



BG-UPTZ-ND

12X/20X/30X Universal PTZ NDI/HDMI/SDI/USB 3.0 RS232/485 Live Streaming Camera Series

User Manual







TABLE OF CONTENTS

Statement	4
Safety Precaution	4
Introduction	5
Features	5
Packing List	6
Specifications	7
Operation Controls and Functions	8
Interfaces and Connection	9
Mounting Brackets	10
RS-232 Interface	13
RS-232 Interface Definition	13
RS232 Mini-DIN 8-pin: Port Definition	14
RS232 (DB9) Port Definition	14
Rotary DIP Switch	15
Remote Control	15
Keys Introduction for IR Remote Control	16
Menu Introduction	18
Network Configuration	20
Web Browser Login	21
Auto Rebooter	24
Serial Port Communication and Control	25
VISCA Protocol Control Command	25
VISCA Protocol Inquiry Command	29
Maintenance and Troubleshooting	33
Tech Support	34
Limited Product Warranty Terms	34
Mission Statement	35
Copyright	36



Statement

Please read these instructions carefully before connecting, operating, or configuring this product. Please save this manual for future reference.

Safety Precaution

- To prevent damaging this product, avoid heavy pressure, strong vibration, or immersion during transportation, storage, and installation.
- The housing of this product is made of organic materials. Do not expose to any liquid, gas, or solids which may corrode the shell.
- Do not expose the product to rain or moisture.
- To prevent the risk of electric shock, do not open the case. Installation and maintenance should only be carried out by qualified technicians.
- Do not use the product beyond the specified temperature, humidity, or power supply specifications.
- This product does not contain parts that can be maintained or repaired by users. Damage caused by dismantling the product without authorization from BZBGear is not covered under the warranty policy.
- Installation and use of this product must strictly comply with local electrical safety standards. The power supply of the product is $\pm 12V$, the max electrical current is 2A.
- Wipe it with a soft, dry cloth when cleaning the camera lens. Wipe it gently with a mild detergent if needed. Do not use strong or corrosive detergents to avoid scratching the lens and affecting the image.
- Do not rotate the camera head aggressively, otherwise it may cause mechanical failure.
- This product should be placed on a stable desktop or on a horizontal surface. Do not install the product obliquely, otherwise it may display an inclined image.
- Ensure there are no obstacles within the rotation circumference of the holder.
- Do not power on until cabling installation is complete for proper operation and synchronizing.
- Electromagnetic fields at specific frequencies may affect the video image. This product is Class A. It may cause radio interference in household application. Appropriate measure is required.



Introduction

The BG-UPTZ-ND series of cameras are packed with features, superior performance, and multiple simultaneous outputs. With its crisp 1080p60 imaging, simultaneous USB 3.0, HDMI, 3G-SDI and IP streaming capabilities these cameras perform well in a wide array of scenarios. The BG-UPTZ-ND features advanced ISP processing algorithms, offering vivid and high-resolution video with a strong sense of depth and fantastic color rendition. It also supports H.264/H.265 encoding for more fluid motion under low bandwidth conditions.

The BG-UPTZ-ND also features **NDI® (Network Device Interface)** technology which provides the ability for multiple video systems to communicate via a local area network (LAN) and eliminates the requirement for video cables like HDMI, DVI, and SDI for streaming, providing convenience and versatility. The technology was developed by NewTek™ to simplify remote connections, streaming, capture/playback, replay, and production.

NDI cameras support bi-directional communication featuring ultra-low latency and ultra-high video streams on shared connections. To function properly the network needs to support 1GB throughput using at least CAT5/6 cables for connectivity. Software programs offering NDI capture will also typically require a NDI plugin to be installed.

Note: NDI streams use more bandwidth than most streaming devices using standard video cables and capture devices. For this reason, it is recommended when using more than two NDI cameras simultaneously it is a good idea to implement VLANs. VLANs provide the ability to divide and segment network bandwidth to optimize streaming without sacrificing quality of the stream or possible streaming interruptions from other devices connecting to the network. If you are having issues with streaming smoothly, this may be caused by network traffic and a lack of bandwidth on the LAN.

EXAMPLES of standard NDI versus NDI|HX streaming bandwidth usage:

- 1920×1080@30 fps: NDI stream requires a minimum of 125 Mbps of dedicated bandwidth.
- 1920×1080@30 fps: NDI|HX stream requires a minimum of 8 to 20 Mbps of dedicated bandwidth.

Features

- **Full HD Resolution:** 1/2.8-inch-high quality CMOS sensor. Resolution is up to 1920x1080 with frame rates up to 60 fps.
- **Multiple Optical Zoom Lens:** 12X/20X/30X optical zoom lens options available.
- **Leading Auto Focus Technology:** Fast, accurate, and stable auto focusing technology.



- **Low Noise and High SNR:** High SNR image is achieved with low noise CMOS. Advanced 2D/3D noise reduction technology further reduces image noise while ensuring high clarity.
- **Multiple Video Output Interfaces:** HDMI, 3G-SDI, USB, LAN (NDI). Simultaneously output audio and video signal on all four outputs. SDI output capable of sending signals of 1080P@60fps up to 100M.
- **Multiple Audio/Video Compression Standards:** Support H.264/H.265 video compression, up to 1920×1080 resolution 60 fps; support AAC, MP3 and G.711A audio compression, 8000,16000,32000,44100,48000 sampling frequencies.
- **Built-in Gravity Sensor:** Supports PTZ auto-flip functionality for simple installation.
- **Multiple Network Protocols:** Supports NDI, ONVIF, GB/T28181, RTSP, RTMP / RTMP(s) protocols; Supports RTMP push mode, connectable to streaming servers (Wowza / FMS); Supports RTP multicast mode; Supports full command VISCA / VISCA IP control protocol.
- **Control Interface:** RS485, RS232 (cascade connection)
- **Multiple Control Protocol:** Support VISCA, PELCO-D, PELCO-P protocols; Supports automatic identification protocols.
- **Quiet Pan / Tilt Movement:** Designed with high accuracy step driving motor, camera pans and tilts quietly and smoothly.
- **Multiple presets:** Up to 255 presets (10 presets via remote control).
- **IR / Wireless Remote Control:** Users can choose IR remote control or wireless remote control according to different conditions (Sold Separately). The 2.4G wireless remote control is unaffected by angles, distance, or infrared interference.
- **Multiple Application:** Online-education, lecture capture, webcasting, video conferencing, tele-medicine, unified communication, emergency command and control systems, etc.

Packing List

- 1x BZBGear BG-UPTZ-ND Camera
- 1x IR Remote Control
- 1x 12V/1.5A Power Supply
- 1x User Manual
- 1x RS232 Control Cable



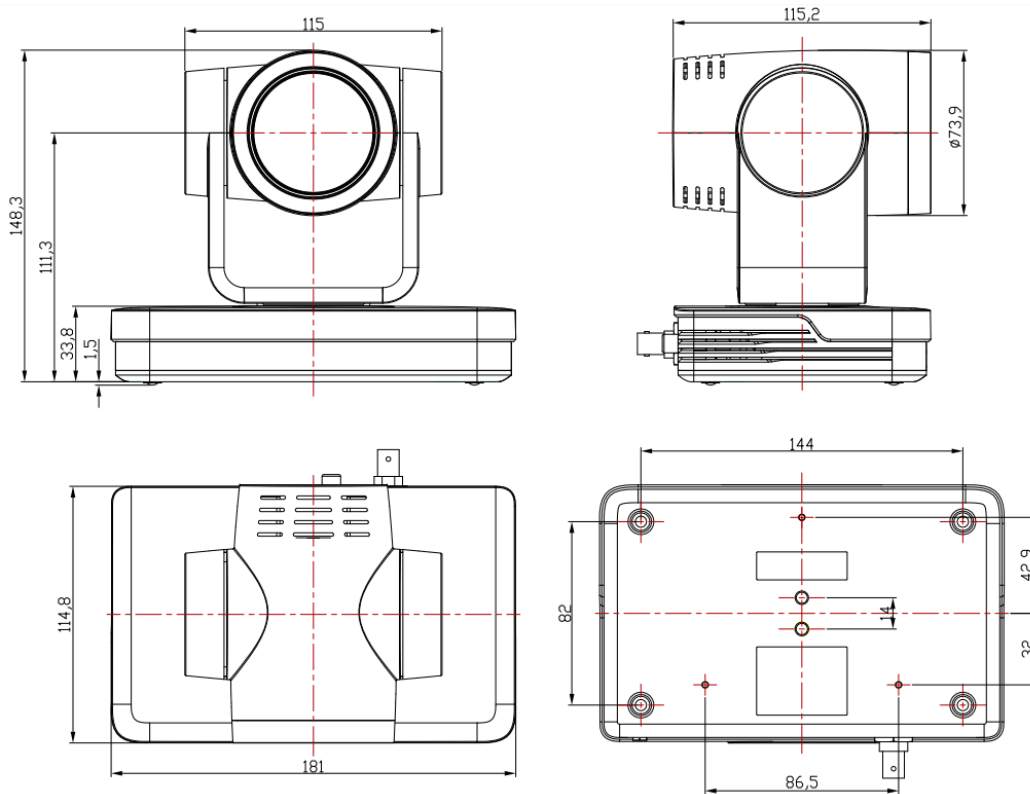
Specifications

Model	12X	20X	30X
Camera Parameters			
Optical Zoom	12X f=3.9-46.8mm	20X f=5.2-104mm	30X f=4.3-129mm
Sensor	1/2.8-inch high quality HD CMOS sensor		
Effective Pixels	16: 9, 2.07 megapixel		
Video Format	HDMI/SDI video format 1080P60/50/30/25/59.94/29.97, 1080I60/50/59.94, 720P60/50/30/25/59.94/29.97 USB3.0 interface video format: Main-Stream: YUY2/MJPEG/NV12/H.264/H.265: 1920×1080P30,1280×720P30,1024×576P30,960×540P30,800×448P30,720×480P30,640×360P30, 640×480P30,320×176P30 Sub-Stream: YUY2/NV12: 640×360P30,640×480P30,320×176P30 MJPEG/H.264/H.265: 1920×1080P30,1280×720P30, 1024×576P30,960×540P30,800×448P30,720×480P30,640×360P30, 640×480P30,320×176P30		
View Angle	72.5°(W) 6.3°(T)	54.7°(W) 3.3°(T)	65.1°(W) 2.34°(T)
AV	F1.8 – F2.4	F1.5~ F3.0	F1.6 – F4.7
Digital Zoom	12X/20X/30X		
Minimum Illumination	0.5Lux (F1.8, AGC ON)		
DNR	2D & 3D DNR		
White Balance	Auto / Manual/ One Push/ Specify color temperature (range: 2400k-7100k)		
Focus/Aperture/ Electronic Shutter	Auto/Manual/One Push Focus		
Iris	Auto/Manual		
Shutter	Auto/Manual		
BLC	ON/OFF		
WDR	OFF/ Dynamic level adjustment		
Video Adjustment	Brightness, Color, Saturation, Contrast, Sharpness, B/W mode, Gamma curve		
SNR	>50dB		
Input/output Interface			
Interface	HDMI, 3G-SDI, LAN (NDI), USB 3.0, RS232-IN/OUT, RS422 (compatible with RS485), 3.5mm Stereo LINE-IN, rotary DIP switch, DC 12V port, power switch		
Video Output	HDMI, SDI, LAN (NDI), USB 3.0		
Video Stream	Dual stream output		
Video Compression Format	LAN Interface: H.265, H.264, Dual stream output USB 3.0 Interface: YUY2, MJPEG, H.264, NV12, H.265		
Audio Input Interface	Stereo 3.5mm linear input		
Audio Output Interface	HDMI, SDI, LAN, USB 3.0		
Audio Compression Format	AAC/MP3/G.711A		
Control Interface	RS232, RS485		
Control Protocol	VISCA / Pelco-D / Pelco-P, Baud Rates: 115200/9600/4800/2400bps		
Power Interface	HEC3800 outlet (DC12V)		
Input Voltage	DC12V±10%		



Input Electric Current	Maximum: 1A
Power Consumption	Maximum: 12W
Network Protocols	TCP/IP, RTSP, RTMP, ONVIF, GB/T28181 Network VISCA control protocol. Supports remote upgrade, reboot and reset
USB Communication	UVC (Video), UAC (UAC)
PTZ Parameter	
Pan/Tilt Rotation	±170°, -30°~+90°
Pan Control Speed	0.1 - 60°/sec
Tilt Control Speed	0.1- 30°/sec
Preset Speed	Pan: 60°/sec, Tilt: 30°/sec
Preset Number	255 presets (10 presets via remote control)
Other Parameter	
Stored Temperature	-10°C~+60°C
Storage Humidity	20%~95%
Working Temperature	-10°C~+50°C
Working Humidity	20%~80%
Dimension (L x W x H)	7" x 4.5" x 5.9" [178mm x 115.5mm x 150.9mm]
Weight	3 lbs [1.38kg]
Attachment	
Package	12V/1.5A Power supply, RS232 control cable, IR Remote Control, User Manual
Optional Accessories	Ceiling / wall mount (additional cost)

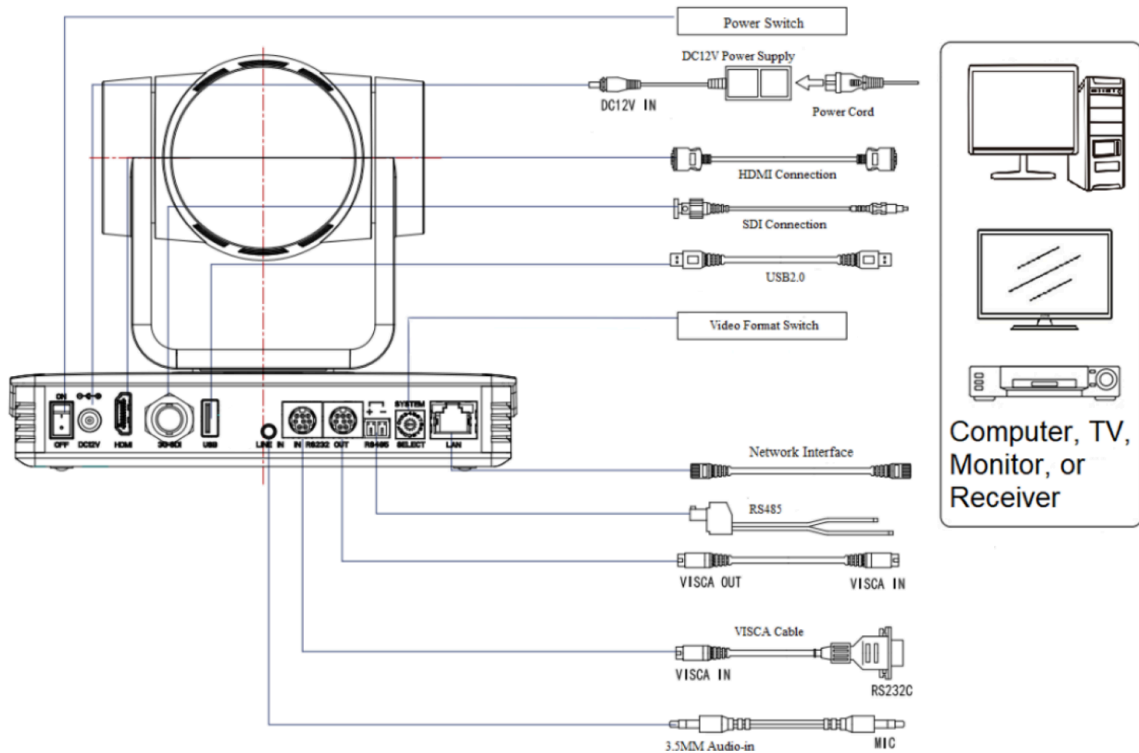
Operation Controls and Functions





Interfaces and Connection

No.	Name
1	HDMI Output
2	USB 3.0 Output
3	SDI Output
4	3.5mm Audio Input Interface (Line-in)
5	Rotary DIP Switch
6	RS232 Control Interface (input)
7	RS232 Control Interface (output)
8	RS422 Interface (Compatible with RS485)
9	Network Interface (NDI)
10	DC12V Input Power Supply Socket
11	Power Switch



Wiring Diagram

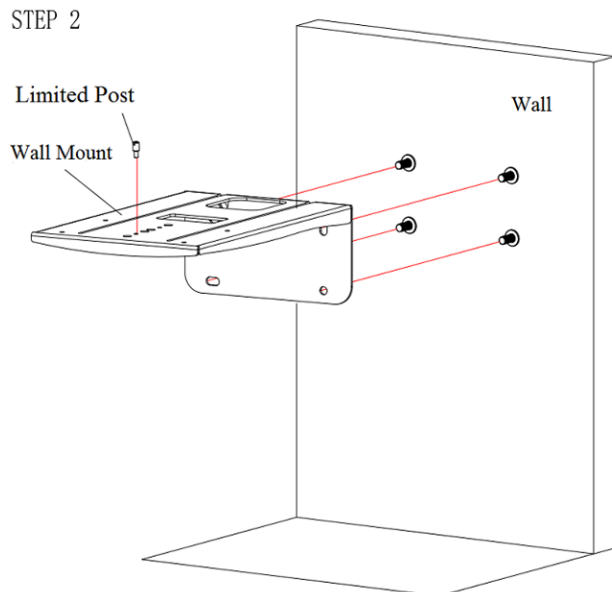
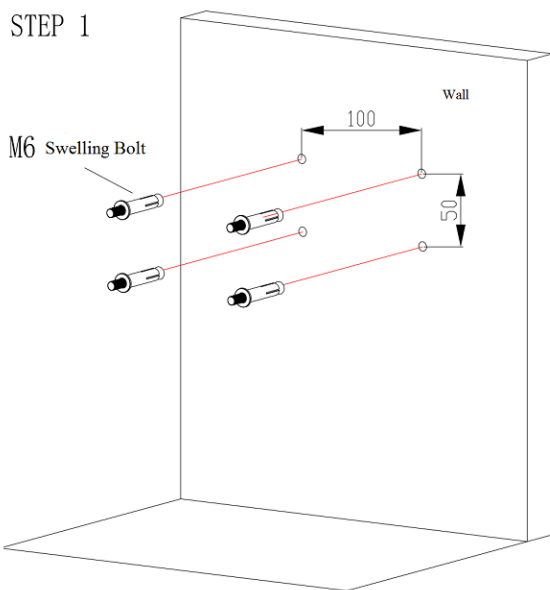
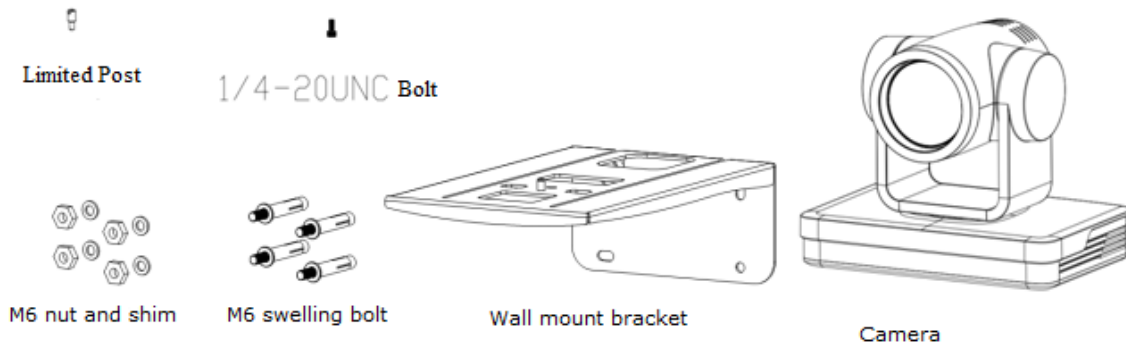
1. After powering on and system self-check, the camera will automatically return to the preset (0) position if it has been pre-set.
2. The default address for the IR remote control is 1.
If restored to factory defaults, the remote control address will be restored to 1.

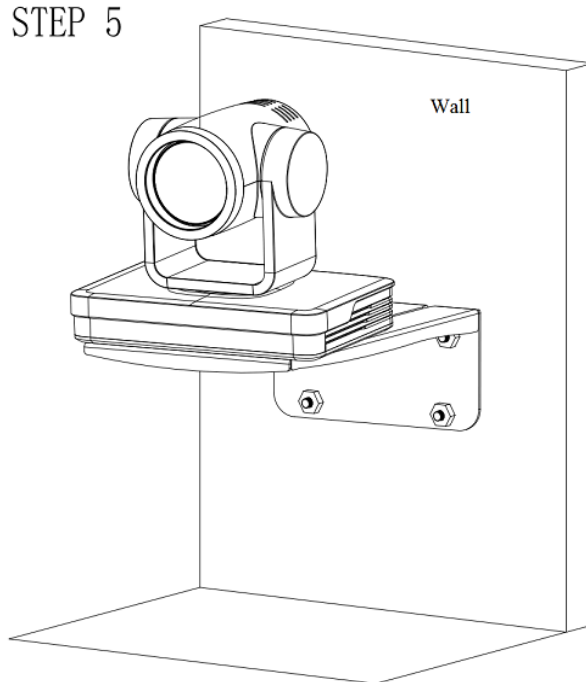
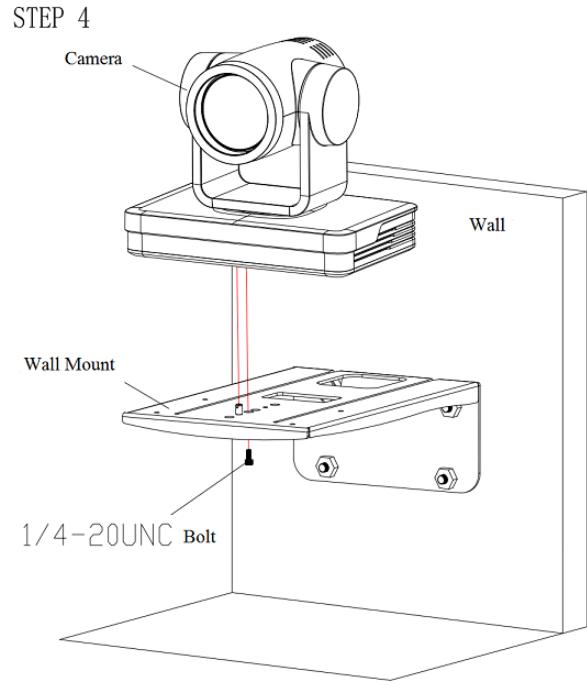
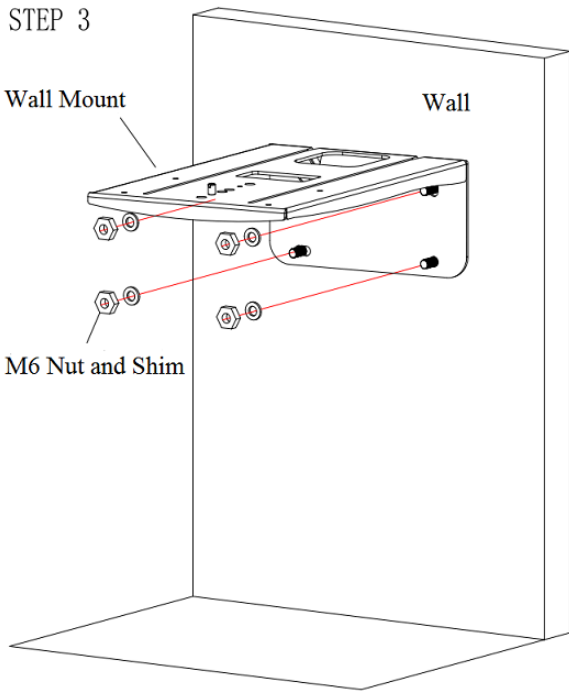


Mounting Brackets

Notes: Ceiling or wall mounting brackets should only be installed on sturdy walls rated to support mounted objects. For safety reasons, plasterboard is not recommended.

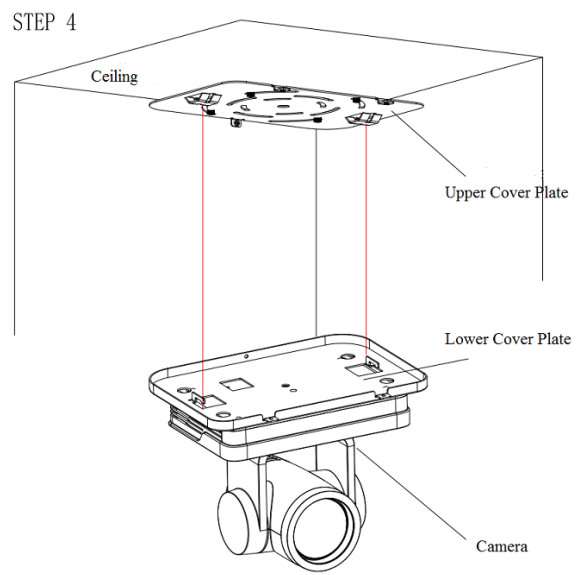
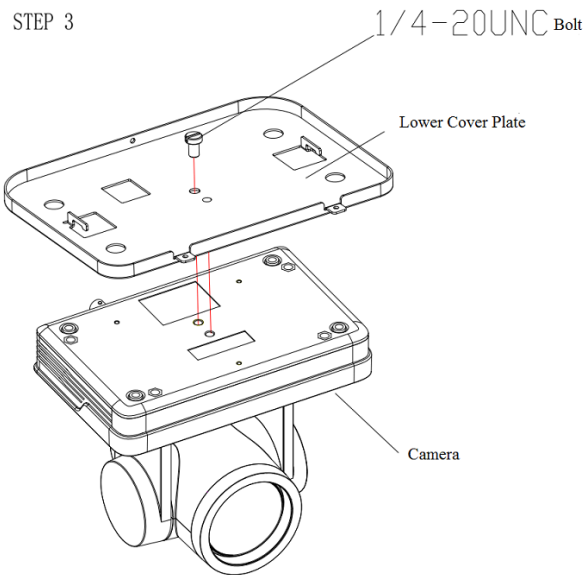
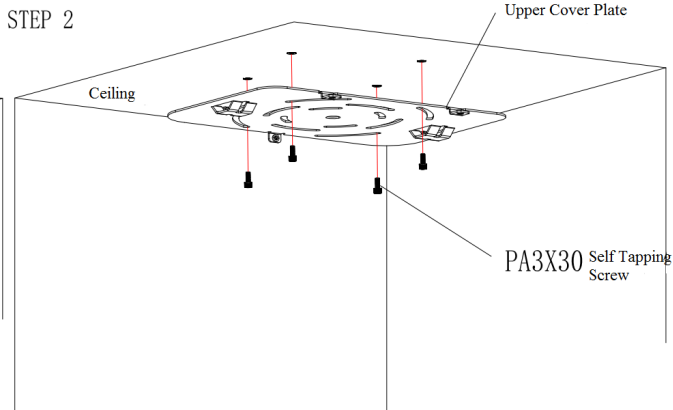
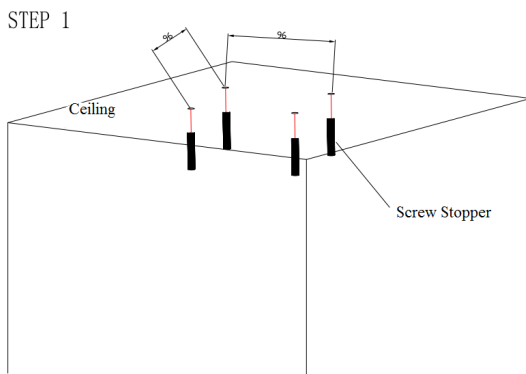
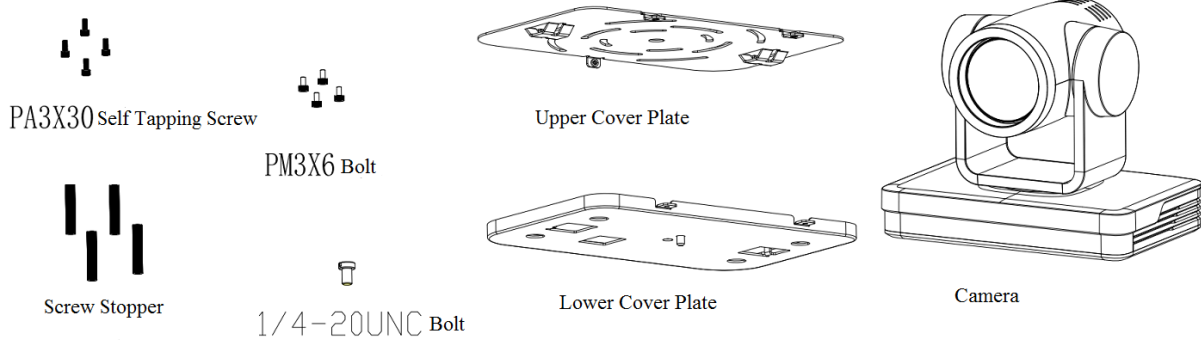
- **Wall Mounting:**





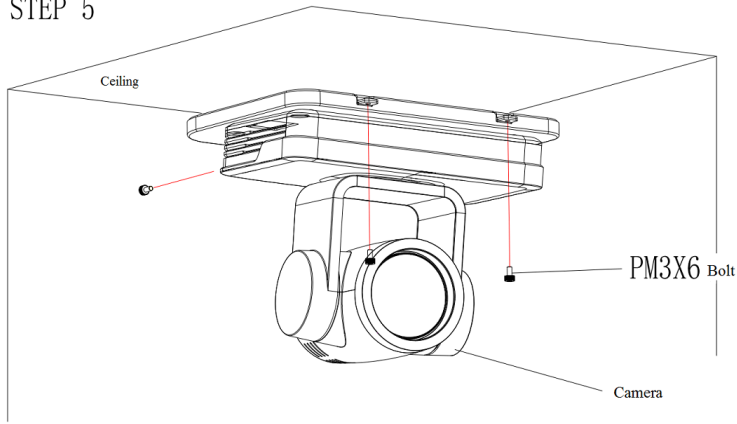


● Ceiling Mounting



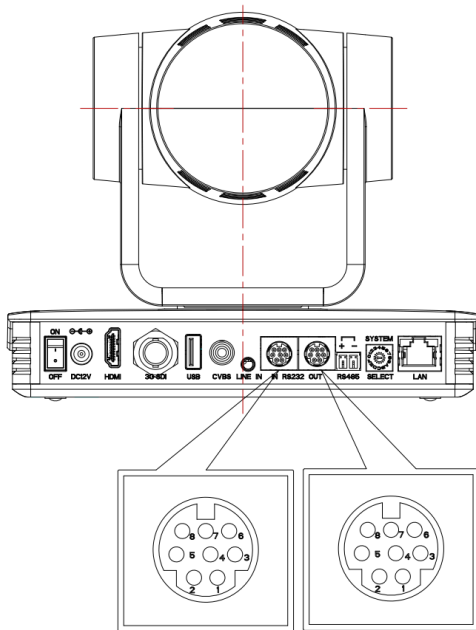


STEP 5



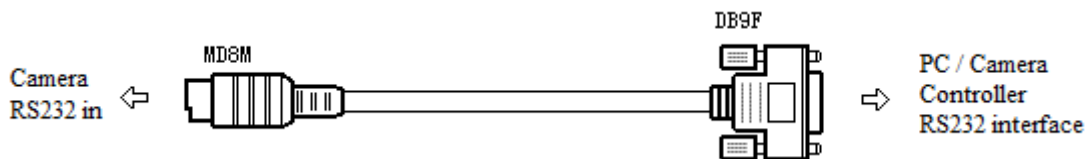
RS-232 Interface

RS-232 Interface Definition



Connection to PC or Camera Controller

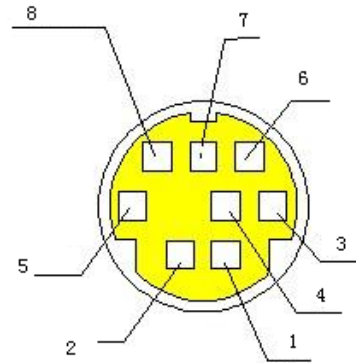
Camera	WindowsDB-9
1.DTR	1.DCD
2.DSR	2.RXD
3.TXD	3.TXD
4.GND	4.DTR
5.RXD	5.GND
6.GND	6.DSR
7.IR OUT	7.RTS
8.NC	8.CTS
	9.RI





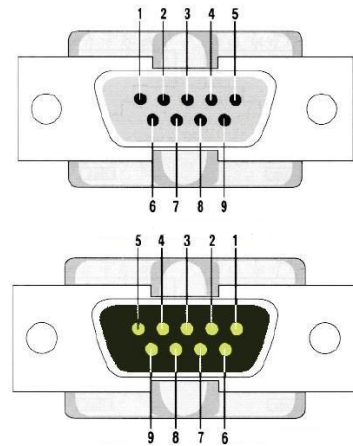
RS232 Mini-DIN 8-pin: Port Definition

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
8	NC	No Connection

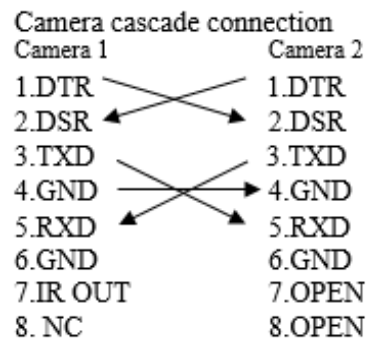
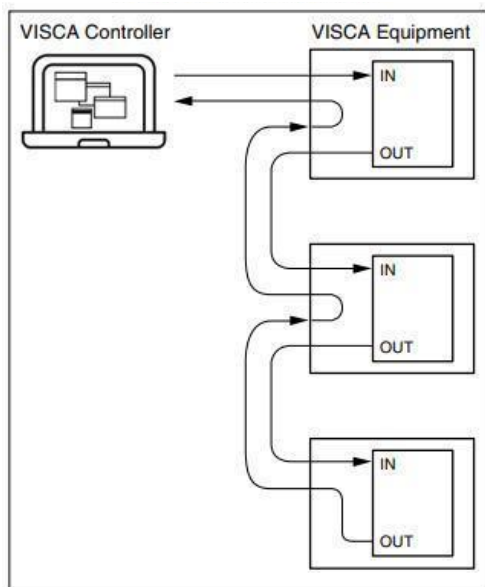


RS232 (DB9) Port Definition

NO.	Port	Definition
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	System Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator



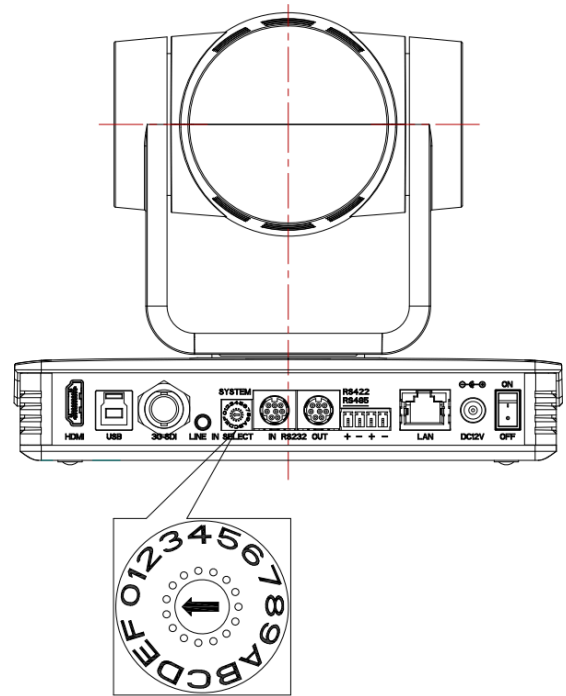
VISCA networking as shown below:





Rotary DIP Switch

Dial-up	Video Format	Dial-up	Video Format
0	1080p60	8	1080p59.94
1	1080p50	9	1080i59.95
2	1080i60	A	1080p29.97
3	1080i50	B	720p59.94
4	1080p30	C	720p29.97
5	1080p25	D	720p29.97
6	720p60	E	720p29.97
7	720p50	F	Set by menu



Note: You must reboot the camera for settings to take effect when the video format is switched using the Rotary DIP Switch.

Remote Control

Match Code for Wireless Remote Control



One-to-One Code Matching:

Press the "set" and "*" keys combined for 3 seconds, LED indicator starts flashing. Camera will receive the signal and power on. The LED indicator will turn off if the code matching is successful. The camera can be controlled by the wireless remote control only after one to one code pairing.

If one-to-one code matching fails, the red LED light flashes for 20 seconds and then will go off. The camera will halt code matching and activate sleep mode; Hold the power for 3 seconds to wake the camera up and re-match code.

Note: Upon matching code successfully, please select the camera's address to control it.

Clear Code:

Press the "set" and "*" keys combined for 3 seconds, the LED indicator will start flashing. Camera will power off and on and the LED indicator will go off if the code clearing is successful.

Sleep Mode and Wake Up:

Press and hold the power button for 3 seconds to wake up the camera from sleep mode.



Keys Introduction for IR Remote Control

- In this manual, “press the key” means a click rather than a long-press, and a special note will be given if a long-press for more than one second is required.
- When a key-combination is required, do it in sequence. For example, [*]+[#]+[F1] means press “[*]” first and then press “[#]” and last press “[F1]”.

1. Standby Key

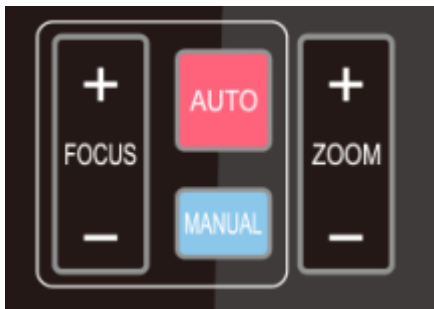
The camera enters standby mode if the power button is pressed for 3 seconds. Press and hold power for 3 seconds to wake up the camera and it will perform the system self-check again and return to the HOME position (If preset (0) position is set, the camera will return to the preset (0) position).

2. Camera Selection



Select the camera's address to control it.

3. Focus Control



Auto: Auto focus mode

Manual: Manual focus mode

Focus + (near): Press [FOCUS +] key (Valid only in manual focus mode)

Focus - (far): Press [FOCUS -] key (Valid only in manual focus mode)

Press and hold the keys, focusing will continue and stop based on the key being pressed and released.

4. Zoom Control



ZOOM +: press [ZOOM +] key to zoom in

ZOOM - : press [ZOOM -] key to zoom out

Press and hold the keys, the action of zoom will continue until the key is released.



5. Set and Clear Presets



Set Preset: press **【SET PRESET】** button, and then press the number key 0-9 to set preset positions.

Note: 10 presets are available via the remote control.

Call Preset: Press a number key (0-9) to call a preset position.

Clear Preset: Press **【CLEAR PRESET】** and then press the number key 0-9 to clear the preset position.

Note: press the **【#】** key three times to clear all presets.

6. Pan/Tilt Control



Up: press ▲ Down: press ▼
 Left: press ◀ Right: press ▶

Back to middle position: press **【HOME】**

Press and hold the up/down/left/right key, the pan/tilt movements will keep running, from slow to fast, until it runs to the endpoint; the camera will stop as soon as the key is released.

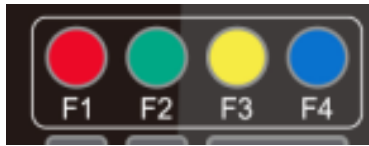
7. Menu Setting



【MENU】: Open / close the OSD menu
【HOME】: Camera lens back to the middle position;
 Confirm button; Enter next menu
【↑】【↓】: Choose item
【←】【→】: Modify values
【BLC ON/OFF】: Turn on or off the back light compensation



8. Camera Remote Control Address Setting



- 【*】+【#】+【F1】:Camera Address No.1
- 【*】+【#】+【F2】:Camera Address No. 2
- 【*】+【#】+【F3】:Camera Address No. 3
- 【*】+【#】+【F4】:Camera Address No. 4

9. Key Combination



- 1) 【#】+【#】+【#】: Clear all presets
- 2) 【*】+【#】+【6】: Restore factory defaults
- 3) 【*】+【#】+【3】: Menu set to Chinese
- 4) 【*】+【#】+【4】: Menu set to English
- 5) 【*】+【#】+【9】: Flip switch
- 6) 【*】+【#】+Auto: Enter aging mode
- 7) 【#】+【*】+Auto: Exit aging mode
- 8) 【*】+【#】+Manual: Restore the default username, password, and IP address
- 9) 【#】+【#】+【0】: Switch the video format to 1080P60
- 10)【#】+【#】+【1】: Switch the video format to 1080P50
- 11)【#】+【#】+【2】: Switch the video format to 1080I60
- 12)【#】+【#】+【3】: Switch the video format to 1080I50
- 13)【#】+【#】+【4】: Switch the video format to 720P60
- 14)【#】+【#】+【5】: Switch the video format to 720P50
- 15)【#】+【#】+【6】: Switch the video format to 1080P30
- 16)【#】+【#】+【7】: Switch the video format to 1080P25
- 17)【#】+【#】+【8】: Switch the video format to 720P30
- 18)【#】+【#】+【9】: Switch the video format to 720P25

Note: If the address of the former remote control is not address 1, the camera will restore to address 1 when the unit is restored to factory defaults. Users need to change the remote control address to address 1 to control the camera again.

Menu Introduction

Note: Users must exit the Menu for settings to apply.

1. Menu Control

【MENU】: Enter / exit the OSD menu or return to the previous menu

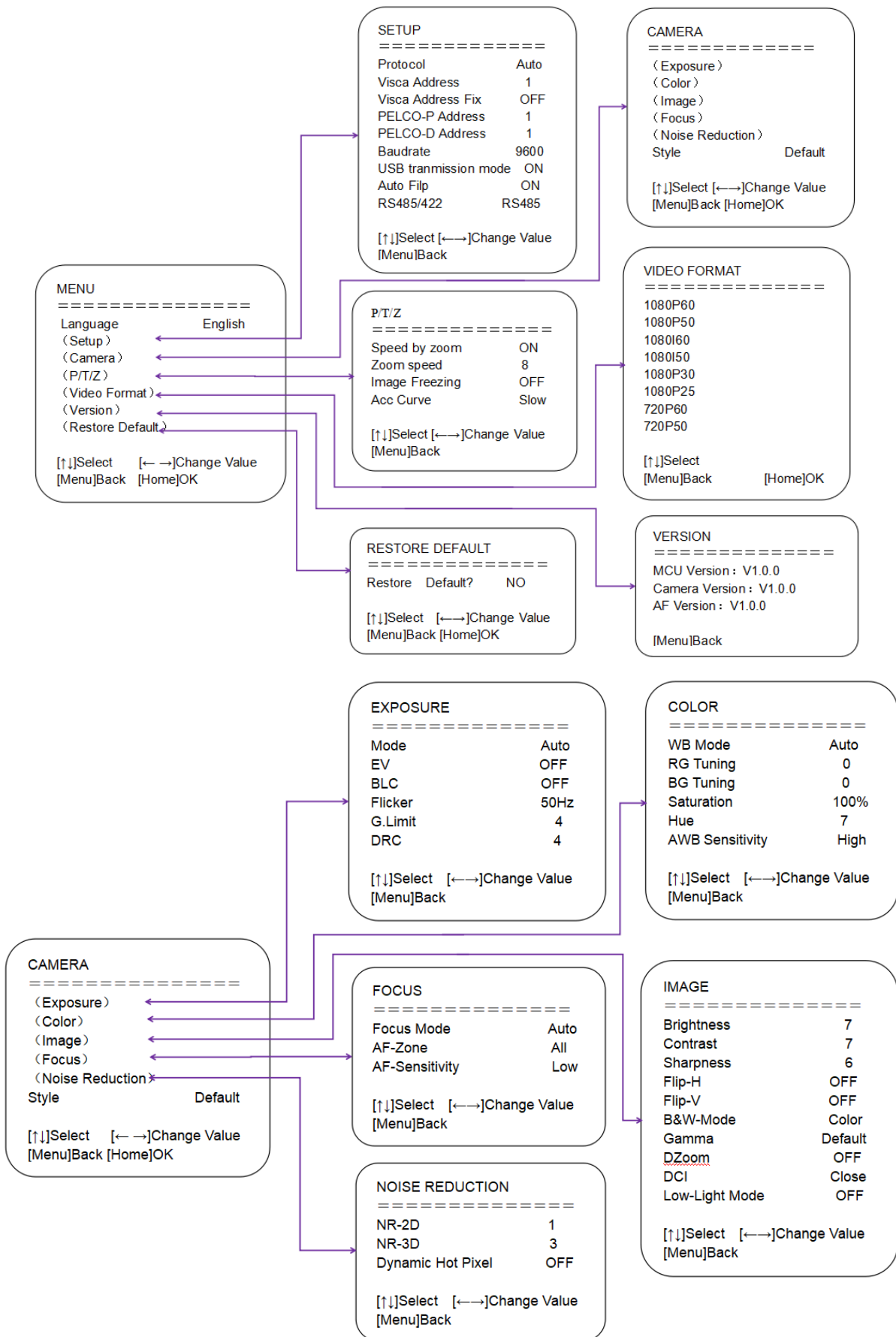
【HOME】: Enter next menu

【↑】【↓】: Choose item

【←】【→】: Modify values



2. Menu Tree





Network Configuration

Network Connection

Connection Modes

Direct connection: Connect the camera directly to the computer using an ethernet cable.

Internet connection mode: Connect the camera and computer to a router or switch and access via the local area network (LAN).

Note: Ensure power and network connections are secured to prevent video issues caused by poor connection quality.

The computer must be on the same subnet as the camera to connect successfully. The device will not be accessible otherwise. The **camera default IP address is 192.168.5.163**, therefore the computer must be connected to the 192.168.5.x subnet.

To connect to the camera, open the Local Area Connection Properties on the computer.

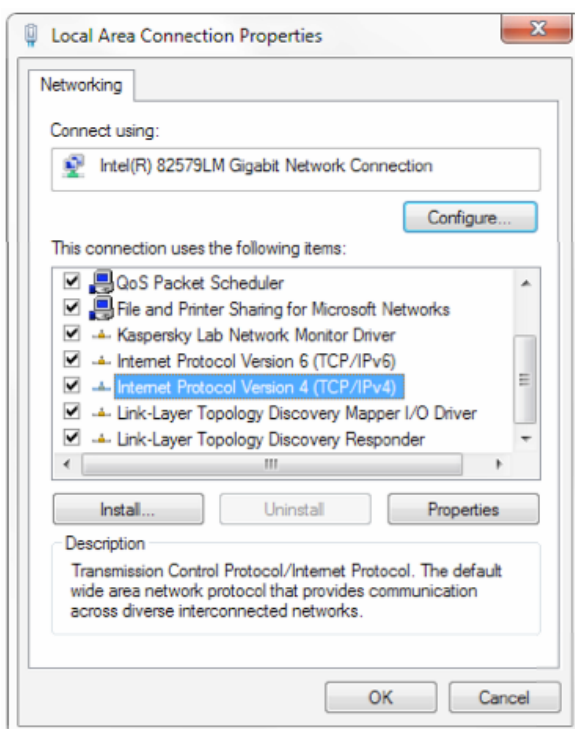
For Windows users right-click on the internet connection in the lower right corner of the desktop.

Select **“Open Network & Internet Settings”**.

Select **“Change Adapter Options”**.

Right-click on your connection (Wi-Fi or Ethernet) and select **“Properties”**.

Select **“Internet Protocol Version 4 (TCP/IPv4)”** as shown below and click **“Properties”**.





For the following steps refer to the diagram below.

Click on the bubble for **“Use the following IP address”**

In the **IP address** field enter a non-conflicting IP address on the same subnet as the camera. If there is another device with the same IP address you will not be able to connect. In the example below we are using 192.168.5.200

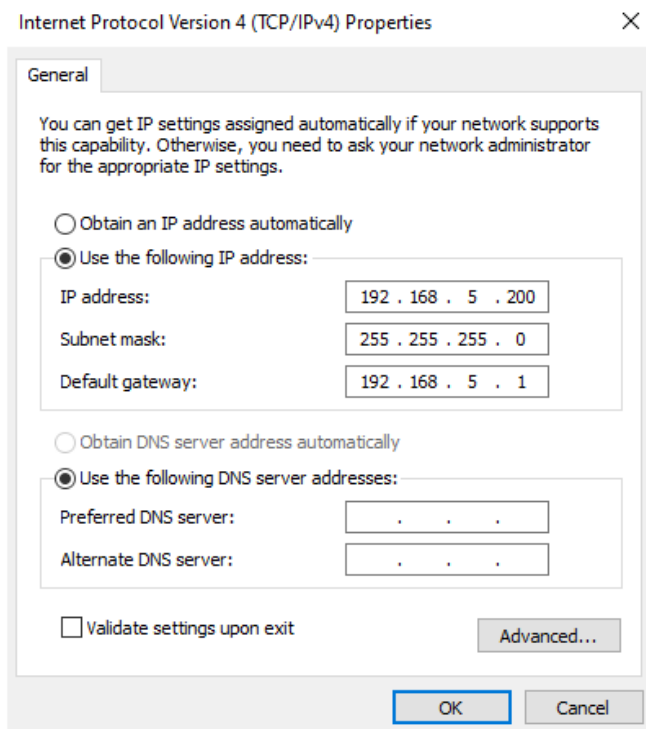
In the **Subnet mask** field enter 255.255.255.0

In the **Default gateway** field type 192.168.5.1

You can leave the DNS fields blank.

Click **OK** to apply your settings.

NOTE: When you are finished configuring the camera you will need to return to this screen and click the bubbles for **“Obtain an IP address automatically”** and **“Obtain DNS server automatically”** to restore internet connectivity to your computer. Also make sure to reconnect any ethernet cables you may have unplugged



Web Browser Login

Web client Log In

Enter 192.168.5.163 in the address bar of your internet browser and click Enter. If logged in as an administrator (Default Username/Password: admin), users can preview and configure in the Web Client. If logged in as a normal user (Default Username/Password:user1 or user2), users can only preview with no options for configuration.



Streaming

1. Video Stream Capture

Configurations -> Video Configure-> Video Encode

Configurations

- Audio Configure
- Video Configure
 - Video Encode**
 - Stream Publish
 - RTP Multicast
 - Video Parameters
 - Video OSD
 - OSD Font Size
 - Video Out
- NetWork Configure
 - Network Port
 - Ethernet
 - DNS
- System Configure
 - SystAttr
 - SysTime
 - SysUser
 - Update
 - Default
 - Reboot

Video Encode

Stream	Main Stream	Sub Stream
Compressed Format	H.264	H.264
Profile	HP	HP
Image Size	1920*1080	320*180
Rate Control	CBR	CBR
Image Quality	Best	Better
Bit Rate(Kb/S)	4096	512
Frame Rate(F/S)	25	25
I Frame Interval	75	75
I Frame Min QP	20	20
Stream Name	live/av0	live/av1

Save

Configure the parameters according to the network environment.

Note: stream name live/av0 (live/ XXX)

Covered by one or more claims of the HEVC patents listed at patentlist.accessadvance.com

For example:

The default IP address of the camera is 192.168.5.163. The way to obtain the RTSP video stream is as below

rtsp://192.168.5.163:554/live/av0 (av0 mainstream)

rtsp://192.168.5.163:554/live/av1 (av1 sub stream)

The default IP address of the camera is 192.168.5.163. the way to obtain RTMP video stream is as below

rtmp://192.168.5.163:1935/live/av0 (av0 mainstream)

rtmp://192.168.5.163:1935/live/av1 (av1 sub stream)

2. Push Video Stream

Configurations -> Video Configure-> Stream Publish



Configurations	Stream Publish	
	Main Stream	Sub Stream
<ul style="list-style-type: none"> Local Configure Audio Configure Video Configure <ul style="list-style-type: none"> Video Encode Stream Publish Video Parameters Video OSD OSD Font Size Video Out NetWork Configure <ul style="list-style-type: none"> Network Port Ethernet DNS GB28181 System Configure <ul style="list-style-type: none"> SystAttr SysTime SysUser Update Default Reboot 	<p>Stream</p> <p>Enable <input type="checkbox"/></p> <p>Protol Type <input type="text" value="RTMP"/></p> <p>Host Address <input type="text" value="192.168.5.11"/></p> <p>Host Port <input type="text" value="1935"/></p> <p>Stream Name <input type="text" value="live/av0"/></p> <p>User Name <input type="text"/></p> <p>Password <input type="text"/></p> <p> Save</p>	<p>Sub Stream</p> <p>Enable <input type="checkbox"/></p> <p>Protol Type <input type="text" value="RTMP"/></p> <p>Host Address <input type="text" value="192.168.5.11"/></p> <p>Host Port <input type="text" value="1935"/></p> <p>Stream Name <input type="text" value="live/av1"/></p> <p>User Name <input type="text" value="1"/></p> <p>Password <input type="text"/></p>

To push a RTMP stream to a public network server, the stream camera must be on the public network, otherwise it will fail to connect to the server.

Host address: server address, which can be either a domain name or an IP address

Host port: server default port number

Stream name: live/test (live/XXX)

Username and password: the username and password set by the server, or leave it empty

Access URL : rtmp://host domain name: host port/live/xxx

Or (rtmp://host IP address: host port/live/xxx)



Auto Rebooter

The BG-UPTZ line of cameras has an integrated Auto Reboot feature that allows users to set a specific time for the camera to automatically restart to help avoid issues caused by systems being on for extended periods of time. There are 3 available options: Daily, Weekly, and Monthly as shown below.

The image displays three screenshots of the 'Auto Reboot' configuration interface. The top screenshot shows the 'Auto Reboot' checkbox unchecked and the 'Schedule' set to 'Daily' with a time of '12:00 AM'. The middle screenshot shows 'Auto Reboot' unchecked, 'Schedule' set to 'Weekly', and 'Repeat On' set to 'M' (Monday) with a time of '12:00 AM'. The bottom screenshot shows 'Auto Reboot' unchecked, 'Schedule' set to 'Monthly', 'On Date' set to '1', and 'Time' set to '12:00 AM'. A 'Save' button is visible at the bottom of the interface.



Serial Port Communication and Control

The camera could be controlled through RS232/RS485 interface; RS232C serial parameter are as follows: Baud rate: 2400/4800/9600/115200 bits/sec; Start bit: 1; data bits: 8; Stop bit: 1; Parity: None.

VISCA Protocol Return Command

Ack/Completion Message		
	Command packet	Note
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 packet	Note
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.

VISCA Protocol Control Command

Command	Function	Command packet	Note
AddressSet	Broadcast	88 30 0p FF	p: 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) - F(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) - F(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



Command	Function	Command packet	Note
CAM_AFSensitivity	High	8x 01 04 58 01 FF	Focus sensitivity Setting
	Normal	8x 01 04 58 02 FF	
	Low	8x 01 04 58 03 FF	
CAM_AFZone	Top	8x 01 04 AA 00 FF	Focus Region Setting
	Center	8x 01 04 AA 01 FF	
	Bottom	8x 01 04 AA 02 FF	
	ALL	8x1 01 04 AA 03 FF	
CAM_WB	One Push mode	8x 01 04 35 03 FF	One Push WB Trigger (Enabled during One Push WB mode) pq = 00--33 WBMode
	One Push Trigger	8x 01 04 10 05 FF	
	CAM_WB Mode	8x 01 04 35 pq FF	
CAM_AWBSensitivity	Low	8x 01 04 A9 00 FF	WB Sensitivity Setting
	Normal	8x 01 04 A9 01 FF	
	High	8x 01 04 A9 02 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



Command	Function	Command packet	Note
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 Limit	Reset	8x 01 04 0C 00 FF	Gain Limit Setting
	Up	8x 01 04 0C 02 FF	
	Down	8x 01 04 0C 03 FF	
	Gain Limit	8x 01 04 2C 0p FF	p: Gain Positon
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
	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



Command	Function	Command packet	Note
CAM_Low-Light Mode	ON	8x 01 04 2D 01 FF	Low-Light Mode Setting
	OFF	8x 01 04 2D 00 FF	
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_Picture effect	B&W-Mode	8x 01 04 63 04 FF	Picture effect Setting
	OFF	8x 01 04 63 00 FF	
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 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
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 5:720P50 1:1080P50 6:1080P30 2:1080i60 7:1080P25 3:1080i50 8:720P30 4:720P60 9:720P25



Command	Function	Command packet	Note
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-tilt LimitSet	Set	8x 01 06 07 00 0W 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	Clear	8x 01 06 07 01 0W 07 0F 0F 0F 07 0F 0F 0F FF	W:1 Up Right 0:Down Left YYYY: Pan Limit Position(TBD) ZZZZ: Tilt Limit Position(TBD)

VISCA Protocol Inquiry Command

Command	Command Packet	Return Packet	Note
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
		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_AFSensitivityInq	8x 09 04 58 FF	y0 50 01 FF	High
		y0 50 02 FF	Normal
		y0 50 03 FF	Low
CAM_AFZonelnq	8x 09 04 AA FF	y0 01 04 AA 00 FF	Top
		y0 01 04 AA 01 FF	Center
		y0 01 04 AA 02 FF	Bottom
		y0 01 04 AA 03 FF	All
CAM_WBModelInq	8x 09 04 35 FF	y0 50 pq FF	Auto
			pq =WBMode
CAM_AWBSensitivityInq	8x 09 04 A9 FF	y0 50 00 FF	Low
		y0 50 01 FF	Normal
		y0 50 02 FF	High
CAM_RGainInq	8x 09 04 43 FF	y0 50 0B FF	7000K



Command	Command Packet	Return Packet	Note
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM_AEModeInq	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_Gain LimitInq	8x 09 04 2C FF	y0 50 0p FF	p: Gain Positon
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_WDRStrengthInq	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: 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 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_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 (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
		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



Command	Command Packet	Return Packet	Note
		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_Low-LightModelInq	8x 09 04 2D FF	y0 50 00 FF	OFF
		y0 50 01 FF	ON
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 rs tu : ARM Version vw : reserve
VideoSystemInq	8x 09 06 23 FF	y0 50 0p FF	P: 0~E Video format 0:1080P60 5:720P50 1:1080P50 6:1080P30 2:1080i60 7:1080P25 3:1080i50 8:720P30 4:720P60 9:720P25
Pan-tiltMaxSpeedInq	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	www: Pan Position zzz: Tilt Position

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
DownLeft	0xFF	Address	0x00	0x14	Pan Speed	Tilt Speed	SUM
DownRight	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



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
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



Maintenance and Troubleshooting

Maintenance

1. Power off the camera and disconnect the power adapter if it's not in use for long periods of time.
2. Use a soft cloth or tissue to clean the camera cover.
3. Wipe it with a soft, dry cloth when cleaning the camera lens. Wipe it gently with a mild detergent if needed. Do not use strong or corrosive detergents to avoid scratching the lens and affecting the video quality.

Troubleshooting

1. **No video output**
 - Check whether the camera power supply is connected, the voltage is normal, and the power indicator is lit.
 - Check whether the camera performed a self-test after restart.
 - Check whether the bottom of the DIP switch is the normal operating mode.
 - Verify that the output cable and display monitor are working properly.
2. **Image cuts out**
 - Verify that the output cable and video display are working properly.
3. **Image distorts when camera is moving**
 - Check whether the camera installation position is solid.
 - Check whether there is machinery or objects nearby that could be transmitting vibration to the camera.
4. **Remote control does not work**
 - Verify the remote control address is set to 1.
 - Check remote control batteries.
 - Verify the camera is in the normal operating mode.
 - Verify the OSD has been exited. Camera cannot be controlled while the menu is being displayed.
5. **Serial port not working**
 - Verify that the camera serial device protocol, baud rate, address is correct.
 - Check whether the control cable is connected properly.
 - Check whether the camera working mode is the normal operating mode.
6. **Cannot connect to Web UI**
 - Check whether the camera output is being displayed normally.
 - Check whether the network cable is connected properly (Ethernet port yellow light flashes to indicate normal network cable connection).
 - Verify your computer is connected to the same subnet as the camera.



Tech Support

Have technical questions? We may have answered them already!

Please visit BZBGear's support page (bzbgear.com/support) for helpful information and tips regarding our products. Here you will find our Knowledge Base (bzbgear.com/knowledge-base) with detailed tutorials, quick start guides, and step-by-step troubleshooting instructions. Or explore our YouTube channel, BZB TV (youtube.com/c/BZBTVchannel), for help setting up, configuring, and other helpful how-to videos about our gear.

Need more in-depth support? Connect with one of our technical specialists directly:

Phone	Email	Live Chat
1.888.499.9906	support@bzbgear.com	bzbgear.com

Limited Product Warranty Terms

Pro Line: 5-year warranty from the date of purchase for AV/Broadcasting products bought on or after August 1, 2024.

Essential Line: 3-year warranty from the date of purchase for AV/Broadcasting products bought on or after August 1, 2024.

Cables: Lifetime Limited Product Warranty.

For complete warranty information, please visit bzbgear.com/warranty.

For questions, please call 1.888.499.9906 or email support@bzbgear.com.

Mission Statement

BZBGear is a breakthrough manufacturer of high-quality, innovative audiovisual equipment ranging from AVoIP, professional broadcasting, conferencing, home theater, to live streaming solutions. We pride ourselves on unparalleled customer support and services. Our team offers system design consultation, and highly reviewed technical support for all the products in our catalog. BZBGear delivers quality products designed with users in mind.

Copyright

All the contents in this manual and its copyright are owned by BZBGear. No one is allowed to imitate, copy, or translate this manual without BZBGear's permission. This manual contains no guarantee, standpoint expression or other implies in any form. Product specification and information in this manual is for reference only and subject to change without notice.

All rights reserved. No reproducing is allowed without acknowledgement.