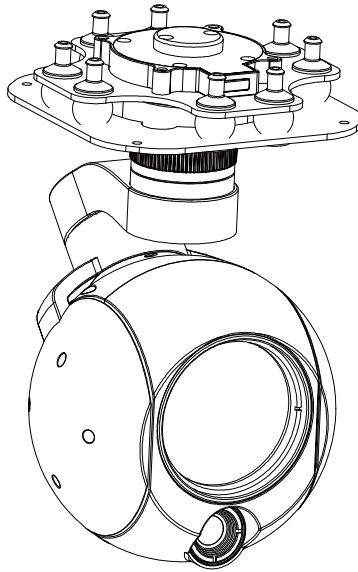
AT9-50 AI IR Object Tracking Gimbal Camera

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

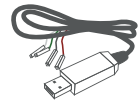
AT9-50 is a high-precision 3-axis stabilized payload camera with a 50mm uncooled VOx IR thermal cmaera. The resolution is 640x512 anf pixel size of 12μm.

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). The OSD can display the heading and pitch angle, electronic magnification, camera and video status and tracking frame. It supports Geo-tagging function, when there is GPS and time-related protocol input, the OSD can also display GPS and time. When taking pictures, the photo attributes have shooting time and GPS information.

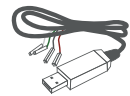
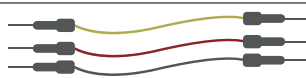
AT9-50 is widely used in industrial drone applications such as surveillance, search&rescue and inspction.

1.2 In the Box

A. Standard Version

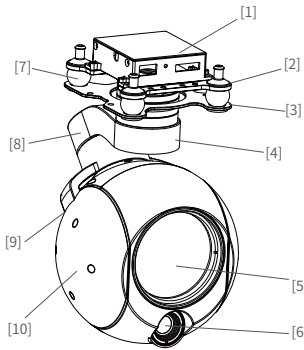
Gimbal Camera X 1 pc		USB to TTL Cable x1pc	
Aluminum Cylinder x 4 pcs		M3 Screw x 8 pcs	
Power Cable x 1 pc			

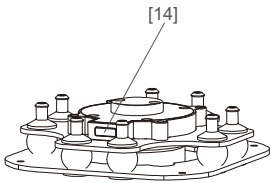
B. Viewport Version

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			

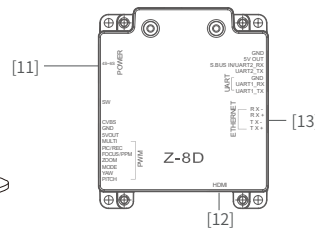
2.Installation Instruction

2.1 Overview





Viewport



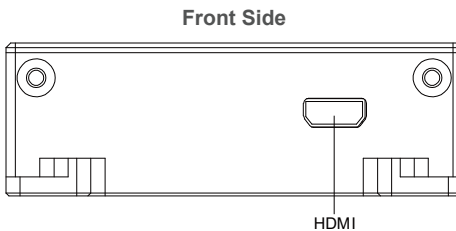
Control Box

[1] Control box
[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] 4-6S power interface
[12] Micro HDMI interface
[13] Ethernet interface
[14] Viewport unlock button

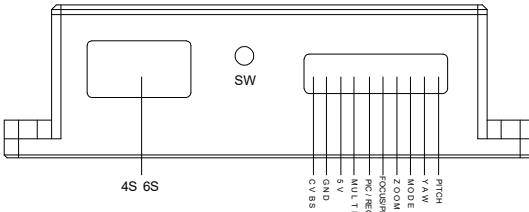
- Please ensure that there isn't any obstacle while the motor rotating.
- Please remove the obstacle immediately if gimbal camera is blocked during rotation.

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

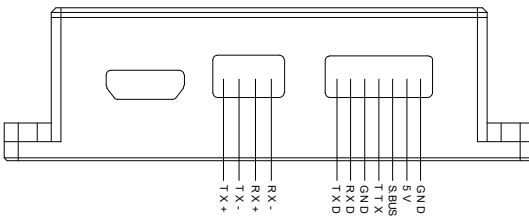
2.2 Control Box Printing (Standard Version)



Left Side



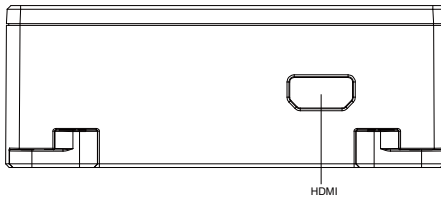
Right Side



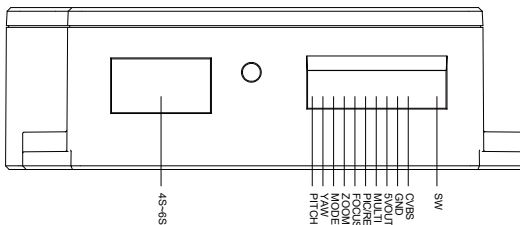
- The input voltage cannot be higher than 6S.
- The pin insertion interface cannot be connected with power supply.
- The yellow jumper cap cannot be removed

2.2.2 Control Box Printing (Viewport Version)

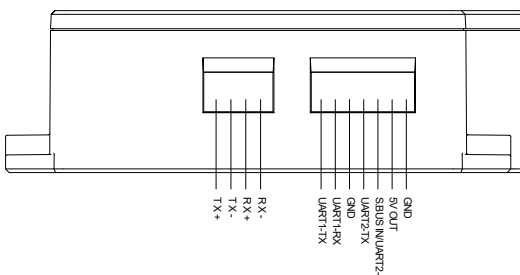
Front Side



Left Side

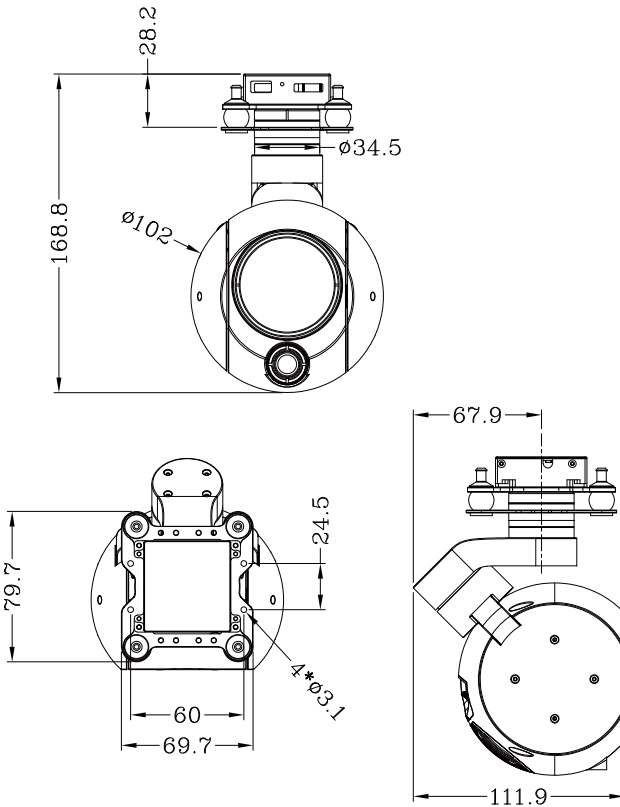


Right Side



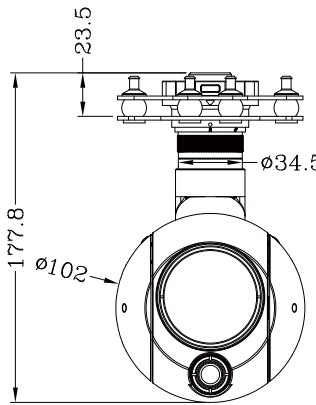
2.3.1 Device Dimensions (Standard Version)

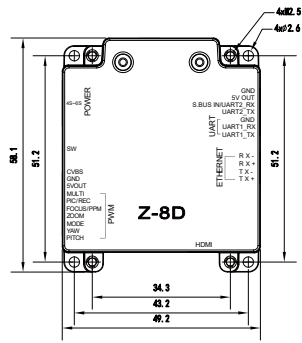
Unit: mm



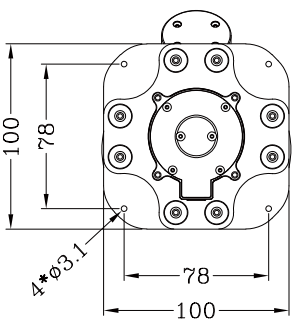
2.3.2 Device Dimensions (Viewport Version)

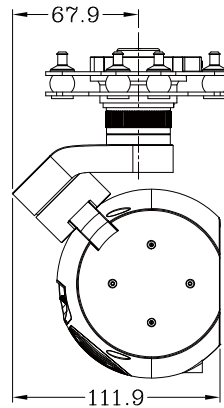
Unit: mm





Control Box



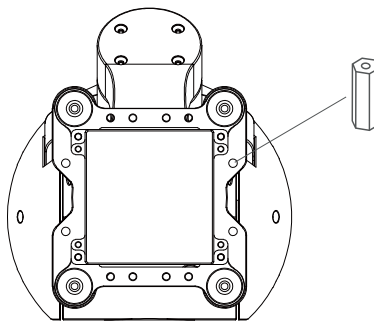


2.4 Install Mounting Part

(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 UAV.

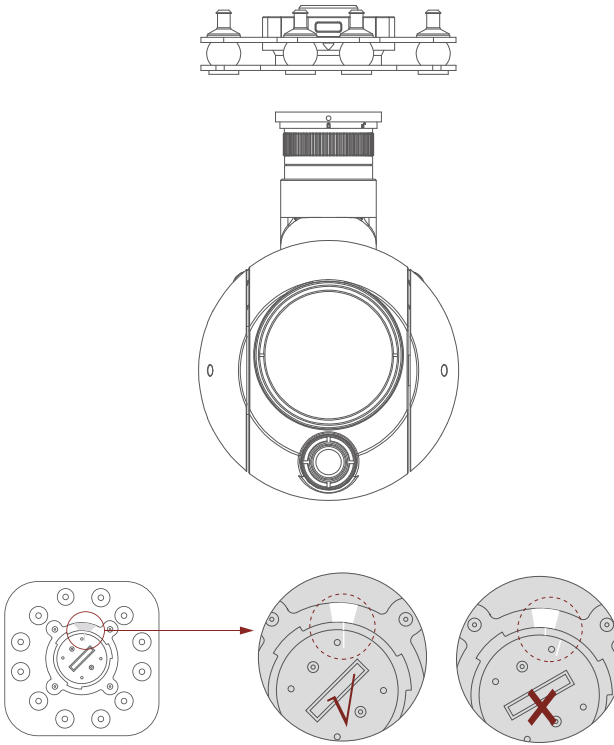
(2) Fix one end of the copper cylinder on the screw hole of lower damping board, and use M3 screw to fasten it.

(3) According to the provided screw hole dimension you can make 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).

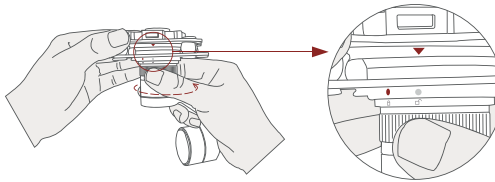


Front

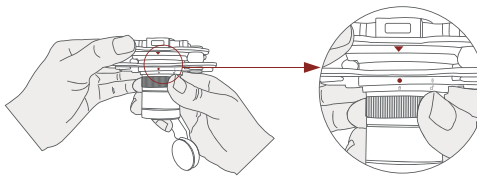
2.5 Viewport Release Instruction



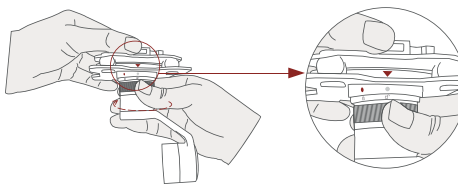
1. Make sure the two white stripes indicated in above picture are aligned with each other. (If the stripes are not aligned to each other, please pinch the connector part and turn it to left manually)



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 or exFAT format.

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

2.7 Image Output Interface

HDMI: Micro HDMI output, HD 1080P 60/30fps, 1080P 60fps as default. (Optional)

Ethernet: Ethernet/IP output interface, support RTSP/RTMP/UDP/ONVIF video streaming. Default: RTSP output, IP address: RTSP: //192.168.2.119:554, output resolution: 1080P, frame rate: 30fps, bit rate: 4M. (Optional)

AV: no AV output

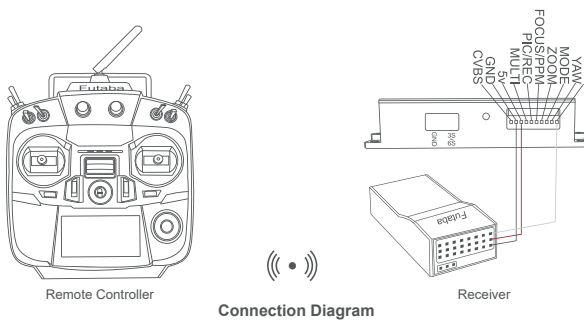
- Above output mode is optional. Please subject to your actual product.
- When using user interface software Viewlink for network connection, the network of external device (computer) should be the IP address: 192.168.2.2 (choose the last byte among 2~254, can not be 119 same as the gimbal), subnet mask: 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 6 control channels of PWM (to expand tracking function use up to 7 PWM channels). 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)



Remote Controller

Receiver

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:

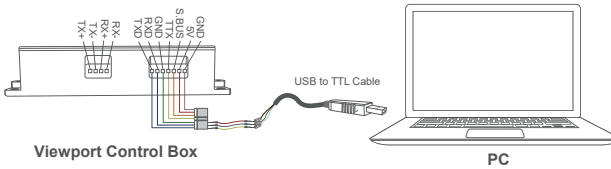
- Cancel tracking

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.

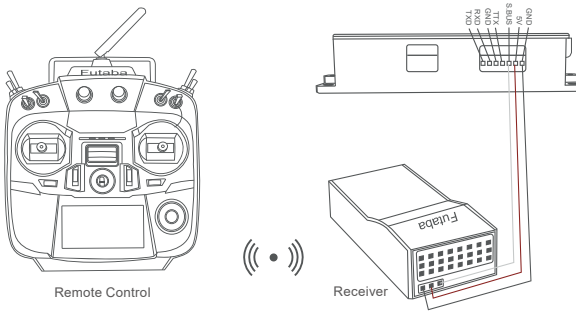
- Connect serial port of gimbal to pins, DO NOT connect with power supply.

- 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

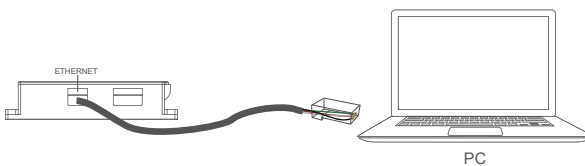
- User can set the channels by setting serial command according to the actual requirement. The S.Bus channel position can be arranged in any sequence within channel 1-15 to connect with the flight controller or remote control.

- TTL control and S.bus control cannot coexist at the same time for standard version. The 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

Hardware Parameter	
Working voltage	16V
Input voltage	4S ~ 6S (14.8V~25.2V)
Output voltage	5V (connect with PWM)
Dynamic current	450~1000mA @ 16V
Power consumption	Average 7.8W, Max 16W
Working environment temp.	-20℃ ~ +50℃
Output	Micro HDMI(1080P 30fps/60fps) / IP (RTSP/UDP 720p/1080p 30fps H264/H265)
Local-storage	TF card (Up to 256G, class 10, FAT32 format)
Picture storage format in TF card	JPG(1920*1080)
Video storage format in TF card	MP4(1080P 30fps)
Control method	PWM / TTL / S.BUS / TCP / UDP
Gimbal Spec	
Mechanical Range	Pitch/Tilt: -105°(Up)～135°(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
Horizontal FOV	8.8°
Vertical FOV	7.0°
Diagonal FOV	11.2°
Detective Distance (Man: 1.8x0.5m)	2083 meters
Recognize Distance (Man: 1.8x0.5m)	521 meters
Verified Distance (Man: 1.8x0.5m)	260 meters
Detective Distance (Car: 4.2x1.8m)	6389 meters
Recognize Distance (Car: 4.2x1.8m)	1597 meters
Verified Distance (Car: 4.2x1.8m)	799 meters
Working mode	Uncooled VOx long 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, pseudo color

Digital zoom	1x ~ 8x
IR Thermal Imager 2 Spec	
Focus Length	9.1mm
Horizontal FOV	48.3°
Vertical FOV	38.6°
Diagonal FOV	62.4°
Detective Distance (Man: 1.8x0.5m)	379 meters
Recognize Distance (Man: 1.8x0.5m)	95 meters
Verified Distance (Man: 1.8x0.5m)	47 meters
Detective Distance (Car: 4.2x1.8m)	1163 meters
Recognize Distance (Car: 4.2x1.8m)	291 meters
Verified Distance (Car: 4.2x1.8m)	145 meters
Working mode	Uncooled VOx long wave (8μm~14μm) thermal imager
Detector pixel	640*512
Pixel size	12μm
Focusing method	Athermal prime lens
NETD	≤40mK (@25℃,@F1.0)

Color palette	White,black,pseudo color
Digital zoom	1x ~ 8x
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
IR 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%

Packing Information	
N.W.	806±10g(Viewport version with Viewport)
Product meas.	111.9*102*168.8mm / 111.9*102*177.8mm (Viewport version with Viewport)

5.FAQ

1.What outputs does HDMI have?
A: HDMI 1080P 60fps(default)/HDMI 1080P 30fps

2.Does AT9-50 support taking photos during recording?
A: Yes

3.How to set the video storage format of AT9-50 ?
A: When the IP output resolution is set to 1280*720, the storage resolution is 1920*1080; Storage resolution is 1920*1080 when the IP output resolution is set to 1920*1080; The video frame rate saved in the TF card is the same with the one set during IP output, 30fps and 60fps are optional.

This user manual is subject to update without notice. For details, please visit http://www.viewprotech.com/index.php to get the latest product information.
Technical support : support@viewprotech.com