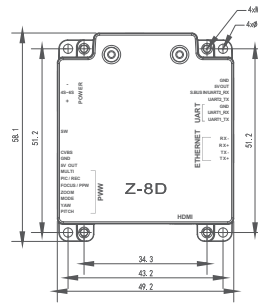
2.3.2 Device Dimensions (Viewport Version)

Unit: mm









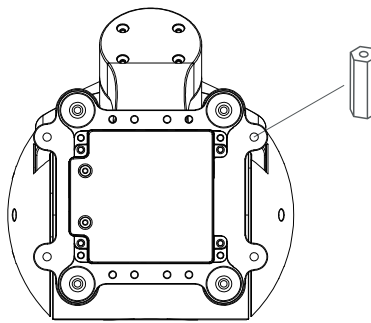
Control Box

2.4 Install Mounting Part

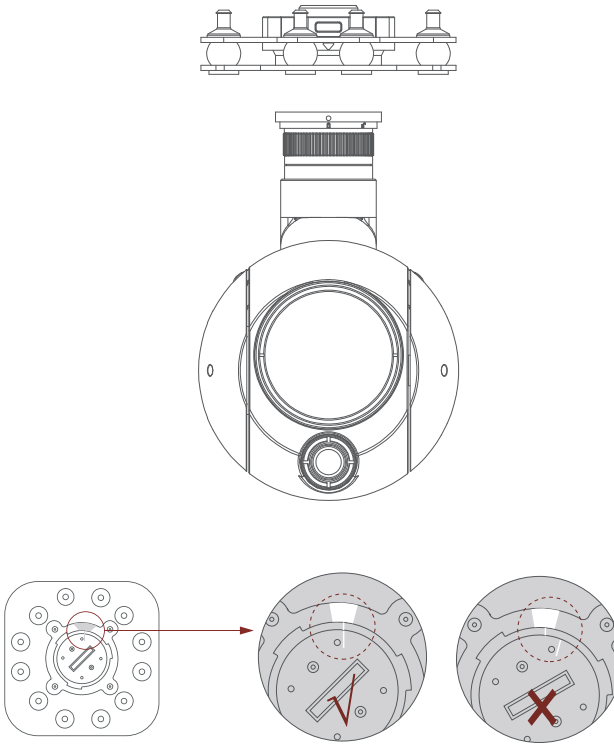
(1) Find out the arrow on the gimbal which indicating the yaw heading of the payload (i.e. the lens direction when the camera power on), and synchronize with the direction specified by the UxS.

(2) Fix one end of the Aluminum Cylinder on the screw hole of lower damping board, and use M3 screw to fasten it.

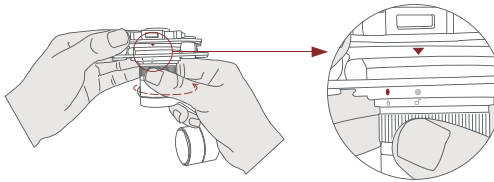
(3) According to the provided screw hole dimension you can make suitable mounting holes on the UxS mounting board, and fixes the other end of the on the mounting board of the UxS (Viewport version is the same).



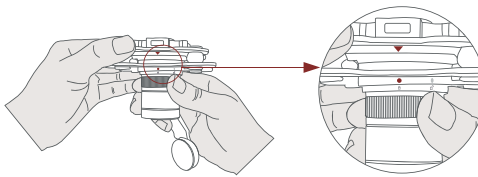
2.5 Viewport Release Instruction



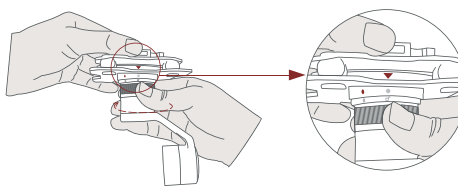
1. Make sure the two white stripes indicated in above picture are aligned with each other. (If the stripes are not aligned to each other, please pinch the connector part and turn it to left manually)



2. Align the white dot (unlock icon) to the red triangle (below unlock button), push the gimbal into the Viewport completely and then rotate the gimbal camera anticlockwise.



3. When you hear "click" sound (when red dot is aligned to the red triangle) means the gimbal camera and Viewport has been locked.



4. To unlock the Viewport, you need to press on unlock button and rotate the gimbal camera clockwise till the white dot align to the red triangle. Then pull the gimbal out from the Viewport.

2.6 Install TF Card

TF (Micro SD card):

Install the TF card to the card slot (Re. 2.1 Overview). Support max 256GB. Request Class 10 (10m/s) transmission speed or higher and FAT32 format.



- Make sure device is power off when inserting the TF card, hot plugging is not supported.

2.7 Image Output Interface

Network output: Standard RJ45 port, supports RTSP/UDP/RTMP.
Default: RTSP, stream at rtsp://192.168.2.119:554, 720P@30fps, 2Mbps bitrate .
All parameters user-adjustable.

Analog output: not supported.



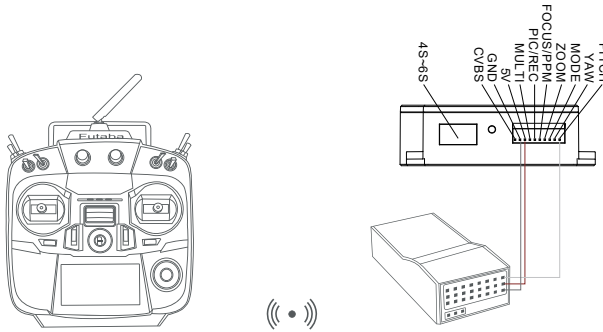
- Above output mode is optional. Please subject to your actual product.
- When using user interface software Viewlink for network connection, the network of external device (computer) should be the IP address: 192.168.2.2 (choose the last byte among 2~254, can not be 119 same as the gimbal), subnet mask: 255.255.255.0, Default gateway: 192.168.2.1, and all firewalls of the computer must be closed. Then enter the IP address of the gimbal camera, Open Video, the video stream can be outputted.

3. Signal Control

3.1 PWM Control

Control the gimbal camera functions by the multiplex pulse width modulation signal outputted by PWM channel of the remote control receiver. The camera needs up to 7 control channels of PWM. You can choose needed functions according to actual usage to reduce the required number of PWM channels.

3.1.1 PWM Connection Diagram (Connect pitch channel as an example)



Connection Diagram

3.1.2 PWM Control Operation Instruction

1) Pitch (PWM Pitch channel in to control Pitch. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear
Pitch Up



Position 2

Middle Gear
Pitch Stop



Position 3

High Gear
Pitch Down

2) Yaw (PWM Yaw channel in to control Yaw. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear
Yaw Left



Position 2

Middle Gear
Yaw Stop



Position 3

High Gear
Yaw Right

3) Mode (PWM Mode channel in to adjust speed control/one key to Home position etc functions. Rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Position 1: Low speed mode, control pitch / yaw with this mode at lowest speed
Position 2: Middle speed mode, control pitch / yaw with this mode at middle speed
Position 3: High speed mode, control pitch / yaw with this mode at highest speed

(If it is controlled by rotary knob, the speed will change according to switch position)

Function of continuous switching:

(1) Operate 1 time continuously and quickly, from position 2 - 3, to Home position.

(2) Operate 2 times continuously and quickly, from position 2 - 3 - 2 - 3, the camera lens looks vertically down.

(3) Operate 3 times continuously and quickly, from position 2 - 3 - 2 - 3 - 2 - 3, to disable Follow Yaw Mode (gimbal yaw not follows by frame)

(4) Operate 4 times continuously and quickly, from position 2 - 3 - 2 - 3 - 2 - 3 - 2 - 3, to enable Follow Yaw Mode (gimbal yaw follows by frame)

4) Zoom (PWM Zoom channel in to control Zoom. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear
IR digital zoom



Position 2

Middle Gear
No control



Position 3

High Gear
IR color palette switch

Switch from Position 2 to 1: IR color switching: white hot, black hot, pseudo color.
Switch from Position 2 to 3: IR digital zoom: 3x, 6x, 9x, 12x.

5) Focus (PWM Focus channel is to control PIP, IR color palette switch, 3-gear switch as example.)



Position 1

Low Gear
No control



Position 2

Middle Gear
No control



Position 3

High Gear
IR color palette switch

Switch from Position 2 to 3: IR color switching: white hot, black hot, pseudo color.

6) Pic/Rec (PWM Pic/Rec channel in to control take picture and record. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Switch from Position 2 to 1 to take a picture.
OSD display “IMG PHOTOING” at the left top corner and the picture is stored in TF card.

Switch from Position 2 to 3 to start “ Record ” , and repeat the operation to stop recording.
During recording, OSD display information of “REC 00 00 00”, as current recording time, and the remaining capacity of TF card. It will show the “TF xxx MB” when stop recording. When the storage capacity of TF card is full , “TF FULL” is shown on screen. If no TF card is inserted, “NO TF” is shown on screen. Please insert the TF card before using.

7) Multi: IR digital zoom / tracking control



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Switch from Position 2 to 1:

- IR digital zoom, 1x~4x

Switch from Position 2 to 3:

- Exit the tracking, display the cross cursor. Adjust the cross cursor to lock target object and start tracking

Switch from Position 3 to 2:

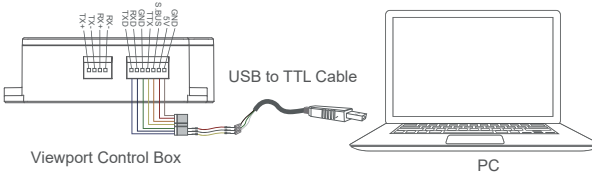
- Cancel tracking

3.2 Serial Port / TTL Control

TTL communication requirements: TTL signal is 3.3V, baud rate: 115200, data bit 8, stop bit 1, no parity, HEX send and receive.

Connection Diagram (PC - USB to TTL Cable- Gimbal Camera as example):

Gimbal Camera		**Cable**
TX	⟷	RX (White)
RX	⟷	TX (Green)
GND	⟷	GND (Black)



Connection Diagram

Diagram of USB to TTL Cable:

Connect the camera to the upper computer by USB to TTL cable (Adopt connection method of TX to RX, RX to TX, GNG to GND at Dupont ends of the provided USB to TTL cable, connect to the specified TTL of the gimbal, and the USB end of the cable connect to computer).

Install Viewlink control software to test the functions directly. Users may choose to develop their own software, please contact technical support for TTL control protocol file.

ViewLink is a user interface developed by Viewpro for Viewpro gimbal cameras, you can download it from Viewpro website (www.viewprotech.com) or ask distributors for installation package.

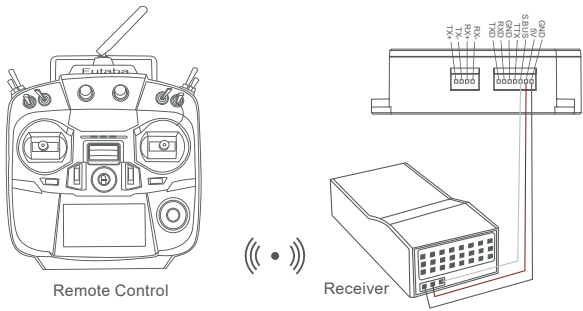
- Connect serial port of gimbal to pins, DO NOT connect with power supply.

- The default baud rate of serial port is 115200, which can be changed according to the docking equipment.

3.3 S.BUS Control

Control the gimbal camera functions by one combining signals. Connect the external S.Bus to S.Bus port on the control box, and the external S.bus signal GND connect to the GND interface of the control box.

Wiring Diagram (Take Futaba remote control for example):



Wiring Diagram

S.Bus control mode: default S.Bus signal channel 7-13 to control gimbal camera functions (the function of channel is consistent with the corresponding channel in PWM function description)

Channel 7: Yaw Control
Channel 8: Pitch Control
Channel 9: Mode Control
Channel 10: Zoom Control
Channel 11: Focus Control
Channel 12: Pic/Rec Control
Channel 13: Multi Backup

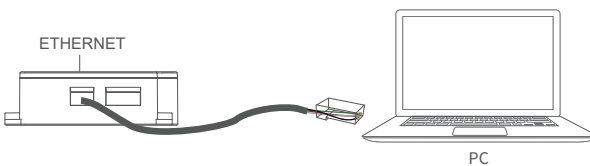
- User can set the channels by setting serial command according to the actual requirement. The S.Bus channel position can be arranged in any sequence within channel 7-13 to connect with the flight controller or remote control.

- TTL control and S.bus control cannot coexist at the same time for standard version. The defualt control is TTL if no requirement. The user can set to S.bus control if needed (please contact with our technical support for the setting instruction.)

3.4 TCP control

For Viewpro gimbal cameras with Ethernet output, the default IP address is: 192.168.2.119, control port: 2000. You can send the corresponding protocol to realize TCP control after connecting.

The TCP control protocol is [Frame header: EB + command ID: 90 + data body (serial port protocol) + Checksum (CS = body checksum, checksum is calculated as a sum of all bytes of data body modulo 256)]. Or directly use UI Viewlink to control after TCP connection.



Ethernet wiring diagram

4.Specification

Overall Specifications	
N.W.	727g
Product meas.	114.5*105*171.2mm
Input voltage	14.8V~25.2V
Dynamic current	500~1000mA @ 16V
Power consumption	Average 8W, Max 16W
Working environment temp.	-20℃ ~ +50℃
IP rate	IP4X
Output	IP (RTSP/UDP 720p/1080p 30fps H264/H265)
Storage	TF card (Up to 256G, class 10, FAT32 format)
Picture in TF Card	JPG(1920*1080)
Video in TF Card	MP4(1080P@30fps)
Control method	PWM / S.BUS / UART (TTL) / TCP / UDP
Gimbal Spec	
Mechanical Range	Pitch/Tilt: -110°(Up)～130°(Down), Roll: ±40°, Yaw/Pan: ±300° / ±360°*N (IP output version)
Controllable Range	Pitch/Tilt: -45°～125°, Yaw/Pan: ±290° / ±360°*N (IP output version)
Vibration angle	Pitch/Roll/Yaw: ±0.02°
One-key to center	√
IR Thermal Imager 1 Spec	
Focus Length	50mm
Aperture	F1.0
Horizontal FOV	8.7°
Vertical FOV	7.0°
Detective Distance (Man: 1.8x0.5m)	2083 meters

Recognize Distance (Man: 1.8x0.5m)	521 meters
Identification Distance (Man: 1.8x0.5m)	260 meters
Detective Distance (Car: 4.2x1.8m)	6389 meters
Recognize Distance (Car: 4.2x1.8m)	1597 meters
Identification Distance (Car: 4.2x1.8m)	799 meters
Working mode	Uncooled VOxlong wave (8μm~14μm) thermal imager
Detector pixel	640*512
Pixel pitch	12μm
Focusing method	Athermal prime lens
NETD	≤50mK@F1.0 @25℃
Color palette	White hot, Black hot, Iron Red
Digital zoom	1x ~ 8x
IR Thermal Imager 2 Spec	
Focus Length	9.1mm
Aperture	F1.0
Horizontal FOV	48.3°
Vertical FOV	38.6°
Detective Distance (Man: 1.8x0.5m)	379 meters
Recognize Distance (Man: 1.8x0.5m)	95 meters
Identification Distance (Man: 1.8x0.5m)	47 meters
Detective Distance (Car: 4.2x1.8m)	1163 meters

Recognize Distance (Car: 4.2x1.8m)	291 meters
Identification Distance (Car: 4.2x1.8m)	145 meters
Working mode	Uncooled VOxlong wave (8μm~14μm) thermal imager
Detector pixel	640*512
Pixel size	12μm
Focusing method	Athermal prime lens
NETD	≤40mK@F1.0 @25℃
Color palette	White hot, Black hot, Iron Red
Camera Object Tracking	
Update rate of deviation pixel	30Hz
Output delay of deviation pixel	<30ms
Minimum object contrast	5%
SNR	4
Minimum object size	16*16 pixel
Maximum object size	256*256 pixel
Tracking speed	±48 pixel / frame
Object memory time	100 frames
Camera AI Performance	
Targets type	Car and human
Simultaneous detection quantity	≥ 10 targets
Min contrast ratio	5%
Min target size	5×5 pixel
Car detection rate	≥85%
False alarm rate	≤10%

5.FAQ

Q1: Forgot the camera IP after changing it?
To restore the default IP (192.168.2.119):
1) Format a TF card to FAT32. (If it is already FAT32, formatting is not necessary.)
2) Copy the file ip_bak.txt to the root directory of the TF card.
3) Power on the gimbal and wait for 3 minutes, the IP address will automatically reset to 192.168.2.119.
4) Power off the gimbal.
5) Confirm that the file ip_bak.txt is disappeared from the card — this means the reset was successful.
6) Insert the card back and power on. The IP should now be restored to 192.168.2.119.

Q2: Does AT9-50 support taking picture during video recording?
Answer: Yes.

Q3: How does AT9-50 store photos and videos?
Answer: The photo resolution saved in the TF card is 1920 * 1080, and the video is 1080P30fps.