EHP20S68N

User Manual

- 3-Axis enhanced stability PTZ
- 140X Hybrid Zoom①
- 4 Supplement Lights
- Global shutter
- Network Read& Write TF card
- AI Target Identification and Tracking
- TOPOTEK ground station control software

Note① ： 140X Hybrid Zoom means 20X optical zoom *7X digital zoom

Publication Instructions

Thank you very much for using our products! Topotek (Beijing) Technology Co., Ltd is a professional optical zoom camera manufacturer in China, which have technical team to Research & Development of optical zoom camera as the core technology. The concept of creating products with superior performance and the idea of serving customers, we are committed to providing customers with innovative products which are superior to others. There are 5x, 10 x, 18x, 20x, 30 x, 36x optical zoom series cameras for you choose. Topotek integrating the camera as the drone load, drone company can use its optical zoom function to see the ground objects details clearly, make the drone just like adding an adjustable telescope.

This manual is for EHP20S68N using and maintenance. EHP20S68N is a 140X hybrid zoom three-axis starlight night vision gimbal camera with global shutter. The gimbal camera outputs RTSP video stream, supporting IP, S.BUS and UART control on the camera as well as the gimbal. The FOC control scheme of the device has the characteristics of high stability, small size, light weight and low power consumption. The camera uses STARVIS2 low noise sensor with an effective of 8 million pixels; supports 4K and 1080P local TF card storage as well as wireless transferring.

In order to give full play to the superior performance of this product, please read this manual carefully before use. Before the new manual is published, the use and maintenance of this equipment should be based on this manual, and other materials are for reference only. Each unit finds problems in use and needs timely feedback for research and correction. As the product is updated quickly, and individual product parameters and configurations change due to product upgrades, the company reserves the right to modify product parameters, performance and other information. If you have any questions, please contact Topotek (Beijing) Technology Co., Ltd to get the latest Information and technical support.

Contents

警 示 页

Warning

- Before installing and using this product, please read this manual carefully, put it away in a safe place for future use;
- Should follow all warnings on the product and manual, and follow all operating instructions;
- Strictly forbidden for the power supply voltage to exceed the specified range (12v-26.2v、3s-6s);
- Strictly forbidden to use the gimbal in the environment exceed its environmental conditions;
- In any circumstances, including startup or shutdown status, do not use the thermal imaging camera look directly at the sun, as well as carbon dioxide laser, electric welding machine this kind of high-intensity radiation sources, to avoid damage to the focal plane of the detector;
- Any load contains electric equipment of sensitive static electricity. To avoid any damage, please prevent static electricity during using;
- Pay attention to the protection of the internal interconnection of the gimbal and the external connection cable;
- It is not allowed to be repaired by the user, and the case cannot be opened without the permission of our company. All consequences caused by repaired by yourself is the user's responsibility;
- Before cleaning the gimbal, disconnect the power first. Do not use chemical solvents, thinners or spray cleaners. You can wipe the shell with a clean, soft, dry flannel or cotton.
- When using this gimbal, please do not look directly at the laser beam.

Notes

- Ensure that the interface definition of the airborne terminal is correct;
- Ensure that the power supply voltage is within the given range（12-26.2v、3s-6s）;

EHP20S68N

USER MANUAL

1、Overview

1.1 Application

EHP20S68N is a 140X hybrid zoom three-axis starlight night vision gimbal camera with global shutter. The gimbal camera outputs RTSP video stream, supporting IP, S.BUS and UART control on the camera as well as the gimbal. The FOC control scheme of the device has the characteristics of high stability, small size, light weight and low power consumption. The camera uses STARVIS2 low noise sensor with an effective of 8 million pixels; supports 4K and 1080P local TF card storage as well as wireless transferring. The structure is shown in Figure 1-1-1:

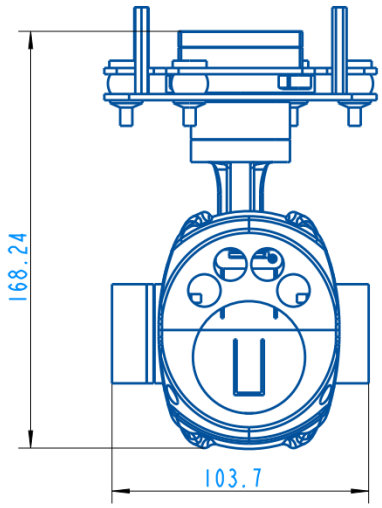


Figure 1-1-1 structure

EHP20S68N can be widely used in public security emergency, fire rescue, power line patrol, field search and other industries. The system integrates optical zoom, video and photography, increase the stability of the head and control as one. Customer docking is simple, the airborne side is installed and fixed to the UAV and other equipment, after the connection diagram is transmitted, the system can work only by power supply. The ground control software can directly display the video, and the button or mouse can realize the zoom, focusing, photographing and recording, PTZ control and other functions.

1.2 Main components and functions of the product

The visible light video stream is stored inside the visible light movement, the TF card is recorded inside, and the encoded output is sent to the image transmission module. The image transmission module transmits the real-time video to the ground receiving end, and receives the ground control signal to control the Pinion and the camera respectively. The composition of the system functional framework is shown in Figure 1-2-1:

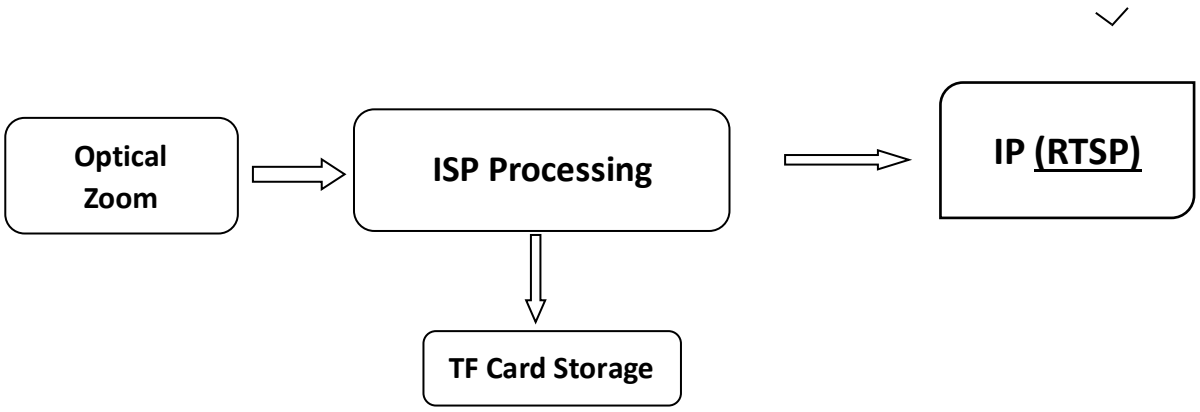


Figure 1-2-1 System functional framework

1.3 Using environment and working conditions

- Work environment： -10℃ to +55℃ / 20% to 80% RH
- Storage environment： -20℃ to +60℃ / 20% to 95% RH
- Transportation: gimbal in the packaging is finished, can meet the requirements of air transportation, highway, railway, water transportation.

2、Technical Features

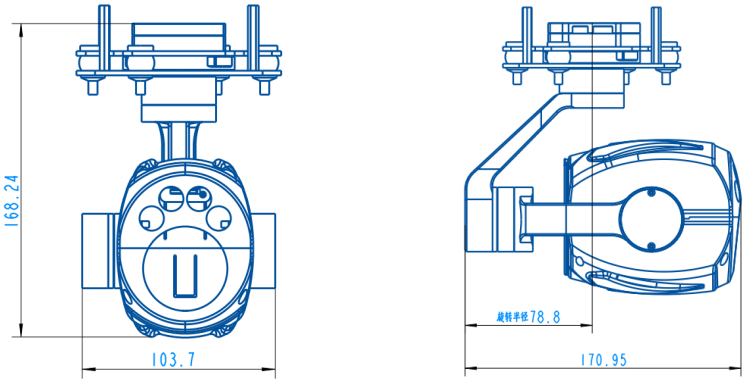
- Visible light Camera Parameters: :
  - CMOS SENSOR： 8 Mega Pixels
  - Focal Length： 6.7±5%～125±5%mm
  - FOV：
    - D : WIDE 66.6º±5% TELE 4.0º±5%
    - H : WIDE 59.6º±5% TELE 3.5º±5%
    - V : WIDE 35.7º±5% TELE 2.0º±5%
  - Optical Zoom: 20X
  - Zoom mode: electric zoom and continuously adjustable

- Storage Formats：
  - Pictures： jpeg； multiple pixels choices
  - Videos： H.264； H.265 ； 1080P video steam
  - HDMI Output： 1080P 60fps
  - IP Output： 1080P 30fps /4K 30fps

- AI Detection and Tracking：
  - Min. tracking target size: 16×16 Pixels
  - Max. tracking target size: 256×256 Pixels
  - Target Memory Time: 2 seconds
  - Tracking speed : 50 pixel/frame max
  - Simultaneous detection qty.: 100 targets max
  - Targets type: Human and Vehicles
  - Min. recognition target size: 16×16 Pixels

- Storage capacity: 32-128g TF Card; Calss10 and above; FAT32 format
- Image output interface: network H.264/H.264 stream output
- Roll Angle Range -45°～ +45°
- Pitch Angle Range -45°～ +120°
- Yaw Angle Range -280°～ +280°
- Control accuracy: pitch and roll direction: ±0.02° Horizontal direction: ±0.03°

- Control modes:
  - IP control: The ground station interface can be controlled by mouse and screen touch, supporting wheel operation.
  - Support network IP/ UART/ SBUS control (optional PWM control, need external PWM decoding board)
- System startup preparation time：20s
- Power supply: DC12-26.2v (3s-6s)
- Power consumption: dynamic 10W
- Weighted：803±20 grams
- Size：103.7mm×170.95mm×168.24mm



3、Installation and debugging

3.1 Installation [Screws and hole location]

Distance between mounting holes of the shocking reducing plate：80mm×80mm;
Mounting hole size：M3

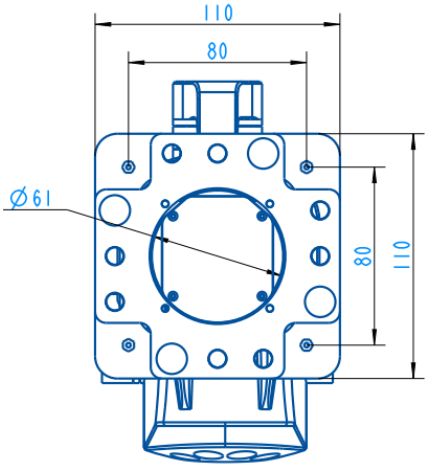
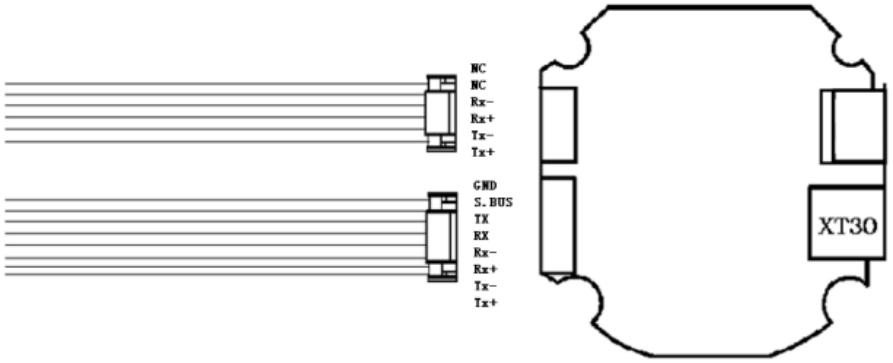


Figure 3-1-1: external mechanical interface of the gimbal

3.2 Electrical interface



No.	Model	Type	Interface Definition	Function
1	6PIN Socket	Communication Interface	485+	485 Interface
2		Communication Interface	485-	485 Interface
3		Communication Interface	Rx-	IP
4		Communication Interface	Rx+	IP
5		Communication Interface	Tx-	IP
6		Communication Interface	Tx+	IP

No.	Model	Type	Interface Definition	Function
1	8PIN Socket	Communication Interface	GND	GND
2		Communication Interface	SBUS	SBUS Input
3		Communication Interface	TXD3	UART Transmission
4		Communication Interface	RXD3	UART Reception
5		Communication Interface	Rx-	IP
6		Communication Interface	Rx+	IP
7		Communication Interface	Tx-	IP
8		Communication Interface	Tx+	IP

***Due to product upgrade, appearance/size/weight/power consumption may change slightly. Please contact the sales for the latest data.**

3.3 Communication

3.3.1 Serial port and UDP communication

12 to 27 char

帧头 (3char)	地址位 (2char)	数据长度 (1char)	控制位 (1char)	标识位 (3char)	Data1 (char)	。。。 。 (char)	Data L (char)	校验位 (2char)
#TP	U/M/D/I/ E/P	L	w/r	$X_1X_2X_3$	D_1	。。。 。	D_L	CRC

Frame header:

#TP: fixed length command, with data length of 2;;

#tp: variable length command, and the data length is determined according to the length bits;

Address bits:

Source address: U: Uart command

M: Camera related commands;
D:System and image related commands;
I: Algorithm related commands;
E:Thermal infrared related commands;
P:PTZ related commands.

Target: U: Uart command

M: Camera related commands;
D: System and image related commands;
I: Algorithm related commands;
E: Thermal infrared related commands;
P:PTZ related commands.

Data length: Number of data; Max F

Control bit: r - > query w- > control

Data: According to length

Identification bits： identification function

Data： data bits, according to the data length;

CRC： except for the beginning, the rest is converted to HEX, after the cumulative sum is done, and then the result is converted to ASC-II. Two bytes, high order first.

Serial port configuration: baud rate: 115200

Data bit：8

Stop bit：1

Check bit: None

Note: please ask for the specific serial communication protocol from Topotek sales.

3.3.2 Network control and display

Default network address and port number:

Video stream 192.168.144.108 (control IP is the same as video stream IP)

Control flow 192.168.144.108 (port number 9003)

Topotek Ground Control Software Shoot

Operation steps:

1. Click the setting button in the lower right corner to pop up the setting menu:

The default IP address is 192.168.144.108 (modify as needed). Enter the RTSP code stream address:

rtsp://192.168.144.108:554/stream=0 Click PLAY, Output: 1080P H.264 Real time stream (picture in picture).

rtsp://192.168.144.108:554/stream=1 Click PLAY, Output: 640*512 H.264 Real time stream (single thermal imaging).

The control flow address is the same as the IP address. Can be used to set.

1.The video stream responds normally, and will appear a real-time image

2. The mode button is used to display shortcut buttons and PTZ angle bars.

3. Three Tabs as below: **Speed mode, Angle mode and Parameter Setting**

A、The default is Speed mode, which can control: Zoom, Focus, Photo, Video, Picture In Picture, Pseudo Color Switching, Pan/tilt motion, heading axis mode and One Key to return. (Note: the tracking function is not supported in this menu).

B、In the angle mode, can drag the slider to make the pan/tilt reach the specified angle (The roll axis is not supported currently).

C、Speed is the basic speed, and pan/tilt will adapt proportionally to this speed value based on the focal length;

Speed Mode TAB

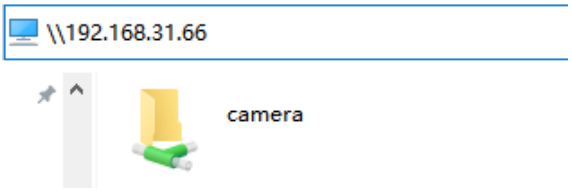
Angle Mode TAB

Zoom+	Zoom-	Focus+	Focus-	Capture	Record	Ai Mode
变焦 +	变焦 -	对焦 +	对焦 -	拍照	录像	跟踪模式
Pseudo Color	Picture in Picture	IRcut	Track	Play	Set	Defog±
伪彩	画中画	日夜切换	跟踪	播放	设置	电子透雾±
Lock Mode	Follow Mode	Up	Down	Left	Right	Home
锁头模式	跟随模式	上	下	左	右	回中

Control Key

3.3.3 Network remote access to stored files

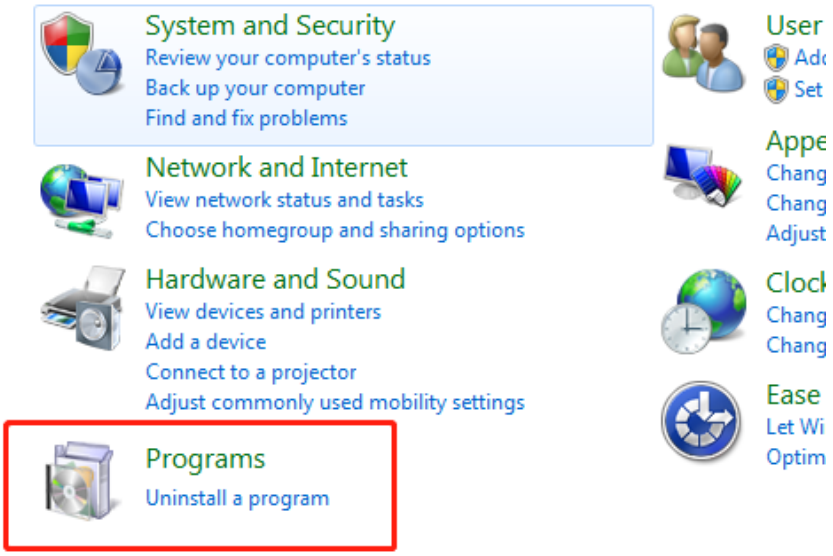
The files in the memory card can be accessed through network sharing. The access method is: Double backslash + IP, as shown in the following figure:



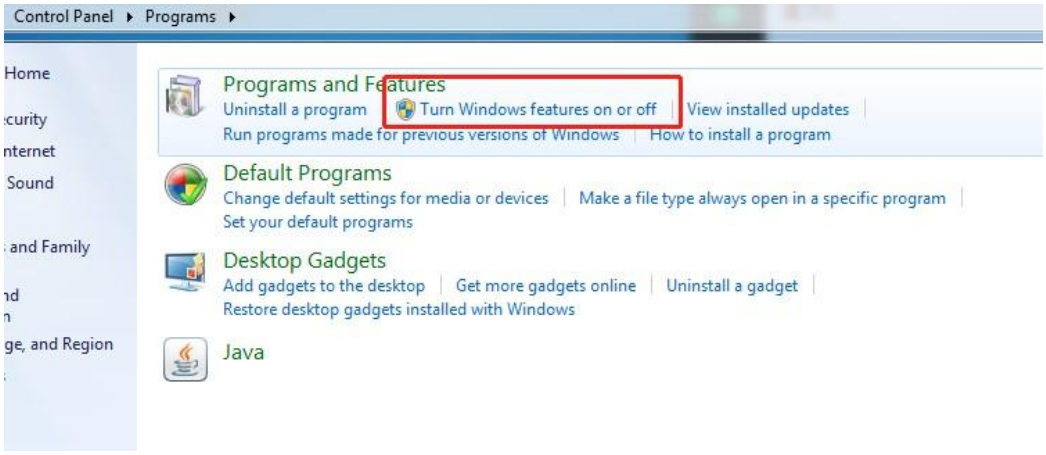
(Note: The host must support the SMB

How to start Windows10:

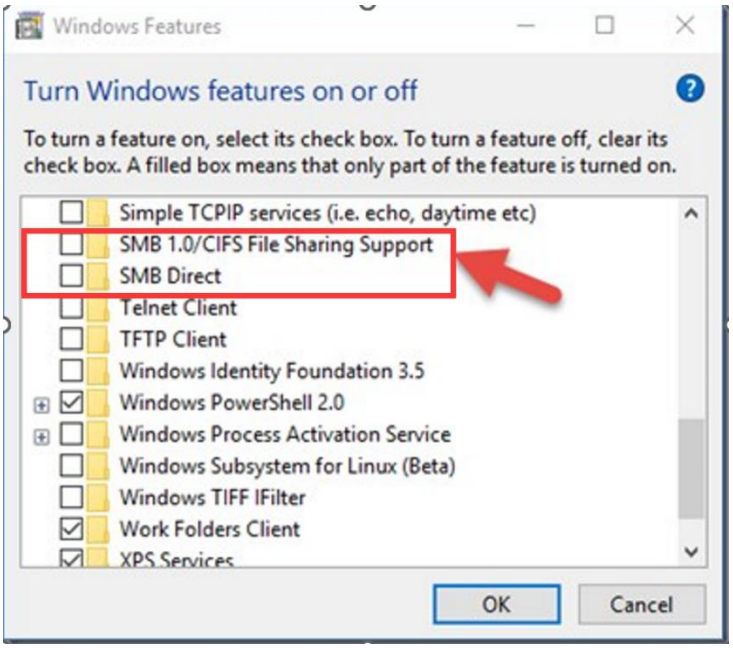
1. Find the program in the control panel and open it.



2、Find the program menu below, find Enable or disable windows features。



3、Select the box before enabling the smb protocol.


Windows Features
Turn Windows features on or off
To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.
Simple TCPIP services (i.e. echo, daytime etc)
SMB 1.0/CIFS File Sharing Support
SMB Direct
Telnet Client
TFTP Client
Windows Identity Foundation 3.5
Windows PowerShell 2.0
Windows Process Activation Service
Windows Subsystem for Linux (Beta)
Windows TIFF IFilter
Work Folders Client
XPS Services
OK
Cancel

3.4 Gimbal debugging

3.4.1 Startup Screen

After the gimbal powered on, the waiting time for startup shall no more than 20s. Within this 20s, the gimbal will be initialized, and wait the RTSP to establish a connection. The default display image is visible light + thermal infrared, as shown in figure 3-4-1-1:

Figure 3-4-1-1 gimbal startup initialization screen

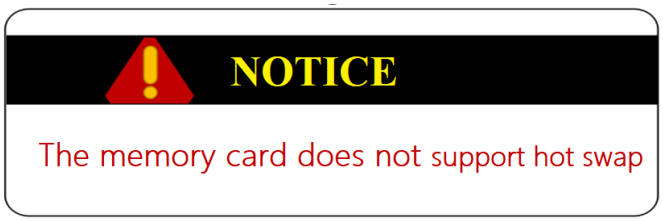
Open the QGC software, enter the correct IP address, default to 192.168.144.108, input RTSP: / / 192.168.144.108:554 / stream = 0 and click PLAY, open the RTSP stream network, then complete the initialization.

3.4.2 Visible light focusing

In some special application scenarios (such as power line inspection), if the target object is too small, the target will not be in focus in the visible light image. In this case, the target object can be correctly focused through the visible light manual focusing command.。

3.4.3 Visible light photography

In the case of TF card, send a photo command to take a picture, or send a photo command to capture the picture when recording, and save the photo time to the photo property.



3.4.4 Recording

When the TF Card exists, the recording can be carried out by sending the recording command. The recording video resolution is 1080p 30fps H264 format. Infrared and visible light video can be recorded at the same time. Send it again and stop recording. The recording time is displayed in the middle of the right side.

3.5 PTZ Debuging and Control

3.5.1 To Initial Position

The gimbal can be set to work in the returning state by control command. In this state, the cradle head will return and keep the camera always facing straight ahead.

3.5.2 YAW Locking

The gimbal can be set to work in the YAW locking mode through control. In this mode, the gimbal will not turn with the rotation of the aircraft heading.

3.5.3 YAW Following

The gimbal can be set to work in the YAW following mode through control. In this mode, it can maintain a fixed Angle with the fuselage and rotate with the course rotation of the aircraft.

3.5.4 Attitude control

The gimbal can be controlled to move at a certain angular rate in the Yaw and pitching direction through serial port command, network command, PWM signal, IBUS and SBUS.

3.5.5 Speed control

When the gimbal rotates, the speed is adaptive based on the rocker offset and the multiple of the visible light camera. As shown in the table 3-5-5-1：

Speed / Multiple	Loa Speed	Middle Speed	High Speed
1x	10r/s	15r/s	20r/s
2x	6r/s	9r/s	12r/s
4x	4r/s	6r/s	8r/s

Figure 3-5-5-1 Gimbal rotate speed

（Note: The data is used only to illustrate the speed control logic and not the actual speed）

3.5.6 Automatic Calibration drift

When the gimbal is used for a period of time or the ambient temperature changes dramatically, it is possible that the gimbal will drift greatly, causing the tilt of the picture or inconvenient manual control. Therefore, automatic drift command is needed for calibration.

4、Use and Operation

4.1 Preparation and checking before using

- Check whether the structure parts of gimbal is normal and whether there is obvious deformation or looseness;
- Check the lens for dirt. If there is dirt in the lens, wipe the lens with a lens cloth;
- Check whether the mechanical installation of the system is normal after installing the gimbal;
- Check whether electrical connection in the system is normal;
- Check gimbal imaging, the function is normal.

4.2 Safety protection, safety marks and instructions in using

When using the product, the power supply voltage shall not exceed the allowable range, and the product shall not be used under the environmental conditions where the load exceeds the normal operation.

4.3 Operate the program during use

After the system is powered on normally, various functions of the gimbal are controlled by buttons or joysticks on the drone handheld terminal.

4.4 Detection and recording during operation

Record the problems encountered during use and save the corresponding image data.

4.5 Operating procedures, methods and precautions after use

After the product is used, disconnect the system power supply, separate the

gimbal from the fuselage in a non-static environment and store it in a dry and ventilated environment. If not used for a long time, it should be placed in the packing box.

5、Fault analysis and troubleshooting

If the user encounters a fault when using the product, please follow the solutions shown in the table below to remove the fault. If any fault is not listed in this manual or cannot be settled
through the solutions in this manual, please contact the customer service department of the Company.

No.	Symptom	reason	solution
1	cannot control gimbal totally	✧ control instruction is invalid; ✧ Docking signal error	✓ check carefully communication protocol ; ✓ confirm the docking signal definition carefully
2	video is sometimes absent, and the control instructions are sometimes unresponsive	✧ docking poor contact wire ✧ External cable damaged	✓ pull plug docking plug-in; ✓ Rewind the cable
3	The image is blurred or the image quality deteriorates	✧ gimbals too close observation target object; ✧ optical focal length is in the clear point ✧ optical lens have stolen goods ✧ optical lenses appear serious quality problem ✧ Other reasons	✓ Adjust the viewing distance, observe whether the image is clear imaging; ✓ Focusing on camera again; ✓ with cotton and observe the imaging effect after alcohol clean lens; ✓ If there is no improvement, please contact the manufacturer.

6、Maintenance

6.1 Daily repair and maintenance

- In the transportation process, please put it in the factory packing box, if there is no packing, please put the gimbal in safe environment such as sponge;
- After the use of the gimbal, turn off the system power and unload the gimbal from the UAV fuselage, which can extend the effective utilization time of the UAV system;
- The gimbal should be kept in a cool, dry environment for long term storage or when not in operation;
- Do not scrub the gimbal housing with chemical solvents, diluents, etc. You can wipe it with clean, soft, dry flannelette;
- Gimbal for important optical components, in the process of installation, to avoid oil and various chemical pollution and damage the surface of the lens, after using, please use a special lens cloth to clean the lens surface, completes the protective measures should be paid attention to in the store at the same time also;
- When not in use for a long time, the functions of the products should be electrified every week, the functions, mechanical interfaces and electrical interfaces of the products should be checked every half a month, the lenses should be cleaned, and the products should be thoroughly checked every month.

6.2 **Maintain procedures and methods**

- Wipe with a clean, soft, dry flannelette in addition to the surface of dust and other sundry together;
- Task load and unmanned aircraft fuselage connection, right after the connection is verified again electrify check;
- After normal operation, adjust and test all functions through the UAV handheld terminal, and make detailed records when problems are found;
- The method in this manual still fails to troubleshoot, please contact our company.

7、Transport and storage

7.1 Transportation

- After the acceptance by the buyer, the seller shall assist the buyer in transporting the products to the user unit and the warehouse for storage in accordance with the provisions of the order Contract;
- The quality of shipment and the safety requirements in the course of transportation shall comply with the relevant provisions of the administrative department of international traffic and transportation;
- Product handling should pay attention to the following matters:
  - 1、 No matter what kind of loading and unloading, it can ensure safety and reliability;
  - 2、 Strictly observe the requirements of fire prevention, water proofing and moisture proofing in shipment;
  - 3、 Do not transport inflammable, explosive and corrosive goods in the same vehicle.
- Collision avoidance during transportation.

7.2 Storage

Qualified products, if not shipped immediately, shall be stored in the warehouse for the finished products. Storage life is not more than three months. The manufacturer shall be responsible for the storage and maintenance of the products during the storage period. When the ordering party stores the products for a long time, the products shall be electrified and tested once every six months.

The product shall be stored in a dry, ventilated and non-corrosive environment with a temperature of -20℃ ~ +65℃ and a relative humidity of no more than 95%.

8、Other Instructions

8.1 Packing list and Notice

When unpacking the case, make sure that the instrument case is stably placed. Check the device and accessories according to the packing list. List is shown as the Table 8-1-1:：

Item	QTY	Unit
Gimbal	1	pcs
Qualification	1	pcs
User Manual	1	Electronic version
Packing box	1	pcs

Figure 8-1-1 Packing list

8.2 Guarantee of production units, after-sale service

After-sale Tele: 010-57147023 WeChat/Mobile:13331001415 QQ:3033642663
Add: Room 909, Unit 1, Building 3, Zhujiang Moer International Building, 1 Beiqing Road, Changping District, Beijing.

Appendix I
Remark:

Factors affecting ranging capability, ranging response speed and speed measurement accuracy is including as follow:

1) Target reflectivity: Generally, the higher the target reflectivity, the better the ranging capability and the faster the ranging response speed. For example, medium reflectivity can measured targets at 1500 meters, high reflectivity can measured targets more than 1800 meters, but low reflectivity only can measured targets within 600 meters, (targets with difficult diffuse reflection, such as water surface, can’t be measured)

2) Target shape: when the reflecting surface area of the measured target is too small or uneven, the ranging ability and ranging response speed will be reduced accordingly;

3) Measurement angle: when the laser angle irradiates vertically on the reflection surface of the measurement target, the better the ranging ability, the faster the ranging response speed. On the contrary, the ranging ability and ranging response

speed will be reduced; When used at extreme measuring angles, the ranging capability and ranging response speed specified in this manual cannot be guaranteed;

4) Measurement environment: factors affecting ranging capability and response speed also include sunshine intensity, concentration of water vapor and suspended particulate matter in the air, deviation from the angle of sunlight, etc.(For example, the range will be reduced in rainy, foggy, snowy and haze weather)

If the product version needs to be upgraded or the functions are required to be changed, please feel free to contact us for further technical support :

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Mailbox: caijianlong@topotek.com

Contact: (+86) 13331001415

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Hangzhou Topotek Technology Co., Ltd. R&D Center(Hangzhou): Room 1001, Building A, Hangzhou artificial intelligence Industrial Park, 57 jianger Road, Binjiang District, Hangzhou, China.

Product Center(Shenzheng)： Room 1209, Building 6, Block A, Hongchuang Technology Centre, Xikeng Road, Longhua District, Shenzhen, China.

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