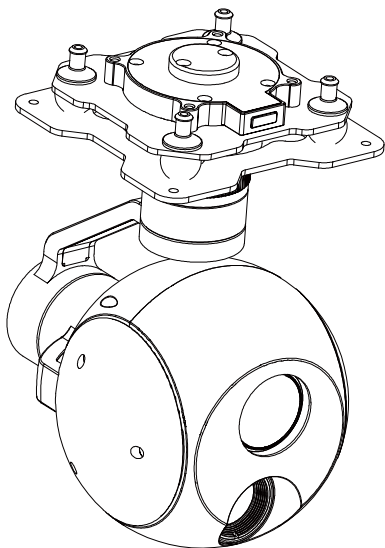




A10T Pro 10x EO + IR Dual Sensors AI Object Tracking Gimbal Camera

User Manual



Please scan QR code for more details,
or visit our website:
www.viewprotech.com

Warning

Thank you for purchasing Viewpro product. Please read this user manual carefully to make sure the correct operation of this product. Failure to follow instructions and operate in accordance with the instruction in this user manual may damage the product. Do not disassemble or assemble the product by yourself, otherwise it may be damaged or not work properly. Viewpro has no ability for any damage that caused by users' incorrect operation, installation and reassembling in directly or indirectly.

Warning Signs



Warning



Important Note

Important Notes

1. After using the product, please keep the device in dry environment to avoid fogging the lens due to excessive humidity. If the lens fogs, turn on the camera for a while and wait for the fog to dissipate.
2. When use the infrared thermal lens, do not aim at strong energy sources, such as the sun, laser beams, lava, etc. The temperature of the measured target must be less than 800°C, otherwise the lens will be burned and cause irreversible damage.
3. When cleaning the dirty on surface of lens, make sure the cleaning cloth is soft and dry.
4. Do not directly touch or scratch the coating on the surface of the infrared lens with your hands or hard objects, otherwise the coating will be damaged and cause blurred image.
5. Do not plug or unplug the TF card while the power is 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 failure.

1. Product Introduction

1.1 Introduction

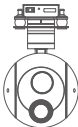
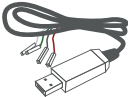



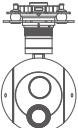
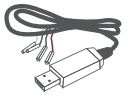





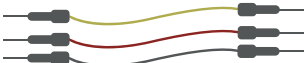
A10T Pro is a 3-axis high-precision gimbal camera. It is integrated with a 10x optical zoom camera which adopts a 5.13MP high resolution EO sensor, a resolution of 640*512 and 19mm lens uncooled long wave IR thermal imager.

It supports optical zoom, photographing and video, target tracking, thermal digital zoom and AI auto recognition of vehicle and human. OSD can display the information of gimbal pitch angle, optical zoom and FOV of camera, the tracking box, and laser range. When input the external GPS and time, the GPS longitude and altitude, and real-time will be displayed on screen. OSD on or off is for optional.

GPS coordinate and shooting time can be also saved in image file. It features with aluminum alloy housing and anti-interference. The 3 axis gimbal can achieve stabilization in yaw, roll and pitch. Integrated with damping system, gimbal can greatly reduce mechanical vibration to stabilize image.

A10T Pro is widely used in UAV industries of public security, electric power, fire fighting, zoom aerial photography and other industrial applications.

1.2 Packing List

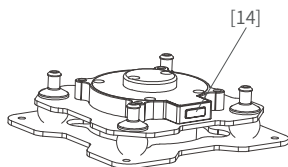
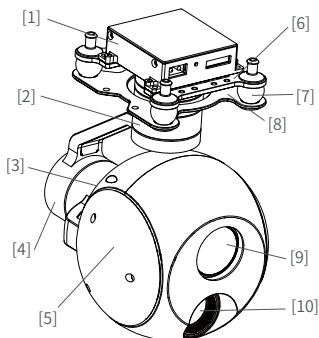
A. Conventional version			
Gimbal Camera X 1 pc		USB to TTL Cable x1pc	
Aluminum Cylinder x 4 pcs		M3 Screw x 8 pcs	
Power Cable x 1 pc			
B. Viewport Version			
Gimbal Camera X 1 pc		USB to TTL Cable x1pc	
Aluminum Cylinder x 4 pcs		M3 Screw x 8 pcs	
Power Cable x 1 pc			
PWM Control Cable x 1 pc			
TTL / S.BUS Control Cable x 1 pc			
TTL Connect Cable x 3 pcs			

Ethernet Cable x 1 pc

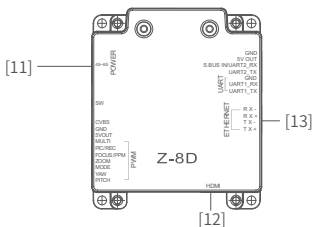


2. Installation Instruction

2.1 Overview



Viewport



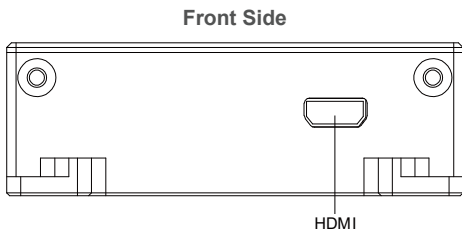
Control Box

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

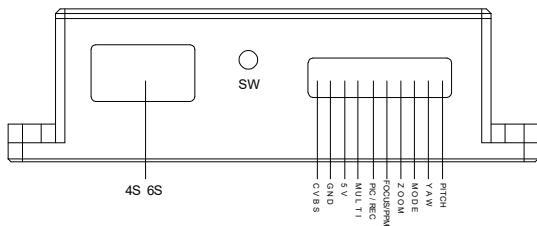


- Make sure no obstacle while the motor is rotating.
- Don't put the thermal imager face to heat or straight to the sun.

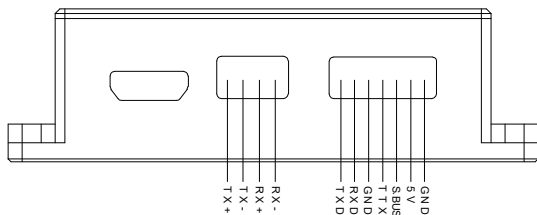
2.2.1 Control Box Printing (Conventional version)



Left Side



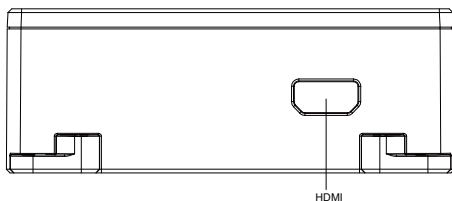
Right Side



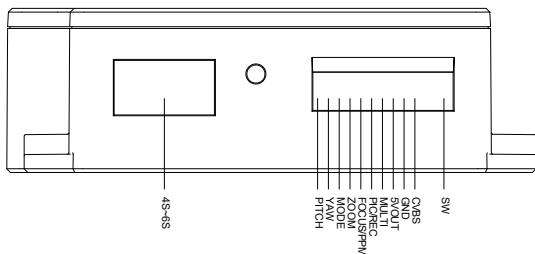
- The input voltage of gimbal camera must not be over 6s.
- The pin interface mustn't be connected with any power supply.
- Don't remove the yellow jumper cap.

2.2.2 Control Box Printing (Viewport Version)

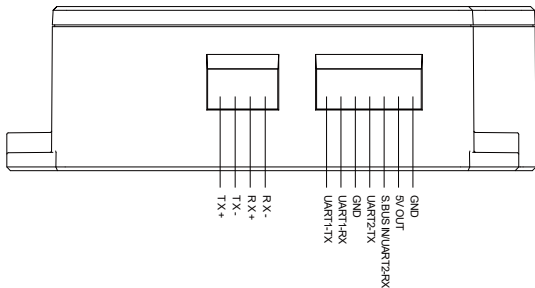
Front Side



Left Side

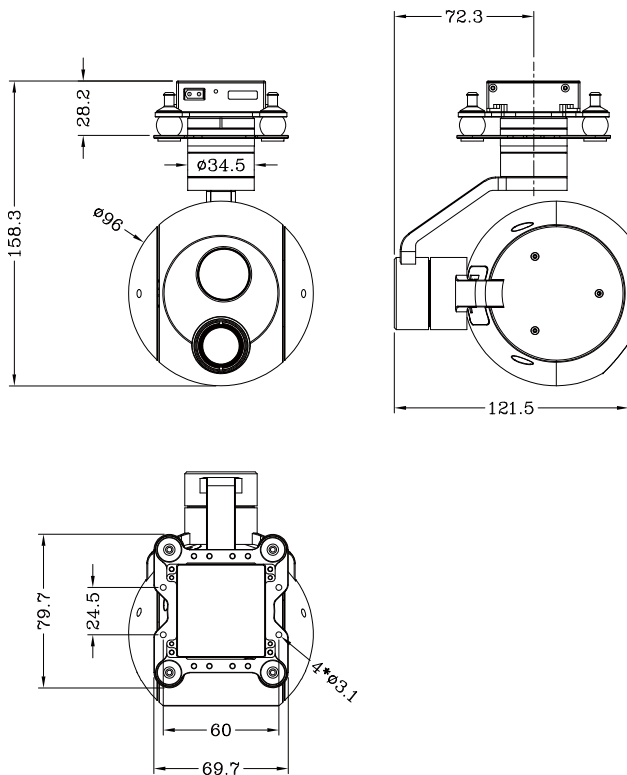


Right Side



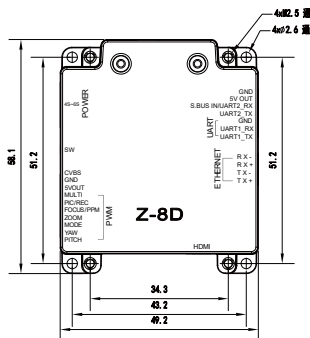
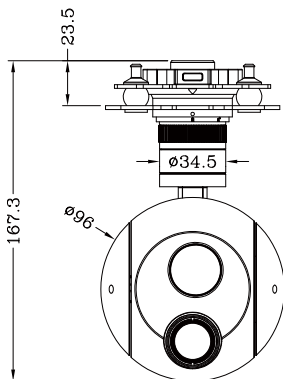
2.3.1 Device Dimensions (Conventional version)

Unit: mm

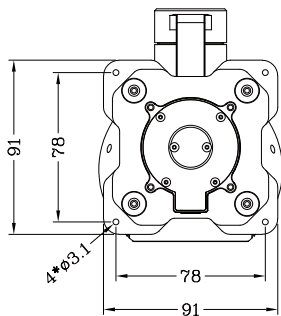
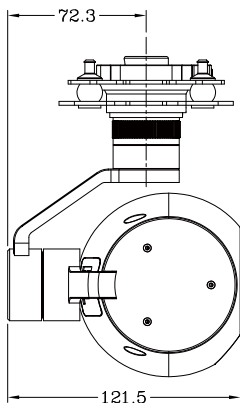


2.3.2 Device Dimensions (Viewport Version)

Unit: mm

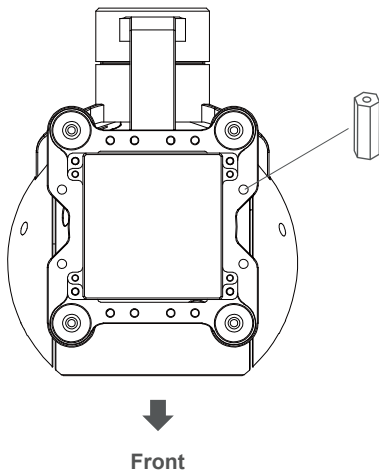


Control Box

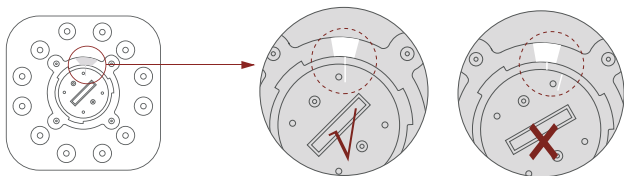
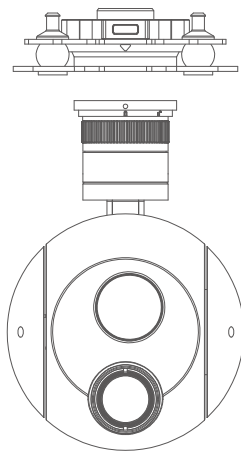


2.4 Install Mounting Part

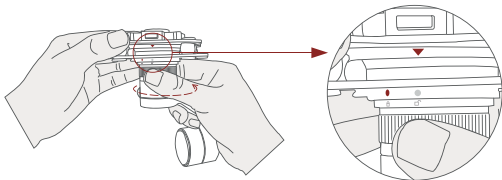
- (1) Find out the arrow icon on the gimbal (that is the lens direction when camera is power on) , and keep its direction same as the specified direction of UAV.
- (2) Fix one end of the copper cylinder on the screw hole of lower damping board, and use M3 screw to fasten it.
- (3) According to the provided screw hole dimension and the actual situation, the user can add suitable mounting holes on the UAV mounting board, and fixes the other end of the copper cylinder on the mounting board of the UAV (Viewport version is the same).



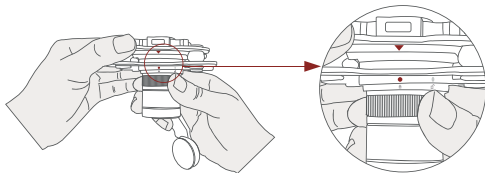
2.5 Viewport Release Instruction



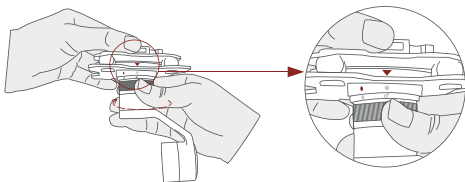
1. Make sure the two white stripes indicated in above picture are aligned with each other. If not aligned, please adjust it manually.



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 counter-clockwise.



3. When you hear a "click" sound (red dot is aligned to the red triangle) means that 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):

Insert the TF card to the card slot (Re. 2.1 Overview). It support maximum capacity of 128GB, and require Class 10 (10m/s) transmission speed or higher and FAT32 or exFAT format.



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

2.7 Image Output Interface

HDMI: Micro HDMI, HD 1080P 60/30fps, default output 1080P 60fps.

Ethernet: Ethernet/IP, default format of RTSP, IP address: rtsp://192.168.2.119:554, resolution: 1080P, frame rate: 30fps, bit rate: 4M.

AV: This mode has no AV output.



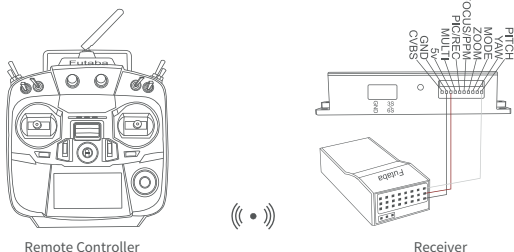
- Above output mode is optional, Please subject to your actual product.
 - When using user interface software Viewlink for network connection, the network of external device (computer) should be the IP address: 192.168.2.2 (choose the last byte among 2~254, but must not be 119 same as the gimbal), subnet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

3. Signal Control

3.1 PWM Control

Control the functions of gimbal camera through the multiplex pulse width modulation signal outputted by PWM channel of the remote control receiver. The gimbal camera needs 7 control channels of PWM at most. Users can choose the required function channels, and reduce some PWM channels accordingly in usage.

PWM Connection Diagram (Connect pitch channel as an example)



Connection Diagram

PWM Control Operation Instruction

3.1.1 Pitch Channel: Connect PWM Pitch channel to control Pitch by Joystick, rotary knob and 3-gear switch on remote control. Take 3-gear switch as an example.



Position 1

Low Gear
Pitch Up



Position 2

Middle Gear
Pitch Stop



Position 3

High Gear
Pitch Down

3.1.2 Yaw Channel: Connect PWM Yaw channel to control Yaw by Joystick, rotary knob and 3-gear switch on remote control. Take 3-gear switch as an example.



Position 1

Low Gear
Yaw Left



Position 2

Middle Gear
Yaw Stop



Position 3

High Gear
Yaw Right

3.1.3 Mode Channel: Connect PWM Mode channel to adjust speed control and One-key to Center. Take 3-gear switch as an example.



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Switch position 1: Low speed mode, control pitch / yaw to move at lowest speed;
Switch position 2: Middle speed mode, control pitch / yaw to move at middle speed;
Switch position 3: High speed mode, control pitch / yaw to move at highest speed.
(When it is controlled by rotary knob, the speed will change according to switch position)

Function of continuous switch:

- 1.Switch one time from position 2 - 3 quickly, to Home position.
- 2.Switch twice from position 2 - 3 - 2 - 3 continuously and quickly, the camera lens is positioned vertically downward.
- 3.Switch 3 times from position 2 - 3 - 2 - 3 - 2 - 3 continuously and quickly, to close Follow Yaw Mode.
- 4.Switch 4 times from position 2 - 3 - 2 - 3 - 2 - 3 - 2 - 3 continuously and quickly, to start Follow Yaw Mode.

3.1.4 Zoom Channel :Connect PWM zoom channel to control Zoom by Joystick, rotary knob and 3-gear switch on remote control. Take 3-gear switch as an example.



Position 1

Low Gear
Zoom Out



Position 2

Middle Gear
Stop Zoom



Position 3

High Gear
Zoom In

3.1.5 Focus Channel: Connect PWM Focus channel to control PIP and IR color palette switch by 3-gear switch. Take the 3-gear switch as an example.

Switch from Position 2 to 1: turn to Picture in Picture mode and four display mode (IR、IR+EO、EO、EO+IR) switch cyclically.

Switch from Position 2 to 3: Three types of IR color (black hot, white hot, pseudo color)switch cyclically.



Position 1

Low Gear
PIP switch



Position 2

Middle Gear
No control



Position 3

High Gear
IR color palette switch

3.1.6 Pic/Rec Channel: Connect PWM Pic/Rec channel to control “Photograph” and “Record” by, rotary knob or 3-gear switch on remote control. Take 3-gear switch as an 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 "TFXXXMB" 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.

3.17 Multi Channel: Connect Multi Backup channel to control digital zoom and tracking by 3-gear switch on the remote control. Take 3-gear switch as an example.



Switch from Position 2 to 1: Thermal imager digital zoom, 1X,2X, 3X, 4X.

Switch from Position 2 to 3: Display the tracking box at the center of screen, 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 an example):

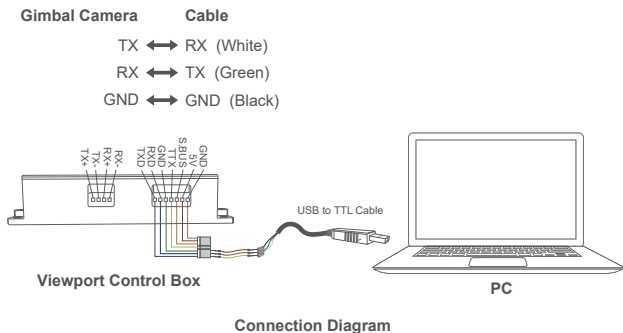


Diagram of USB to TTL Cable:

Connect the camera to the upper computer by USB to TTL cable (Adopt connection method of TX to RX, RX to TX, GND 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.

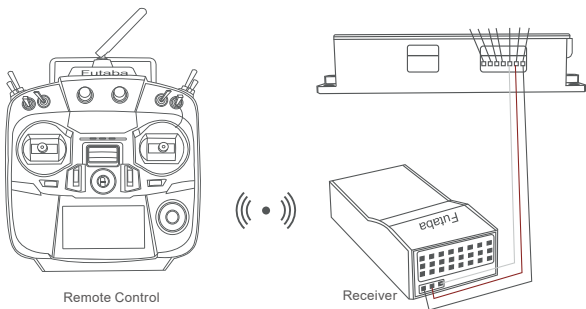
3.3 S.BUS Control

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.

Take Futaba's S.Bus remote control for example:

Connect receiver's S.Bus port with gimbal camera. The receiver working power (5V) is supplied from gimbal camera.

Wiring Diagram



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)

Channel7: 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

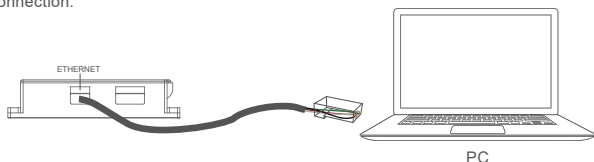


- User can set the channels by setting serial command according to the actual requirement. The S.Bus channel position can be arranged in any sequence within channel 1-15 to connect with the flight controller or remote control.
 - TTL control and S.bus control cannot coexist at the same time for standard version. The default 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

Hardware Parameters

Working voltage	16V
Input voltage	4S ~ 6S (14.8V~25.2V)
Output voltage	5V (connect with PWM)
Dynamic current	700~1250mA @ 16V
Power consumption	Average 11.2W, Max 20W
Working environment temp.	-20℃ ~ +50℃
Output	micro HDMI(1080P 30fps/60fps) / IP (RTSP/UDP 720p/1080p 30fps H264/H265)
Local-storage	SD card (Up to 256G,class 10, FAT32)
Photo storage format	JPG(1920*1080)

Video storage format	MP4 (1080P 30fps)
Control method	PWM / TTL / S.BUS / TCP / UDP
Gimbal Spec	
Angle scope of structure design	Pitch/Tilt: -50°~135°, Roll: ±70°, Yaw/Pan: ±300° / ±360°*N (IP output version)
Angle scope of software design	Pitch/Tilt: -45°~130°, Yaw/Pan: ±290° / ±360°*N (IP output version)
Vibration angle	Pitch/Roll/Yaw: ±0.02°
One-key to center	√
EO Camera Spec	
Imager Sensor	1/2.8" SONY CMOS Sensor
Total pixel	5.13MP
Picture quality	Full HD 1080 (1920*1080)
Optical zoom	10x, f = 4.7mm ~ 47mm, F1.7~F3.1
Digital zoom	32x
Angle of View (H)	69.9°(Wide end) ~ 8.7° (Tele end)
Min target distance	0.1 / 1.5 / 3.0 / 5.0 / 10.0 m
Min illumination	Color(1/30s, 72.0dB): 0.02 lux , BW(1/30s, 72.0dB): 0.005lux Color DSS(1/1s, 72.0dB): 0.002 lux , BW DSS (1/1s, 72.0dB): 0.0005 lux"
White balance	Auto / One Push / Manual / Indoor / Outdoor
Shutter speed	1/1sec ~ 1/100,000 sec

Focus	Auto / One Push / Manual
Exposure	Auto / Manual / Priority Mode (Shutter priority & aperture priority)
B acklight compensation	Yes
Auto ICR	Yes
Image stabilization	Yes
Defog	Yes

IR Thermal Imager Spec

Focus Length	19mm
Horizontal FOV	22.9°
Vertical FOV	18.4°
Diagonal FOV	29.0°
Detective Distance (Man: 1.8x0.5m)	792 meters
Recognize Distance (Man: 1.8x0.5m)	198 meters
Verified Distance (Man: 1.8x0.5m)	99 meters
Detective Distance (Car: 4.2x1.8m)	2428 meters
Recognize Distance (Car: 4.2x1.8m)	607 meters
Verified Distance (Car: 4.2x1.8m)	303 meters
Working mode	Uncooled VOx long wave (8μm~14μm) thermal imager
Detector pixel	640*512

Pixel size	12 μ m
Focusing method	Athermal prime lens
NETD	$\leq 50\text{mK}@25\text{ }^{\circ}\text{C}$, F#1.0($\leq 40\text{mk}$ Optional)
Color palette	White, iron red, pseudo color
Digital zoom	1x~4x continuous zoom(step length 0.1)
Radiometric function(optional)	Optional (-20 $^{\circ}\text{C}$ ~+150 $^{\circ}\text{C}$, +100 $^{\circ}\text{C}$ ~+550 $^{\circ}\text{C}$)

EO / IR 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

EO 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%
Features	
OSD	Display the gimbal's yaw and pitch angle, magnification, card recording duration, aircraft GPS and altitude, target ranging point GPS and altitude, date and time
Geotagging	Display time and GPS coordinate in picture exif
Card reading online	HTTP read pictures or videos
KLV (UDP)	Card recording or Viewlink video playback
ArduPilot / PX4	Support(Mavlink protocol) Optional: Support Ardupilot Follow me feature"
Video stitching	EO+IR /IR+EO /EO /IR
Dual video stream output (optional)	Support(EO and IR two stream output, notes: unable to record once the dual video stream output activated)
Packing Information	
N.W.	745±10g(Viewport version with Viewport)
Product meas.	121.5*96*161.6mm / 121.5*96*167.3mm (Viewport Version)

5.FAQ

1.What is the video output mode of the A10T Pro HDMI?

Answer: HDMI1080P60fps (default) / HDMI1080P30fps

2.Does A10T Pro support taking picture during video recording?

Answer: Yes.

3.How does A10T Pro store photos and videos?

Answer: The photo resolution saved in the TF card is 1920 * 1080, and the video is 1080P30fps.

If there is any update version of this user manual, please visit the site through

" <https://www.viewprouav.com/documents-download/> " for the latest product information.

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