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ALFATRON ELECTRONICS GmbH GERMANY

ALF-12 / 20X-HD-TC, ALF-12 / 20X-SD-TC PTZ Tracking
Camera

User Manual



FCC Statement



NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Radiation Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Radiation Exposure:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment.

Do not dispose of this product with the normal household waste at the end of its life cycle. Return it to a collection point for the recycling of electrical and electronic devices. This is indicated by the symbol on the product, user manual or packaging. The materials are reusable according to their markings. By reusing, recycling or other forms of utilisation of old devices you make an important contribution to the protection of our environment. Please contact your local authorities for details about collection points.

Preface

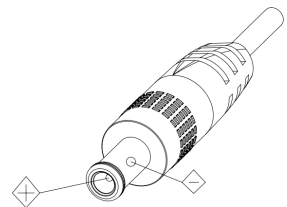
This manual describes the functions, installation and operation principles and methods of the product in detail. Before installing and using this product, please read it carefully.

1. Safety precautions

- During transportation, storage, installation, and use, it is necessary to prevent heavy pressure, severe vibration, and immersion to avoid damage to the product.
- The product shell is made of organic material. Ensure product does not encounter corrosive liquid, gas, or solid substances.
- Do not let the product get wet or rained on. Do not use it beyond the limit of temperature and humidity.
- When cleaning the lens, please use a soft dry cloth to wipe. When there is a lot of dust, please use a neutral cleaner and wipe gently.
- Do not use a strong or corrosive detergent to avoid scratching the lens and affecting the image.
- This product has no parts that users can repair by themselves, and the damage caused by users' self-disassembly does not fall within the scope of warranty.

2. Electrical safety

- The installation and use of products must strictly comply with the national and local electrical safety standards.
- Do not use power adapters beyond the specifications of the power supply, otherwise the equipment components will burn out and will not work properly.
- In the process of using the product, we should keep enough distance from the high-power equipment, and do a good job of lightning protection, surge protection and other protective measures when necessary.
- When the product is not in use, please disconnect the power switch and disconnect the power adapter from the power socket.
- The product uses a DC 12V power supply, and the polarity of the power plug is as shown in the picture.

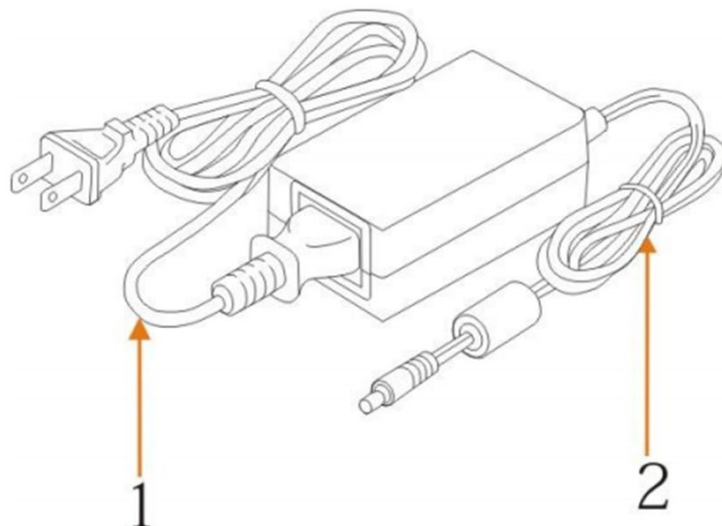


3. Installation Safety

- Do not rotate the cylinder of the product by hand, otherwise it will destroy the rotating shaft of the structure.
- Installation and placement of equipment should be horizontal and stable, and the product should not be tilted, otherwise the picture may be skewed.
- Installation ensures that there are no obstacles in the rotating range of the platform to prevent damage to the rotating shaft of the structure.
- Do not turn on the power until all installation work is completed.

4. Magnetic Interference

- The electromagnetic field at a specific frequency may affect the local image. The product is Class A product. Radio interference may occur in the home environment, and users need to take appropriate measures.



If it is needed to extend the power line of the camera, extend it from terminal 1 (220V/110V) rather than terminal 2 (DC12V), otherwise, it will prevent the device from functioning!

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1. System overview

1.1 System introduction

The ALF-XX-HD-TC / ALF-XX-SD-TC is a dedicated smart camera solution leading in the international education information industry.

The tracking camera features a built-in high-speed processor and advanced image processing and analytical algorithm, which allows it to track and detect teachers, students and blackboard-writing accurately and quickly. It fully satisfies all scenario demands by recorded broadcasting of teaching and remote interactive teaching.

The tracking camera adopts an advanced ISP processing technique and algorithm, producing vivid images which feature balanced brightness, distinct layering, high definition and colour reducibility.

The ALF-XX-HD-TC range are characterized by improved function, high performance, reliable operation, simple use and easy maintenance.

1.2 Product advantages

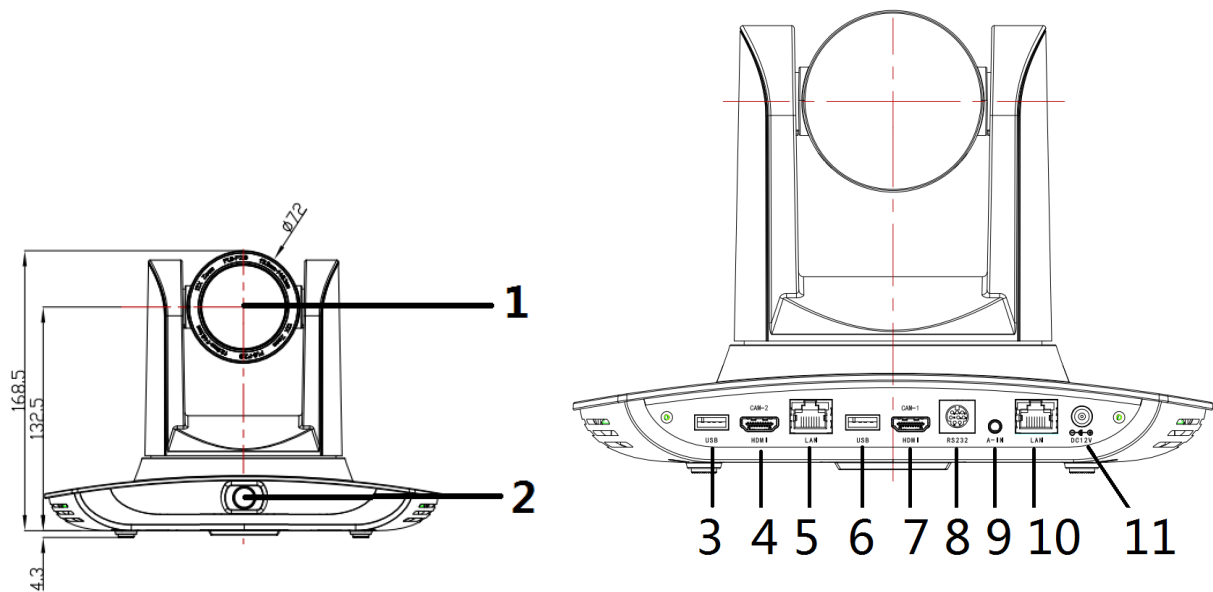
- **Full-scene solution:** Different product combinations satisfy different scenario demands.
- **Networked control interface:** Control information of all products will be transmitted via a network, and it is suitable for product layout for all scenarios.
- **Recognition algorithm unrelated to the location:** Status detection and recognition of teachers and students adopt a unique smart partitioning algorithm to ensure that the result of detection and recognition is unrelated to location.
- **Ease of installation:** Supports both standing installation and upside-down installation.
- **All-in-one design:** The built-in panoramic lens allows the perfect combination of panoramic lens and tracking camera.
- **Sophisticated tracking algorithm:** It applies sophisticated human detection, locking and tracking image processing and analytical algorithm (smart image recognition library, scene adaptive algorithm), and achieves stable, fast and accurate target tracking.
- **High immunity from interference:** More diversified and flexible recognition shield settings ensure that once the tracking target is locked, it will not be affected by another moving object or projector.
- **Stable tracking:** Movement sensitivity is adjustable. When tracking a slight movement of target or hand movement, it will not cause the wrong operation of the camera.

- **Self-adaptive image:** The tracking camera zooms depending on the distance to target so that the visual image maintains proper size and scale.
- **High environmental suitability:** Tracking result will not be affected by classroom size, shape or seat arrangement.
- **Super wide dynamic exposure:** Solves the issue that tracking object dims in strong light such as a projector.

1.3 Product features

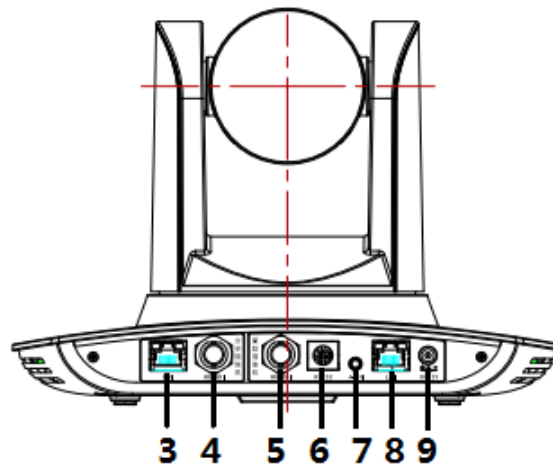
- **Full HD image:** With a 1/2.8-inch-high quality image sensor, the maximum resolution ratio is 1920x1080.
- **Multiple optical zoom lens:** 12X and 20X optical zoom lens are available. The lens features a 72.5° distortionless wide viewing angle.
- **Advanced focusing technique:** The advanced automatic focusing algorithm allows automatic focusing to be done quickly, accurately and steadily.
- **Low noise high signal to noise ratio:** Low noise CMOS ensures super high signal to noise ratio of video taken by the camera. With advanced 2D and 3D noise reduction technology, noise is reduced, and image resolution is guaranteed.
- **Audio input port:** It supports 16000, 32000, 44100, 48000 Hz sampling frequency and AAC, MP3 and G.711A audio coding.
- **Super quiet mechanism:** High precision stepping motor and precision motor-driven controller ensure the PTZ mechanism operates at low and stable speed without noise.
- **Multiple video compression standards:** It supports H.265 / H.264 video compression.
- **Multiple networking protocols:** It supports ONVIF, GB/T28181, RTSP, protocol and RTMP push mode.
- **Sleep mode:** It supports low-power consumption sleep / wake up mode. Power consumption in sleep mode is lower than 400mW.
- **Multiple control protocol:** Supports VISCA, PELCO-D, PELCO-P protocol, automatic recognition protocol and all command VISCA control protocol.

2. Port introduction – ALF-XX-HD-TC



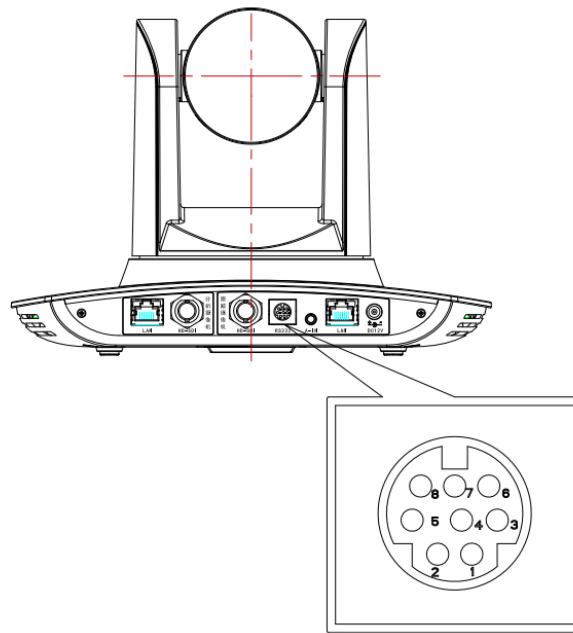
1. Close-up lens
2. Panorama (Wide) lens
3. USB3.0 output 1 (panorama lens output)
4. HDMI output 1 (panorama lens output)
5. LAN network port for panorama lens
6. USB3.0 output 2 (close-up lens output)
7. HDMI output 2 (close-up lens output)
8. RS-232 control port
9. Audio input port
10. LAN network port for close-up lens
11. Power supply port (DC12V)

2.1 Port introduction – ALF-XX-SD-TC



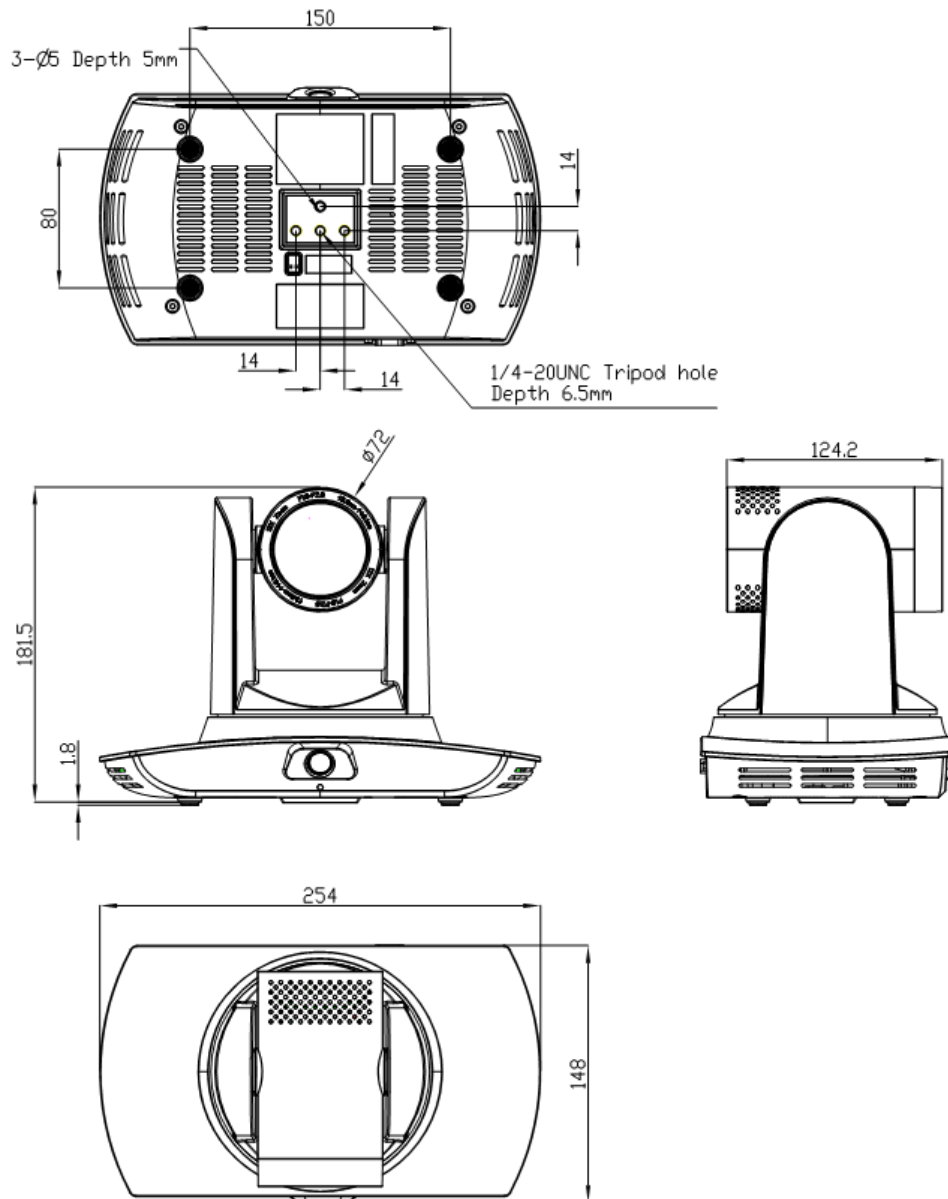
1. Close-up lens
2. Panorama lens
3. LAN network port for panorama lens
4. SDI output 1 (panorama lens output)
5. SDI output 2 (close-up lens output)
6. RS-232 control port
7. Audio input port
8. LAN network port for close-up lens
9. Power supply port (DC12V)

Pin definition:



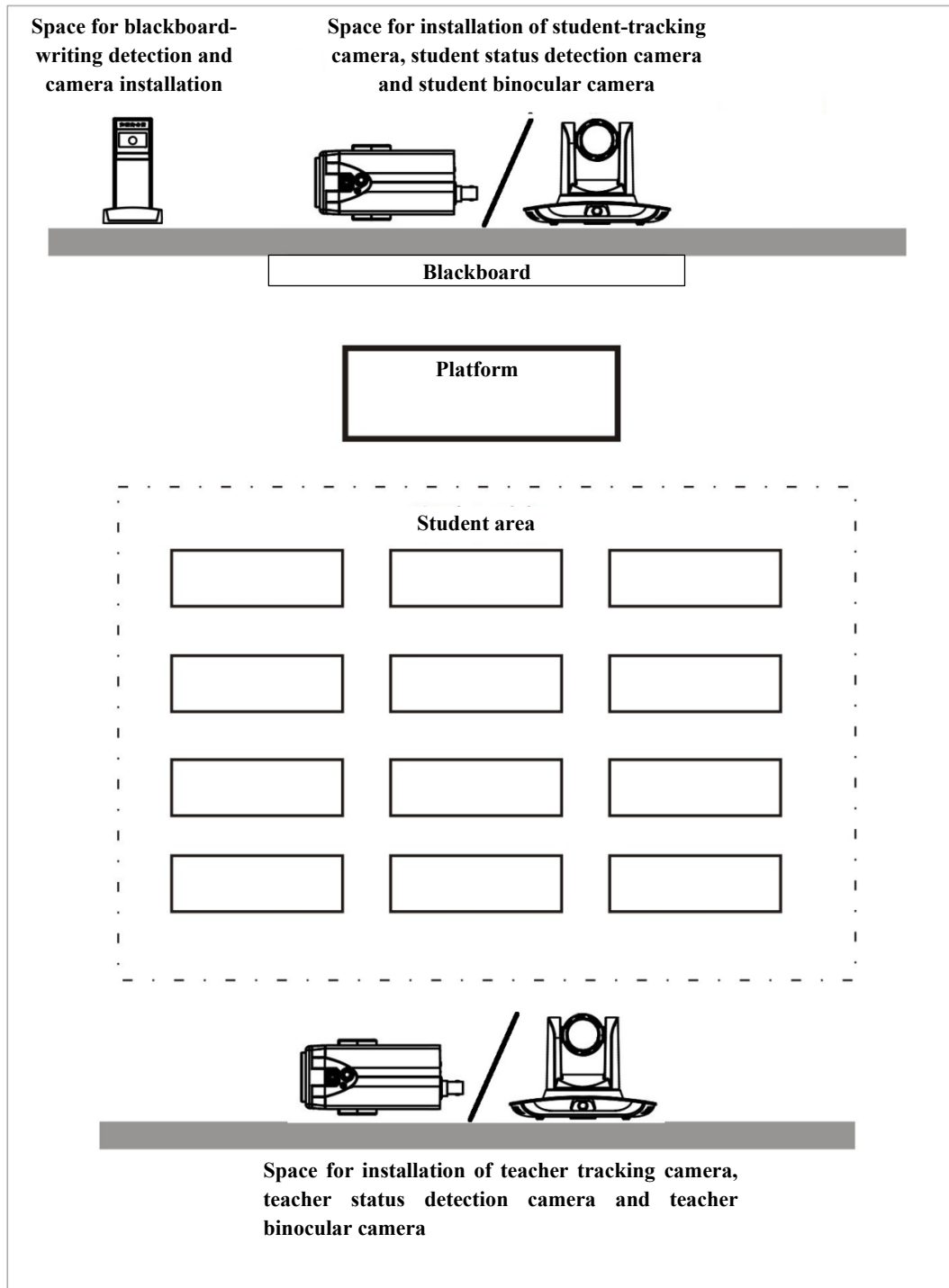
No.	Port	Definition
1	DTR	Data Terminal Ready
2	DSR	Data Set Ready
3	TXD	Transmit Data
4	GND	Signal ground
5	RXD	Receive Data
6	GND	Signal ground
7	IR OUT	IR Commander Signal IR
8	NC	No Connection

3. Dimensions



4. System connection

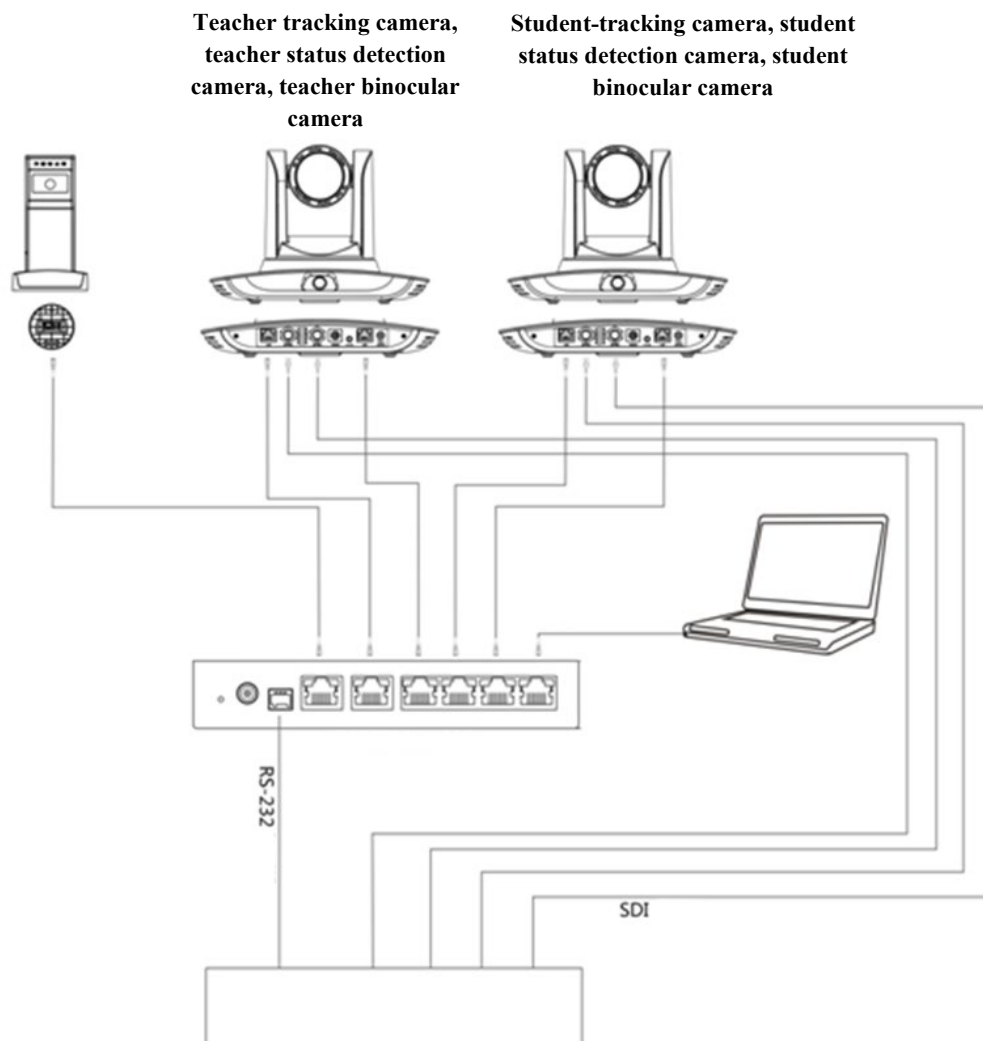
4.1 Installation layout



The tracking camera is installed about 1.8 - 2.5m from the ground (distance from the panoramic lens to the floor), 5 - 15m from the blackboard (when the distance is 5 - 9m, 4mm panoramic lens is recommended; when distance is 9 - 15m, 6mm panoramic lens is recommended). Teacher tracking camera should be installed near the central axis of the classroom as much as possible to get the best result of tracking camera shooting.

4.2 System wiring

The tracking camera provides a smart camera solution for the education information field. Different combinations of products meet the demand of customers' application scenarios.



If the recording and broadcasting host supports the LAN network control port, the network hub can be replaced by a LAN network switch.

5. Configuration tools

5.1 Set IP address of the tracking machine

Open Alfatron tracking software, click Settings -> IP address -> Search successively (refer to Figure 5.1-1 for details), the configuration interface will display all valid devices in the LAN, check the type of device to be configured and click Confirm. *Note: The computer for operating the Alfatron tracking software tool should be in the same LAN with the camera to be configured.*

The screenshot shows the 'IP Setting' window with the following configuration details:

- Hub:** Use Hub pls. IP Address: 192.168.5.190, Data Port: 3000, Camera Port: 3001, Host Control Port: 3002.
- Blackboard Camera:** Enable. IP Address: 192.168.5.191, Data Port: 3000, VISCA Port: 1259, User Name: admin, Password: *****.
- Teacher Tracking Camera:** Enable. Camera Type: PTZ Tearch Camer. IP Address: 192.168.5.103, Data Port: 3000, VISCA Port: 3001, User Name: admin, Password: *****.
- Student Tracking Camera:** Enable. Camera Type: PTZ Student Camer. IP Address: 192.168.5.105, Data Port: 3000, VISCA Port: 1259, User Name: admin, Password: *****.

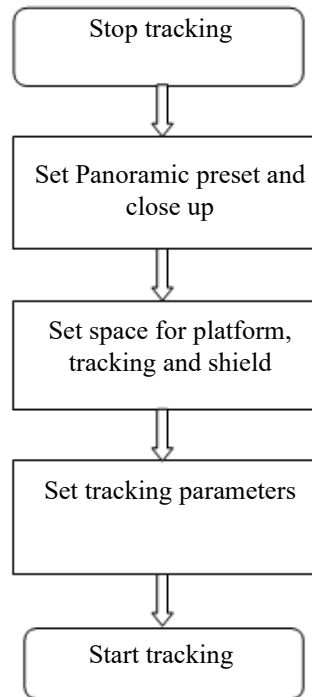
Device Type	Panoramic IP	Panoramic Port	Panoramic V...	Close-up IP	Close-up Port	Close-up VI...
<input type="checkbox"/> Student Tracking	192.168.5.105	3000	1259	192.168.5.193	3000	1259
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input type="checkbox"/> Teacher Tracking	192.168.5.103	3000	3001	192.168.5.102	3000	1259
<input type="checkbox"/> Teacher Tracking	192.168.4.108	3000	1259	192.168.4.107	3000	1259
<input type="checkbox"/> Teacher Tracking	192.168.4.103	3000	3001	192.168.4.102	3000	1259

At the bottom, the IP Address is set to 192.168.0.31, and the 'Confirm' button is highlighted with a blue arrow.

Figure 5.1-1 Operation interface

5.2 Configure tracking parameters.

To configure, follow the below process:



The following is a depiction of the configuration for the above process:

The main interface of the configuration tool is shown in Figure 5.2-1.

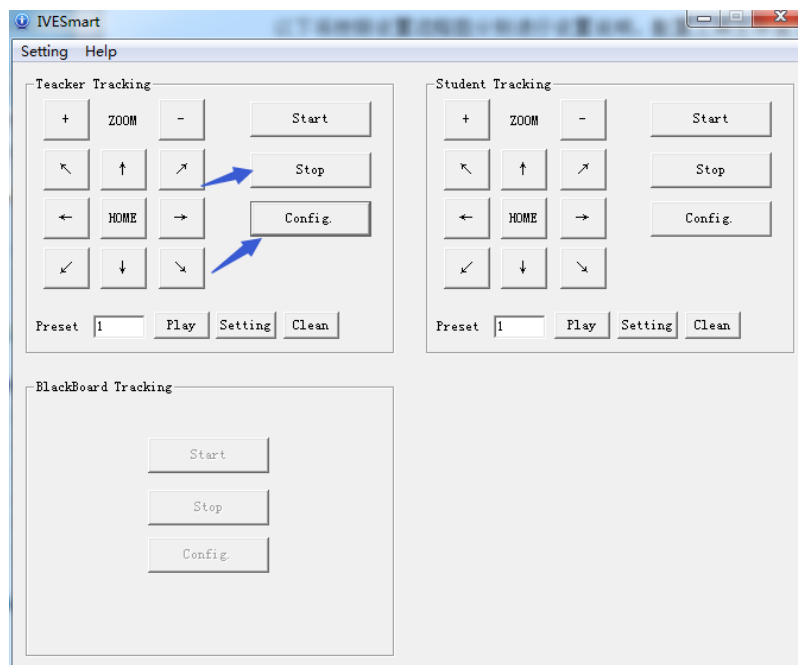


Figure 5.2-1 Operation interface

1. Set the preset position for close up

The operation interface for setting preset position for close up is shown in Figure 5.2-2.

The framed area indicated by the arrow has the PTZ control buttons. By controlling the Pan / Tilt position and Zoom value, it will adjust the camera angle and position to the desired preset position.

Settings of panoramic preset position and platform preset position are as follows:

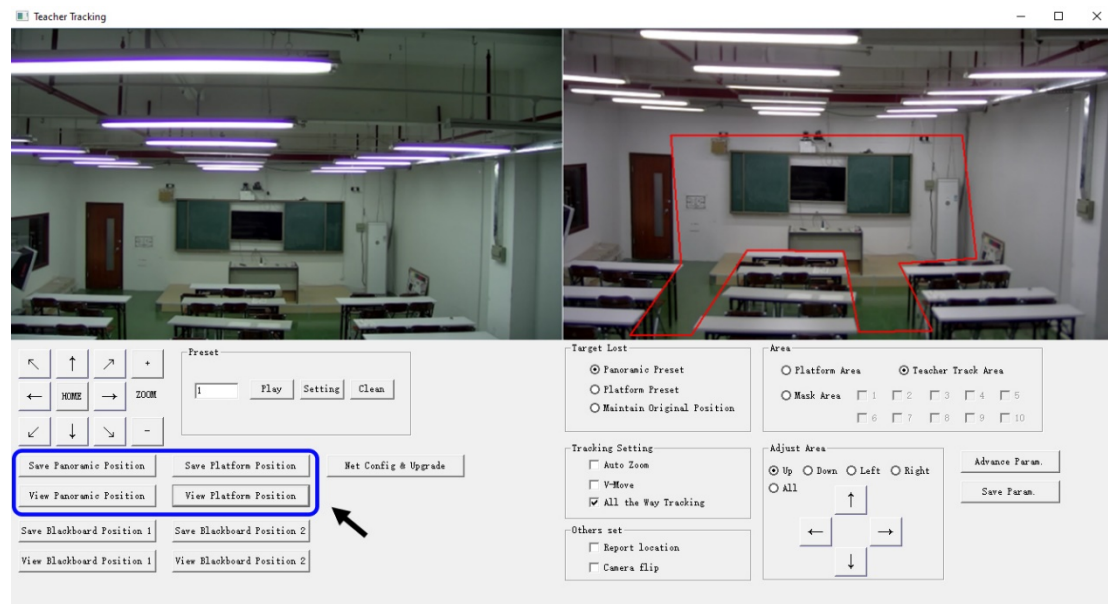


Figure 5.2-2 Operation interface

Platform preset: Control the tracking camera (close up camera) to create a platform area and get the desired visual result in-camera image, then click and save Platform preset. During normal tracking, the size of the persons image in the picture uses a Platform preset as a reference. When the tracking target disappears, it can select a close-up lens to go back to the Platform preset.

Panoramic preset: Control tracking camera to allow it to have a panoramic view of the classroom (or any position). When the tracking target disappears, it can select the close-up lens to go back to the panoramic position.

2. Set panoramic lens area

Platform area: This is the area that is tracked once the close-up lens starts tracking. There is a blackboard within the platform area generally to ensure that when the teacher is on the platform their upper body is displayed within the set area, and it will not exceed the lower margin of the platform area when students in the first row sit down. See Figure 5.2-3.

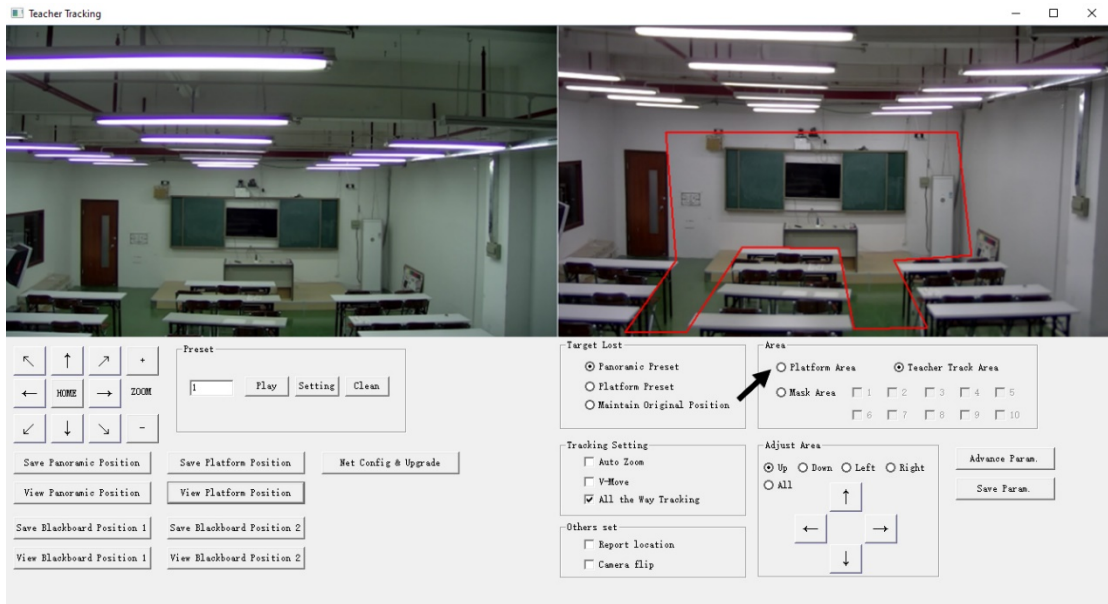


Figure 5.2-3 Operation interface

Tracking area: Tracking area means the scope of area tracking the teacher. When the tracking target goes out of the tracking area, it will be considered as tracking target lost. The tracking area can be set into a polygon shape according to certain environmental conditions or set student area outside of tracking area. See Figure 5.2-4:

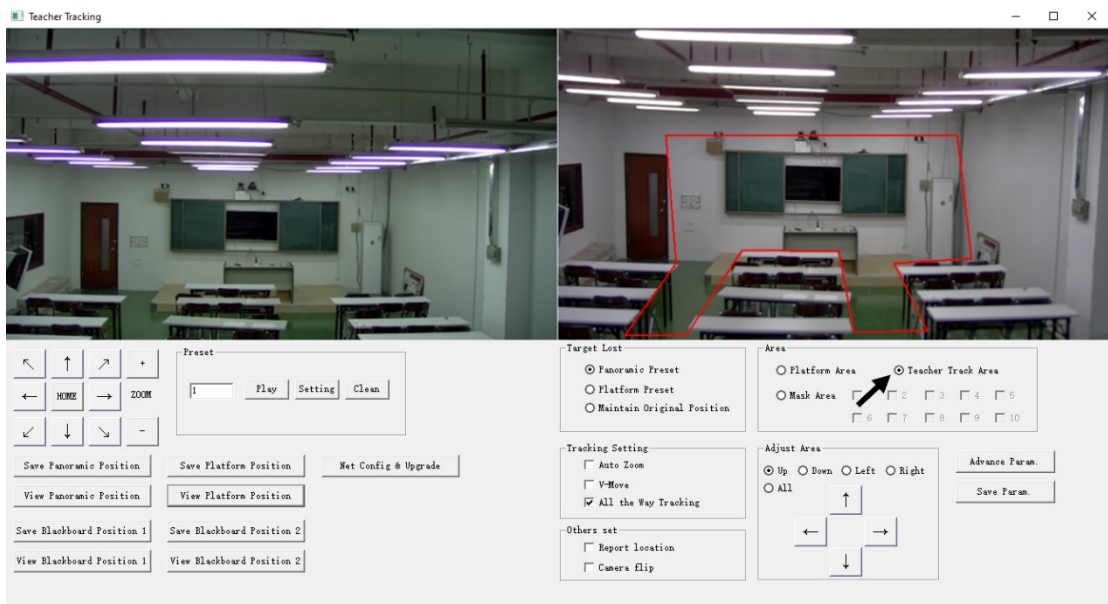


Figure 5.2-4 Operation interface

Mask area: The mask area is an area that may impact the effectiveness of target tracking, these are places that may have dynamic changes such as monitors, projector, doors, and windows. See Figure 5.2-5:

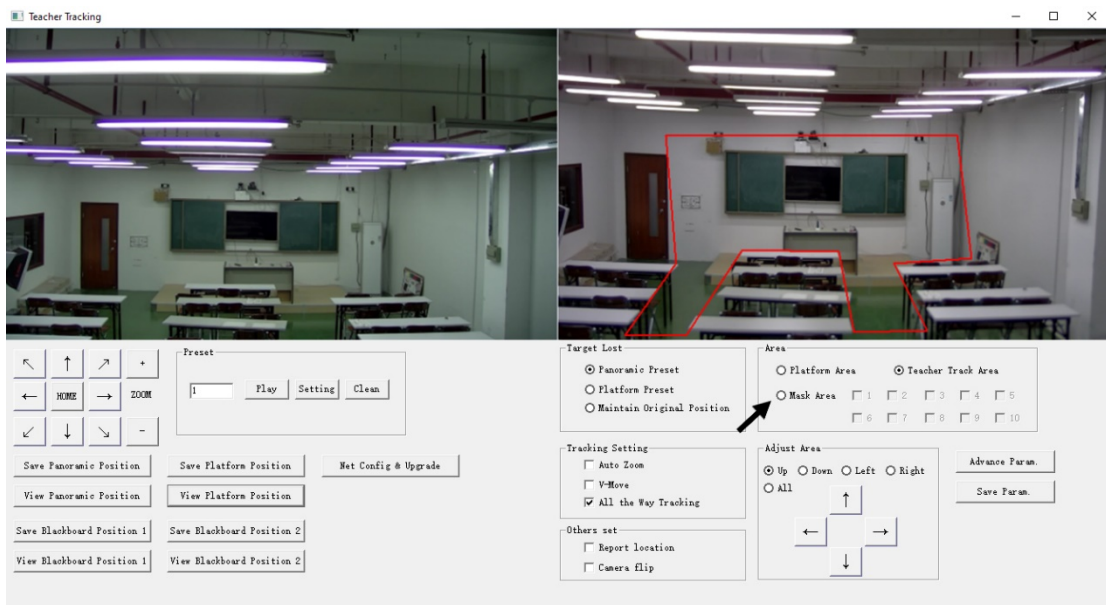


Figure 5.2-5 Operation interface

3. Set tracking parameters

Target lost: When the target is lost, the close-up lens will return to a designated preset position. This preset position can be the Panoramic Preset, Platform Preset or Maintain Original Position.

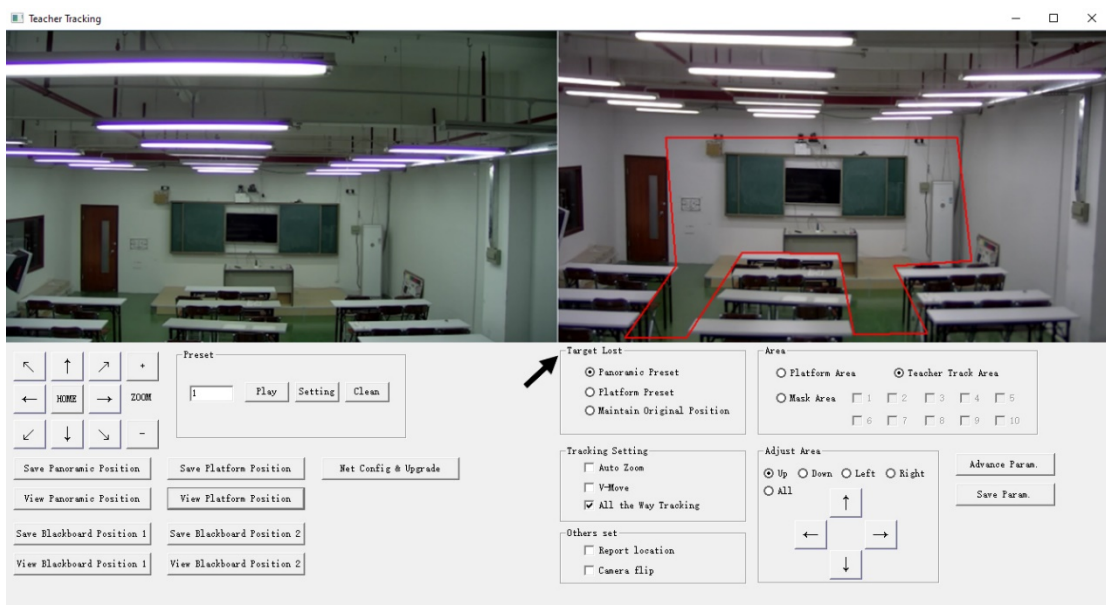


Figure 5.2-6 Operation interface

Tracking settings:

Auto-zoom: In open mode (checked), during tracking, the camera will zoom automatically according to target distance; in off mode (unchecked), during tracking, zoom remains to the value set during platform preset.

V-move: In open mode (checked) and during tracking, the camera will adjust its angle of elevation according to the height of the tracking target; in off mode (unchecked) and during tracking, the angle of elevation remains to the value set during platform preset. If a teacher does not step down from the platform in class, we suggest turning off the auto-zoom and v-move.

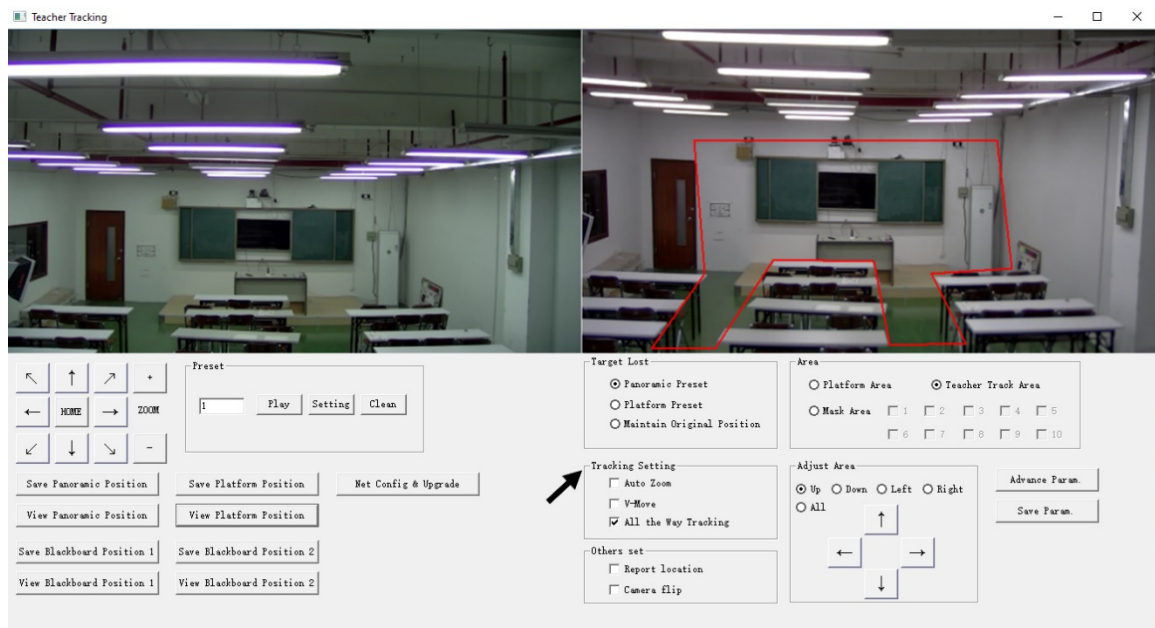


Figure 5.2-7 Operation interface

Advanced parameters:

Action sensitivity: In tracking mode, it is the action range required to trigger the tracking camera when the tracking target changes from a stationary state to a motion state. The higher the action sensitivity, the smaller the movement of the tracking target that will trigger the camera's tracking motion.

H-speed: It means the speed of the camera for horizontal tracking.

V-speed: It means the speed of the camera for vertical tracking.

Zoom range: The bigger the range, the higher zoom extent required for the camera when the tracking target steps down from the platform.

Lost timeout: This means the time required (5s by default) for the camera to perform the target lost action when the target is lost (options: return to panorama preset, platform preset, or remain original position).

Down platform sensitivity: This is used for determining if a teacher steps down from the platform. The lower the sensitivity, the longer the teacher's distance to the blackboard is required to trigger the down platform action.

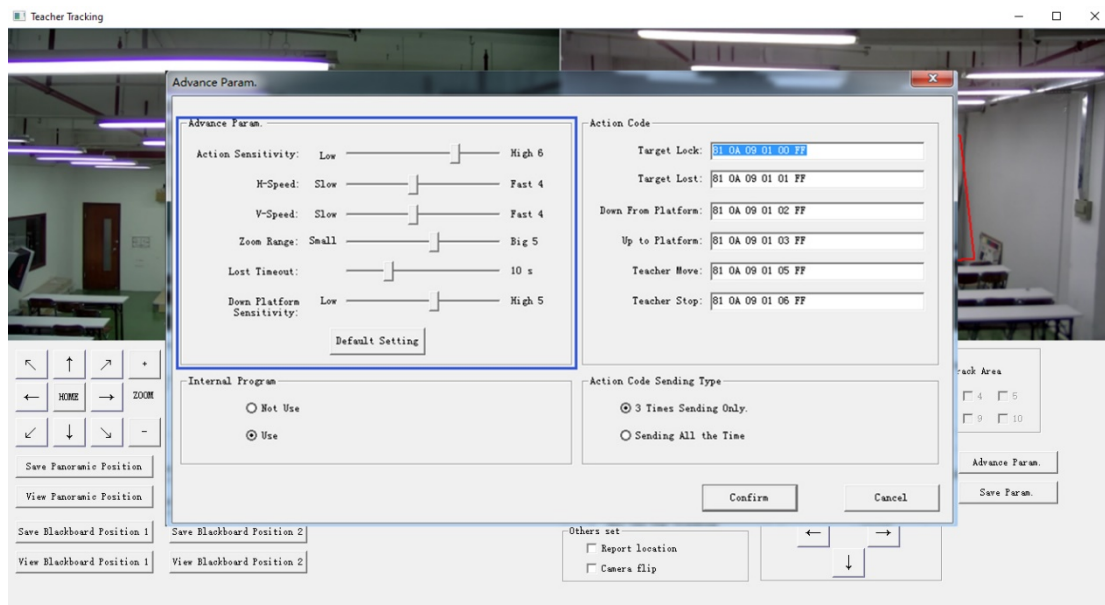


Figure 5.2-5 Operation interface

For settings of action code, refer to “6.2 Description of connecting recording and broadcasting host”.

After setting, click Save Parameter. This allows entering the advance parameter settings column to change configuration value to obtain the best result subject to specific scenes and requirements.

5.3 Network update

When updating the camera firmware, please use the Alfatron tracking software application. Click Configuration -> Network configuration & update, to enter update interface, as shown below:

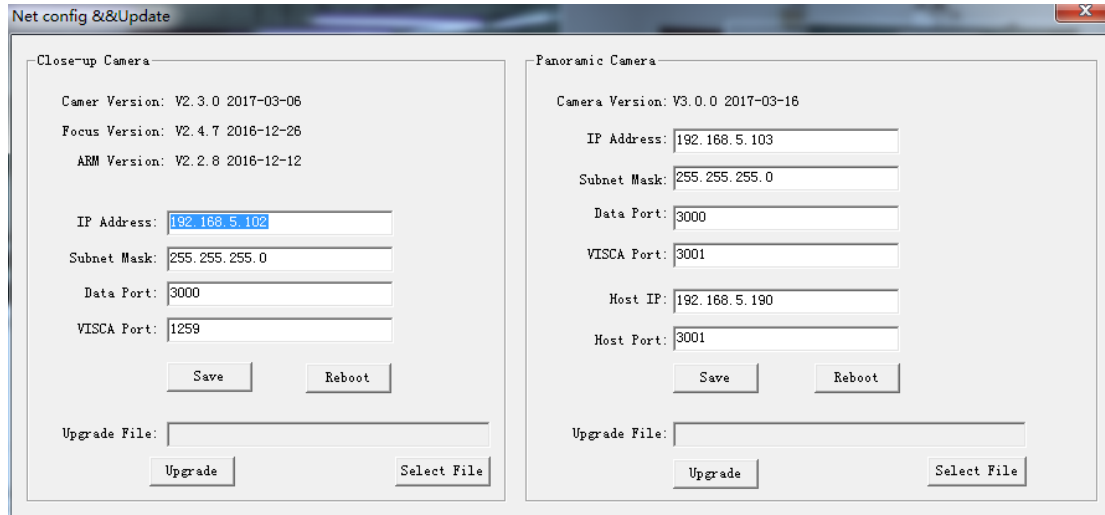
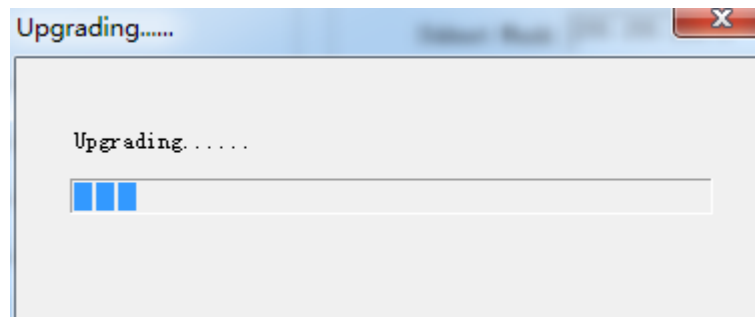


Figure 5.2-8 Operation interface

When upgrading, note whether the camera to be upgraded is the close-up camera or panorama camera, then click Select file -> upgrade, the following interface appears:



After upgrading is completed, the camera will perform self-inspection.

Note: After grading, you can restore factory settings by combination key [*] [#] [6] on the remote control or by remote control menu.

6. Description of recording and broadcasting host

6.1 Auto tracking control

The recording and broadcasting host sends commands via the LAN network port or network hub RS232 serial port and controls automatic tracking motion of teacher tracking camera. In auto-tracking mode, it does not allow control of the camera rotation or zoom by Alfatron tracking software tool or remote control; in stop auto-tracking mode, it allows control of the camera rotation or zoom by Alfatron tracking software tool or remote control.

1. Network receiving address

Address for teacher tracking camera to receive commands can be searched in Alfatron tracking software, click Setting -> IP address -> search, as follows:

The screenshot shows the 'IP Setting' window with the following configuration:

- Hub:** Use Hub pls. IP Address: 192.168.5.190, Data Port: 3000, Camera Port: 3001, Host Control Port: 3002.
- Blackboard Camera:** Enable. IP Address: 192.168.5.195, Data Port: 3000, VISCA Port: 1259, User Name: admin, Password: *****.
- Teacher Tracking Camera:** Enable. Camera Type: I Teacher Camera. IP Address: 192.168.5.197, Data Port: 3000, VISCA Port: 1259, User Name: admin, Password: *****.
- Student Tracking Camera:** Enable. Camera Type: PTZ Student Camera. IP Address: 192.168.5.105, Data Port: 3000, VISCA Port: 1259, User Name: admin, Password: *****.

Device Type	Panoramic IP	Panoramic Port	Panoramic V...	Close-up IP	Close-up Port	Close-up VI...
<input type="checkbox"/> Teacher Tracking	192.168.5.200	3000	1259	192.168.5.201	3000	1259
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input checked="" type="checkbox"/> Teacher Tracking	192.168.5.197	3000	1259		0	0
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input type="checkbox"/> Hub	192.168.5.190	3000	3001		0	0
<input type="checkbox"/> Teacher Tracking	192.168.4.103	3000	3001	192.168.4.102	3000	1259

IP Address: 192.168.0.31 Search Confirm Cancel

Figure 6.1-1 Operation interface

2. Command

Type	Command
Start teacher tracking	0x810x0A 0x08 0x01 0x020xFF
Stop teacher tracking	0x81 0x0A 0x08 0x01 0x03 0xFF

6.2 Action code docking

The tracking status of the teacher tracking camera will give feedback to the recording and broadcasting host via the network (UDP transmission mode) or network hub (RS232 serial port) in the form of an action code.

1. Configure recording and broadcasting host address

If the recording and the broadcasting host use LAN to receive the activation code, then it needs to configure the host address via the Alfatron tracking software tool. Click **Configuration -> Network configuration & update**, as shown below:

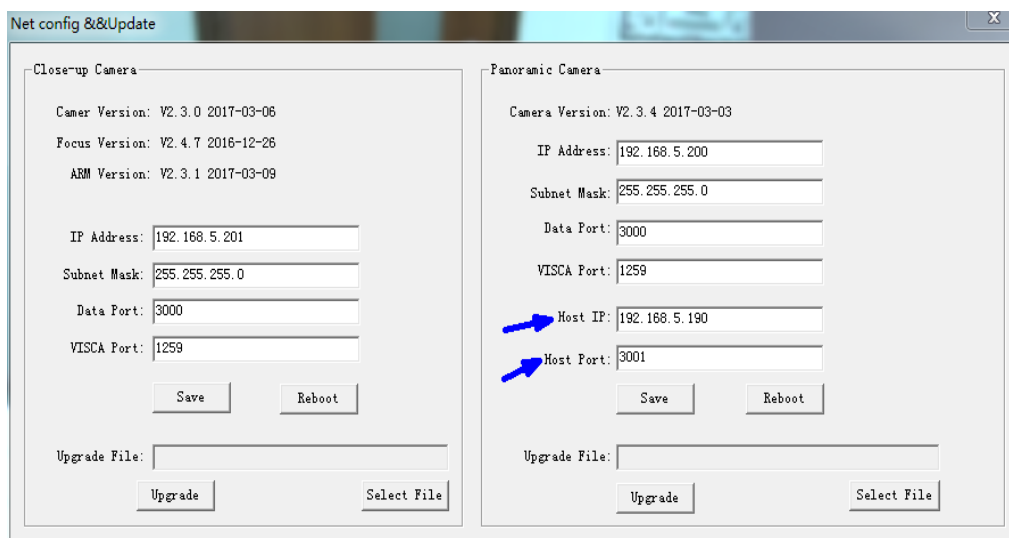


Figure 6.2-1 Operation interface

2. Configure action code

Edit action code as needed via the Alfatron tracking software tool. Click Configuration -> advance parameters.

After modification, click Confirm -> save parameters, as shown below:

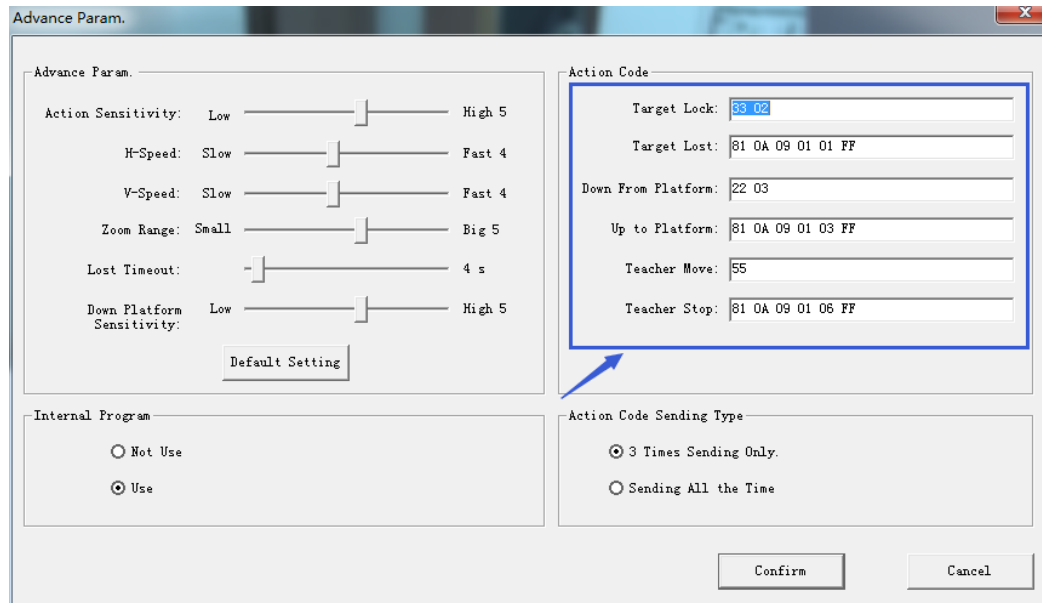


Figure 6.2-2 Operation interface

7. Description of remote control

7.1. Description of keys



1. Standby key

Long press standby key for 3s, the camera enters standby mode, long press this key again for 3s, the camera will perform self-inspection and return to the HOME position. When setting #0 as preset, and there is no action within 12s, the camera will return to #0 preset.

2. Select camera

Select the address number of cameras to be controlled.

3. Number key

Set or call #0-9 preset.

4. *key and #key

5. Focusing control key: adjust focusing.

[Auto focusing]: Enter autofocusing mode.

[Manual focusing]: shift camera focusing mode to manual; adjust focusing via [Focusing +] or [Focusing -]

6. Zoom key

[Zoom +]: zoom out lens; [Zoom -]: zoom-in lens.

7. Set and clear preset key

Set preset: Save a preset, set preset + number key (0-9), that is set preset of the corresponding number key.

Cancel preset: Cancel a preset, cancel preset + number key (0-9), that will cancel preset of corresponding number key.

8. Camera control key

UDLR (Up, Down, Left, Right) arrow controls the UDLR movement of the camera.

[HOME] key: Camera returns to centre position or enters the next level menu.

9. Backlight compensation control key

The backlight on/off: Turn on or off the backlight.

10. Menu key: Enter/exit OSD menu or return to the previous level menu.

11. Set infrared remote-control address of camera

[*] + [#] + [F1]: # 1 address [*] + [#] + [F2]: # 2 address

[*] + [#] + [F3]: #3 address [*] + [#] + [F4]: #4 address

12. Combination key functions

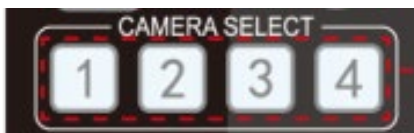
- | | |
|--|---|
| 1) [#] + [#] + [#]: Cancel all presets | 2) [*] + [#] + [6]: Restore factory settings |
| 3) [*] + [#] + [9]: Shift between front and upside-down installation | 4) [*] + [#] + auto: Enter aging mode |
| 5) [*] + [#] + [3]: Set menu into Chinese | 6) [*] + [#] + [4]: Set menu into English |
| 7) [*] + [#] + manual: Restore default IP, username, password | 8) [#] + [#] + [0]: Shift video format 1080P60 |
| 9) [#] + [#] + [1]: Shift video format 1080P50 | 10) [#] + [#] + [2]: Shift video format 1080I60 |
| 11) [#] + [#] + [3]: Shift video format 1080I50 | 12) [#] + [#] + [4]: Shift video format 720P60 |
| 13) [#] + [#] + [5]: Shift video format 720P50 | 14) [#] + [#] + [6]: Shift video format 1080P30 |
| 15) [#] + [#] + [7]: Shift video format 1080P25 | 16) [#] + [#] + [8]: Shift video format 720P30 |
| 17) [#] + [#] + [9]: Shift video format 720P25 | |

7.2 Use remote control.

Once the camera has powered on and run its self inspection, it will be capable of receiving infrared commands. Press down the remote-control key, the receiving indicator of remote-control flashes, release the key, the indicator stops flashing. Users can set presets, read position, and control horizontal and vertical motion by infrared remote control.

Description of keys:

1. The keypress mentioned in this manual means press and release the key on the remote control. For example, “press [HOME] key” means press down [HOME] key and release. If a long press is needed, it will be specified.
2. Operation of combination keys mentioned in this manual means operating such keys in order. For example, “press [*] + [#] + [F1]” means press [*] first, then [#], and [F1] at last.

1) Select camera

Select the address number of cameras to be controlled.

2) Camera Control



Move upwards: Press [▲]; move downwards: Press [▼]

Rotate left: Press [◀]; rotate right: Press [▶]

Center position: Press [HOME]

Long press the UD/LR key, it will move from low speed to high speed continuously, until it reaches the destination; release in the middle of the movement, the camera will stop moving.

3) Set, cancel, call preset.



1. Save preset: Press [Set preset], then press any number key from 0 to 9, it will reset a preset corresponding to the number key.

Note: with remote control, it can set 10 presets at most.

2. Call preset: Press number key 0~9 directly, it will move to the preset which has been saved.

Note: If this key has not been preset, this operation is invalid.

3. Cancel preset: Press [cancel preset], then press any number from 0 to 9, it will cancel the preset corresponding to the number.

Note: Press [#] three times in a row, this will cancel all presets.

4) Zoom control

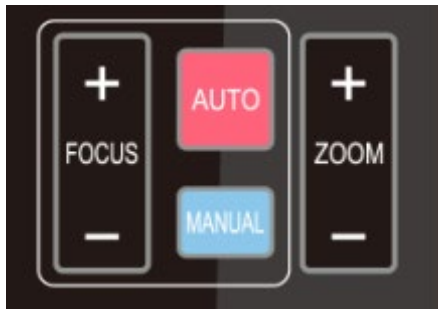


Zoom in: Press [zoom +]

Zoom out: Press [zoom -]

Long press these keys will enable continuous zoom to in/zoom out; release midway will stop zoom.

5) Focusing control



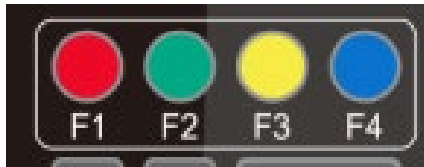
Focusing in: Press [focusing +] key (only valid in manual focusing mode)

Focusing out: Press [focusing -] key (only valid in manual focusing mode)

Long press these keys will enable continuous focusing in/ focusing out, release midway will stop focusing.

Autofocusing: Support Manual focusing: Support

7) Set the infrared remote-control address of the camera.



[F1] stop tracking, (whenever use remote control, please stop tracking first)

[F2] Start tracking.

[*] + [#] + [F1]: Set up #1 address.

[*] + [#] + [F2]: Set up #2 address.

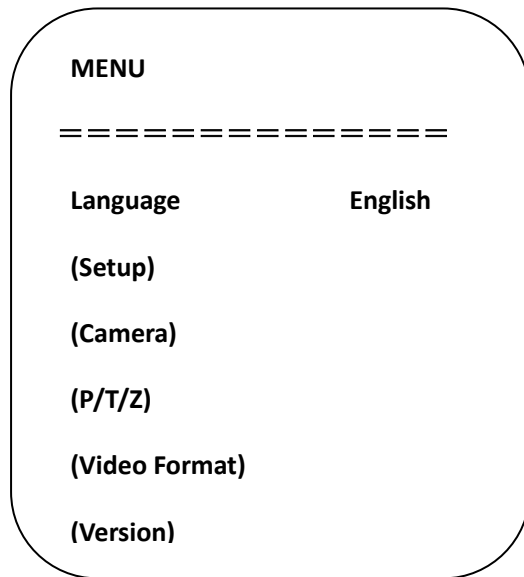
[*] + [#] + [F3]: Set #3 address.

[*] + [#] + [F4]: Set up #4 address

8 Set menu

8.1 Main menu

In a normal image, press the [MENU] key, the screen displays the menu content, use the arrow to point to the desired item.



Language settings / Language: Select menu language, Chinese/English

Settings: Enter submenu of system parameter settings

Camera parameters: Enter submenu of camera parameter settings

P/T/Z: Enter submenu item of camera parameter settings

Version: Enter submenu of Version

Restore default: Enter restore to default, select “yes” or “no” restore the default

[↑↓] Select: Press [↑↓] to select the menu item

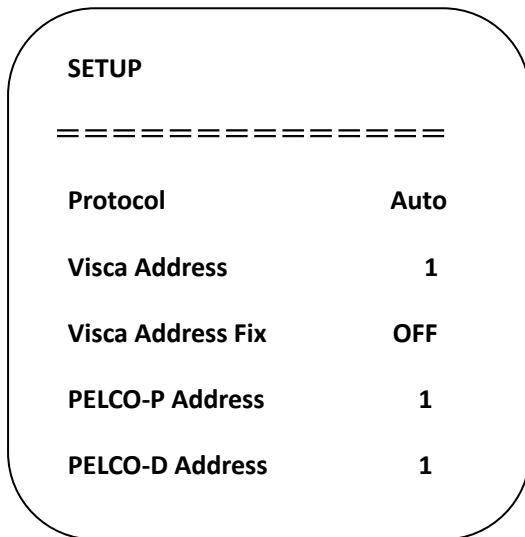
[←→] Change value: Press [←→] to change the value

[Menu] return: Press menu key to return

[Home] OK: Press [Home] key to confirm

8.2 System parameter settings

On the main menu, move the cursor to (Settings), press the [HOME] key to enter the Settings page, as shown below.



Protocol: Protocol type VISCA/PELCO-P/PELCO-D/auto

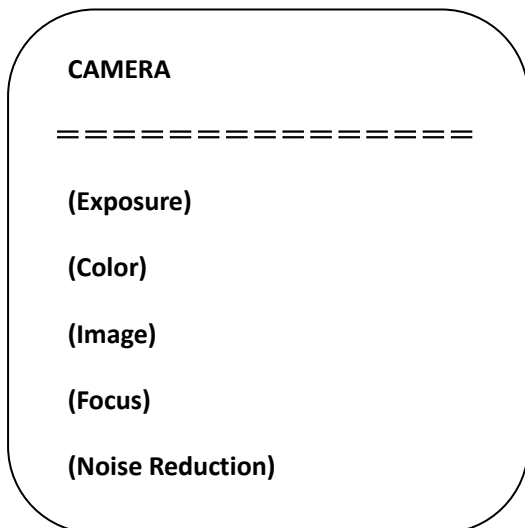
Communication address: VISCA=1~7; PELCO-P = 1~64; PELCO-D =1~64

Baud rate: Set item: 2400/4800/9600/115200

VISCA address fix: Set item: On/off

8.3 Camera parameter settings

On the main menu, move the cursor to (CAMERA), press the [HOME] key to enter the CAMERA page, as shown below.



Exposure: Enter exposure submenu item

Image: Enter image submenu item

Colour: Enter colour submenu item

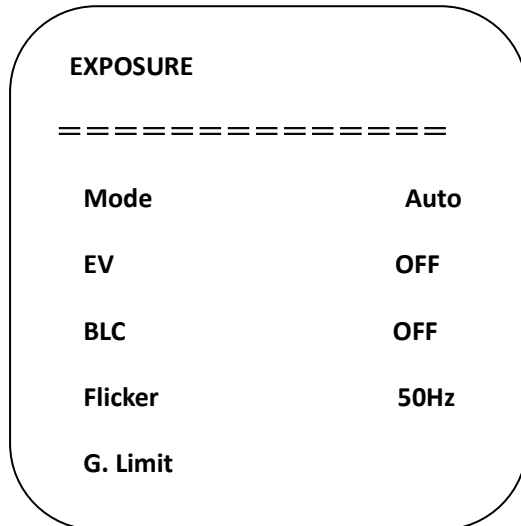
Focus: Enter focus submenu item

Noise reduction: Enter noise reduction submenu item

Style: Default, standard, clear, bright, gentle

1) Exposure

On the CAMERA menu, move the cursor to (EXPOSURE), press the [HOME] key to enter the exposure page, as shown below:



Mode: Options: Auto, manual, shutter priority, aperture priority, brightness priority

EV: Options: On/off (only valid in auto mode)

Compensation Grade: Options: -7~7 (only valid in auto mode when "EV" is on.)

BLC: Options: On/off (only valid in auto mode) **DRC:** Options: 1~8, off

Flicker: Options: Off, 50Hz, 60Hz (valid in auto, shutter priority and brightness priority modes)

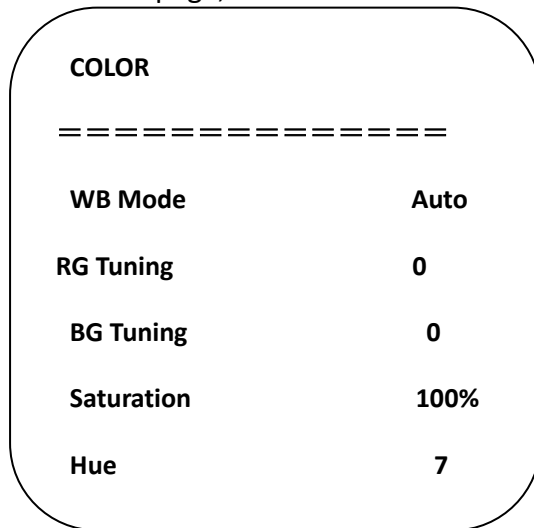
G. Limit: Options: 0~15(valid in auto, shutter priority and brightness priority modes)

Shutter priority: Options: 1/25, 1/30, 1/50, 1/60, 1/90, 1/100, 1/120, 1/180, 1/250, 1/350, 1/500, 1/1,000, 1/2000, 1/3000, 1/4000, 1/6000, 1/10000 (valid in manual and shutter priority modes)

Aperture priority: Options: Off, F11.0, F9.6, F8.0, F6.8, F5.6, F4.8, F4.0, F3.4, F2.8, F2.4, F2.0, F1.8 (valid in manual and aperture priority modes) **Brightness:** Options: 0~23 (only valid in brightness priority mode.)

2) Color

On the CAMERA menu, move the cursor to (COLOR), press the [HOME] key to enter the COLOR page, as shown below:



WB Mode: Options: auto, 3000K, 4000K, 5000K, 6500K, manual, one-key white balance.

RG Tuning: Options: -10~10 (only valid in auto mode) **BG Tuning:** Options: -10~10 (only valid in auto mode)

Red gain: Options: 0~255 (only valid in manual mode) **Blue gain:** Options: 0~255 (only valid in manual mode)

Saturation: Options: 60%, 70%, 80%, 90%, 100%, 110%, 120%, 130%, 140%, 150%, 160%, 170%,
180%, 190%, 200%

Hue: Options: 0~14

AWB Sensitivity: Options: high, medium, low (only valid in auto mode)

3) Image

On the CAMERA menu, move the cursor to (IMAGE), press [HOME] to enter the IMAGE page, as shown below:

IMAGE	
=====	
Brightness	7
Contrast	7
Sharpness	4
Flip-H	OFF
Flip-V	OFF
B&W-Mode	Color
Gamma	Default
DZoom	OFF
DCI	OFF

Brightness: Options: 0~14

Contrast: Options: 0~14

Sharpness: Options: 0~15

Flip-H: Options: on/off

Flip-V: Options: on/off

B&W-Mode: Options: color, black & white

Gamma: Options: default, 0.45, 0.50, 0.55, 0.63

DZoom: Options : on/off

DCI: Dynamic contrast: options, off, 1~8

4) Focus

On the CAMERA menu, move the cursor to (FOCUS), press the [HOME] key to enter the FOCUS page, as shown below:

FOCUS	
=====	
Focus Mode	Auto
AF-Area	Center
AF-Sensitivity	Low

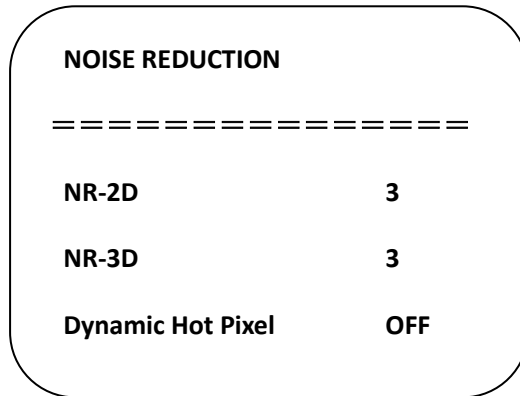
Focus mode: Options: auto/manual

AF-Area: Options: up/center/low

AF-Sensitivity: Options: high/medium/low

5) Noise reduction

On the CAMERA menu, move the cursor to (Noise reduction), press [HOME] key to enter the Noise reduction page, as shown below:



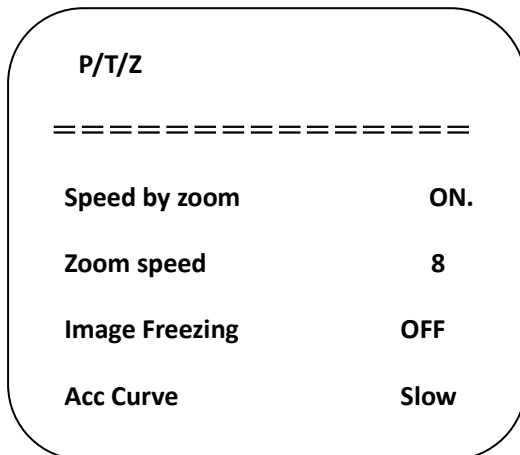
NR-2D: Options: auto, off, 1~7

NR-3D: Options: off, 1~8

Dynamic hot pixel: Options: off, 1~5

8.4 P/T/Z

On the main menu, move the cursor to (P/T/Z), press the [HOME] key to enter the P/T/Z page, as shown below:



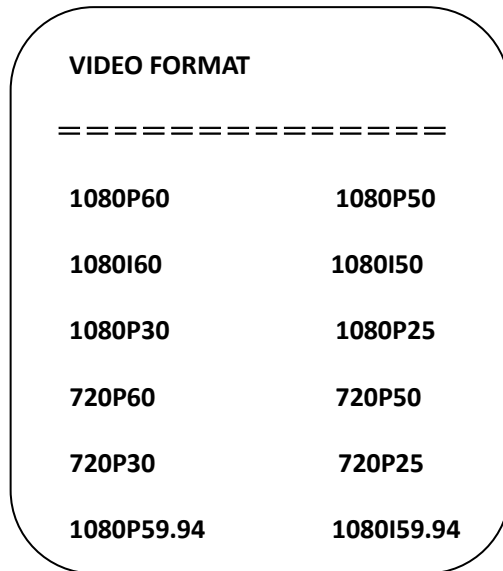
Speed by zoom: It only works on the remote control, on, off; when the camera zooms in, the remote control will make the camera rotate at the lower speed.

Zoom speed: Set speed for remote control camera **Image freezing:** Options: On/off zoom, 1~8

Acc Curve: Options: Quick/slow

8.5 Video format

On the main menu, move the cursor to (VIDEO FORMAT), press the [HOME] key to enter the VIDEO FORMAT page, as shown below:



Change parameter value in the menu. To save value when power off, exit menu.

8.6 Version

On the main menu, move the cursor to (Version), press the [HOME] key to enter the Version page. Version information varies from product model and date of production. Version information contains the version number and version upgrade time.

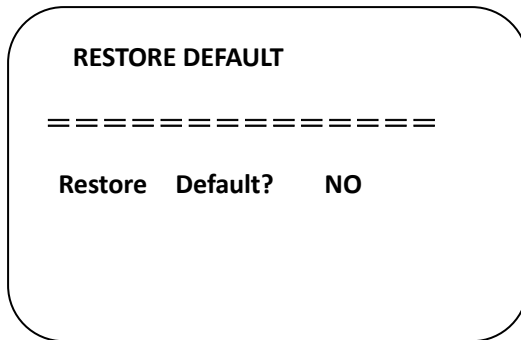
MCU version: It displays MCU version information.

Camera version: It displays camera version information.

Focus version: It displays focus version information.

8.7 Restore default

On the main menu, move the cursor to (restore), press the [HOME] key to enter the Restore page, as shown below.



Restore default: Options: Yes/no (Color style and video format can't be restored default).

Note: If the address of former remoter is not 1 but another one from 2, 3, or 4, the corresponding camera address will restore back to 1 when all parameters or system parameters are restored. User should change the remoter address to be 1 (press No.1 according to the camera so to get normal operation)

9. Technical parameters

Parameter/model	Model-12 X	Model-20 X
Tracking camera, lens parameters		
Image sensor	1/2.8inch high-quality CMOS sensor	
Effective pixels	2,070,000 16: 9	
Video signal	1080P60/50/30/25/59.94/29.971080I60/50/59.94720P60/50/30/25 /59.94/29.97	
Lens optics zoom	12X optical zoom f=3.9~46.1mm	20X optical zoom f=4.7~94mm
Visual angle	6.3° (narrow angle) ~72.5° (wide angle)	2.9° (narrow angle) ~55.4° (wide angle)
Aperture coefficient	F1.8~F2.4	F1.6 ~ F3.5
Digit zoom	X10	
Minimum illumination	0.5Lux (F1.8, AGC ON)	
Digit noise reduction	2D & 3D digit noise reduction	
White balance	Manual/auto/one-key white balance /3000K/ 4000K/5000K/6500K	

Focus	Auto/manual
Aperture	Auto/manual
Electronic shutter	Auto/manual
Backlight compensation	On/off
Wide dynamic	Off/dynamic grade adjustment
Video regulation	Brightness, hue, saturation, contrast ratio, sharpness, Gamma
Signal to noise ratio	>55dB

Panoramic lens	
Image sensor	1/2.8inch high-quality CMOS sensor
Effective pixels	2,100,000
Lens	Manual focus
Output port	SDI Model: SDI, LAN, HDMI/ USB Model: HDMI, USB3.0, LAN
Field angle (D/H/V)	112°/82°/57.6°

Input/output port and support protocol	
Ports	SDI Model: SDI, LAN, 2-channel 3.5mm linear audio input, RS232 (input) HDMI/USB Model: HDMI (support video and audio output), USB3.0, LAN, 2-channel 3.5mm linear audio input, RS232 (input)
Network port	100M internet access (10/100BASE-TX) 5GWiFi(optional), support network VISCA control protocol
Network protocol	RTSP, RTMP, ONVIF, GB/T28181
Compression image code stream	Dual-stream output
Video compression format	H.265, H.264
Control signal port	RS-232/485
Control protocol	VISCA/Pleco-D/Pelco-P; Baud rate: 115,200/9,600/4,800/2,400bps
Audio input port	Dual track 3.5mm linear input
Audio compression format	AAC, MP3, PCM
Power port	HEC3800 power socket (DC12V)

Pan/tilt parameters	
Horizontal rotation	-170°~+170°
Vertical rotation	-30°~+90°

Horizontal control speed	0.1 ~100°/s
Vertical control speed	0.1~45°/s
Preset speed	Horizontal: 100°/s, vertical:45°/s
Preset quantity	User can set 255 presets at most.

Other parameters	
Power adapter	Input AC110V-AC220V output DC12V/2.5A
Input voltage	DC12V±10%
Input current	1.5A (maximum)
Power consumption	18W (maximum)
Storage temperature	-10°C~+60°C
Storage humidity	20%~95%
Operating temperature	-10°C~+50°C
Operating humidity	20%~80%
Dimension (WxHxD)	254mm X 144mm X 174mm
Weight (approx.)	1.50kg
Operating environment	Indoor
Remote maintenance (network port)	Remote upgrade, restart and reset
Standard accessories	12V/2.5A power, RS232 control line, remote control, operation manual, warranty card
Optional accessories	Installation support

10. VISCA protocol command list

When the camera is in normal operation, it can be controlled via RS232C / RS485 port (VISCA IN).

Parameters of RS232C serial port are as follows:

Baud rate: 2,400/4,800/9,600/115,200 bit/s; start bit: 1 bit; digit bit: 8 bits; stop bit: 1 bit; verification bit: none.

After powering on, the camera rotates to the left bottom first and then returns to the middle. Zoom lens zooms out to its furthest point and zooms in to the nearest point and finishes self-inspection. If the camera saves #0 preset, after initialization, the camera will go to #0 preset. Now user can use a serial port command to control the camera.

Return command.

Ack/Completion Message		
	Command package	Notes
ACK	z0 41 FF	Returned when the command is accepted.
Completion	z0 51 FF	Returned when the command has been executed.

z = camera address+8

Error Messages		
	Command package	Notes
Syntax Error	z0 60 02 FF	Returned when the command format is different or when a command with illegal command parameters is accepted
Command Not Executable	z0 61 41 FF	Returned when a command cannot be executed due to current conditions. For example, when commands controlling the focus manually are received during autofocus.

Control command

Command	Function	Command package	Notes
AddressSet	Broadcast	88 30 01 FF	Address setting
IF_Clear	Broadcast	88 01 00 01 FF	I/F Clear
CommandCancel		8x 21 FF	
CAM_Power	On	8x 01 04 00 02 FF	Power ON/OFF
	Off	8x 01 04 00 03 FF	
CAM_Zoom	Stop	8x 01 04 07 00 FF	
	Tele (Standard)	8x 01 04 07 02 FF	
	Wide (Standard)	8x 01 04 07 03 FF	
	Tele (Variable)	8x 01 04 07 2p FF	p = 0(low) - 7(high)
	Wide (Variable)	8x 01 04 07 3p FF	
	Direct	8x 01 04 47 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM_Focus	Stop	8x 01 04 08 00 FF	
	Far(Standard)	8x 01 04 08 02 FF	
	Near(Standard)	8x 01 04 08 03 FF	
	Far(Variable)	8x 01 04 08 2p FF	p = 0(low) - 7(high)
	Near (Variable)	8x 01 04 08 3p FF	
	Direct	8x 01 04 48 0p 0q 0r 0s FF	pqrs: Focus Position
	Auto Focus	8x 01 04 38 02 FF	
Manual Focus	8x 01 04 38 03 FF		

Command	Function	Command package	Notes
CAM_Zoom Focus	Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs: Zoom Position tuvw: Focus Position
CAM_WB	Auto	8x 01 04 35 00 FF	
	3000K	8x 01 04 35 01 FF	
	4000k	8x 01 04 35 02 FF	
	One Push mode	8x 01 04 35 03 FF	
	5000k	8x 01 04 35 04 FF	
	Manual	8x 01 04 35 05 FF	
	6500k	8x 01 04 35 06 FF	
CAM_RGain	Reset	8x 01 04 03 00 FF	Manual Control of R Gain
	Up	8x 01 04 03 02 FF	
	Down	8x 01 04 03 03 FF	
	Direct	8x 01 04 43 00 00 0p 0q FF	pq: R Gain
CAM_Bgain	Reset	8x 01 04 04 00 FF	Manual Control of B Gain
	Up	8x 01 04 04 02 FF	
	Down	8x 01 04 04 03 FF	
	Direct	8x 01 04 44 00 00 0p 0q FF	pq: B Gain
CAM_AE	Full Auto	8x 01 04 39 00 FF	Automatic Exposure mode
	Manual	8x 01 04 39 03 FF	Manual Control mode
	Shutter priority	8x 01 04 39 0A FF	Shutter Priority Automatic Exposure mode
	Iris priority	8x 01 04 39 0B FF	Iris Priority Automatic Exposure mode
	Bright	8x 01 04 39 0D FF	Bright mode
CAM_Shutter	Reset	8x 01 04 0A 00 FF	Shutter Setting
	Up	8x 01 04 0A 02 FF	
	Down	8x 01 04 0A 03 FF	
	Direct	8x 01 04 4A 00 00 0p 0q FF	pq: Shutter Position
CAM_Iris	Reset	8x 01 04 0B 00 FF	Iris Setting
	Up	8x 01 04 0B 02 FF	
	Down	8x 01 04 0B 03 FF	
	Direct	8x 01 04 4B 00 00 0p 0q FF	pq: Iris Position
CAM_Gain	Reset	8x 01 04 0C 00 FF	Gain Setting
	Up	8x 01 04 0C 02 FF	

Command	Function	Command package	Notes
	Down	8x 01 04 0C 03 FF	
	Direct	8x 01 04 0C 00 00 0p 0q FF	pq: Gain Position
CAM_Bright	Reset	8x 01 04 0D 00 FF	Bright Setting
	Up	8x 01 04 0D 02 FF	
	Down	8x 01 04 0D 03 FF	
	Direct	8x 01 04 4D 00 00 0p 0q FF	pq: Bright Position
CAM_ExpComp	On	8x 01 04 3E 02 FF	Exposure Compensation ON/OFF
	Off	8x 01 04 3E 03 FF	
	Reset	8x 01 04 0E 00 FF	Exposure Compensation Amount Setting
	Up	8x 01 04 0E 02 FF	
	Down	8x 01 04 0E 03 FF	
	Direct	8x 01 04 4E 00 00 0p 0q FF	pq: ExpComp Position
CAM_Back Light	On	8x 01 04 33 02 FF	Back Light
	Off	8x 01 04 33 03 FF	Compensation
CAM_NR (2D)		8x 01 04 53 0p FF	P=0-7 0:OFF
CAM_NR (3D)		8x 01 04 54 0p FF	P=0-8 0:OFF
CAM_Gamma		8x 01 04 5B 0p FF	p = 0 – 4 0: Default 1: 0.45 2: 0.50 3: 0.55 4: 0.63
CAM_Flicker	OFF	8x 01 04 23 00 FF	OFF
	50HZ	8x 01 04 23 01 FF	50HZ
	60HZ	8x 01 04 23 02 FF	60HZ
CAM_Aperture	Reset	8x 01 04 02 00 FF	Aperture Control
	Up	8x 01 04 02 02 FF	
	Down	8x 01 04 02 03 FF	
	Direct	8x 01 04 42 00 00 0p 0q FF	pq: Aperture Gain
CAM_Memory	Reset	8x 01 04 3F 00 pq FF	pq: Memory Number(=0 to 254) Corresponds to 0 to 9 on the Remote Commander
	Set	8x 01 04 3F 01 pq FF	
	Recall	8x 01 04 3F 02 pq FF	
CAM_LR_Reverse	On	8x 01 04 61 02 FF	Image Flip Horizontal ON/OFF
	Off	8x 01 04 61 03 FF	
CAM_PictureFlip	On	8x 01 04 66 02 FF	Image Flip Vertical ON/OFF
	Off	8x 01 04 66 03 FF	
CAM_ColorSaturation	Direct	8x 01 04 4900 00 00 0p FF	P=0-E

Command	Function	Command package	Notes
			0:60% 1:70% 2:80% 3:90% 4:100% 5:110% 6:120% 7:130% 8:140% 9:150% 10:160% 11:160% 12:180% 13:190% 14:200%
CAM_IDWrite		8x 01 04 22 0p 0q 0r 0s FF	pqrs: Camera ID (=0000 to FFFF)
SYS_Menu	ON	8x 01 04 06 06 02 FF	Turn on the menu screen
	OFF	8x 01 04 06 06 03 FF	Turn off the menu screen
IR_Receive	ON	8x 01 0608 02 FF	IR(remote commander)receive On/Off
	OFF	8x 01 0608 03 FF	
IR_ReceiveReturn	On	8x 01 7D 01 03 00 00 FF	IR(remote commander)receive the message via the VISCA communication ON/OFF
	Off	8x 01 7D 01 13 00 00 FF	
CAM_SettingReset	Reset	8x 01 04 A0 10 FF	Reset Factory Setting
CAM_Brightness	Direct	8x 01 04 A1 00 00 0p 0q FF	pq: Brightness Position
CAM_Contrast	Direct	8x 01 04 A2 00 00 0p 0q FF	pq: Contrast Position
CAM_Flip	OFF	8x 01 04 A4 00 FF	Single Command For Video Flip
	Flip-H	8x 01 04 A4 01 FF	
	Flip-V	8x 01 04 A4 02 FF	
	Flip-HV	8x 01 04 A4 03 FF	
CAM_VideoSystem	Set camera video system	8x 01 06 35 00 0p FF	P: 0~E Video format 0:1080P60 8:720P30 1:1080P50 9:720P25 2:1080i60 A: 1080P59.94 3:1080i50 B: 1080i59.94 4:720P60 C: 720P59.94

Command	Function	Command package	Notes
			5:720P50 D: 1080P29.97 6:1080P30 E: 720P29.97 7:1080P25
Pan_tiltDrive	Up	8x 01 06 01 VV WW 03 01 FF	VV: Pan speed 0x01 (low speed) to 0x18 (high speed) WW: Tilt speed 0x01 (low speed) to 0x14 (high speed) YYYY: Pan Position ZZZZ: Tilt Position
	Down	8x 01 06 01 VV WW 03 02 FF	
	Left	8x 01 06 01 VV WW 01 03 FF	
	Right	8x 01 06 01 VV WW 02 03 FF	
	Upleft	8x 01 06 01 VV WW 01 01 FF	
	Upright	8x 01 06 01 VV WW 02 01 FF	
	DownLeft	8x 01 06 01 VV WW 01 02 FF	
	DownRight	8x 01 06 01 VV WW 02 02 FF	
	Stop	8x 01 06 01 VV WW 03 03 FF	
	AbsolutePosition	8x 01 06 02 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	RelativePosition	8x 01 06 03 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	Home	8x 01 06 04 FF	
Reset	8x 01 06 05 FF		
Pan-tiltLimitSet	Set	8x 01 06 07000W 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	W:1 UpRight 0:DownLeft
	Clear	8x 01 06 07010W 07 0F 0F 0F 07 0F 0F 0F FF	YYYY: Pan Limit Position(TBD) ZZZZ: Tilt Limit Position(TBD)

Search command

Command	Command package	Return package	Notes
CAM_PowerInq	8x 09 04 00 FF	y0 50 02 FF	On
		y0 50 03 FF	Off(Standby)
CAM_ZoomPosInq	8x 09 04 47 FF	y0 50 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM_FocusAFModelInq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
CAM_FocusPosInq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM_WBModelInq	8x 09 04 35 FF	y0 50 00 FF	Auto
		y0 50 01 FF	3000K
		y0 50 02 FF	4000K
		y0 50 03 FF	One Push Mode
		y0 50 04 FF	5000K
		y0 50 05 FF	Manual
		y0 50 00 FF	6500K
CAM_RGainInq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq: R Gain
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM_AEModelInq	8x 09 04 39 FF	y0 50 00 FF	Full Auto
		y0 50 03 FF	Manual
		y0 50 0A FF	Shutter priority
		y0 50 0B FF	Iris priority
		y0 50 0D FF	Bright
CAM_ShutterPosInq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM_IrisPosInq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM_BrightPosInq	8x 09 04 4D FF	y0 50 00 00 0p 0q FF	pq: Bright Position
CAM_ExpCompModelInq	8x 09 04 3E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ExpCompPosInq	8x 09 04 4E FF	y0 50 00 00 0p 0q FF	pq: ExpComp Position
CAM_BacklightModelInq	8x 09 04 33 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_NRLevel(2D) Inq	8x 09 04 53 FF	y0 50 0p FF	P: 2DNRLLevel
CAM_NRLevel(3D) Inq	8x 09 04 54 FF	y0 50 0p FF	P:3D NRLevel
CAM_FlickerModelInq	8x 09 04 55 FF	y0 50 0p FF	p: Flicker Settings (0: OFF, 1: 50Hz, 2:60Hz)

CAM_ApertureInq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM_PictureEffectModelInq	8x 09 04 63 FF	y0 50 00 FF	Off
		y0 50 04 FF	B&W
CAM_MemoryInq	8x 09 04 3F FF	y0 50 0p FF	p: Memory number last operated.
SYS_MenuModelInq	8x 09 0606 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_LR_ReverseInq	8x 09 04 61 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_PictureFlipInq	8x 09 04 66 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ColorSaturationInq	8x 09 04 49 FF	y0 50 00 00 00 0p FF	p: Color Gain setting 0h (60%) to Eh (200%)
CAM_IDInq	8x 09 04 22 FF	y0 50 0p FF	p: Gamma ID
IR_ReceiveInq	8x 09 0608 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
IR_ReceiveReturn		y0 077D 01 04 00 FF	Power ON/OFF
		y0 077D 01 04 07 FF	Zoom Tele/Wide
		y0 077D 01 04 38 FF	AF ON/OFF
		y0 077D 01 04 33 FF	Camera _Backlight
		y0 077D 01 04 3F FF	Camera _Memery
		y0 077D 01 06 01 FF	Pan_titleDriver
CAM_BrightnessInq	8x 09 04A1 FF	y0 50 00 00 0p 0q FF	pq: Brightness Position
CAM_ContrastInq	8x 09 04A2 FF	y0 50 00 00 0p 0q FF	pq: Contrast Position
CAM_FlipInq	8x 09 04A4 FF	y0 50 00 FF	Off
		y0 50 01 FF	Flip-H
		y0 50 02 FF	Flip-V
		y0 50 03 FF	Flip-HV
CAM_GammaInq	8x 09 04 5B FF	y0 50 0p FF	p: Gamma setting
CAM_VersionInq	8x 09 00 02 FF	y0 50 ab cd mn pq rs tu vw FF	ab cd: vender ID (0220) mn pq : model ID ST (0951) U3 (3950) rs tu : ARM Version vw: reserve
VideoSystemInq	8x 09 06 23 FF	y0 50 0p FF	P: 0~E Video format

			0:1080P60 8:720P30 1:1080P50 9:720P25 2:1080i60 A: 1080P59.94 3:1080i50 B: 1080i59.94 4:720P60 C: 720P59.94 5:720P50 D: 1080P29.97 6:1080P30 E: 720P29.97 7:1080P25
Pan-tiltMaxSpeedInq	8x 09 06 11 FF	y0 50 ww zz FF	ww: Pan Max Speedzz: Tilt Max Speed
Pan-tiltPosInq	8x 09 06 12 FF	y0 50 0w 0w 0w 0w Oz Oz Oz Oz FF	wwww: Pan Positionzzz z: Tilt Position

Note: [x] on table above means address of camera to be operated, [y] = [x+8].

11. Pelco-D protocol command list

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Up	0xFF	Address	0x00	0x08	Pan Speed	Tilt Speed	SUM
Down	0xFF	Address	0x00	0x10	Pan Speed	Tilt Speed	SUM
Left	0xFF	Address	0x00	0x04	Pan Speed	Tilt Speed	SUM
Right	0xFF	Address	0x00	0x02	Pan Speed	Tilt Speed	SUM
Upleft	0xFF	Address	0x00	0x0C	Pan Speed	Tilt Speed	SUM
Upright	0xFF	Address	0x00	0x0A	Pan Speed	Tilt Speed	SUM
Down Left	0xFF	Address	0x00	0x14	Pan Speed	Tilt Speed	SUM
Down Right	0xFF	Address	0x00	0x12	Pan Speed	Tilt Speed	SUM
Zoom In	0xFF	Address	0x00	0x20	0x00	0x00	SUM
Zoom Out	0xFF	Address	0x00	0x40	0x00	0x00	SUM
Focus Far	0xFF	Address	0x00	0x80	0x00	0x00	SUM
Focus Near	0xFF	Address	0x01	0x00	0x00	0x00	SUM
Stop	0xFF	Address	0x00	0x00	0x00	0x00	SUM
Set Preset	0xFF	Address	0x00	0x03	0x00	Preset ID	SUM
Clear Preset	0xFF	Address	0x00	0x05	0x00	Preset ID	SUM
Call Preset	0xFF	Address	0x00	0x07	0x00	Preset ID	SUM
Query Pan Position	0xFF	Address	0x00	0x51	0x00	0x00	SUM
Query Pan Position Response	0xFF	Address	0x00	0x59	Value High Byte	Value Low Byte	SUM
Query Tilt Position	0xFF	Address	0x00	0x53	0x00	0x00	SUM

Query Tilt Position Response	0xFF	Address	0x00	0x5B	Value High Byte	Value Low Byte	SUM
Query Zoom Position	0xFF	Address	0x00	0x55	0x00	0x00	SUM
Query Zoom Position Response	0xFF	Address	0x00	0x5D	Value High Byte	Value Low Byte	SUM

12. Pelco-P protocol command list

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Up	0xA0	Address	0x00	0x08	Pan Speed	Tilt Speed	0xAF	XOR
Down	0xA0	Address	0x00	0x10	Pan Speed	Tilt Speed	0xAF	XOR
Left	0xA0	Address	0x00	0x04	Pan Speed	Tilt Speed	0xAF	XOR
Right	0xA0	Address	0x00	0x02	Pan Speed	Tilt Speed	0xAF	XOR
Upleft	0xA0	Address	0x00	0x0C	Pan Speed	Tilt Speed	0xAF	XOR
Upright	0xA0	Address	0x00	0x0A	Pan Speed	Tilt Speed	0xAF	XOR
DownLeft	0xA0	Address	0x00	0x14	Pan Speed	Tilt Speed	0xAF	XOR
Down Right	0xA0	Address	0x00	0x12	Pan Speed	Tilt Speed	0xAF	XOR
Zoom In	0xA0	Address	0x00	0x20	0x00	0x00	0xAF	XOR
Zoom Out	0xA0	Address	0x00	0x40	0x00	0x00	0xAF	XOR
Stop	0xA0	Address	0x00	0x00	0x00	0x00	0xAF	XOR
Focus Far	0xA0	Address	0x01	0x00	0x00	0x00	0xAF	XOR
Focus Near	0xA0	Address	0x02	0x00	0x00	0x00	0xAF	XOR
Set Preset	0xA0	Address	0x00	0x03	0x00	Preset ID	0xAF	XOR

Clear Preset	0xA0	Address	0x00	0x05	0x00	Preset ID	0xAF	XOR
Call Preset	0xA0	Address	0x00	0x07	0x00	Preset ID	0xAF	XOR
Query Pan Position	0xA0	Address	0x00	0x51	0x00	0x00	0xAF	XOR
Query Pan Position Response	0xA0	Address	0x00	0x59	Value High Byte	Value Low Byte	0xAF	XOR
Query Tilt Position	0xA0	Address	0x00	0x53	0x00	0x00	0xAF	XOR
Query Tilt Position Response	0xA0	Address	0x00	0x5B	Value High Byte	Value Low Byte	0xAF	XOR
Query Zoom Position	0xA0	Address	0x00	0x55	0x00	0x00	0xAF	XOR
Query Zoom Position Response	0xA0	Address	0x00	0x5D	Value High Byte	Value Low Byte	0xAF	XOR

13. Maintenance and troubleshooting

13.1 Maintenance

- 1) Please disconnect the power of the camera if it is not in long-term use. Disconnect the AC power adapter from the AC socket.
- 2) To avoid scratches, use a soft cloth or cotton to wipe off the dust on the camera case.
- 3) Clean the camera lens with a dry soft cloth. If the blemish persists, use a mild detergent to wipe gently.

Do not use strong or corrosive detergent which may scratch the lens and affect image result.

13.2 Troubleshooting

- 1) No image displayed by the video output:

Solution: a. Check camera power for connection, and check if the power indicator is lit.

- b. Power off, restart the device and check if it performs self-inspection as per usual.
- c. Check if the dial switch at the bottom is in the normal operating mode
- d. Check if the connection line of video output and video display functions.

- 2) Image is unstable:

Solution: a. Check if the connection line of video output and video display functions.

- 3) Lens zoom image dithering:

Solution: a. Check if the camera is installed securely.

- b. Check if there is a vibrating machine or object nearby the camera.

- 4) Remote control is out of service:

Solution: a. Set remote control address to be 1, and check if it works (if the device restores to default, remote control address will be restored to 1).

- b. Check if remote control battery is installed or battery is low
- c. Check if the camera is in the normal operating mode
- d. Check if the menu exits. It only works when the menu exits; if the webpage outputs an image, it will not display the menu or perform any operation. Menu exits in the 30s automatically. The remote control works.

5) Serial port is not controllable:

Solution: a. Check if it is a standard control cable provided.

b. Check if the serial port protocol, baud rate and address are consistent with the camera.

c. Check if the control cable is correctly connected.

d. Check if the camera is in the normal operating mode

6) Failure to log in webpage:

Solution: a. Use the display to check if the camera outputs image normally.

b. Check if the network cable connects correctly (flicker of the yellow indicator at internet access means network cable connection is correct).

c. Check if the computer adds a network segment and if the network segment is consistent with a camera IP address.

d. Click "start" in computer, select "operate", and enter cmd; click "confirm", DOS command window appears; input ping 192.168.5.163, press Enter, the information below means network connection functions well.

```
C:\Users\qq214>ping 192.168.5.163

Pinging 192.168.5.163 with 32 bytes of data:
Reply from 192.168.5.163: bytes=32 time=2ms TTL=64
Reply from 192.168.5.163: bytes=32 time=1ms TTL=64
Reply from 192.168.5.163: bytes=32 time<1ms TTL=64
Reply from 192.168.5.163: bytes=32 time=4ms TTL=64

Ping statistics for 192.168.5.163:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 4ms, Average = 1ms

C:\Users\qq214>_
```

After-sales Service

Should you experience problems using the Alfatron ALF-12/20X-HD-TC, ALF-12/20X-SD-TC please refer to the manual and troubleshooting and maintenance section (6). Should the error persist, note that any transport costs of the equipment to the distributor are borne by the user during the warranty.

1) Product Limited Warranty: Alfatron warrants that its products will be free from defects in materials and workmanship for **seven years**, which starts from the first day of purchase.

Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the warranty period must be presented to obtain warranty service.

2) What the warranty does not cover (servicing available for a fee):

- Warranty expiration.
- Factory applied serial number has been altered or removed from the product.
- Damage, deterioration, or malfunction caused by:
 - Normal wear and tear.
 - Use of supplies or parts not meeting product specifications.
 - No certificate or invoice as the proof of warranty.
 - The product model showed on the warranty card does not match with the product or if the product had been altered.
 - Damage caused by force majeure.
 - Servicing not authorized by Alfatron.
 - Any other causes which do not relate to a product defect.
 - Delivery, installation or labour charges for installation or setup of the product.

3) Technical Support: Contact our after-sales department at

www.alfatronelectronics.com

Warranty

1.1 This limited warranty covers defects in materials and workmanship in this product.

1.2 Should warranty service be required, proof of purchase must be presented to the Company. The serial number on the product must be clearly visible and not have been tampered with in any way whatsoever.

1.3 This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by the Company to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover equipment enclosures, cables or accessories used in conjunction with this product.

This limited warranty does not cover the cost of normal maintenance. Failure of the product due to insufficient or improper maintenance is not covered.

1.4 The Company does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

1.5 Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

1.6 Unless otherwise specified, the goods are warranted in accordance with the manufacturer's product specific warranties against any defect attributable to faulty workmanship or materials, fair wear and tear being excluded.

1.7 This limited warranty only covers the cost of faulty goods and does not include the cost of labor and travel to return the goods to the Company's premises.

1.8 In the event of any improper maintenance, repair or service being carried out by any third persons during the warranty period without the Company's written authorization, the limited warranty shall be void.

1.9 A 7 (seven) year limited warranty is given on the aforesaid product where used correctly according to the Company's instructions, and only with the use of the Company's components.

1.10 The Company will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1.10.1 Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition.; or

1.10.2 Replace this product with a direct replacement or with a similar product deemed by the Company to perform substantially the same function as the original product; or

1.10.3 Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

1.11 The Company is not obligated to provide the Customer with a substitute unit during the limited warranty period or at any time thereafter.

1.12 If this product is returned to the Company this product must be insured during shipment, with the insurance and shipping charges prepaid by the Customer. If this product is returned uninsured, the Customer assumes all risks of loss or damage during shipment. The Company will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. The Company will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

1.13 Please be aware that the Company's products and components have not been tested with competitor's products and therefore the Company cannot warrant products and/or components used in conjunction with competitor's products.

1.14 The appropriateness of the goods for the purpose intended is only warranted to the extent that the goods are used in accordance with the Company's installation, classification and usage instructions.

1.15 Any claim by the Customer which is based on any defect in the quality or condition of the goods or their failure to correspond with specification shall be notified in writing to the Company within 7 days of delivery or (where the defect or failure was not apparent on reasonable inspection by the Customer) within a reasonable time after discovery of the defect or failure, but, in any event, within 6 months of delivery.

1.16 If delivery is not refused, and the Customer does not notify the Company accordingly, the Customer may not reject the goods and the Company shall have no liability and the Customer shall pay the price as if the goods had been delivered in accordance with the Agreement.

1.17 THE MAXIMUM LIABILITY OF THE COMPANY UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT