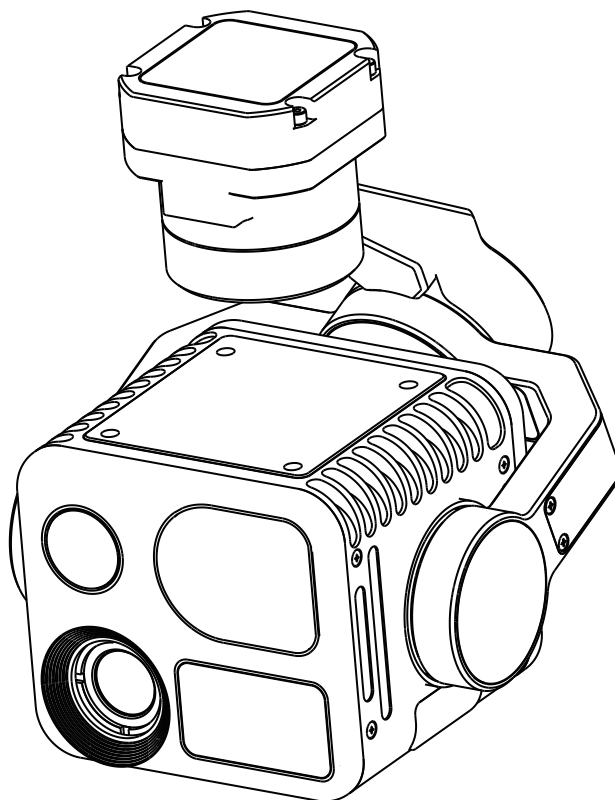




K40T Quad-Sensor AI Gimbal Camera User Manual

V1.1 202610



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1. Product Overview

The K40T Quad-Sensor AI Gimbal Camera is a professional UAV inspection payload that integrates a high-precision, lightweight three-axis stabilization system, multiple sensors, and 6 TOPS of computing power. It delivers high resolution and long-range observation with $\pm 0.005^\circ$ control stability while weighing only 290 g (± 5 g). The system incorporates a 48 MP telephoto camera, a 48 MP wide-angle camera, a 640×512 thermal imager, and a 1.2 km laser rangefinder (± 1 m accuracy), supporting around-the-clock inspection in complex environments. With 6 TOPS of onboard AI computing power, the K40T provides real-time recognition of people, vehicles, and vessels, dynamic target tracking, and thermal fire-source alerts. Users can flexibly configure multi-view split-screen output and simultaneously store H.264/H.265 video and JPEG images, significantly improving efficiency in security inspection, disaster monitoring, engineering surveying, and other applications.

2. Product Specifications

Weight	290 g $\pm$ 5 g
Operating Voltage	12-18 V
Number of Axes	3 (Mechanical)
Software Angle Limits	Pitch: -90° to $+30^\circ$; Yaw: -120° to $+120^\circ$
Mechanical Angle Range	Pitch: -135° to $+45^\circ$; Roll: -45° to $+45^\circ$; Yaw: -135° to $+135^\circ$
Maximum Control Speed	$180^\circ/\text{s}$
Angular Jitter	$\pm 0.005^\circ$
Interface	Ethernet/Serial Port/SBUS
Gimbal Mode	Recognition, Auto Tracking
Operating Temperature	-40°C to $+65^\circ\text{C}$
Communication Protocol	HEQ Proprietary Protocol/MAVLink
Protection Rating	IP54
Power Consumption	12 W
Hybrid Zoom	160 $\times$
Optical Zoom	11 $\times$
TF Card Image Format	JPG (12 MP by default; up to 48 MP)
TF Card Video Format	MP4 (12 MP by default)
Recording Resolution	12 MP@30fps
Encoding Format	H.264, H.265
AI Recognition and Tracking	Supported

Wide-Angle Camera

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

Telephoto (Zoom) Camera

Sensor 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°

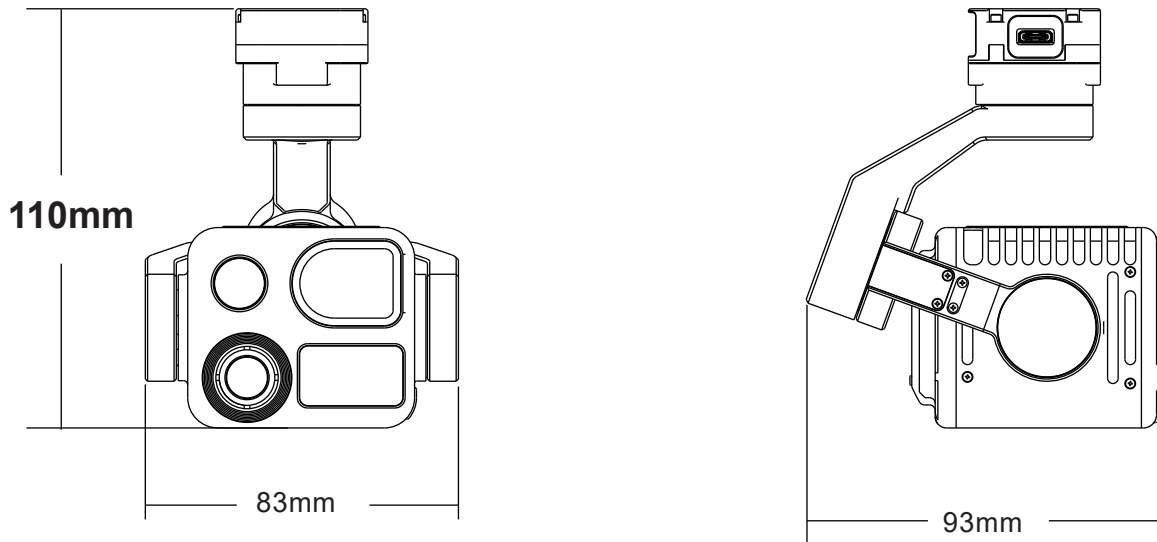
Thermal Imaging Camera

Detector Type	Vanadium Oxide Uncooled Infrared Focal Plane Detector
Resolution	640 × 512
Pixel Pitch	12 μm
Frame Rate	25 Hz / 50 Hz
Spectral Range	8-14 μm
Focal Length	13 mm
FOV	33.5° × 26.9°
Aperture	F1.2
Temperature Measurement Range	High-gain mode: -20°C to +150°C; low-gain mode: +100°C to +650°C

Laser Rangefinder

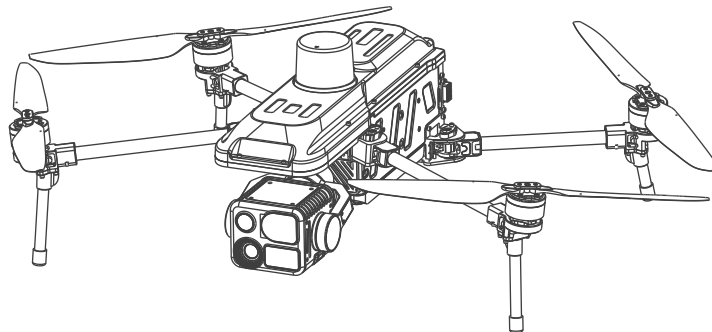
Ranging Distance	5-1200m
Ranging Accuracy	±1 m
Ranging Resolution	0.1 m
Laser Divergence	3.2 mrad
Laser Type	905nm
Ranging Frequency	1-10Hz

3. Gimbal Dimensions



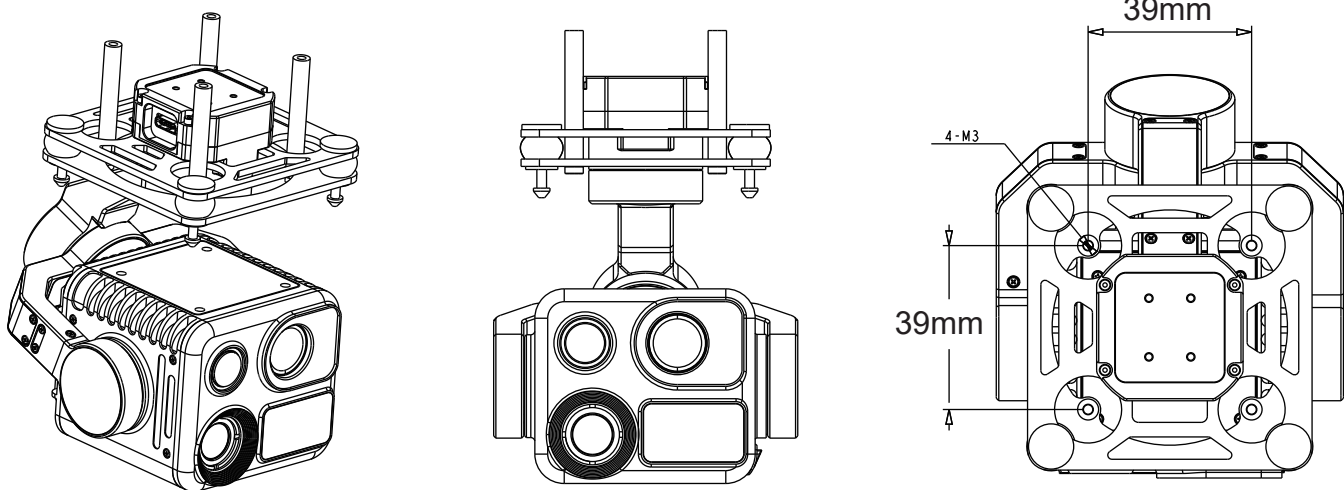
4. Product Installation

Download the 3D model from the Download Center at <https://www.hequavtech.com/>

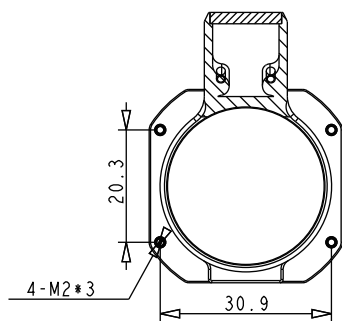


Installation Example 1

Installation Example 2

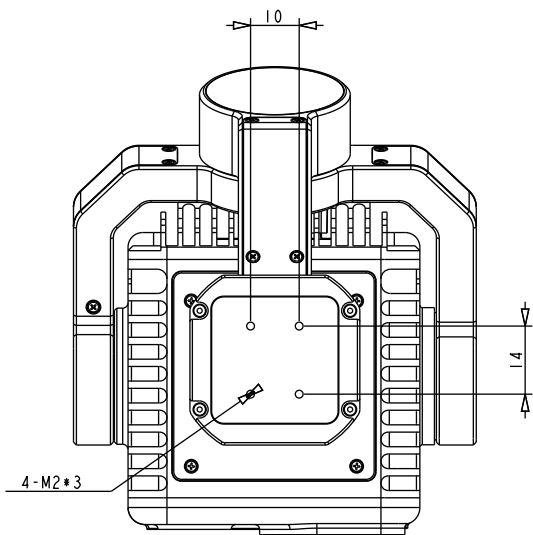


Installation Method 1



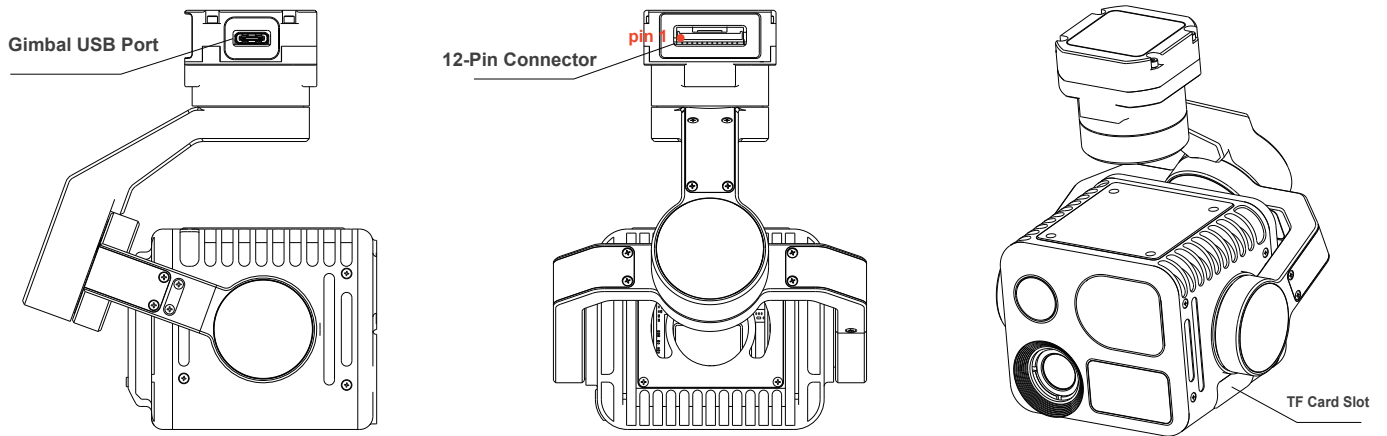
Upper bracket mounting holes: four M2 × 3 mm screws
Hole spacing: 20.3 mm and 30.9 mm.

Installation Method 2



Upper bracket mounting holes: four M2 × 3 mm screws
Hole spacing: 10 mm and 14 mm.

5. Hardware Interfaces



Model	Interface Type	Function
Gimbal USB	USB Port	Gimbal Upgrade and Debugging
Memory Card Interface	TF Card Slot	Store Photos/Videos Upgrade Camera and Gimbal Firmware

No.	Model	Interface Type	Pin 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:

1. The K40T serial port can receive gimbal camera control commands and flight-controller attitude data to improve image stabilization accuracy and performance.

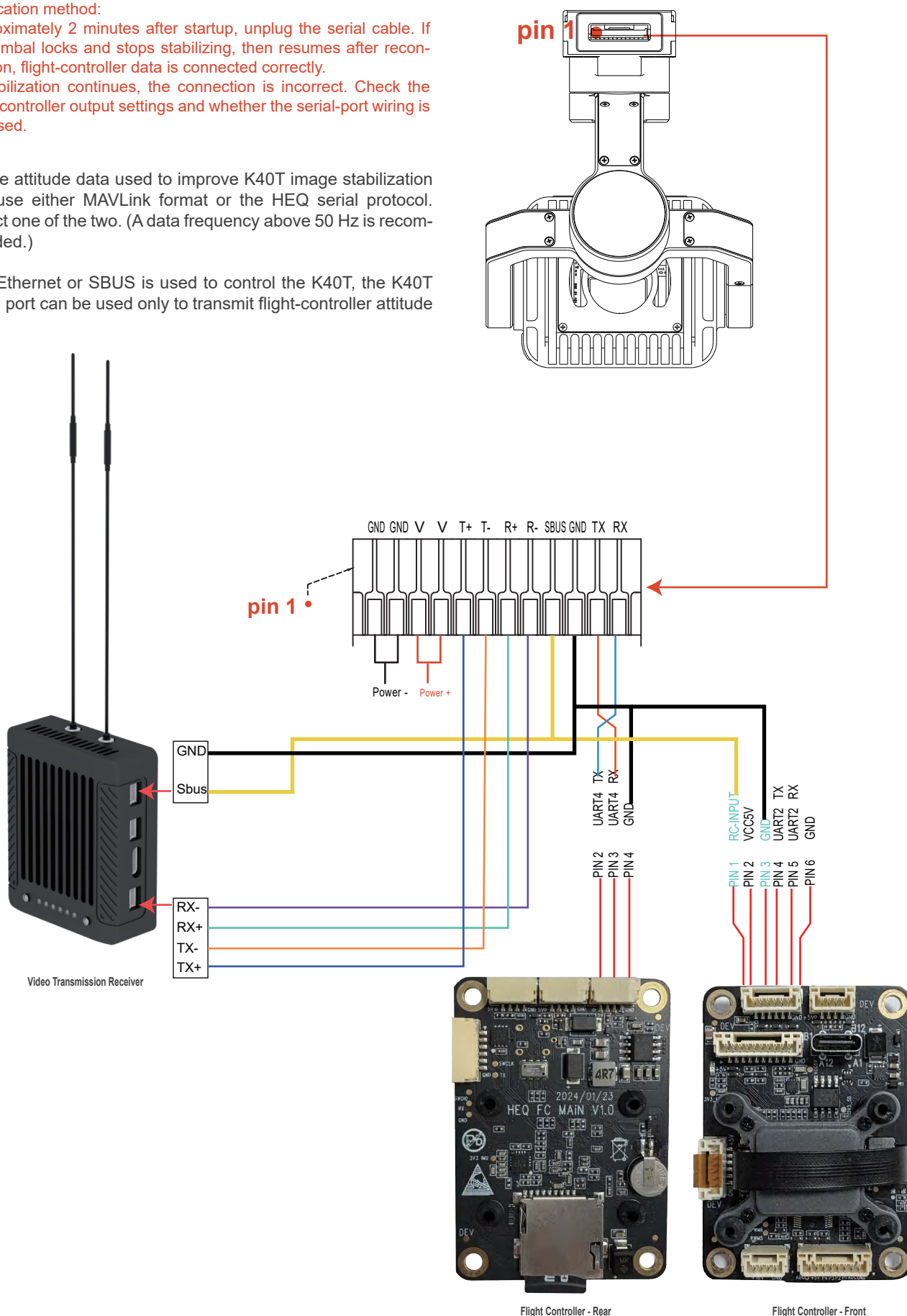
Verification method:

Approximately 2 minutes after startup, unplug the serial cable. If the gimbal locks and stops stabilizing, then resumes after reconnection, flight-controller data is connected correctly.

If stabilization continues, the connection is incorrect. Check the flight-controller output settings and whether the serial-port wiring is reversed.

2. The attitude data used to improve K40T image stabilization can use either MAVLink format or the HEQ serial protocol. Select one of the two. (A data frequency above 50 Hz is recommended.)

3. If Ethernet or SBUS is used to control the K40T, the K40T serial port can be used only to transmit flight-controller attitude data.



6. Control Interfaces and Protocols

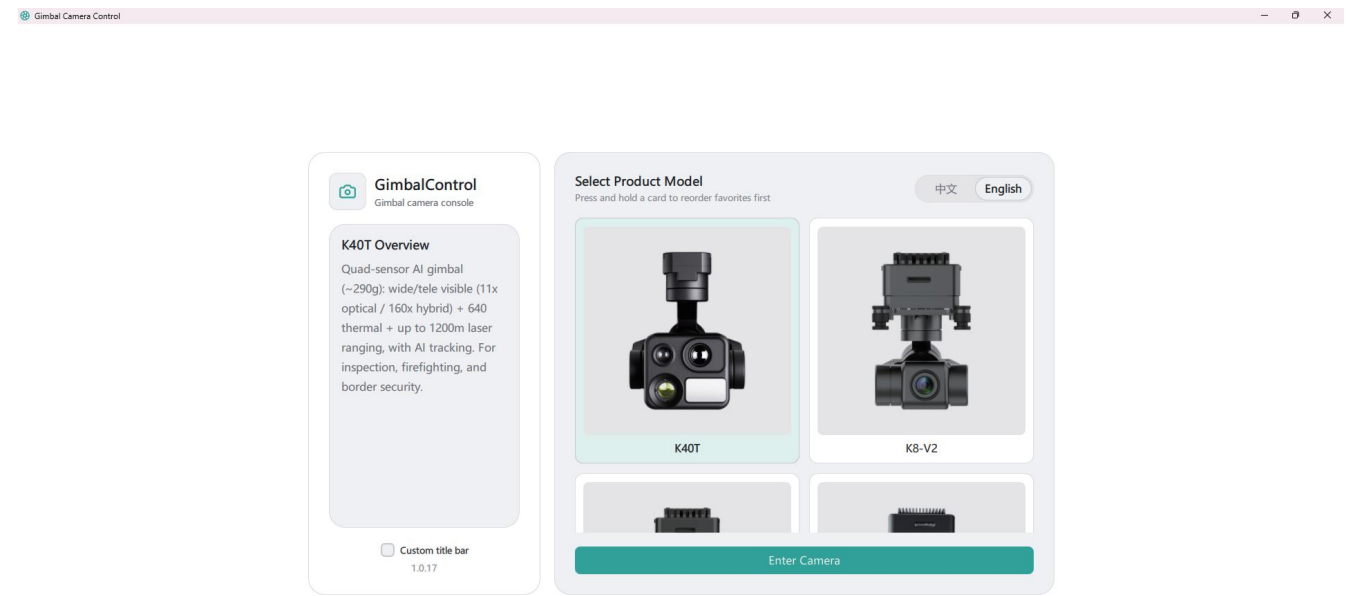
Control Type	Interface	Protocol
Gimbal Control	Network/Serial Port/SBUS	Download the network/serial-port protocol at https://www.hequavtech.com/ . SBUS is the standard protocol for UAV remote controllers. For setup, see Section 7.
Video Stream	Network	Default RTSP URL: <code>rtsp://192.168.144.64:558/live/single</code> . Before playing video, place the device on the same network segment as the K40T. For IP settings, see Section 7.

7. HEQ Gimbal Camera App User Guide

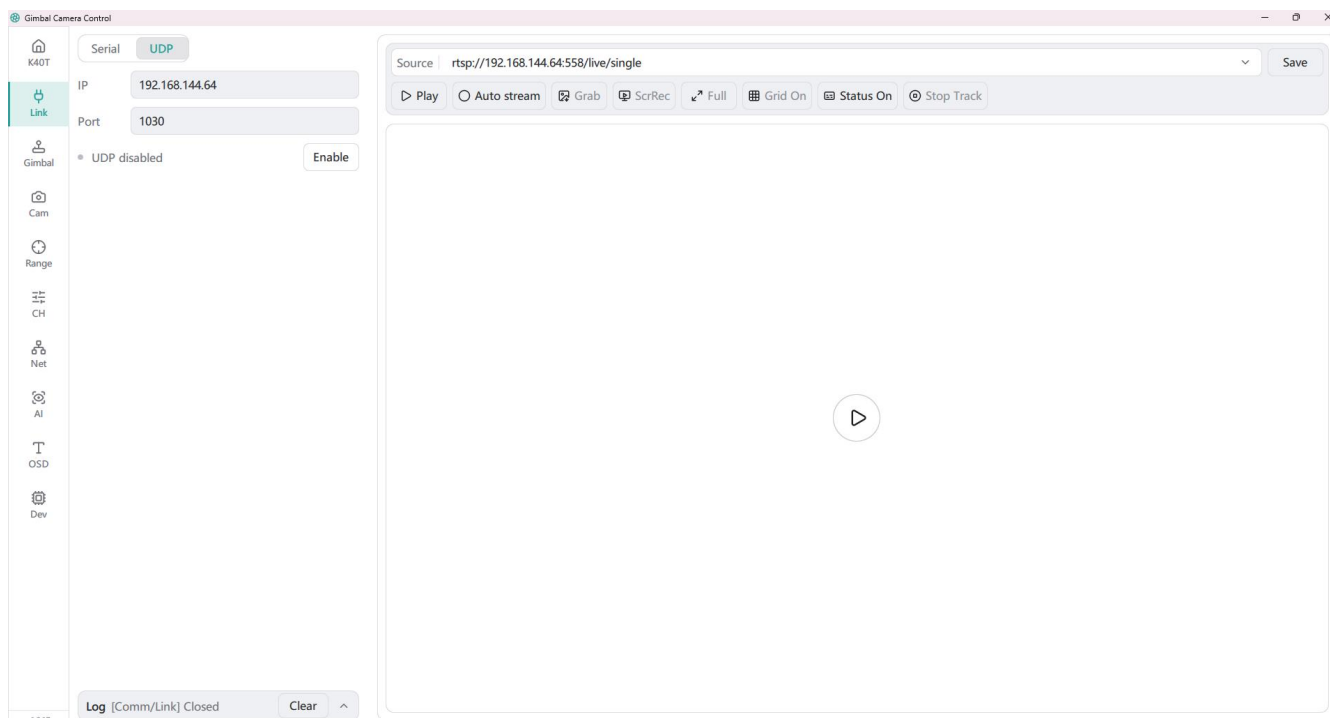
Download the HEQ Gimbal Camera App from the Download Center at <https://www.hequavtech.com/>

7.1 App Interface

Open the HEQ Gimbal Camera App and select K40T. To change the interface language, use the language selector in the upper-right corner.



After entering the page for the corresponding product model, the interface appears as follows:

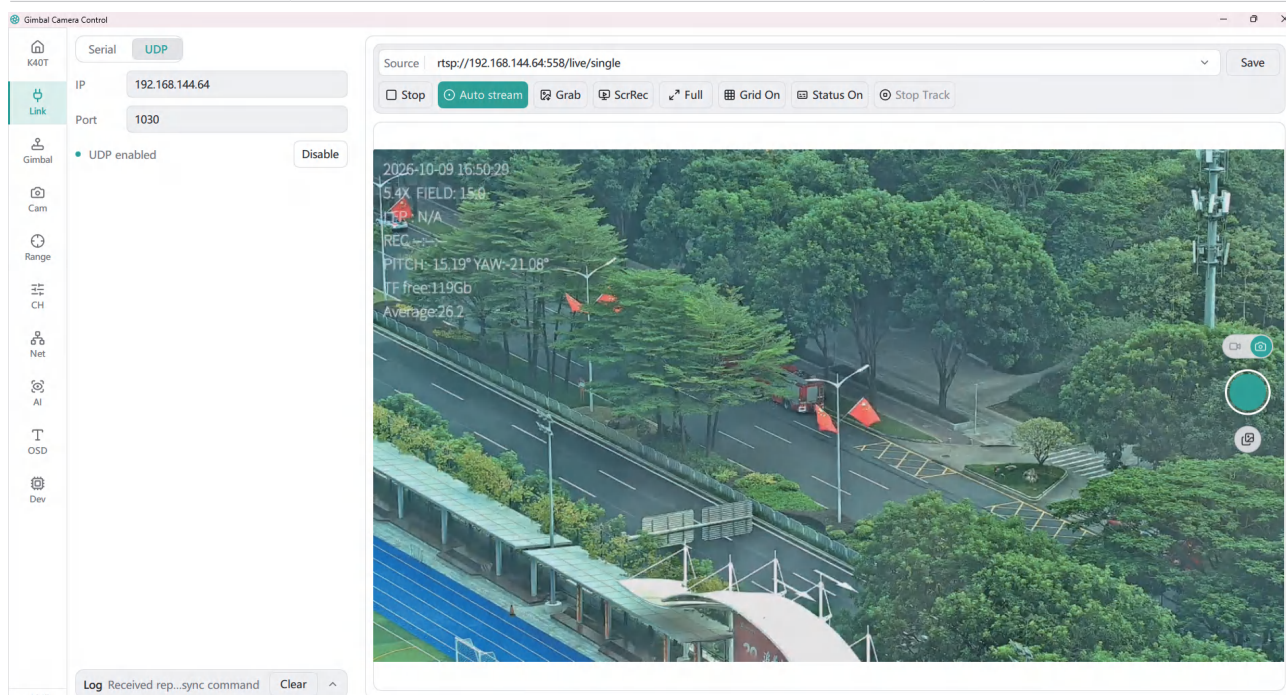


7.2 Connection Settings

1. After selecting the model, verify that the camera IP address, port, and stream URL are correct. If not, change them to the parameters for this camera (the app defaults to the camera's factory settings).
2. The camera must complete startup before it can communicate and stream video normally.
3. Select UDP on the left and click Enable to connect the camera.
4. Click Play below the stream URL, or click Auto Stream to play continuously until the camera is powered off or the stream is interrupted.
5. After changing the stream URL, click Save and then Auto Stream to play the new stream.

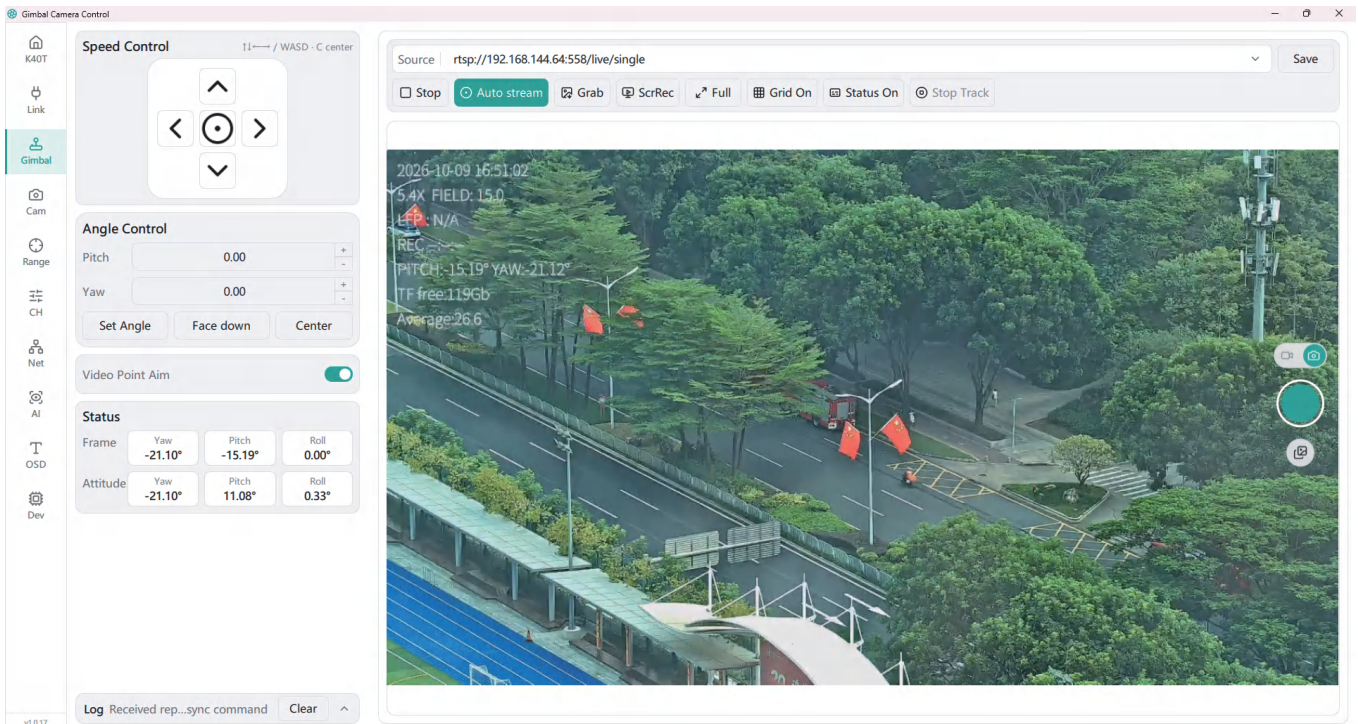
Select a serial-port or UDP connection as required. Refer to the table below for parameter settings.

Interface Type	Parameter/Setting	User-Configurable
Serial-Port Baud Rate	Default: 115200	No
UDP Address	Default: 192.168.144.64	Yes (IP address)
Video Stream URL	Default: rtsp://192.168.144.64:558/live/single	Yes (IP address)



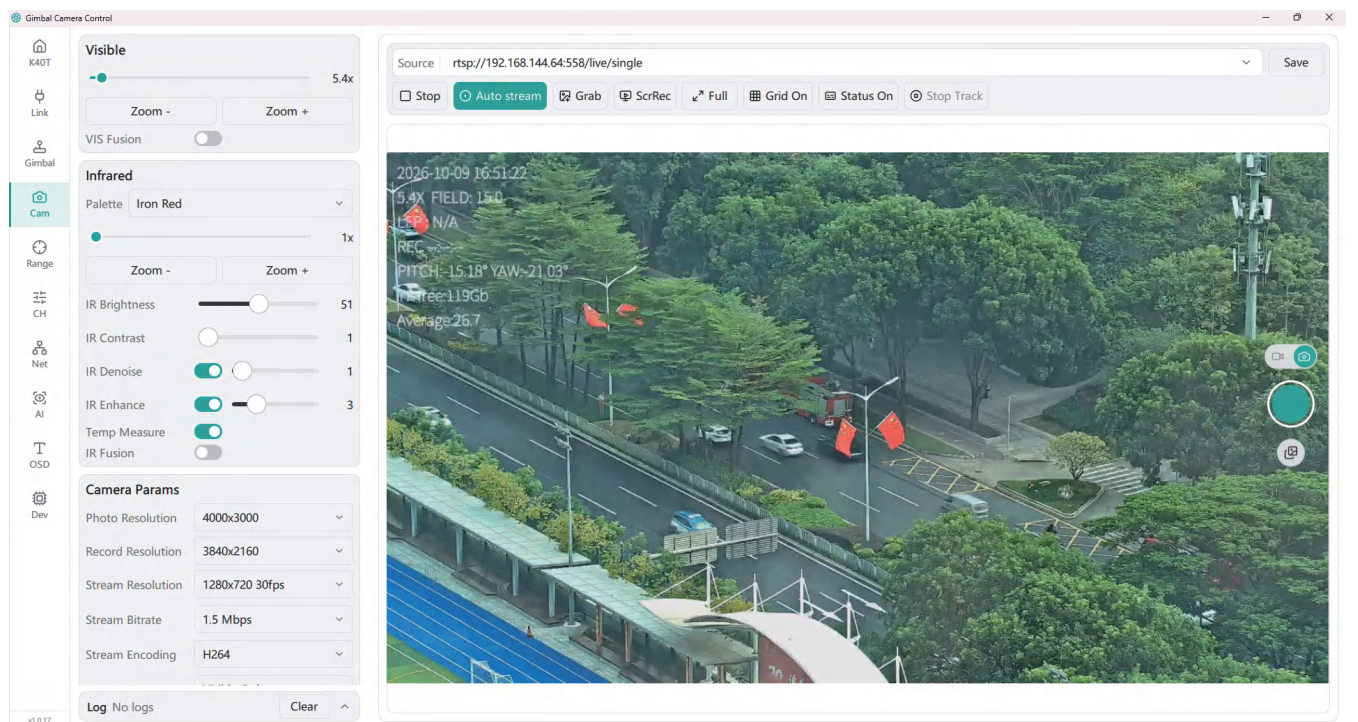
7.3 Gimbal Settings

1. Use the arrow keys or the W/A/S/D/C keys to move the camera up, down, left, or right and recenter it.
2. The gimbal can be controlled by angle. Enter pitch and yaw angles, or click Look Down 90° or Recenter.
3. After enabling Point-to-Aim, click a position in the video to move the camera until that position is centered.
4. While the camera is moving, the HEQ Gimbal Camera App displays the corresponding frame angles and attitude angles in real time.



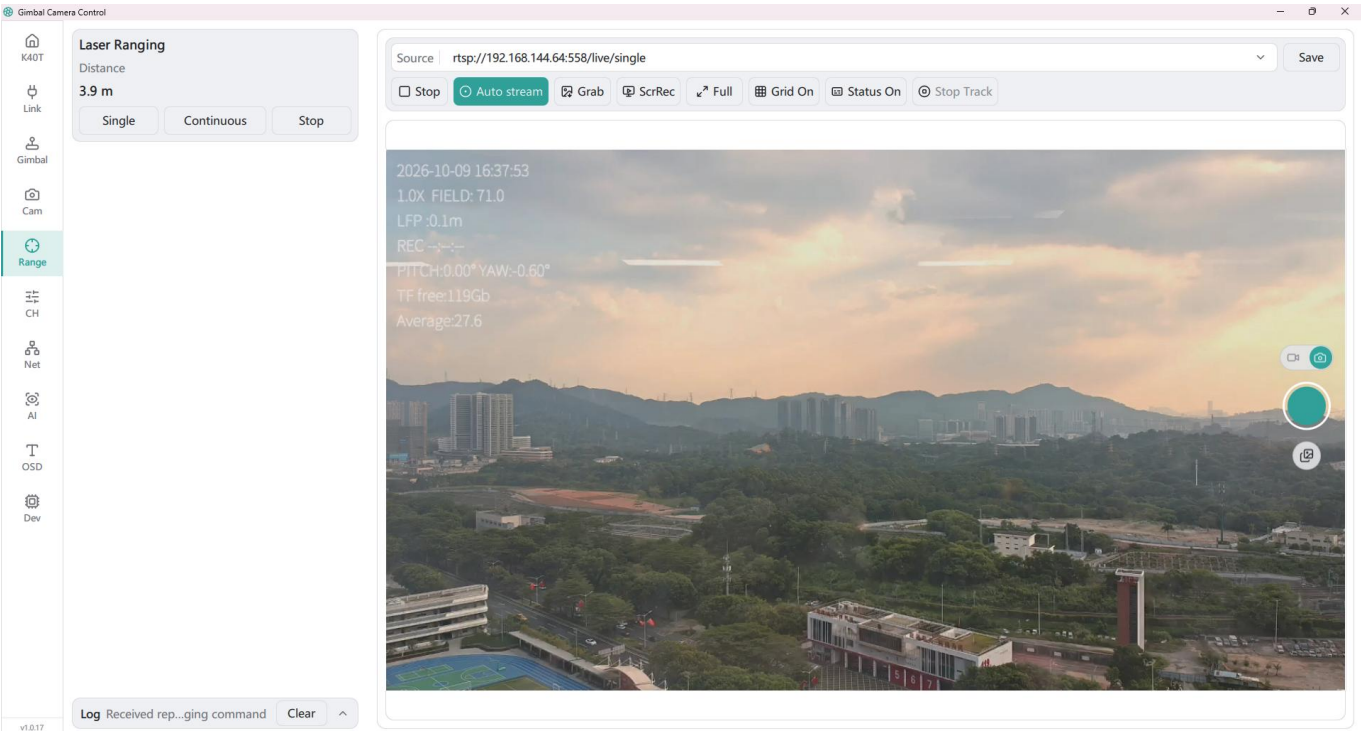
7.4 Camera Settings

1. On this page, switch the camera video output among visible light, infrared, and split-screen modes.
2. For the selected video output, switch the video zoom level or enable image fusion.
3. In infrared view, adjust the infrared image by changing the infrared parameters.
4. Change the photo and recording resolutions as required.
5. Change the video-transmission resolution, bit rate, and encoding format as required.



7.5 Laser Ranging

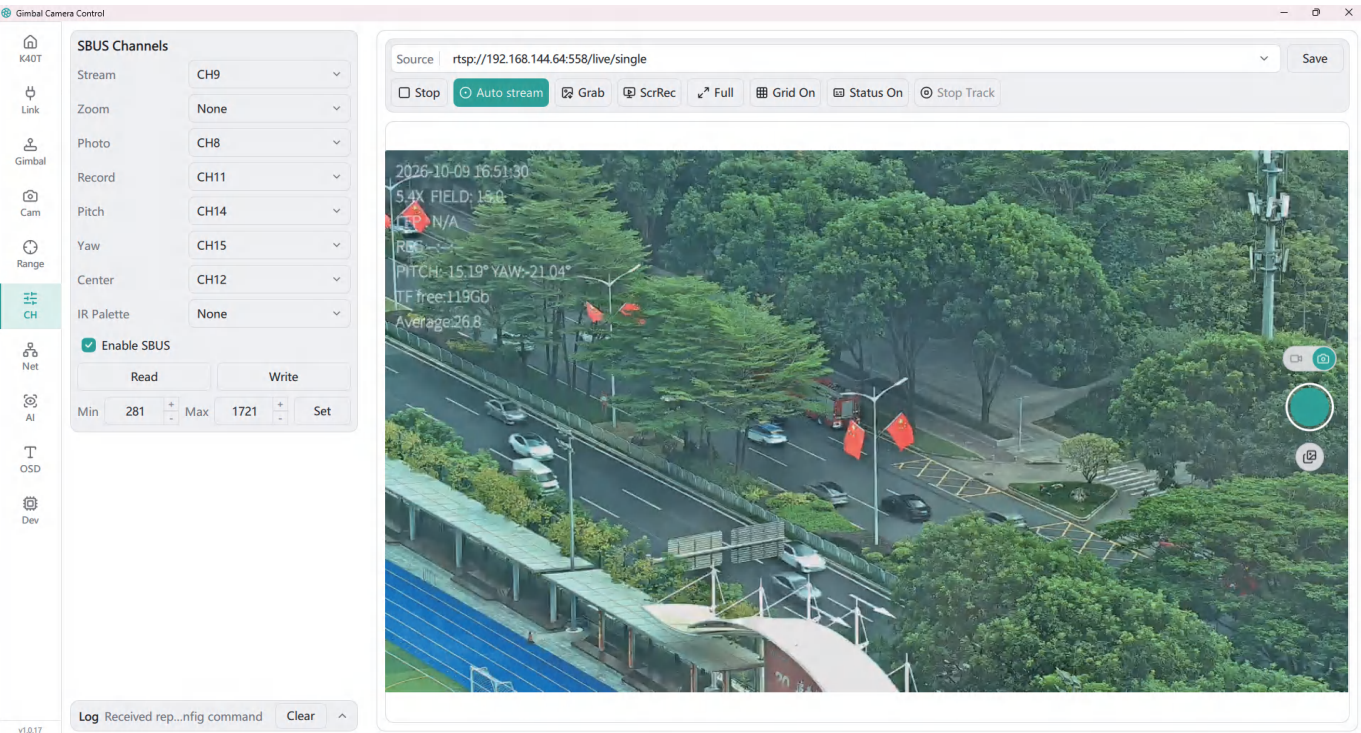
When the target is 5-1200 m away, click Single Ranging or Continuous Ranging.



7.6 SBUS Channel Settings

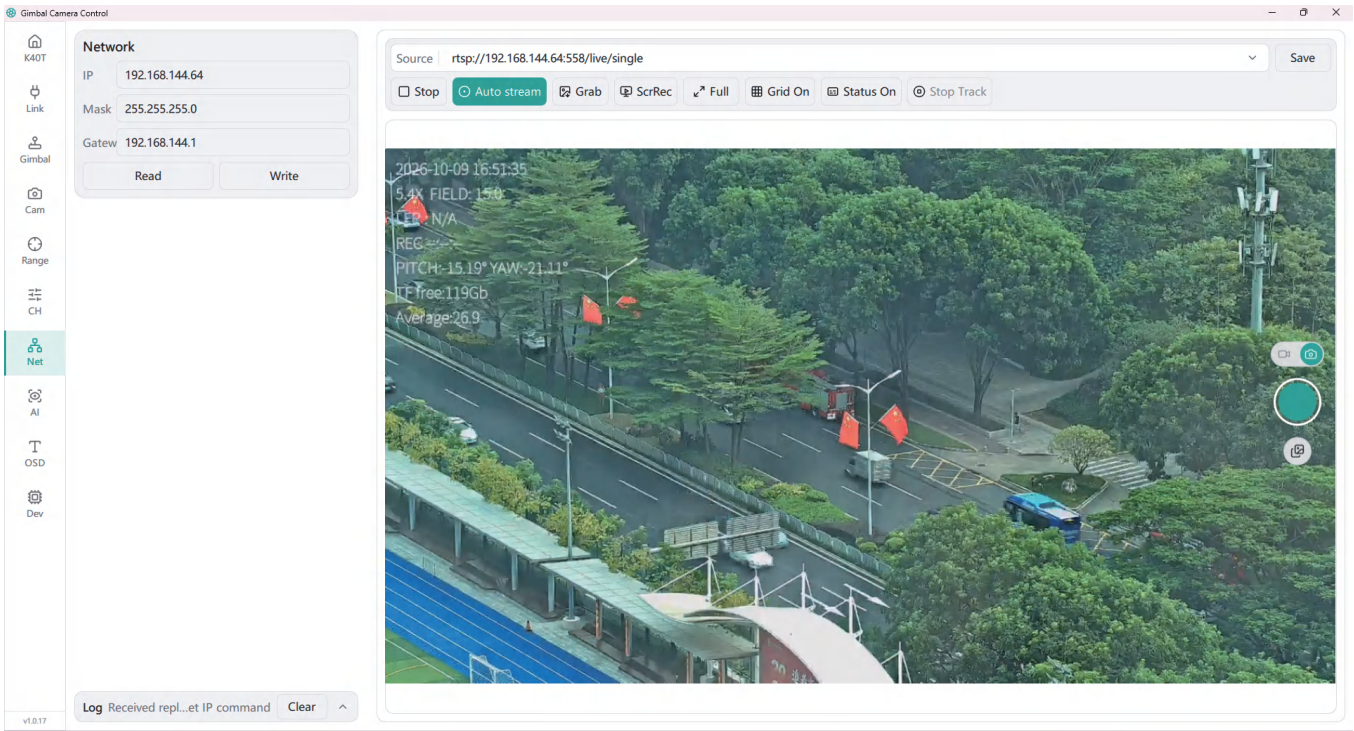
- 1. If you use SBUS to control the gimbal camera, open the interface shown above to configure channel mapping. After assigning the channels, click Write to save the settings. Click Read to retrieve the current mapping.
- 2. The available channel-value range varies by remote-controller brand. The ranges of three common remote controllers are listed below for reference:

Yunzhuo remote controller: 282-1722 HEQ remote controller: 281-1721 SIYI remote controller: 272-1712



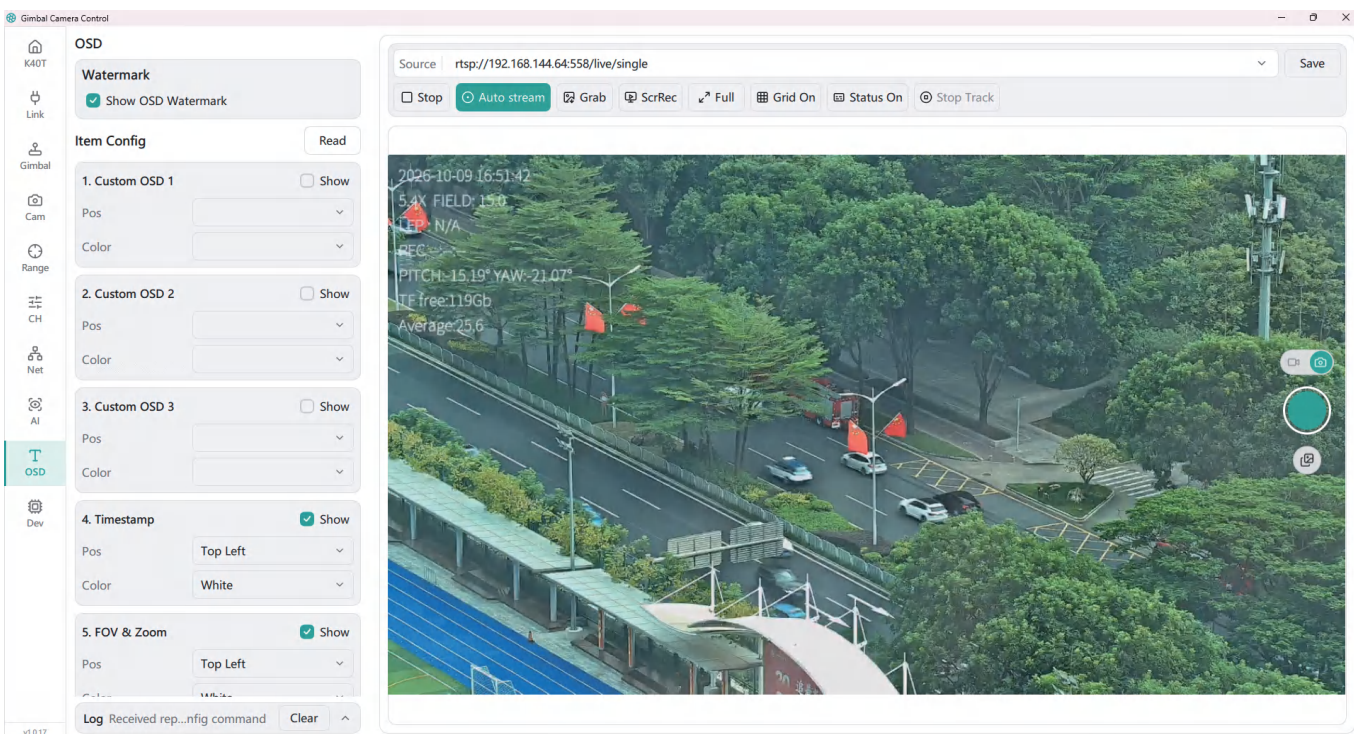
7.7 Camera IP Network Settings

Set the IP address as required. Important: Record the new IP address after changing it to avoid losing access to the device. If you forget the IP address, contact HEQ for support.



7.8 OSD Watermark Settings

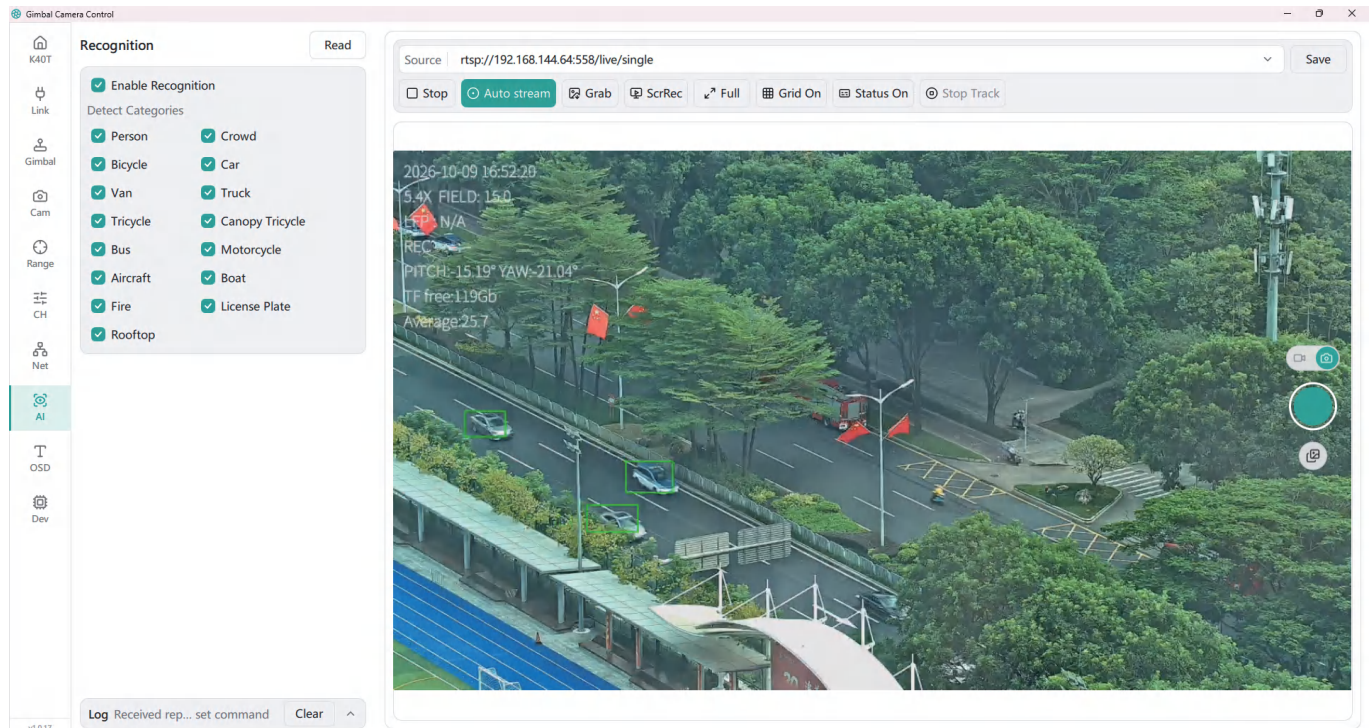
1. The OSD Settings page is used to enable or disable watermarks and change watermark items, positions, and colors.
2. On the OSD Settings page, select Display OSD Watermark to show the watermark in the video. It is enabled by default. Clear the check box to disable the video watermark.
3. The Item Settings section automatically displays the watermarks currently present in the camera video. Each watermark can be enabled or disabled separately. You can change its position and color. After making changes, reselect Display to show the updated watermark item in the video.



7.9 AI Recognition

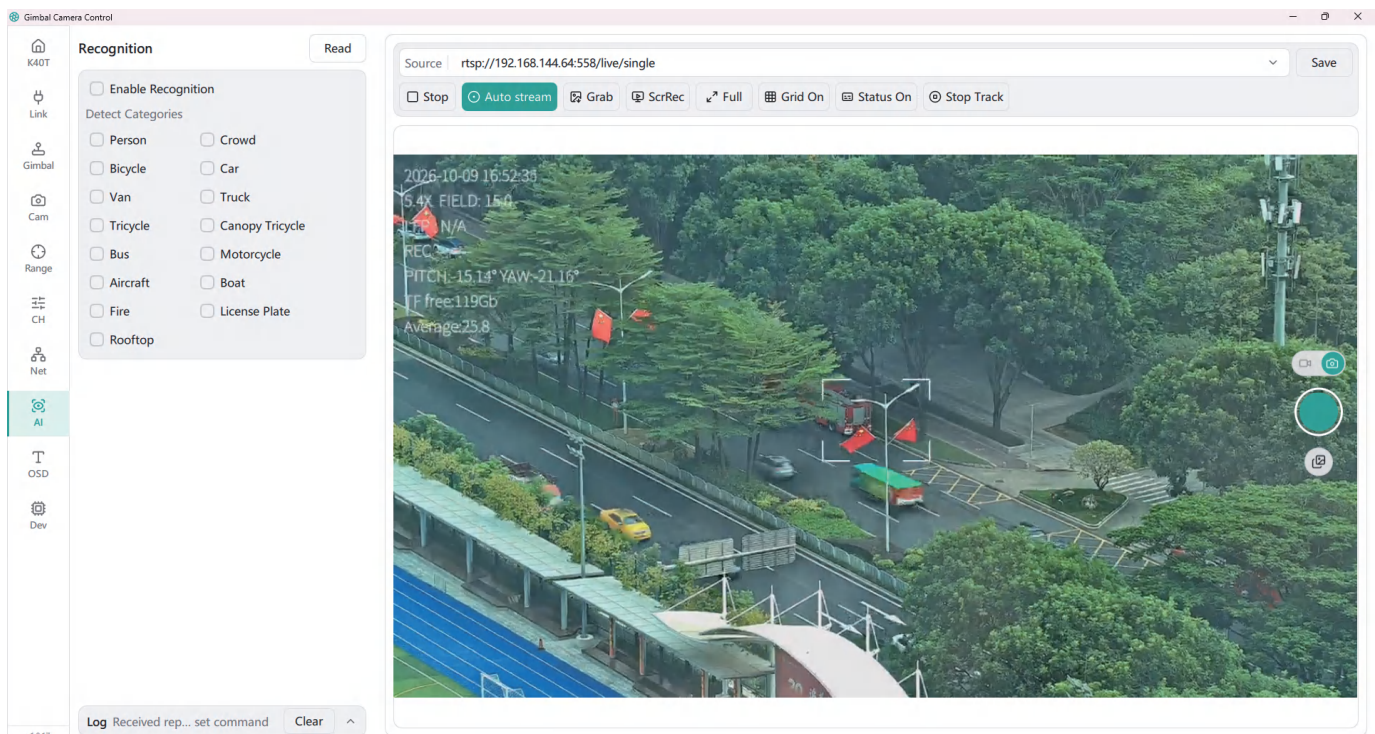
Ten common recognition models are built in. Select the desired model, then click Enable Recognition. Detected targets are automatically marked with green boxes.

The default models are trained for aerial UAV perspectives, so use this function from an elevated viewpoint.



7.10 Box-Select Tracking

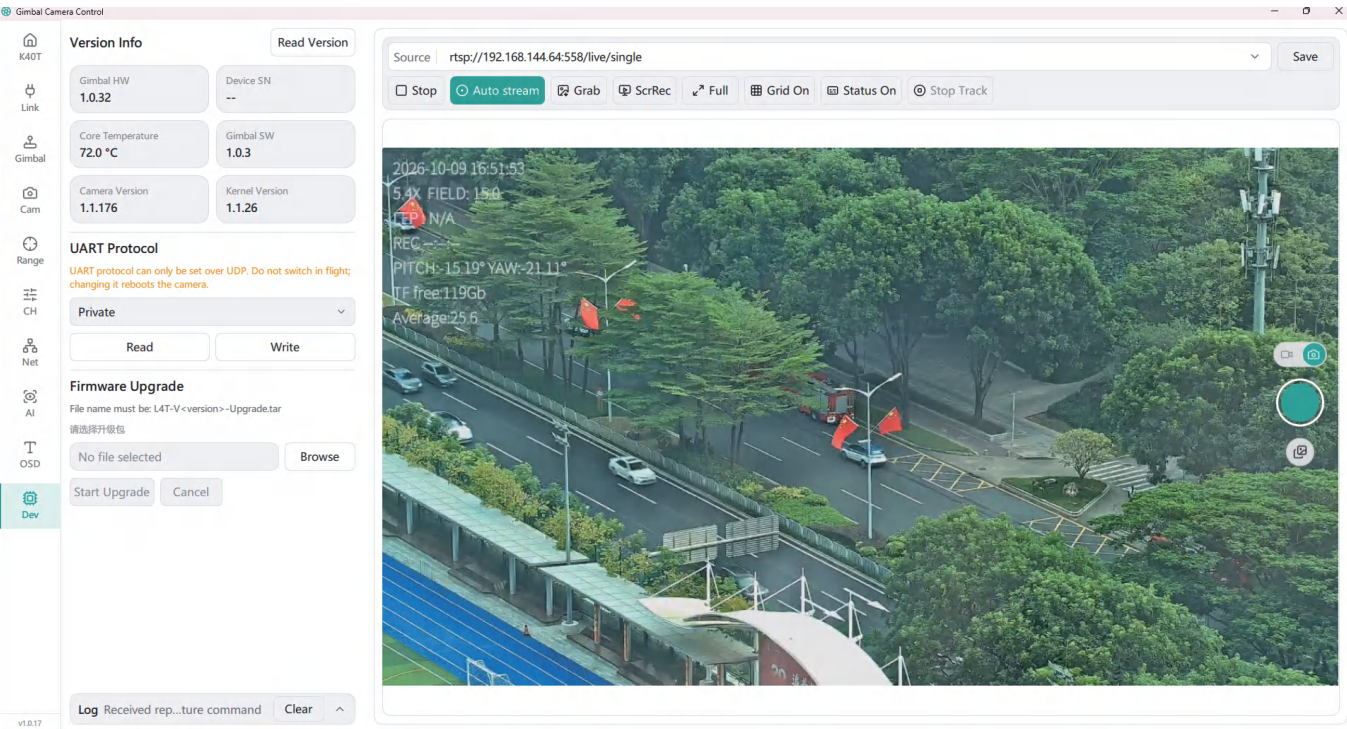
Drag a box around the target to track. Once locked, it is outlined in white, and the gimbal keeps it centered. Tracking is more effective for targets detected by AI Recognition.



(AI recognition and box-select tracking are continuously being improved, and additional recognition models will be added. Download the latest HEQ Gimbal Camera App, device firmware, 3D files, and user manual from the Download Center at www.hequavtech.com. We apologize for any inconvenience.)

7.11 Device Information

- 1. Once the camera is connected normally, its version information is read automatically.
- 2. With a UDP connection, you can switch the camera's serial-port protocol (the K40T camera version must be later than 1.1.169).
- 3. Once the camera is connected normally, you can upgrade the firmware through the HEQ Gimbal Camera App. Click Select File and upload the firmware package for the corresponding model to begin the upgrade (the K40T camera version must be later than 1.1.169).



8. Product Firmware Upgrade

The K40T Quad-Sensor AI Gimbal Camera upgrade consists of two parts: camera firmware and gimbal firmware.

8.1 Camera Firmware Upgrade via SD Card

Place the file in the root directory of the SD card and power on the device. Do not extract the file. Wait approximately 3 minutes for the upgrade to finish.

 L4T-V1.1.178-Upgrade.tar	2026/10/14 11:02	Compressed archive	292,180 KB
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8.2 Camera Firmware Upgrade via App (see 7.11, Item 3)

8.3 Gimbal Firmware Upgrade

Place the file in the root directory of the SD card and power on the device. During the upgrade, the gimbal motors will disengage. After a successful upgrade, the gimbal will run its self-test and resume stabilization.

 K40T_APP_V1.0.0.27_20260105.bin	2026/10/14 17:26	BIN file	101 KB
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9. Precautions for Use

9.1 Storage Environment

Store the camera at normal room temperature in a dry, well-ventilated environment to prevent lens fogging caused by excessive humidity. If the lens fogs, the moisture will normally dissipate after the device has been operating for a period of time. The recommended storage temperature is $20 \pm 5^{\circ}\text{C}$, with relative humidity below 40%.

9.2 Avoid Exposure to High-Energy Sources

Do not point the infrared camera lens directly at high-energy sources such as the sun, lava, or laser beams. The observed target must not exceed 800°C ; otherwise, the camera may burn out and sustain permanent damage.

9.3 Avoid High Temperatures and Frequent Power Cycling

Do not place the product in direct sunlight, in poorly ventilated areas, or near heat sources such as heaters. Avoid frequent power cycling. After switching the product off, wait at least 30 seconds before switching it on again to prevent a reduction in service life.

9.4 Protection Rating

Under stable laboratory conditions, the K40T complies with the IP54 protection rating specified in IEC 60529. However, this protection is not permanent and may gradually decrease with extended use.

9.5 Lens Cleaning and Protection

Do not touch the lens surface with fingers or hard objects, as this may cause scratches or affect image quality. To clean the lens, wipe it gently with a soft, dry, clean cloth. Do not use alkaline cleaners.

9.6 Technical Support

If you have any questions, please contact HEQ customer service at any time. We will provide comprehensive technical support.

HEQ Official Website: www.hequavtech.com