A-TC04
NoirCam

USER MANUAL

www.a-dena.com

This manual provides information relevant to the installation of the A-TC04 NoirCam, as well as its functions and control methods in details. Please read this manual carefully before installing and using the camera.

- **Precautions**

This product can only be used in the specified conditions in order to avoid any damage to the camera:

To avoid causing damage to the camera, please observe the following key precautions:

1. Do not expose the camera and its components/accessories to rain or moisture.
2. Due to the risk of electric shock, do not open the camera's casing. Installation and maintenance of the device should only be carried out by qualified technicians.
3. Do not use the product beyond the temperature, humidity or power supply specifications stated in this user manual.
4. Please use a soft, dry cloth to clean the camera. If the camera is very dirty, clean it with a diluted neutral detergent; Using any type of solvents may damage the surface of the camera, thus you should not use them.

- **Electrical Safety**

Installation and use of this product must strictly comply with the local electrical safety standards.

- **Transportation**

Avoid any stress, vibration, or moisture during transportation, storage, installation and operation of the camera.

- **Installation**

1. Do not rotate the camera head violently. Doing otherwise may cause mechanical failure.
2. This product should be placed on a stable desktop or other horizontal surface. Do not install the product at an angle, otherwise your camera's image will be inclined.
3. Ensure there are no obstacles within the camera holder's rotation range.
4. Do not power on before completing the camera's installation.

- **Do Not Dismantle The Camera**

ADENA Limited is not responsible for any unauthorized modification or changes in the camera's behavior produced by dismantling of the product. Unauthorized dismantling of the product will nullify your camera's warranty.

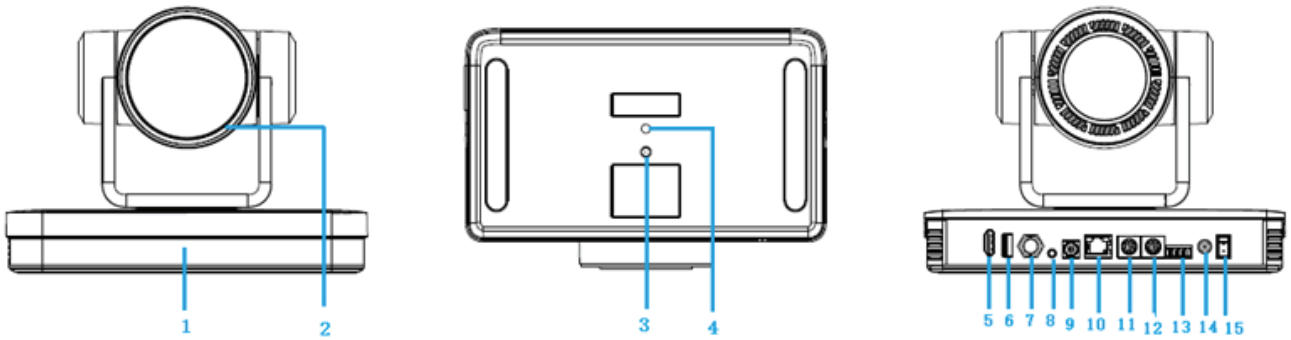
- **Magnetic Interference**

Electromagnetic fields at specific frequencies may affect the video image produced by the camera. This is a Class A product; it may cause radio interference in domestic environment. If used in such environment, please take this into account and apply appropriate measures.

Table of Contents

1. Quick Installation Guide

1.1 Interface



Interface Introduction

1. IR Sensor for the Remote Control	10. RJ-45 Port (Network, PoE+)
2. Lens	11. RS-232 Input
3. Fixing Hole	12. RS-232 Output
4. Tripod Screw Hole	13. RS-422 (Compatible with RS-485) Interface
5. HDMI Output	14. DC12V Power Input Jack
6. USB Type-A 2.0 Output	15. Power Switch Button
7. 3G-SDI Output	
8. 3.5mm Line Input	
9. Rotary DIP Switch	

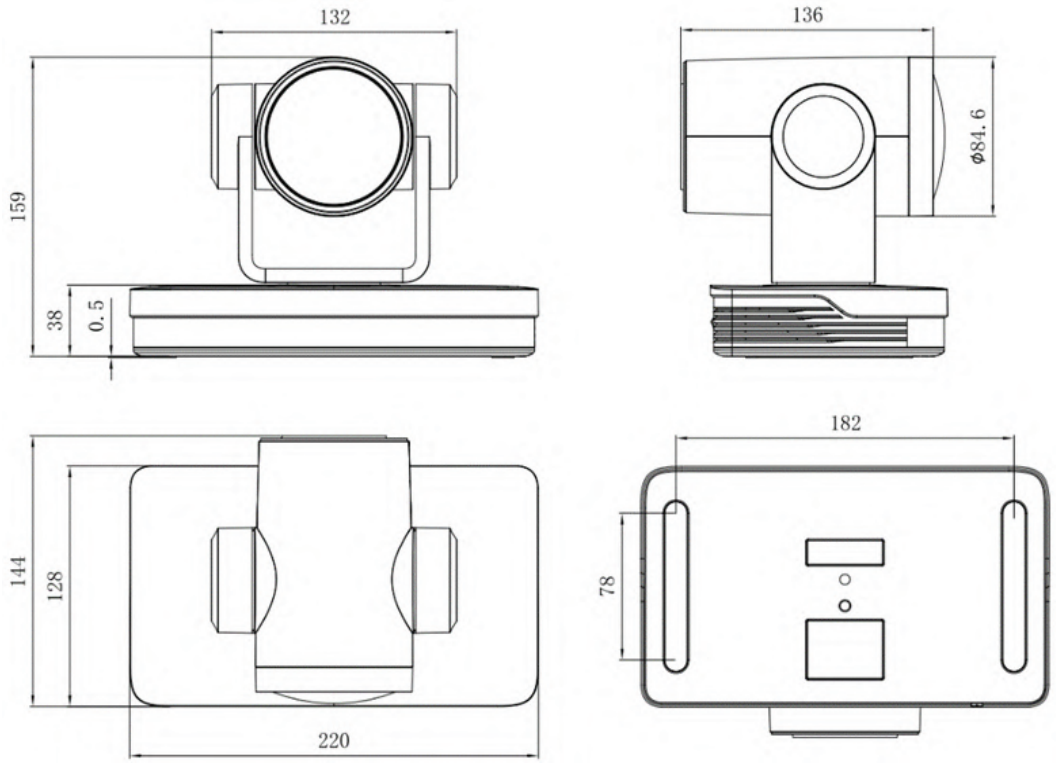
1.2 Power-on Self-Test

- **After powering on and running a self-check, the camera will automatically return to the preset 0 if it is configured.**
- **The default address for the IR remote control is №1.**

If the camera is returned to factory default settings, its IR address for remote control will also reset to №1.

2. Product Overview

2.1 Dimensions



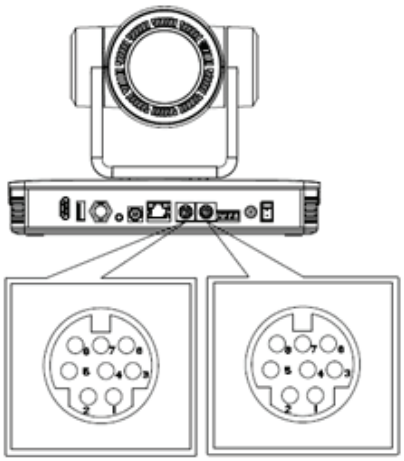
2.1.1 Accessories

- **When you unpack the product, check that all the supplied accessries are included:**

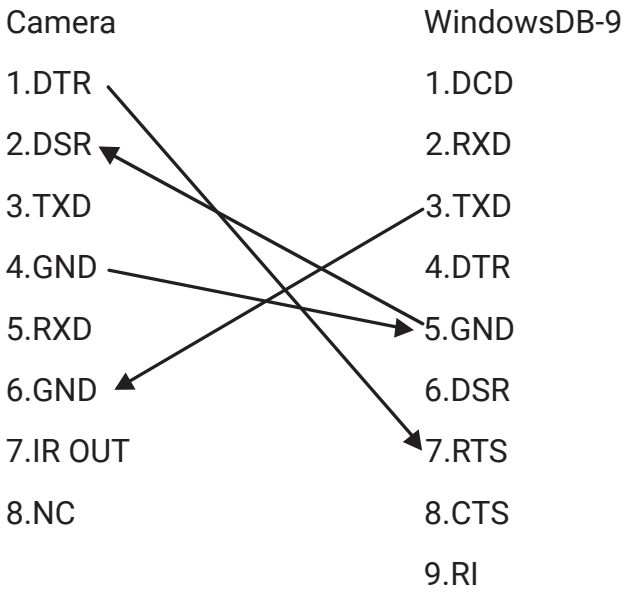
Supplied	Power adapter
	USB2.0 Cable
	RS-232 Cable
	Camera Setup Guide Leaflet
	IR Remote Control

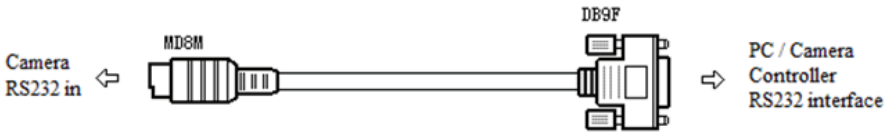
2.2 RS-232

2.2.1 RS-232 Jack

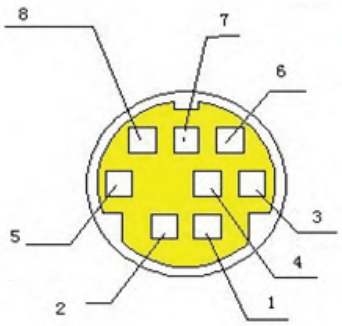


Connection method of the camera to a PC or a controller.





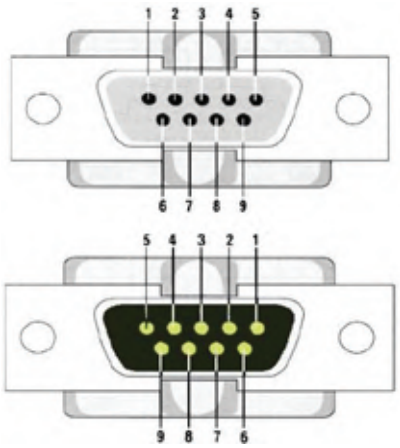
2.2.2 RS-232 Mini-DIN 8-pin Terminal Definition



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

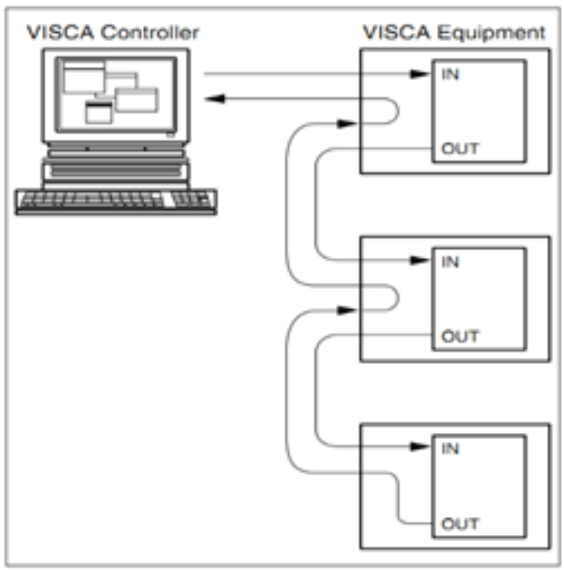
Definitions

2.2.3 RS232(DB9) Port Definition

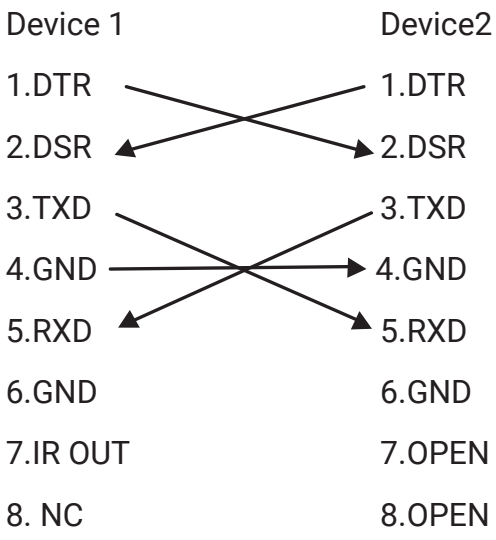


NO.	Port	Definition
1	DTR	Data Terminal Ready
2	DSR	Data Set Ready
3	TXD	Transmit Data
4	GND	System Ground
5	RXD	Receive Data
6	GND	System Ground
7	IR OUT	IR Commander Signal IR
8	NC	No Connection
9	RI	Ring Indicator

2.2.4 VISCA Networking Method

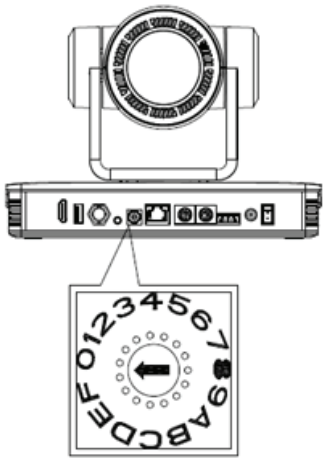


Networking Method



The product has RS232 input and output interfaces and can be cascaded in the manner described above.

2.3 Rotary Dial



Dial	Video Format	Dial	Video Format
0	4KP60	8	1080P30
1	4KP50	9	1080P25
2	4KP30	A	720P60
3	4KP25	B	720P50
4	1080P60	C	Menu can be switched
5	1080P50	D	Menu can be switched
6	1080I60	E	Menu can be switched
7	1080I50	F	Menu can be switched

⚠ Caution

After switching the mode and dialing the code, you need to restart the camera for changes to take effect.

2.4 Product Features

A-TC04 NoirCam is a standalone AI Auto-Tracking Network Camera that works out of the box. It does not require applications to work and provides a clear, high-quality UHD image via USB, HDMI, NDI|HX and network outputs, as well as FHD via 3G-SDI. Advanced tracking algorithm ensures that the camera stays focused on its target even if there are other potential targets walking in front of it. It supports two distinct tracking modes, making it suitable for installations in lecture halls, conferencing halls, auditoriums, and other facilities.

A-TC04 NoirCam is able to stream to RTMP platforms and has an audio input for you to connect a microphone. Therefore, it can be used not only with specialized hardware encoders/mixers/switchers, but also independently.

A-TC04 NoirCam comes with a preinstalled NDI|HX license, allowing users to fully incorporate the camera into various production scenarios. It can be used with smartphones, tablets, computers, professional AV hardware, and other devices via NDI|HX protocol.

Other features include:

- **4K UHD Resolution:** 1/1.8” Sony CMOS sensor. Up to 4K resolution with frame rate up to 60 fps.
- **Optical Zoom Lens:** 25X optical zoom with a 59.2° angle lens.
- **Leading Autofocus Technology:** Fast, accurate and stable auto-focusing technology.
- **Low Noise and High SNR:** High SNR image is achieved with low noise CMOS. Advanced 3D noise reduction technology further reduces the noise while ensuring high image clarity.
- **Multiple output interfaces:** HDMI, 3G-SDI, USB 2.0, RJ-45 (with NDI|HX and PoE+). The camera simultaneously outputs audio and video signals.
- **Multiple Audio/Video Compression Standards:** The camera’s network interface supports H.264/H.265 video compression formats; USB 2.0 supports MJPEG, H.264, YUY2, NV12, H.265; The camera supports AAC audio compression format.
- **Dual Stream Output:** USB supports the main stream and a sub stream simultaneously.
- **Built-in Gravity Sensor:** Supports PTZ auto-flip function and easy installation.
- **Multiple Network Protocols:** Supports ONVIF Profile S, NDI|HX and NDI|HX3, RTSP, RTMP, VISCA-over-IP, RTMPS, SRT protocols; Supports RTMP push mode, easily connects to streaming servers (e.g. Wowza, YouTube); Supports RTP multicast mode.
- **Control Interfaces:** The camera has an RS-422 port which is compatible with RS-485, as well as RS-232 IN and RS232 OUT. RS-232 interface supports cascading.
- **Multiple Control Protocols:** Supports VISCA, PELCO-D, PELCO-P protocols; Supports automatic identification protocols.

- **AI Human Detection:** Built-in high-speed processor and advanced image processing and analysis algorithms. Users can choose real-time tracking or zone tracking according to the environment.
- **Multiple Applications:** A-TC04 NoirCam is an excellent choice for Lecture Capture and automatic tracking of the lecturers and presenters, for tracking of the VIPs in corporate and governmental applications, for Video Conferencing, Telemedicine, Unified Communications, Live Production and other usage scenarios. The camera can be used together with other professional AV recording/streaming/mixing/switching solutions, such as AREC Media Stations, or independently.

2.5 Technical Specification

Camera Parameters	
Lens and Focus	25X optical zoom / 15x digital zoom
Focal Length	f=7.1 mm~171.95 mm ±5%
Field of View	**Horizontal:** 3.2° (N)~59.2° (W) **Vertical:** 1.4° (N)~34.6° (W)
Iris Value	F1.61~F5.19±5%
Image Sensor	1/1.8 inch SONY CMOS sensor
Effective Pixels	8.29 Megapixels (16:9)
Video Format	**HDMI:** 3840*2160P60/50/25/59.94/29.97; 1080P60/50/30/25/59.94/29.97; 1080I60/50/59.94;720P60/50/59.94; **SDI:** 1080P60/50/30/25/59.94/29.97; 1080I60/50/59.94; 720P60/50/59.94;

	USB2.0: **MJPEG:** 3840*2160/1920*1080/1280*720/1024*768/1024*576/800*600/720*576/720*480/704*576/640*480/640*360/352*288/320*240 P30; **H264:** 3840*2160/1920*1080/1280*720/1024*768/1024*576/800*600/720*576/720*480/704*576/640*480/640*360/352*288/320*240 P30; **H265:** 1920*1080/1280*720/1024*768/1024*576/800*600/720*576/720*480/704*576/640*480/640*360/352*288/320*240P30; YUY2: 800*448/720*480P25/640*360/432*240P30 NV12: 800*448P25/640*480/640*360/432*240P30
Minimum Illumination	0.05Lux (F1.8, AGC ON)
DNR	3D DNR
White Balance	Auto/Manual/One Push/Specified Temperature
Focal Length	Auto/Manual/One Push
Exposure Mode	Auto/Manual/Shutter Priority/Aperture Priority/Brightness Priority
Aperture Value	F1.8-F11, CLOSE
Shutter Speed	1/25~1/10000
BLC	On/Off
WDR	Off/Dynamic Level Adjustment
Video Adjustment	Brightness, Colour, Saturation, Contrast, Sharpness, B/W Mode, Gamma Curve
SNR	≥50dB
Tracking Function	
Tracking Type	AI Tracking
Tracking Distance	Effective tracking at distances up to 20 metres

Tracking Modes	Presenter (camera follows the first target it spots) Zone Tracking (4 tracking zones can be set up, which can be set within -110° ~ +110° in horizontal and -27° ~ +27° in vertical. Camera uses zone PTZ presets to track targets)
Camera Interface Description	
Interfaces	HDMI, 3G-SDI, RJ-45 (Supports PoE+), USB Type-A 2.0, 3.5mm Line IN, RS-232 IN, RS-232 OUT, RS-422 (Compatible with RS-485), Rotary DIP Switch, DC12V Power Supply Jack, Power Switch Button
Video Compression Format	Network: H.264, H.265 USB 2.0: MJPEG, H.264, H.265, YUY2, NV12
Audio Input	Double Track 3.5mm Linear Input
Audio Output	HDMI, Network, USB 2.0, 3G-SDI
Audio Compression Format	AAC
RJ-45 Port	10M/100M/1000M adaptive Ethernet port, support PoE+ (802.3at) power supply, supports audio and video output
Network Protocols	RTSP, RTMP, ONVIF Profile S, SRT, NDI|HX and NDI|HX3 Supports VISCA-over-IP, NDI, and ONVIF Profile S network control protocols
Control Ports	RS-232 IN, RS-232 OUT, RS-422 (compatible with RS-485)
Serial Port Communication Protocols	VISCA/Pelco-D/Pelco-P Supported baud rate: 115200/38400/9600/4800/2400
USB Communication Protocol	UVC (Video Communication Protocol), UAC (Audio Communication Protocol)
Power Supply	HEC3800 Outlet (DC12V)
Power Adapter	AC110V-AC220V to DC12V/2.5A
Input Voltage	DC12V±10%
Input Current	<1A
Consumption	<12W

PTZ Parameters	
Pan Move	-110° ~ +110°
Tilt Move	-27° ~ +27°
Pan Speed	0.1°/s ~ 100°/s
Tilt Speed	0.1°/s ~ 70°/s
Preset Speed	Pan: 78.8°/s, Tilt: 31.7°/s
Preset Quantity	Up to 255 presets (10 can be configured and used via remote control)
Other Parameters	
Storage Temperature	-10°C ~ +60°C
Storage Humidity	20% ~ 95%
Working Temperature	-10°C ~ +50°C
Working Humidity	20% ~ 80%
Dimensions	220mm (L) × 144mm (W) × 159mm (H)
Weight	1.7kg
Intended Environment	Indoors
Supplied Accessories	Power Supply Unit, RS-232 Control Cable, USB Type-A 2.0 Cable, Remote Control, Camera Setup Guide
Suggested Accessories	A-B01 Camera Bracket (https://www.a-dena.com/product-page/a-b01) RADA Duo Wireless Microphones (https://www.a-dena.com/product-page/rada-duo)

3. Remote Control Functions

3.1 IR Remote Control Keys and Commands

1. Standby Key

Press and hold for 3 seconds to send the camera into standby mode. Press and hold for 3 seconds again to boot up the camera. It will perform the self-test and return to the “HOME” position or to Preset 0 if it is configured).

2. Camera Address Selection

Change the remote’s IR number to control the camera with the same IR number. Please note that NoirCam is set to “1” by default.

3. Number Keys

Press to move the camera to presets 0-9. You will need to save them first by following the procedure described under the point 7. “SET PRESET” and “CLEAR PRESET” keys.

4. Asterisk (*) and Hash (#) Keys

These keys are used in some of the commands described bellow.

5. Focus Control Keys

AUTO: Enables autofocus on the camera.
MANUAL: Changes the focus mode to manual, allowing you to change it with the plus (+) and minus (-) buttons.

6. Zoom Control Keys

Zoom＋: Zooms in the lens, making the image appear closer.
Zoom－: Zooms out the lens, making the image appear farther.

7. “SET PRESET” and “CLEAR PRESET” Keys

SET PRESET: Press this button and then a 0-9 number key to save the current pan/tilt/zoom settings as that preset number position.
CLEAR PRESET: Press this button and then a 0-9 number key to clear that preset number position.

8. Arrow/HOME Control Keys

▲ Key: Moves the camera up; also used for navigation in the camera's OSD menu.

▼ Key: Moves the camera down; also used for navigation in the camera's OSD menu.

◀ Key: Moves the camera left; also used for navigation in the camera's OSD menu.

▶ Key: Moves the camera down; also used for navigation in the camera's OSD menu.

"HOME" Key: Return to the middle position or enter the next level in the camera's OSD menu.

9. BLC ON/OFF Control Key

Back Light ON / OFF: Turn on or off the back light.

10. MENU Key

Enter/exit the OSD menu or return to the previous menu.

3.2 IR Remote Control Key Combinations

- **Setting the camera's IR address number**

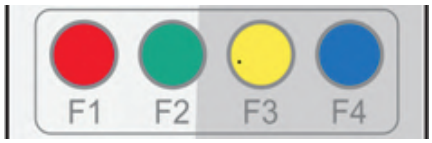
【*】+【＃】+【F1】: Change the camera's IR address to №1
【*】+【＃】+【F2】: Change the camera's IR address to №2
【*】+【＃】+【F3】: Change the camera's IR address to №3
【*】+【＃】+【F4】: Change the camera's IR address to №4

- **Key Combination Functions**

1.【#】+【#】+【#】: Clear all presets
2.【*】+【#】+【6】: Restore factory defaults
3.【*】+【#】+【9】: Flip switch
4.【*】+【#】+ Auto: Enter into the aging mode
5.【*】+【#】+【3】: Menu set to Chinese
6.【*】+【#】+【4】: Menu set to English
7.【*】+【#】+ Manual: Restore the default user name, password, and IP address
8.【#】+【#】+【0】: Switch the video format to 4KP60
9.【#】+【#】+【1】: Switch the video format to 4KP50
10.【#】+【#】+【2】: Switch the video format to 4KP30

11.【#】+【#】+【3】: Switch the video format to 4KP25
12.【#】+【#】+【4】: Switch the video format to 1080P60
13.【#】+【#】+【5】: Switch the video format to 1080P50
14.【#】+【#】+【6】: Switch the video format to 1080I60
15.【#】+【#】+【7】: Switch the video format to 1080I50
16.【#】+【#】+【8】: Switch the video format to 1080P30
17.【#】+【#】+【9】: Switch the video format to 1080P25

- **AI Tracking Control Keys**

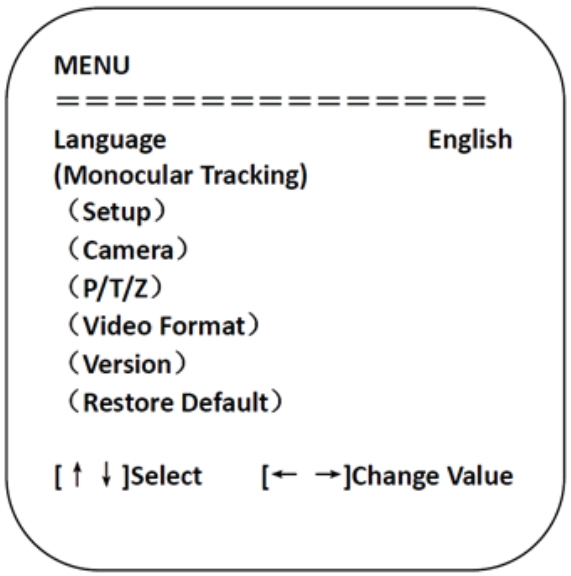


【F1】：Turn off AI Human Detection
【F2】：Turn on AI Human Detection
【F3】：Toggle between real time tracking mode and zone tracking mode
【F4】：Change tracking target in real time tracking mode

3.3 OSD Menu

- **Setting the camera's IR address number**

To enter the OSD menu, press "MENU" on the remote. Use the arrow keys to navigate this menu/change values. Press "HOME" to enter the next menu.



Use arrows "Up" and "Down" to navigate the menu, press "Home" to enter a submenu, and use arrows "Left" and "Right" to adjust values. Press "Menu" to return.

4. Web interface and settings

4.1 Accessing the Web Interface

To connect the A-TC04 NoirCam to network, connect an Ethernet cable to its RJ-45 port and plug it into a switch or router. The camera comes with a static default IP address 192.168.5.163.

Use an Ethernet cable to connect the camera to network. NoirCams come with a static default IP address 192.168.5.163. To change the camera's IP address, connect to the camera using a computer and set the computer to be in the same network as the camera. If you know how to do this, continue to "4.2 Web Interface Introduction".

If you do not know, then please first make sure that the computer is in the same network segment as the camera. Thus, computer must also have an IP address 192.168.5.xxx. If you are using Windows, open Settings -> Advanced network settings -> Change adapter options. In the menu that opens, double-click on your Ethernet adapter, click on Properties -> Internet Protocol Version 4 and click on Properties. Select "Use the following IP address" and type in an IP address that matches the camera's network segment, for example 192.168.5.160. Click on the empty field in "Subnet mask" and let it auto-fill to 255.255.255.0. Then press "OK" to save your settings. You should now be able to access the camera by typing its IP address 192.168.5.163 in a browser.

This process is demonstrated on the ADENA Limited YouTube channel in video "26. How to Change the IP Address of your AREC Device".

4.2 Web Interface Introduction

After you land on the camera's web page, use the default username and password "admin" to access it.

There are three pages on the web interface of A-TC04:

- Preview
- Monocular tracking
- Configuration

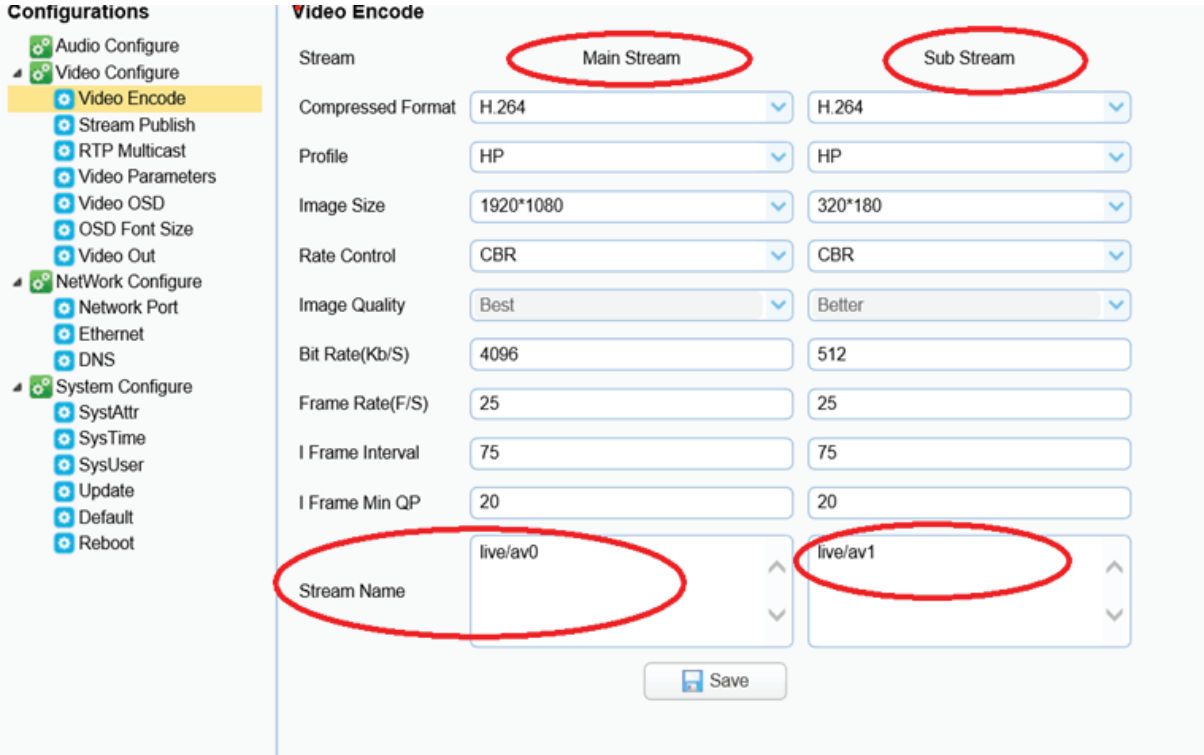
After logging in, you will see the camera's preview. You can control its PTZ from this page, change focus modes, save and go to presets, and control other options, including audio and streaming.

Tracking settings can be adjusted on the “Monocular tracking” page and are described in “4.5 Tracking Settings.”
Camera’s streaming, image, and other settings can be changed in the “Configuration” page. This page is described in headings 4.3 and 4.4.

4.3 Configuration – Streaming

- **Configuring the camera’s video encoding**

NoirCam’s streaming settings can be changed in the “Configuration” page. Click on it, then proceed to -> Video Configure-> Video Encode



You can change the parameters to better suit the camera’s network environment.

To access the camera via RTSP (or to use it via RTSP), use the following link structure:

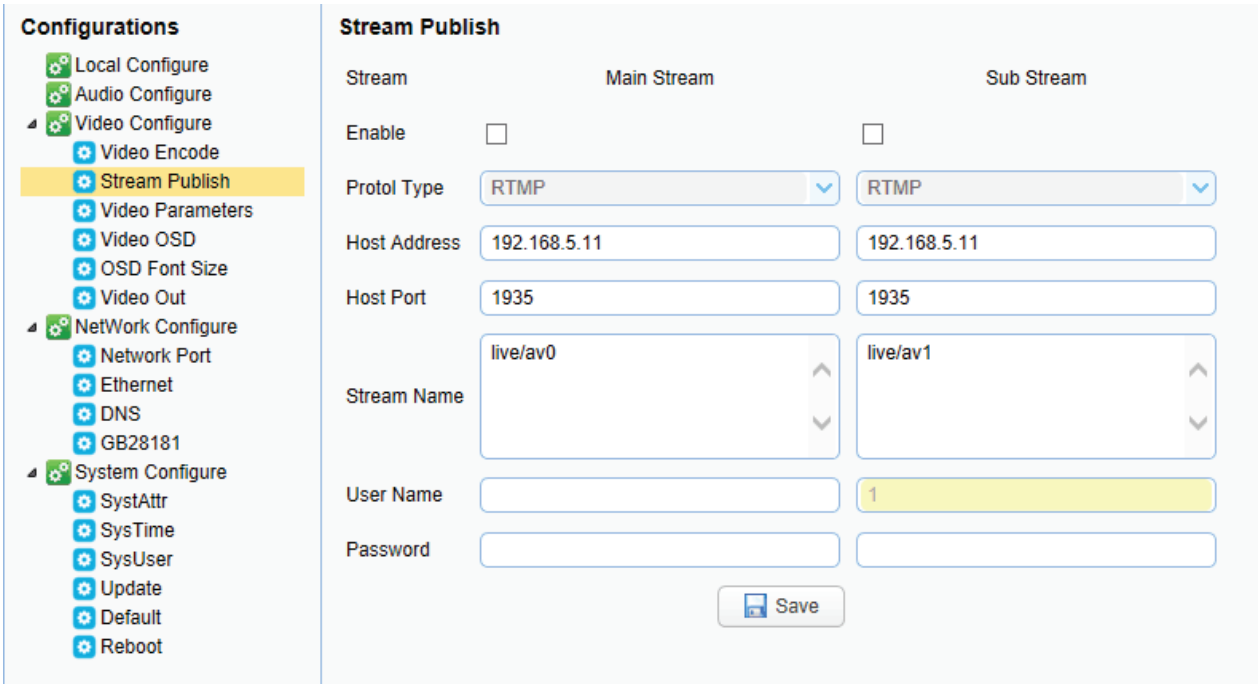
rtsp://IP address of the camera/stream name (by default it is live/av0 for the main stream and live/av1 for the sub stream. These can be changed in the “Stream Name” fields).

Thus, if there are no changes to the camera's IP or settings, you should be able to access its RTSP stream by entering either of the links below in your network media player or hardware:

rtsp://192.168.5.163/live/av0（av0 main stream）
rtsp://192.168.5.163/live/av1（av1 sub stream）
The same link structure applies if you want to use RTMP:
rtmp://192.168.5.163/live/av0（av0 main stream）
rtmp://192.168.5.163/live/av1（av1 sub stream）

- **Publishing the camera's stream**

NoirCam can be used to stream to RTMP servers. Related settings can be changed in the "Configuration" page. Click on it, then proceed to -> Video Configure -> Stream Publish



Please note that the camera must be on the public network to stream to public network servers. For this you will also need to configure DNS, thus make sure to go to the Network Configure -> DNS page and fill out the fields accordingly. Your organization should inform you which DNS should be used, but you can use Google's public DNS 8.8.8.8 and 8.8.4.4 if there are no restrictions. You must reboot the camera for these network changes to take effect.

To set up streaming, first, fill out the fields accordingly:

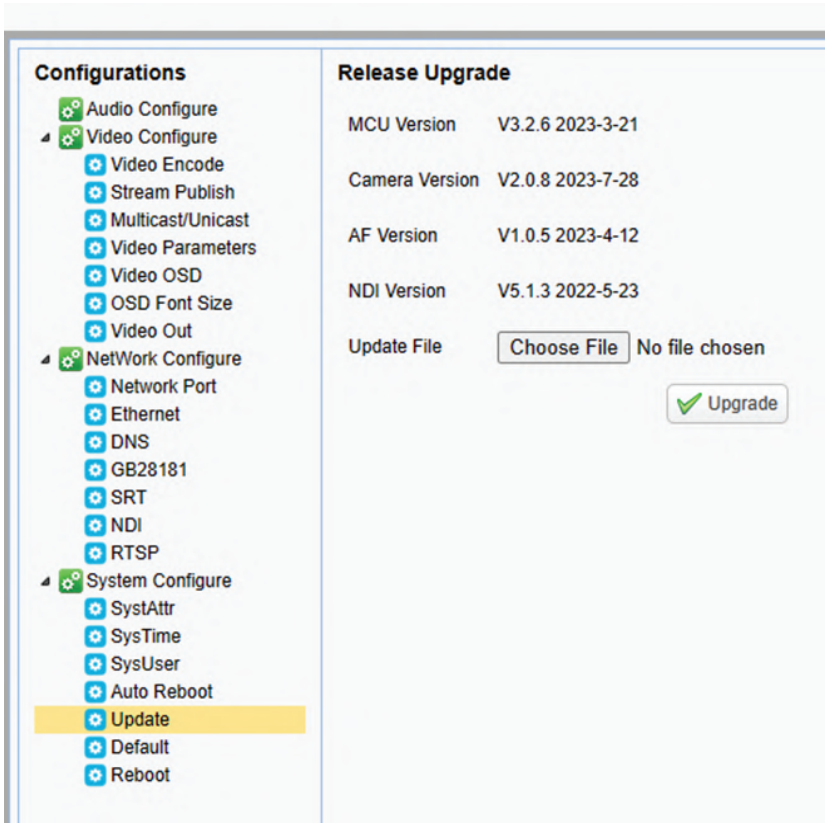
- **Host address:** this should be the server's address. Either a domain name or an IP address.
- **Host port:** server default port number.
- **Stream name:** enter the stream key in this field.
- **Username and password:** enter the username and password set by the server in these fields if required.

After you fill out the required information, tick the box under the main and/or sub stream to publish your camera's stream. Please note that you may need to enable audio for some streaming platforms to accept the stream (e.g., YouTube). You can do so in the camera's "Audio Configure" page.

The stream can then be accessed via network media players by typing the information in the following format:
rtmp://host domain name:host port/live/xxx
rtmp://host IP address:host port/live/xxx

4.4 Configuration – Firmware Update

The camera's firmware can be updated via the "Configuration" page of the web interface. Click on it, then System Configure -> Update. You can find out if there is a new firmware update for your camera on www.a-dena.com -> Firmware & Applications page.

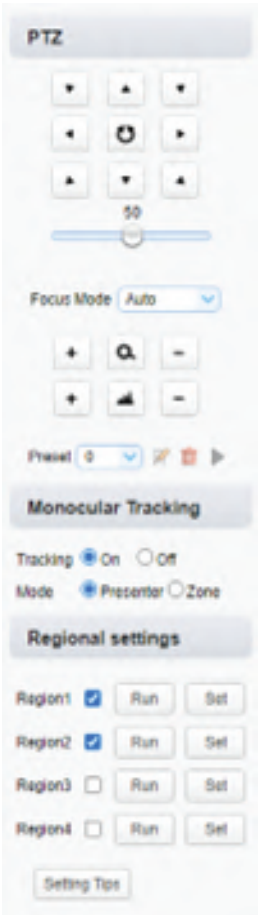


To update firmware, click “Browse”, select the .mrg file update file, then click “Upgrade”. Your camera will reboot after completing the firmware update. Login again after it finishes to check if the new version is in place.

It may be possible that for certain new features to take effect you will need to do a factory reset after updating the camera. You can double-check with your vendor or at www.a-dena.com if this is needed in your case. To do a factory reset, click on “Default” under “System Configure”, then click on “Restore factory defaults”.

4.5 Monocular Tracking - Tracking Settings

The camera’s tracking settings are configured on the “Monocular Tracking” page.
To enable tracking, select “On” under the “Monocular Tracking”.
NoirCam supports two different tracking modes – “Presenter” and “Zone”.



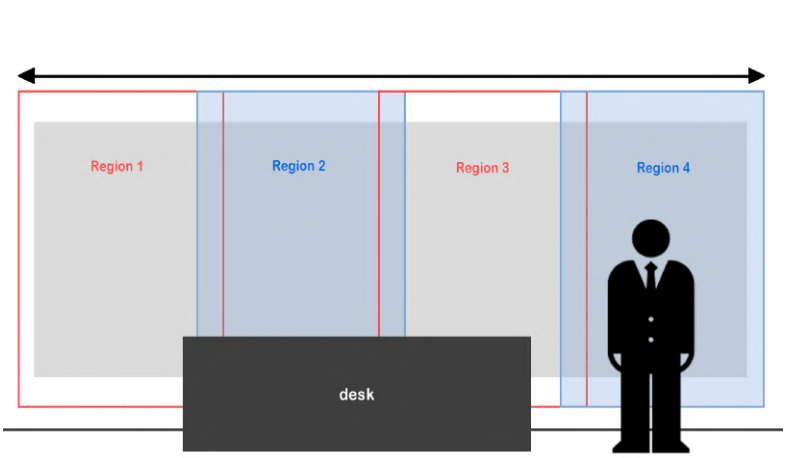
“Presenter” mode is the default tracking mode and it will make the camera track the first person it saw. The camera will automatically adjust zoom based on the person’s position relative to the camera. Please note that manual PTZ controls will not work while this tracking mode is active.

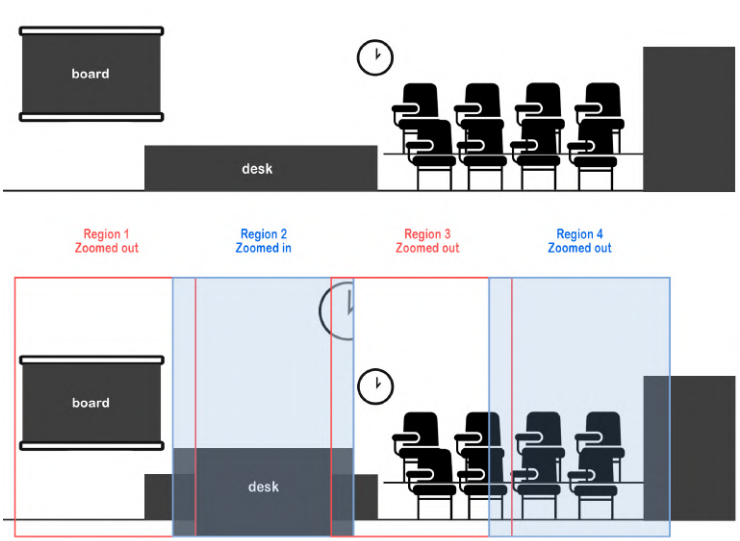
“Zone’ tracking mode requires configuration, but allows you to set up several tracking regions with custom PTZ presets. The camera will track the target using presets as it moves from one region to another. Importantly, these regions must be continuous, meaning that the preset views should overlap a little. Also, the first region you configure should be either on the left or the right edge of your tracking zone. This mode is best used when you want to track targets on a stage or as they move from a board to a desk. The way to configure it is as follows:

- Turn off the tracking.
- Use the PTZ controls to adjust zoom and move the camera into the position you want to set as this region's preset.
- Tick the box next to the region you are configuring, then click 'Set' to save the current zoom and pan-tilt position for this region. You should always start with 'Region1'.
- Repeat this for other regions. You can set up to 4 regions, and at least 2 regions must be configured for this mode to work.

You can also erase previously saved regions by pressing the 'Region Deletion' button. Please note that your camera must be running the latest firmware version for this button to appear.

The following two drawings are examples of zone tracking configuration with 4 regions.





5. Serial Port Communication Port

In normal working state, you can control the camera through RS-232/RS-485 (VISCA IN) cable. The parameters of RS-232 are as below:

Baud rate: 2400/4800/9600/115200/second
Start Bit: 1 bit;
Data Bit: 8 bit;
Stop Bit: 1 bit;
Verification Bit: None.

After powering on, the camera runs a self-check and then returns back to its center position. The zoom lens is extended to the farthest position and then pulled back. The self-check is completed at that point.
The camera will apply preset 0 after initialization completes if it is configured.
The user can control the device using serial commands.

5.1 VISCA Protocol List

5.1.1 Camera return command Ack/Completion Message

Command Message		
	Command packet	Remark
ACK	z0 41 FF	Returned when the command is accepted.
Completion	z0 51 FF	Returned when the command has been executed.

z = device address + 8

Error Messages		
	Command packet	Remark
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 auto focus.

5.1.2 Camera Control Command

Command	Function	Command Packet	Remark
AddressSet	Broadcast	88 30 0p FF	p：Address Setting
IF Clear	Broadcast	88 01 00 01 FF	I/F Clear
Command Cancel		8x21 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

Command	Function	Command Packet	Remark
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	
	One Push Mode	8x 01 04 38 04 FF	
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	
	3500K	8x 01 04 35 07 FF	
	4500K	8x 01 04 35 08 FF	
	5500K	8x 01 04 35 09 FF	
	6000K	8x 01 04 35 0A FF	
	7000K	8x 01 04 35 0B FF	

Command	Function	Command Packet	Remark
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	

Command	Function	Command Packet	Remark
	Down	8x 01 04 0B 03 FF	
	Direct	8x 01 04 4B 00 00 0p 0q FF	pq: Iris Position
CAM Gain Limit	Gain Limit	8x 01 04 2C 0p FF	p: 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 Positon
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 Compensation
	Off	8x 01 04 33 03 FF	
CAM WDRStrength	Reset	8x 01 04 21 00 FF	WDR Level Setting
	Up	8x 01 04 21 02 FF	
	Down	8x 01 04 21 03 FF	
	Direct	8x 01 04 51 00 00 00 0p FF	p: WDR Level Positon
CAM NR(2D)		8x 01 04 53 0p FF	P=0-7 0:Off

Command	Function	Command Packet	Remark
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	

Command	Function	Command Packet	Remark
CAM Color Saturation	Direct	8x 01 04 49 00 00 00 0p FF	P=0-E 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 06 08 02 FF	IR(remote commander) receive On/Off
	OFF	8x 01 06 08 03 FF	
IR ReceiveReturn	ON	8x 01 7D 01 03 00 00 FF	IR(remote commander) receive 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
	Direct	8x 0A 01 32 0p 0q FF	HDMI to SDI

Command	Function	Command Packet	Remark
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 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	

Command	Function	Command Packet	Remark
	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 07 00 0W 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	W:1 UpRight 0:DownLeft YYYY: Pan Limit Position(TBD) ZZZZ: Tilt Limit Position(TBD)
	Clear	8x 01 06 07 01 0W 07 0F 0F 0F 07 0F 0F 0F FF	
Tracking	Tracking Off	81 0A 01 32 00 00 03 00 FF	Tracking Off/On
	Tracking On	81 0A 01 32 00 00 02 00 FF	
	Real Time Tracking Mode	81 0A 01 32 00 00 02 00 FF	
	Zone Tracking Mode	81 0A 01 32 00 00 02 01 FF	

5.1.3 Inquiry Command

Command	Command Packet	Return Packet	Remark
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 FocusAFModeInq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
		y0 50 04 FF	One Push Mode
CAM FocusPosInq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM WBModeInq	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
		y0 50 06 FF	6500K
		y0 50 07 FF	3500K
		y0 50 08 FF	4500K
		y0 50 09FF	5500K
		y0 50 0A FF	6000K
CAM RGainInq	8x 09 04 43 FF	y0 50 0BFF	7000K
CAM BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain

Command	Command Packet	Return Packet	Remark
CAM AEModelnq	8x 09 04 39 FF	y0 50 00FF	Full Auto
		y0 50 03 FF	Manual
		y0 50 0A FF	Shutter Prioity
		y0 50 0B FF	Iris Priority
		y0 50 0D FF	Bright
CAM Shutter Posinq	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 Gain LimitInq	8x 09 04 2C FF	y0 50 0p FF	p: Gain Position
CAM BrightPosiInq	8x 09 04 4D FF	y0 50 00 00 0p 0q FF	pq: Bright Position
CAM ExpCompModeInq	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 Backlight-ModeInq	8x 09 04 33 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM WDR StrengthInq	8x 09 04 51 FF	y0 50 00 00 00 0p FF	p: WDR Strength
CAM NRLevel (2D) Inq	8x 09 04 53 FF	y0 50 0p FF	P: 2DNRLevel
CAM NRLevel (3D) Inq	8x 09 04 54 FF	y0 50 0p FF	P: 3D NRLevel

Command	Command Packet	Return Packet	Remark
CAM Flicker ModeInq	8x 09 04 55 FF	y0 50 0p FF	p: Flicker Settings(0: OFF, 1: 50Hz, 2:60Hz)
CAM Apertur eInq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM Picture EffectModeInq	8x 09 04 63 FF	y0 50 00 FF	Off
		y0 50 04 FF	B&W
CAM Memory Inq	8x 09 04 3F FF	y0 50 0p FF	p: Memory Number Last Operated
SYS Menu ModeInq	8x 09 06 06 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 Picture FlipInq	8x 09 04 66 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM Color SaturationInq	8x 09 04 49 FF	y0 50 00 00 00 0p FF	p: Color Gain Setting 0h (60%) to Eh (130%)
CAM IDInq	8x 09 04 22 FF	y0 50 0p FF	p: Gamma ID
IR ReceiveInq	8x 09 06 08 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
IR ReceiveReturn		y0 07 7D 01 04 00 FF	Power On/Off
		y0 07 7D 01 04 07 FF	Zoom Tele/Wide
		y0 07 7D 01 04 38 FF	AF On/Off
		y0 07 7D 01 04 33 FF	Camera Backlight

Command	Command Packet	Return Packet	Remark
		y0 07 7D 01 04 3F FF	Camera Memery
		y0 07 7D 01 06 01 FF	Pan TitleDriver
CAM Brightnessinq	8x 09 04 A1 FF	y0 50 00 00 0p 0q FF	pq: Brightness Position
CAM ContrastInq	8x 09 04 A2 FF	y0 50 00 00 0p 0q FF	pq: Contrast Position
CAM FlipInq	8x 09 04 A4 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 (0510) 、U2 (0512)、U3 (0513) 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

Command	Command Packet	Return Packet	Remark
Pan TiltMax SpeedInq	8x 09 06 11 FF	y0 50 ww zz FF	ww: Pan Max Speed zz: Tilt Max Speed
Pan TiltPosInq	8x 09 06 12 FF	y0 50 0w 0w 0w 0w 0z 0z 0z 0z FF	wwww: Pan Position zzzz: Tilt Position

Note: In the table above above,【x】represents the address of the device to be operated, and【y】is equal to【x + 8 】.

5.2 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	0x1C	Pan Speed	Tilt Speed	SUM
UpRight	0xFF	Address	0x00	0x1A	Pan Speed	Tilt Speed	SUM
DownLeft	0xFF	Address	0x00	0x14	Pan Speed	Tilt Speed	SUM
DownRight	0xFF	Address	0x00	0x12	Pan Speed	Tilt Speed	SUM
Zoon 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

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
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

5.3 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
DownRight	0xA0	Address	0x00	0x12	Pan Speed	Tilt Speed	0xAF	XOR
Zoon 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

6. Maintenance and Troubleshooting

6.1 Camera Maintenance

- **If you are not going to use the camera for a long time, please keep it powered off.**
- **Use a soft cloth or lotion-free tissue to clean the camera body.**
- **Use a soft, dry lint-free cloth to clean the lens. If the camera is very dirty, clean it with a diluted neutral detergent. Do not use any type of solvent or harsh detergent, since they may damage the surface.**

6.2 Important Notice

- **Do not shoot extremely bright objects for a long period of time, such as sunlight, ultra-bright light sources, etc.**
- **Do not operate in unstable lighting conditions, otherwise the image may flicker.**
- **Do not operate close to sources of powerful electromagnetic radiation, such as TV or radio transmitters.**

6.3 Troubleshooting

- **No image**

1. Check whether the power cord is connected, that voltage is OK, and that the power LED is lit.

2. Check whether the camera does the self-check after its startup (camera will briefly pan and tilt and return to the home position, or if preset 0 is set, the camera will return to the preset 0 position).

3. Check that the cable you are using to get the camera's image (USB/HDMI/SDI/Network) is connected correctly.

- **Abnormal display of image**

1. Check settings of the rotary dial on the rear of camera. Be sure to use the resolution and refresh rate that is supported by your software.

- **Image is shaky or vibrating**

1. Check whether the camera is mounted solidly or sitting on a steady horizontal and level surface.

2. Check the building and any supporting furniture for vibration. Ceiling mounts are often affected by building vibration more than wall mounts.

3. Any external vibration that is affecting the camera will be more apparent when in tele zoom (zoomed in).

- **The remote control is not functioning**

1. Check that the remote control has batteries inside and that they have sufficient charge.

2. Check that the remote control and camera's IR addresses match. By default, the remote and camera are assigned IR address 1.

3. Ensure that the OSD menu is not open. Exit the menu to regain control. If no operations are performed, the menu will automatically close after 30 seconds and the control will be regained.