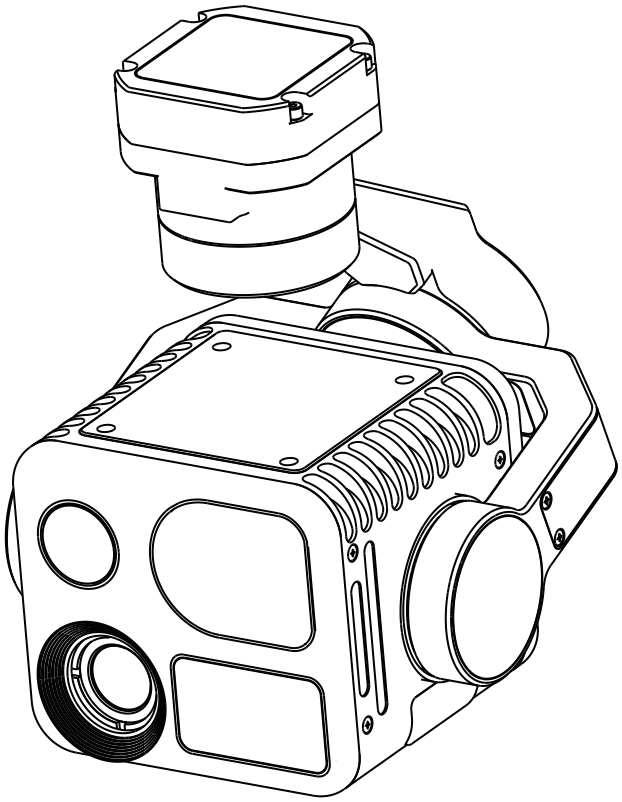
HEQUAV

K40T 4-Sensor AI Gimbal Camera User Manual

V1.0 202506



Shenzhen HEQ Intelligent Technology Co.,Ltd.

CONTENT

1、Product Introduction

The K40T four-sensor AI gimbal camera is a professional drone inspection payload that integrates a high-precision, lightweight three-axis stabilization system, multiple sensors, and 6TOPS computing power. The K40T four-sensor AI gimbal camera has high resolution and long observation distance, and has a control stability of ±0.005°. The whole machine weighs only 290g (±5g). The system includes multi-dimensional dedicated sensors: 48MP telephoto camera, 48MP wide-angle camera, 640×512 resolution thermal imager and 1.2km laser rangefinder (±1m accuracy), supporting all-time and complex environment inspection operations. The K40T has built-in computing power, which can realize real-time personnel/vehicle/vessel identification, dynamic target tracking, fire heat source warning, and face/license plate recognition under regulatory conditions. Users can flexibly configure multi-screen split-screen output, and simultaneously store H.264/H.265 videos and JPEG and other format images, which significantly improves the operation efficiency of scenes such as security inspection, disaster monitoring and engineering survey.

2、Product Function Parameter

GIMBAL PARAMETERS

Weight	290 g ±5 g
Operating Voltage	12V-18V
Number of Axes	Mechanical 3-axis
Software Limit Angle	Pitch: -90° to +30°; Yaw: -120° to +120°
Mechanical Angle Range	Pitch: -135° to +45°; Roll: -45° to +45°; Yaw: -135° to +135°
Max Control Speed	180°/s
Angular Jitter	±0.005°
Interface	Ethernet / Serial / SBUS
Gimbal Mode	Recognition, auto tracking
Operating Temperature	-40°C to +65°C
Communication Protocol	HEQ proprietary protocol / Mavlink
Protection Rating	IP54
Power Consumption	12 W
Hybrid Zoom	160x
Optical Zoom	11x
TF Card Photo Format	JPG (default 12 MP, up to 48 MP)
TF Card Video Format	MP4 (default 12 MP)
Video Resolution	12 MP @ 30 fps
Encoding Format	H.264, H.265
AI Recognition & Tracking	Supported

WIDE-ANGLE CAMERA

Sensor	1/2 inch
Wide Focal Length	4.49 mm
Effective Pixels	48 MP
Wide Aperture	F2.8
FOV	H:71° V:56° D:84° +/-1°

TELEPHOTO (ZOOM) CAMERA

Lens Size	1/2 inch
Pixels	48 MP
Focal Length	15.2-50 mm
Aperture	F3.7-F4.6
FOV	H:7.4° V:5.6° D:9.3°

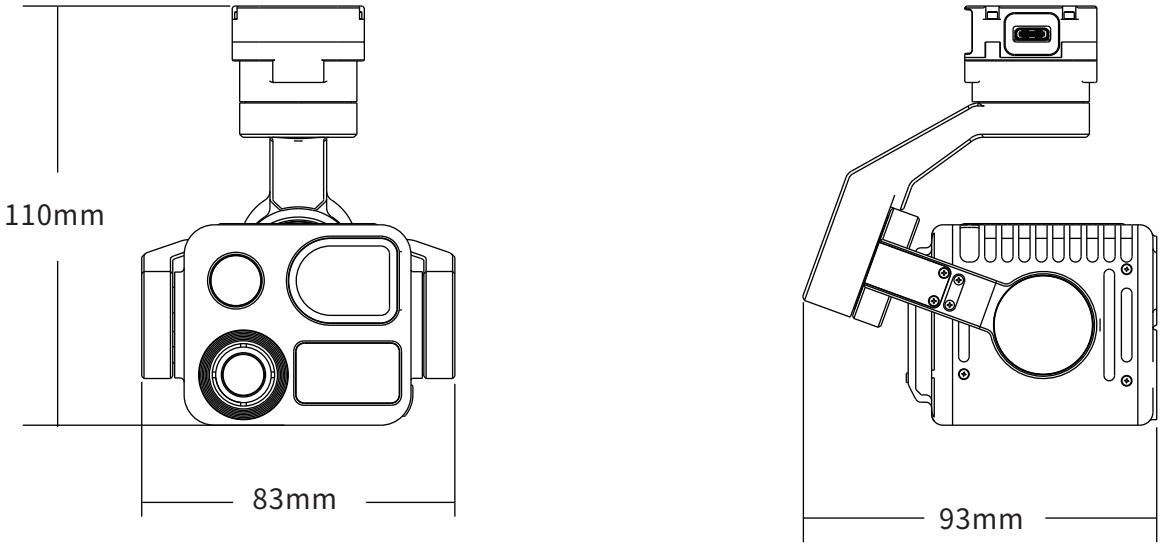
THERMAL CAMERA

Detector Type	Uncooled VOx IR FPA detector
Resolution	640 x 512
Pixel Pitch	12 um
Frame Rate	25 Hz / 50 Hz
Spectral Range	8-14 um
Focal Length	13 mm
FOV	33.5° x 26.9°
Aperture	F1.2

LASER RANGEFINDER

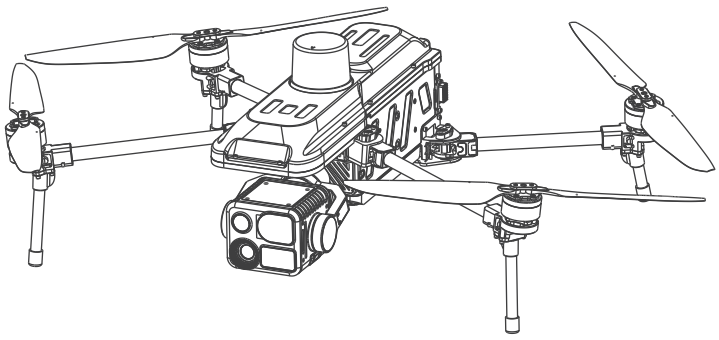
Range	5-1200 m
Accuracy	±1 m
Resolution	0.1 m
Laser Divergence	3.2 mrad
Laser Type	905 nm
Frequency	1-10 Hz

3、Gimbal Appearance Dimensions



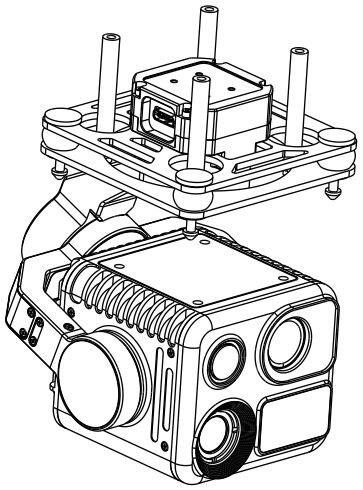
4、Product Installation

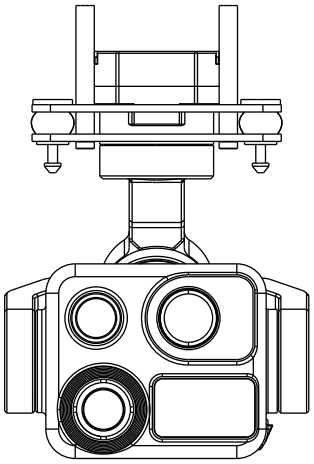
Please go to the official website "Download Center" to download the product 3D model: https://www.hequavtech.com/

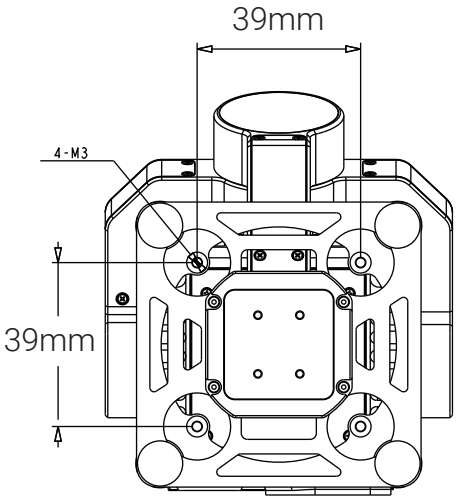


Installation Example 1

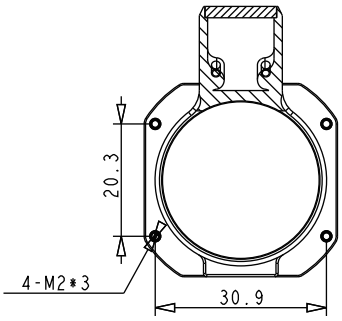
Installation Example 2





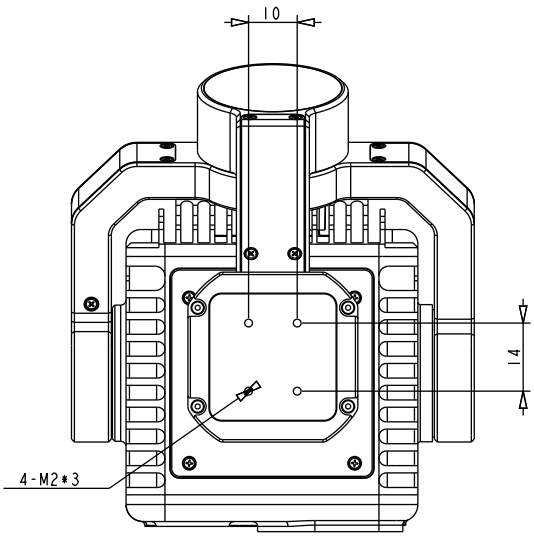


Installation Method 1



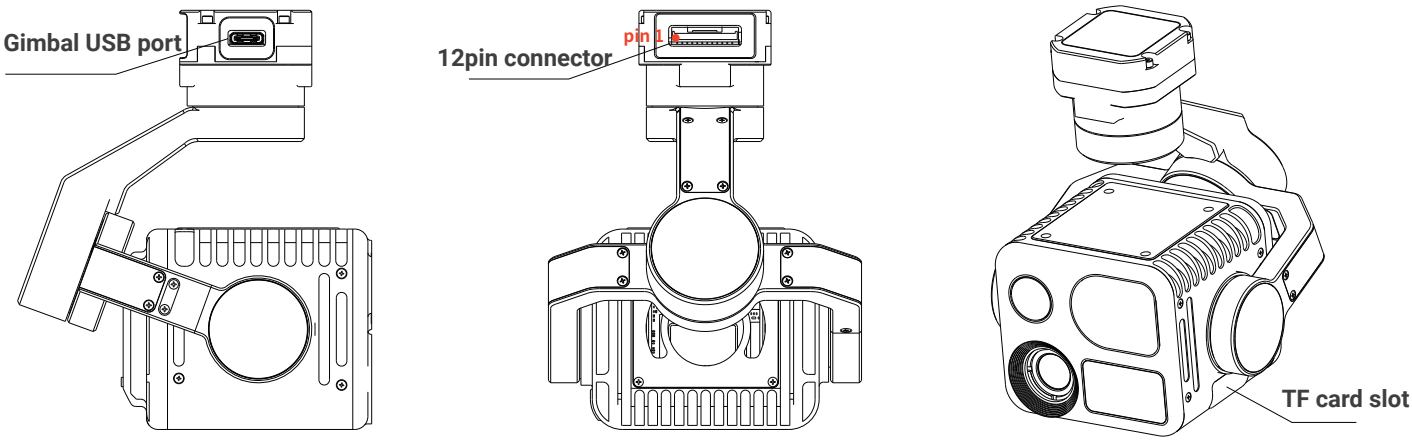
The upper bracket installation holes, 4 M2*3mm screws, the hole spacing is 20.3mm and 30.9mm respectively.

Installation Method 2



The upper bracket installation holes, 4 M2*3mm screws, the hole spacing is 10mm and 14mm respectively.

5、Product Hardware Interface



Model	Interface Type	Function
Gimbal USB	USB Port	Gimbal upgrade and debugging
Memory card interface	TF card interface	Store photos and videos/upgrade camera and gimbal firmware

No.	Model	Interface Type	Interface Definition	Function
1	12PIN(GH1.25mm) Connector	Power Interface	GND	GND
2		Power Interface	GND	GND
3		Power Interface	12V-18V	Power Input
4		Power Interface	12V-18V	Power Input
5		Communication Interface	T+	Network Interface
6		Communication Interface	T-	Network Interface
7		Communication Interface	R+	Network Interface
8		Communication Interface	R-	Network Interface
9		Communication Interface	SBUS	
10		Communication Interface	GND	
11		Communication Interface	TX	TTL Serial Port
12		Communication Interface	RX	TTL Serial Port

Gimbal and UAV System Connection Diagram

Important Notes:
1. The serial port of K40T can be used to receive control commands of the gimbal camera, and can also receive attitude data of the flight control to improve the accuracy and effect of image stabilization.

Verification Method for Successful Interfacing:
Approximately two minutes after the device is powered on, disconnect the serial cable. If the gimbal locks up and stabilization ceases, reconnect the serial cable. If stabilization resumes upon reconnection, it indicates successful interfacing with the flight controller data.

Conversely, if stabilization persists after the serial cable is disconnected, the interfacing is incorrect. In this case, check whether the flight controller output settings are correct or if the serial hardware connection is reversed.

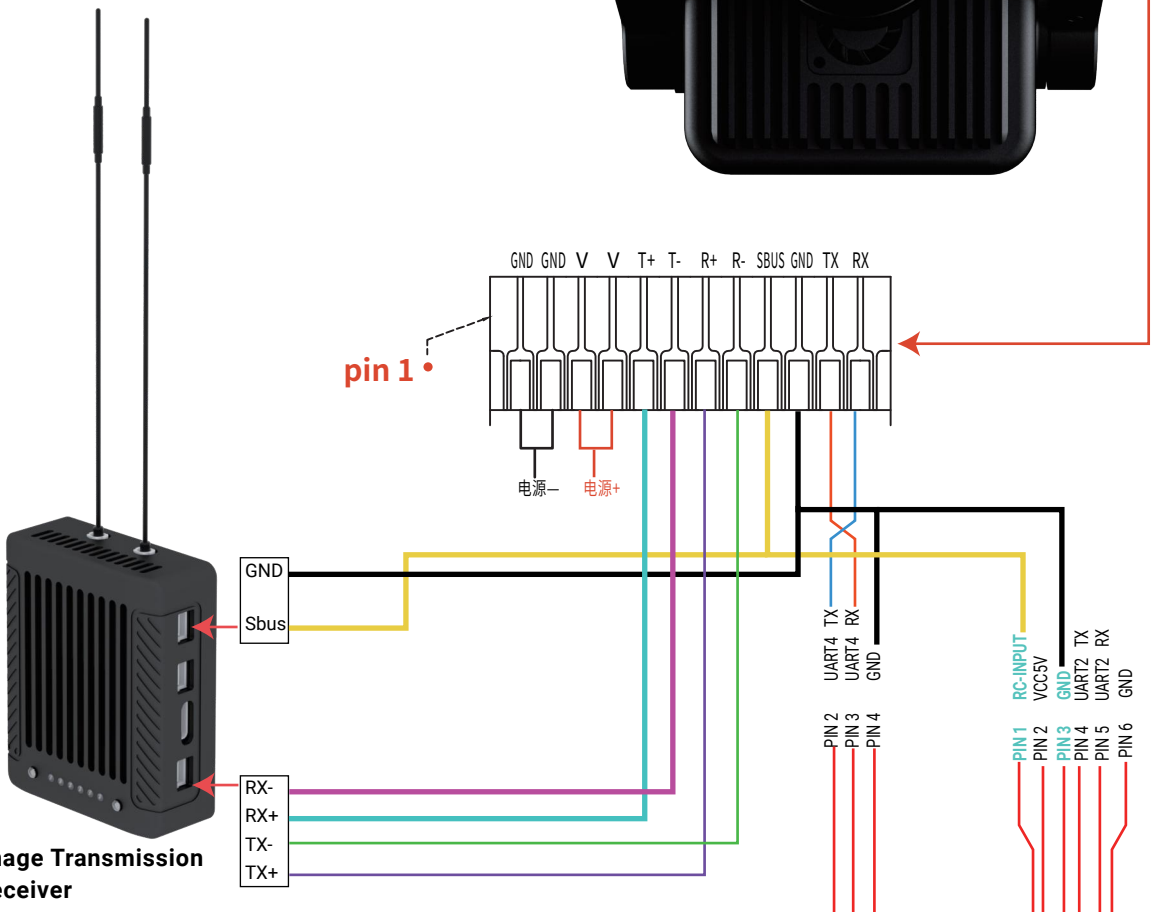
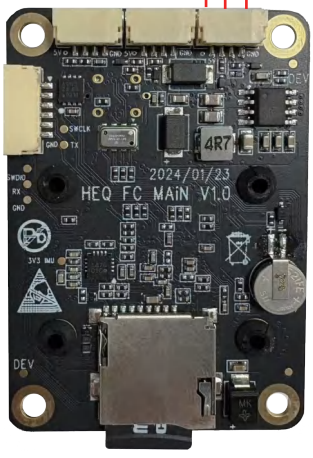


Image Transmission Receiver

2.The attitude data used to improve the image stabilization effect of K40T can be in the format of MAVLINK protocol or HEQ serial port protocol, choose one of the two. (The data frequency is recommended to be above 50Hz)

3.If the user chooses to control K40T with the network port or Sbus protocol, the serial port of K40T can also be used only to transmit the attitude data of the flight control.



Back of Flight Control

Front of Flight Control

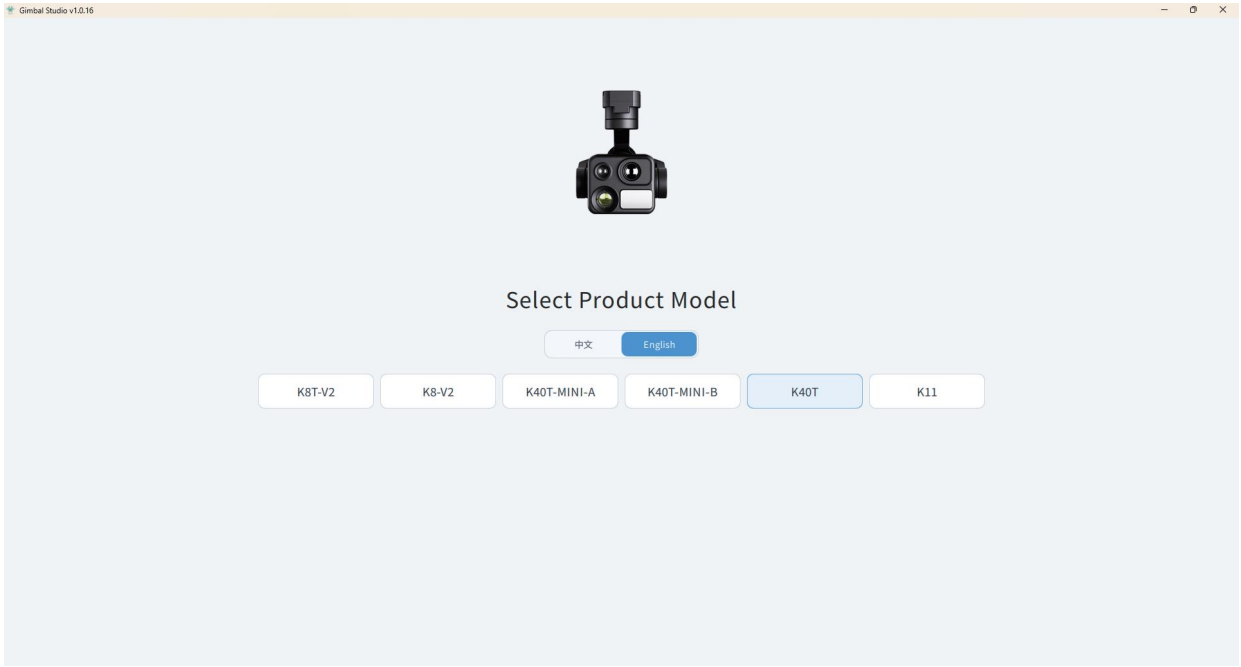
6、Product Control Interface and Protocol

Control Type	Interface	Protocol
Gimbal control	Network/serial port/Sbus	Please go to the official website: https://www.hequavtech.com/ “Download Center” to download the network/serial port protocol; Sbus protocol is a universal standard protocol for drone remote controllers. For specific setting methods, refer to 7. Product Assistant Software Usage Guide of this document for setting.
Video stream	Network	Default RTSP push stream, pull stream address : rtsp:// 192.168.144.64:558/live/single , Before starting the video, please make sure that the network segment of the device is consistent with that of the K40T gimbal camera. (The K40T Assistant Software supports IP address settings. For details, please refer to 7. Product Assistant Software Usage Guide)

7、Product Assistant Software Usage Guide

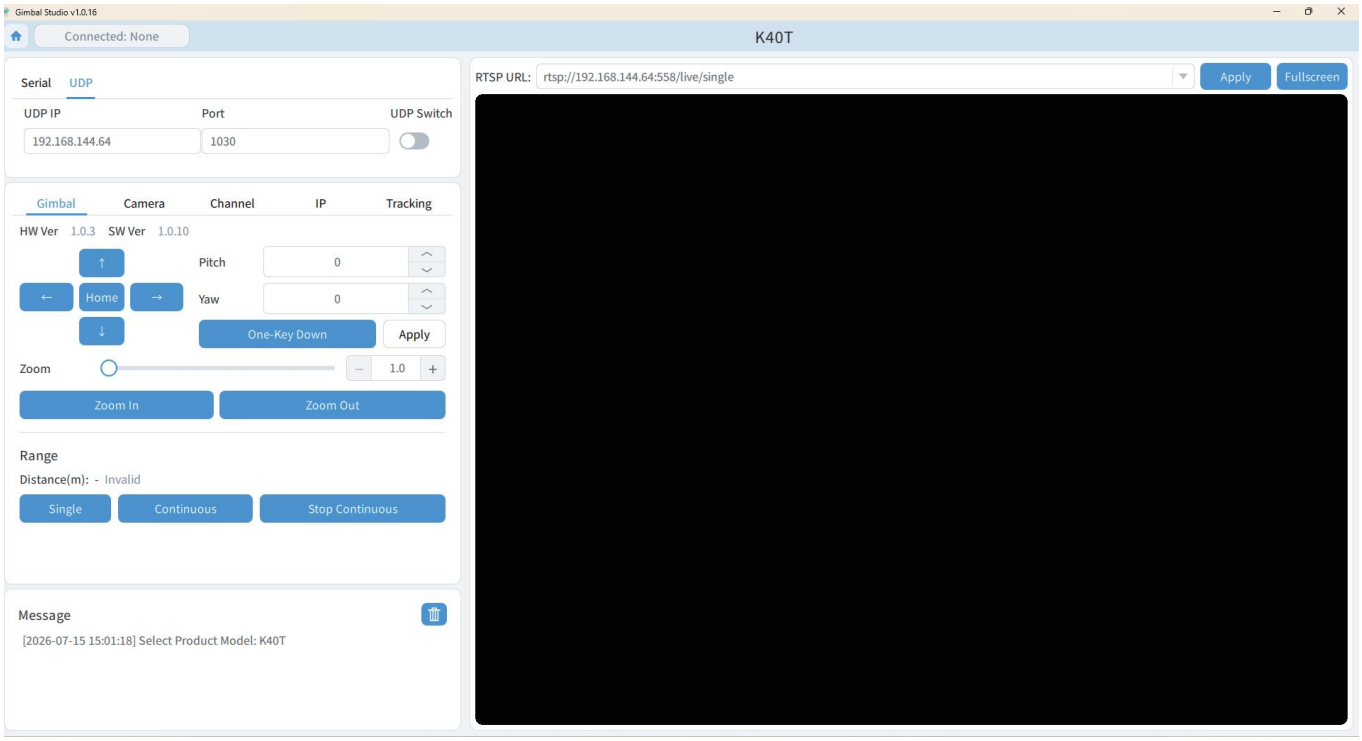
Please go to the official website "Download Center" to download the assistant software: https://www.hequavtech.com/

7.1 Assistant Software Interface

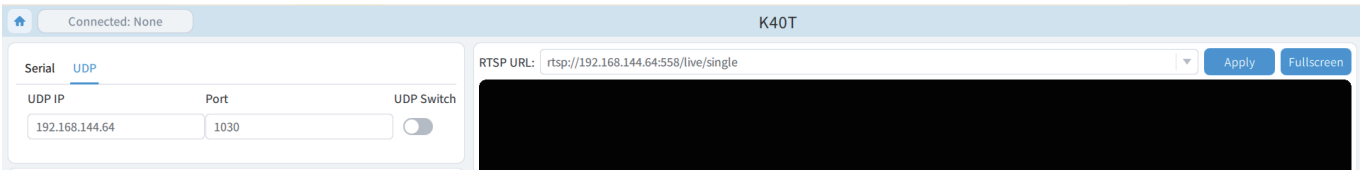


Enter the assistant software page and select the corresponding product model. If you need to switch the language version, please click the icon below to set it.

After entering the page of the corresponding product model, the interface is as follows:



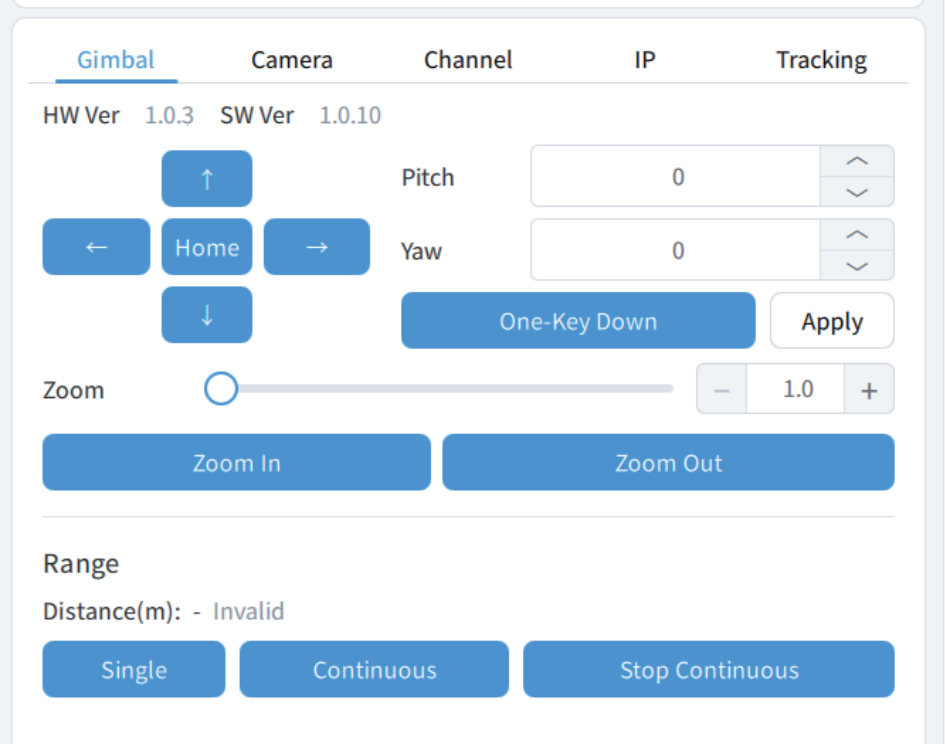
7.2 Connection Settings



Users can choose serial port or UDP connection mode according to actual conditions.
For specific parameter settings, refer to the table below:

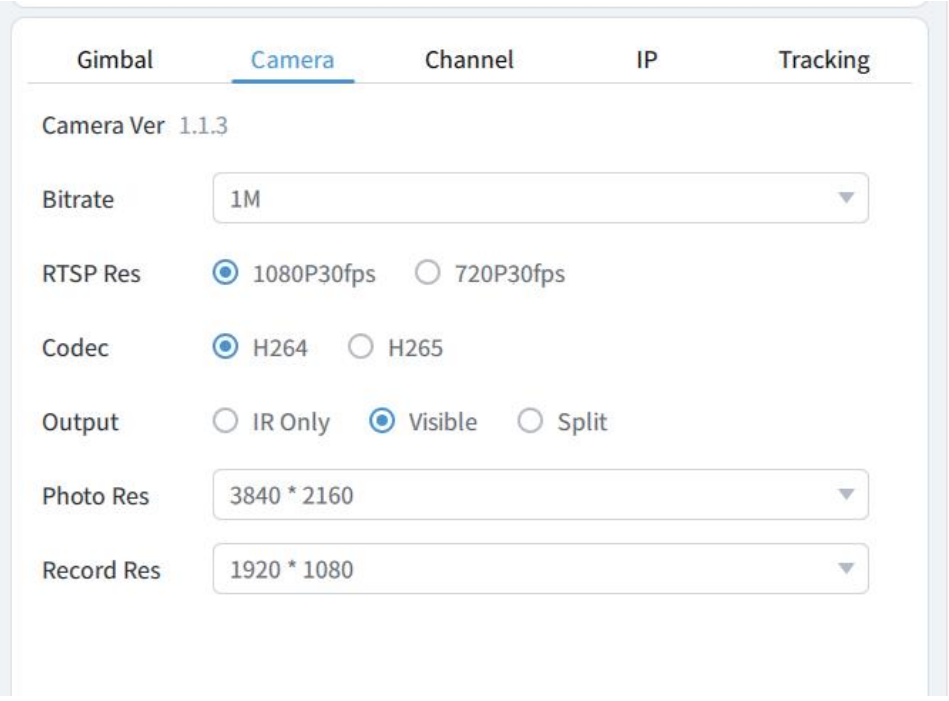
Interface Type	Parameters/Settings	User Settings Supported Or Not
Serial port baud rate	Default：115200	NO
UDP address	Default：192.168.144.64	Yes (IP address)
Video playback address	Default ： rtsp://192.168.144.64:558/live/single	Yes (IP address)

7.3 Gimbal Control



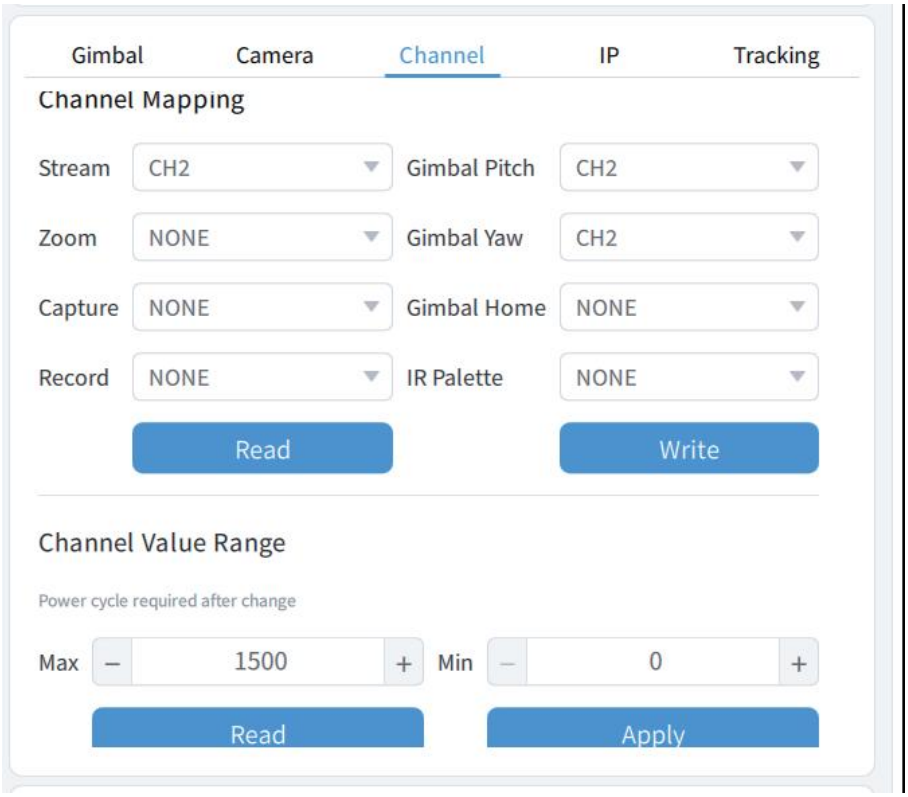
Users can click the gimbal control button to control the gimbal speed and angle. The gimbal control speed will have an adaptive relationship with the zoom ratio. For example, the higher the zoom ratio, the lower the gimbal movement speed.

7.4 Video Stream Camera Type Settings



The assistant software can select the camera type of the video stream (such as wide-angle, telephoto and thermal imaging), and can perform zoom operations. For example, in the thermal imaging type, color palettes can be switched.

7.5 Sbus Function Settings



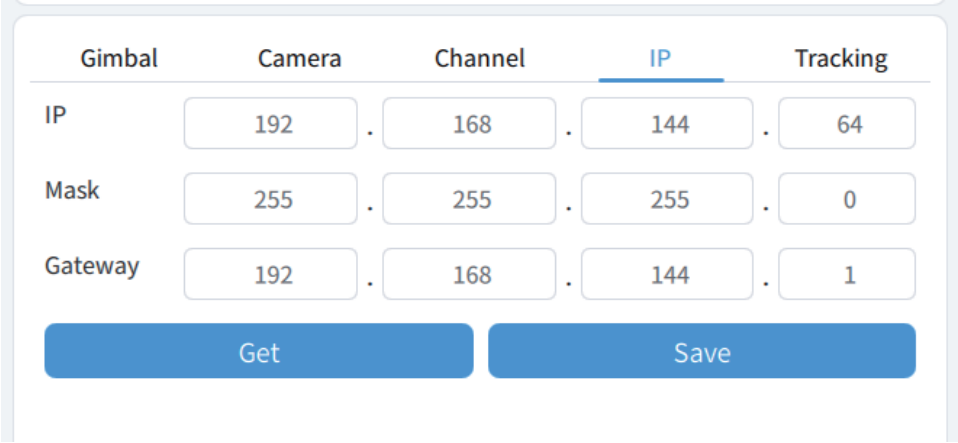
If the user uses Sbus for gimbal camera control, the user can enter the interface shown above to set the channel mapping. After setting the corresponding channel, click "Write" to save the setting. Click "Read" to obtain the current mapping status.

Yunzhuo Remote Control Setting Range: 282-1722
Heqi Remote Control Setting Range: 281-1721
Siyi Remote Control Setting Range: 272-1712

7.6 Distance Measurement Function

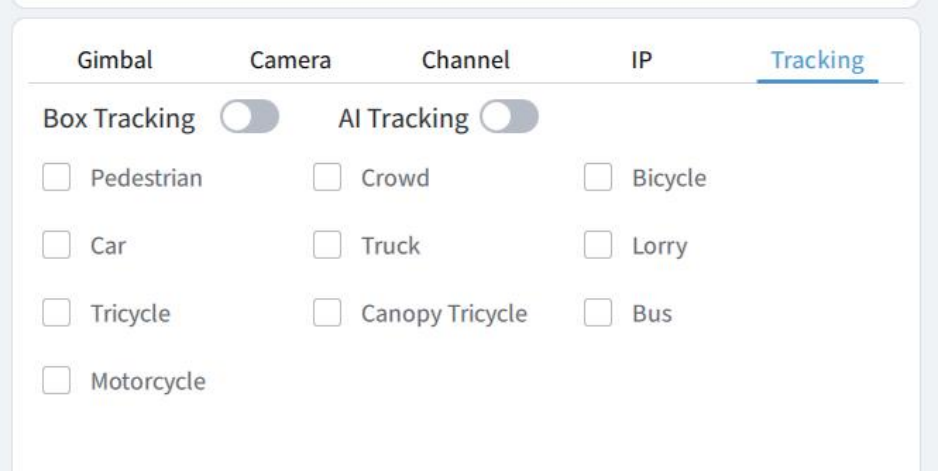
The assistant software provides single distance measurement, continuous distance measurement and stop continuous distance measurement buttons, and users can perform functional tests according to their needs.
Note: The reference range of the K40T rangefinder is 5m~1200m, and the actual test data may vary due to the environment.

7.7 Camera IP Address Setting

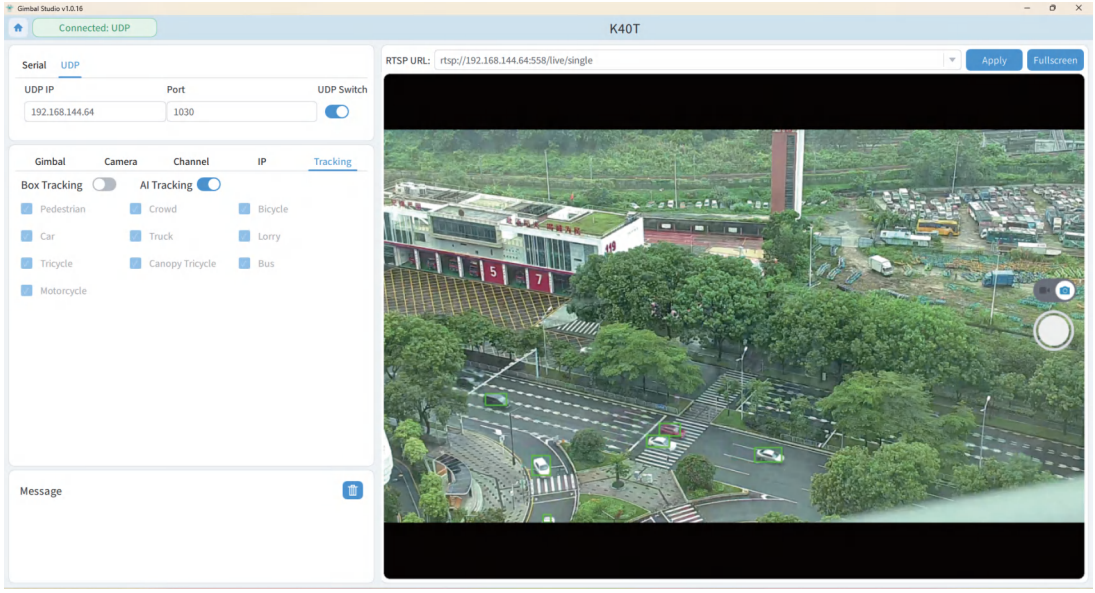


Users can set the IP address according to actual needs.
Note: Please keep a record after setting the IP address to avoid device connection failure. If you forget the IP address, please contact HEQ official for support.

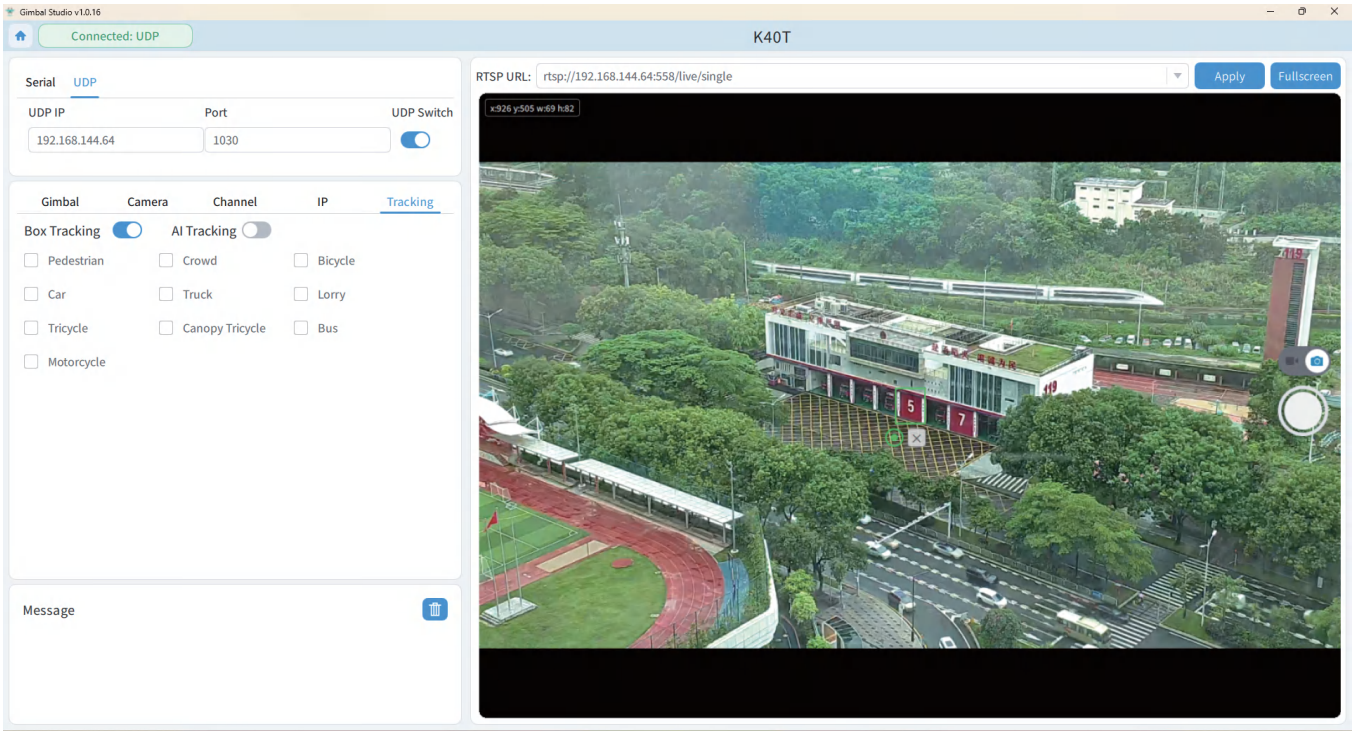
7.8 AI Recognition And Tracking Function

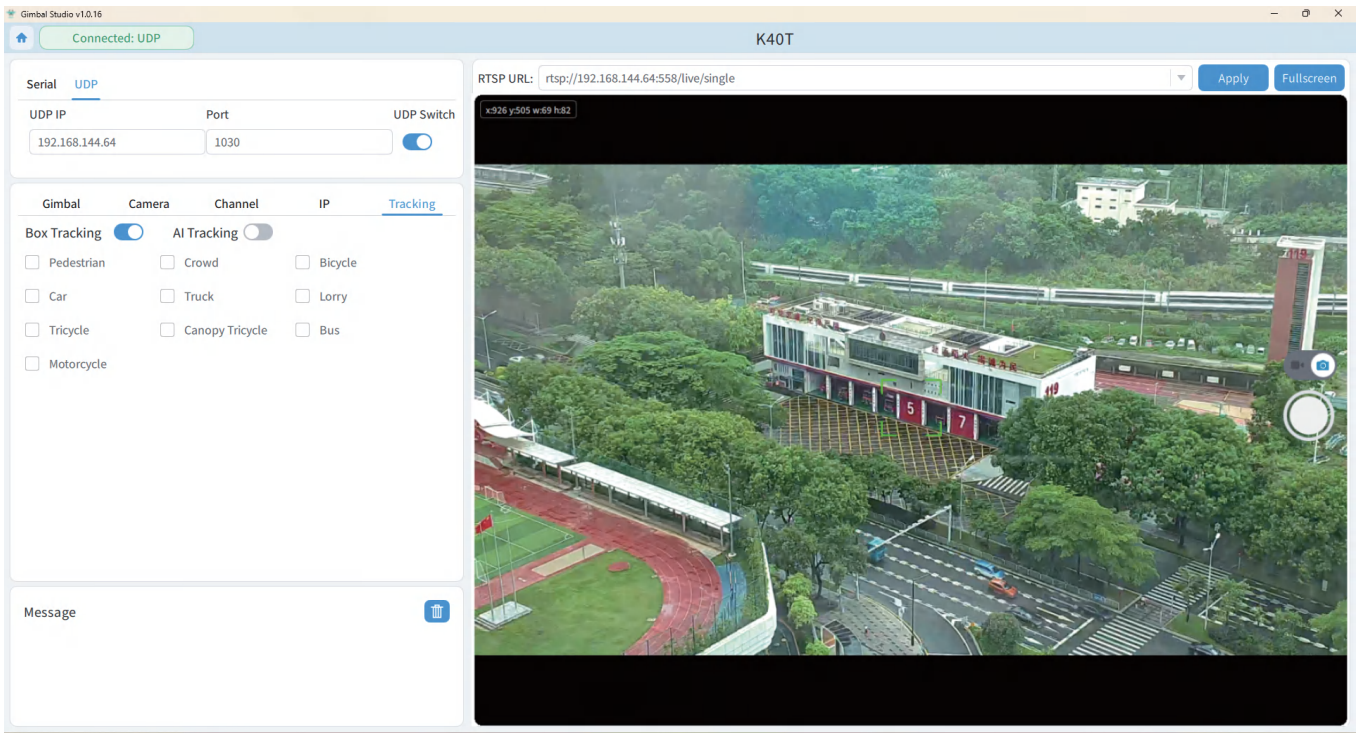


K40T has multiple common models built in and provides two tracking modes.



Recognition & Tracking: In Recognition & Tracking mode, recognized targets are marked. Tap the target box to enter tracking mode.





Box-Select Target Tracking: Use the left mouse button to drag from the upper-left corner to the lower-right corner of the target or area of interest to complete target selection. The device will automatically enter tracking mode, and the tracked target will be automatically centered.

After box-select tracking is enabled, gimbal movement cannot be controlled.

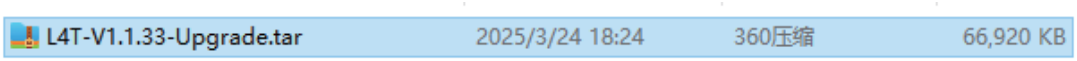
(Some functions are continuously iterating and optimizing, and new recognition models will be added in the future. Users in need can download the latest assistant software, device firmware, 3D images and user manuals from the "Download Center" of the official website: www.hequavtech.com.
We apologize for any trouble or inconvenience caused to you!)

8、Product Firmware Upgrade

The upgrade of the K40T four-sensor AI gimbal camera is divided into two parts: camera firmware upgrade and gimbal firmware upgrade.

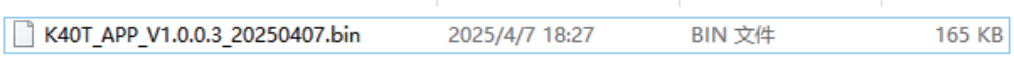
8.1 Camera Firmware Upgrade Method

After puttting the file in the root directory of the SD card and powering on, there is no need to unzip the file, just wait for about 3 minutes.



8.2 Gimbal Firmware Upgrade Method

Put the file in the root directory of the SD card and power on. During the upgrade process, the gimbal motor will stop. After the upgrade is successful, the gimbal will re-self check and stabilize.



9、Product Usage Precautions

9.1 Please store the gimbal camera in a dry and ventilated area at room temperature to avoid camera fogging due to high ambient humidity. If the camera fogs up, the water vapor will usually dissipate after the device is turned on for a while. The recommended storage environment is at a temperature of 20±5℃ and a relative humidity of less than 40%.

9.2 Do not expose the infrared camera camera to strong energy sources such as the sun, lava, or laser beams. The temperature of the observed target must not exceed 800℃, otherwise it will burn the camera and cause permanent damage.

9.3 Do not place the product in direct sunlight, in a poorly ventilated area, or near a heat source such as a heater. Do not turn the product on and off frequently. After turning it off, wait at least 30 seconds before turning it back on, otherwise it will affect the life of the product.

9.4 Under stable laboratory conditions, the K40T achieves the IP54 protection level of the IEC60529 standard. However, this protection level is not permanent and may degrade over time after long-term use.

9.5 Do not touch the surface of the camera lens and keep it away from hard objects, as this may cause the image to blur and affect the image quality. Use a soft, dry, clean cloth to clean the surface of the camera lens, and do not use alkaline detergent.

9.6 If there are other unclear points, please feel free to contact HEQ official, we will provide you with full technical support.

HEQ Official Website: www.hequavtech.com

HEQ Contact Email:
Email 1: sales@hequavtech.com
Email 2: support@hequavtech.com