NewTek™

NewTek

NDI®|HX PTZ3

IP Video Camera

Operating Instructions

March 8, 2022

Table of Contents

Section 1 INTRODUCTION AND SETUP

This section explains how to connect and configure your NewTek NDI|HX-PTZ3 camera. It also explains how to update the device, and where you can find additional NDI® software to extend your workflow. After completing this short section, you'll be all set to begin using your new camera.

1.1 OVERVIEW

Thank you for purchasing this NewTek product. NewTek is proud of its record of innovation and commitment to excellence in design, manufacture, and superb product support.

NewTek NDI®|HX-PTZ3 is the best way to acquire live video for input into modern production workflows. Working with the latest version of NDI, this pan-tilt-zoom (PTZ) camera transmits full HD video formats up to 1080p 60 directly to NDI-compatible receiving devices across the network. It is uniquely suited for IP-based live production and streaming, and other single, and multi-camera applications to include sports and event coverage, video conferencing, lecture capture, distance learning, media communications, and surveillance. You can also use NDI|HX3 as an option for better video with reduced latency, using a fraction of the bandwidth.

Your NewTek NDI|HX-PTZ3 camera delivers amazing functionality in a compact package. Prosumers and video professionals alike will appreciate the convenience and flexibility it provides in connection with video production and capture.

Unlike typical cameras, your PTZ3 leverages the ground-breaking benefits of the NDI-based IP workflow supported by leading video software and hardware developers around the globe. This manual will assist you in installing and configuring your new product.

1.2 GETTING READY

Your PTZ3 device uses the NDI®|HX protocol for audio/video transmission, and more.

To download the NDI|HX, and receive the latest version of NDI (at no cost) head over to ndi.tv/tools/ and install the NewTek NDI Tools for Windows or Mac.

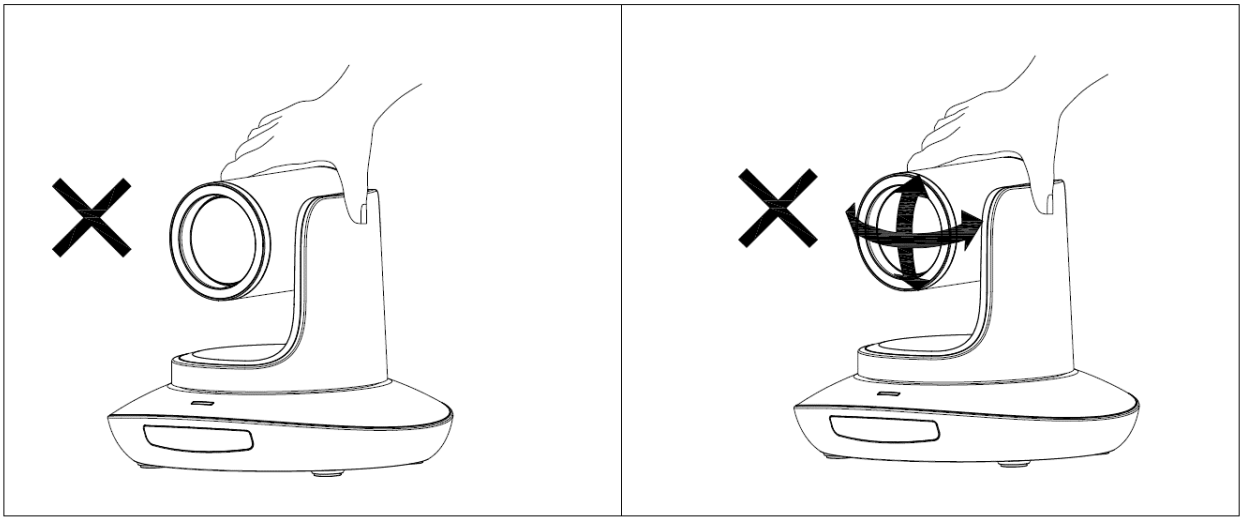
The NDI Tools will provide a very useful array of additional NDI apps, including the NDI Studio Monitor application, which will not only display the output of your camera, but provide easy access to its settings, through its built-in PTZ controls.

NOTE: The End User License Agreement under which you use the NDI|HX driver specifies that "you may use up to five (5), and no more than five, copies on separate machines at one time."

1.3 SAFETY GUIDES

1. Before operation, please fully read and follow all instruction in this manual. For your safety, always keep this manual with the camera.
2. The camera power input range is 100~240V AC (50~60Hz), ensure the power supply input within this range before powering on.
3. The camera power voltage is 12V DC, rated amperage is 2A. We suggest you use it with the original power supply adapter supplied by the factory.
4. Please keep the power, video and control cable in a safe place. Protect all cables, especially their connections.
5. Operational environment: -10℃~50℃, humidity less than 80%. To avoid any danger, do not put anything inside the camera, and keep away from the corrosive liquids.
6. Avoid shock, vibration and moisture during transportation, storage and installation.
7. Do not disassemble the camera. For any service, please contact authorized technicians.
8. Video and control cables should be individually shielded, and should not be substituted with lesser quality cables. Do not direct the camera lens towards strong light, such as the sun or other intense light sources.
9. Use a dry soft cloth to clean the camera housing. Use only neutral non-abrasive cleaning agents.
   To avoid damage to the camera lens, never use strong or abrasive cleaning agents on the camera lens. Do not move the camera by holding the camera head. To avoid mechanical trouble, do not rotate the camera head by hand. NEVER MOVE THE CAMERA MANUALLY WHEN IT IS POWERED ON.
10. Place the camera with the base in only a horizontal or vertical orientation (such as on a desk, wall or ceiling).

Note: The camera's video quality may be affected by the specific frequencies emitted by the electromagnetic filed of other devices. Never grasp the head of the camera (as shown in the drawing below) and never move the camera by hand when it is working, the mechanism maybe destroyed.



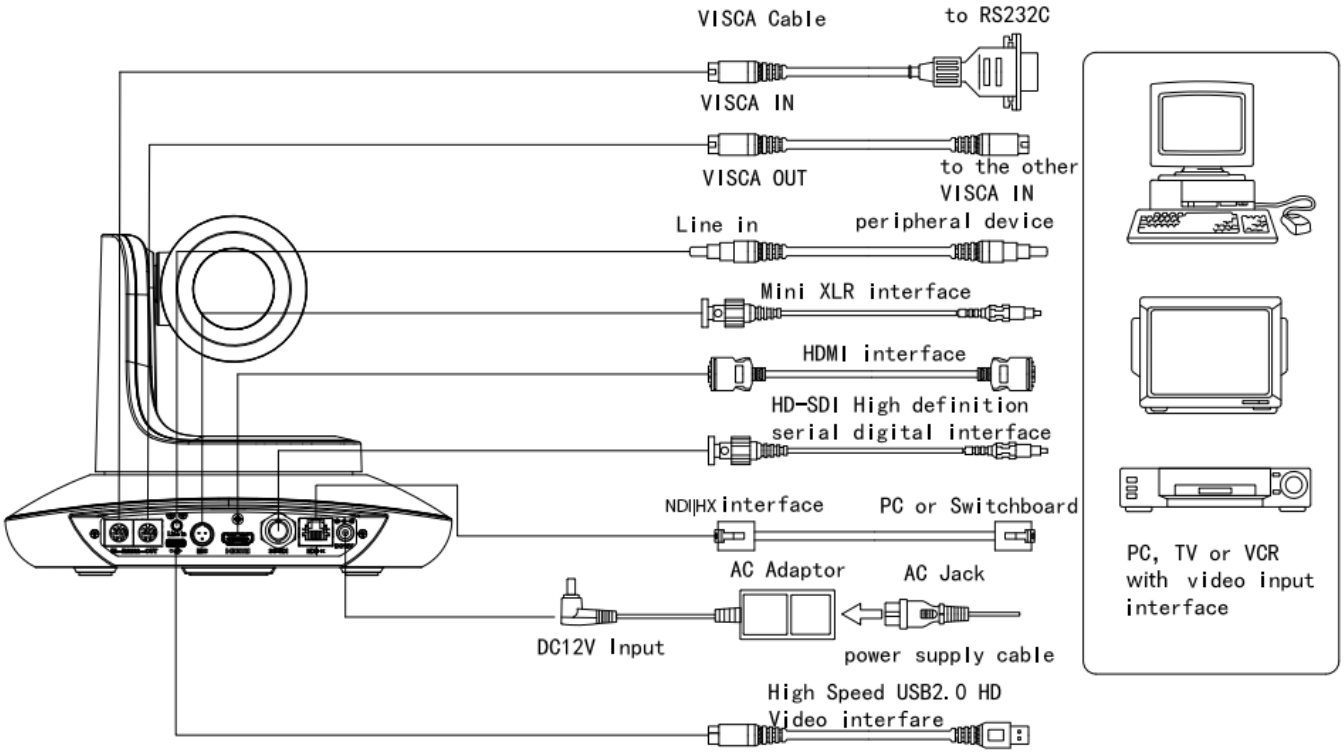
1.4 PACKING LIST

To begin, let's review "what came in the box":

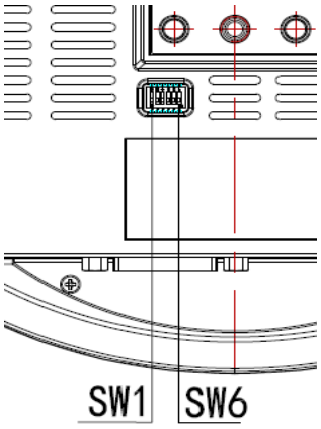
- NDI®|HX PTZ3 Camera
- Power Adapter
- Power Cable
- RS232 Control Cable
- Remote Controller
- User Manual
- Double-sided Adhesive
- QC Certification

1.5 QUICK START GUIDE

1. Check all cable connections before you power on.



2. Dial Switch Setting (on the bottom of camera). The PTZ3 default setting is 1-6 On, On, On, On, On, Off.



Dial Switch (ARM)			
	SW-1	SW-2	Instruction
1	OFF	OFF	Updating mode
2	ON	OFF	Debugging mode
3	OFF	ON	Undefined
4	ON	ON	Working mode

Dial Switch			
	SW-3	SW-4	Instruction
1	OFF	OFF	reserve
2	ON	OFF	reserve
3	OFF	ON	reserve
4	ON	ON	reserve

Dial Switch (ISP)			
	SW-5	SW-6	Instruction
1	OFF	OFF	Working mode
2	ON	OFF	Working mode
3	OFF	ON	Updating mode
4	ON	ON	Updating mode

1.6 PRODUCT FEATURES

- Adopts most advanced American ISP, 1/2.8 inch 2.4MP sensor, providing 1080P60 full HD video resolution.
- Big optical lens: 20x optical zoom, with 60-degree field of view.
- 1080P60 video over NDI|HX, support H.264 and H.265 encoding.
- Supports Line in and Mini XLR audio input for excellent sound quality.
- Supports NewTek NDI video transmission and control.
- NDI|HX, HDMI, 3G-SDI outputs for different applications.
- White Balance, Exposure, Focus, and Iris automatic or manual control.
- Supports PoE (Power over Ethernet): a single connected CAT5/6 cable can provide the transfer of video, control, and power needed by the camera.
- Special Focusing Algorithm: fast and precise focusing performance when zooming or moving.
- Smooth PTZ operation with accurate pan/tilt motor controls.
- 128 presets supported, e.g., Exposure and White Balance parameters can be saved in presets (in manual mode).
- Standard Sony VISCA, IP VISCA, PELCO-P, PELCO-D control protocols; IP VISCA over both TCP and UDP.
- Daisy chaining is supported with a max of 7 cameras connected in VISCA protocol.
- Image flip function supports upside-down installation.
- Supported field upgrade for ISP and ARM.
- Support RS232/RS485 controls.
- OSD menu in English and Chinese supported. IP address can be set in OSD menu.

1.7 WEB CONFIGURATION

Your NewTek NDI|HX PTZ3 is very easy to configure. In many installations, all you need to do is supply power, connect a video source and your network, and you're ready to go.

Sometimes though, you will want to access its settings, perhaps to configure login credentials, adjust color balance, and so on.

Note: As web browsers vary widely, you may occasionally find it necessary to delete cached files (sometimes referred to as the browser's "history", "cached images and files' or "cached web content") before the display refreshes to properly show some recent change. This can happen, for example, after a firmware update.

These settings are made available by means of a configuration webpage, which you can access from any suitable device (i.e., one with a web browser) on the same network.

Some devices provide direct, easy access to PTZ3's configuration webpage.

For example, when you select its NDI output as the source for a NewTek TriCaster® input, a convenient "Configure" button is shown. Simply click it to open PTZ3's web control page.

1.7.1 STUDIO MONITOR

Operate camera controls, monitor video, manage login credentials, and configure audio, video, and network settings from any compatible networked device using the Web-based user interface or NDI® Studio Monitor (NDI® Video Monitor for OS X systems).

FIGURE 1

Once you have launched *NDI Studio Monitor* from your start menu, a QR code will populate providing an option for mobile management as shown in Figure 2.

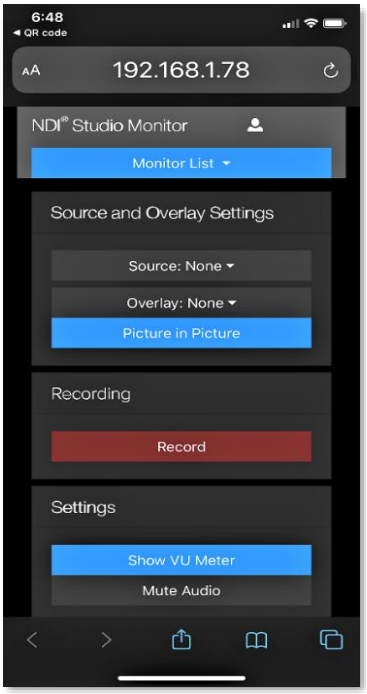


FIGURE 2

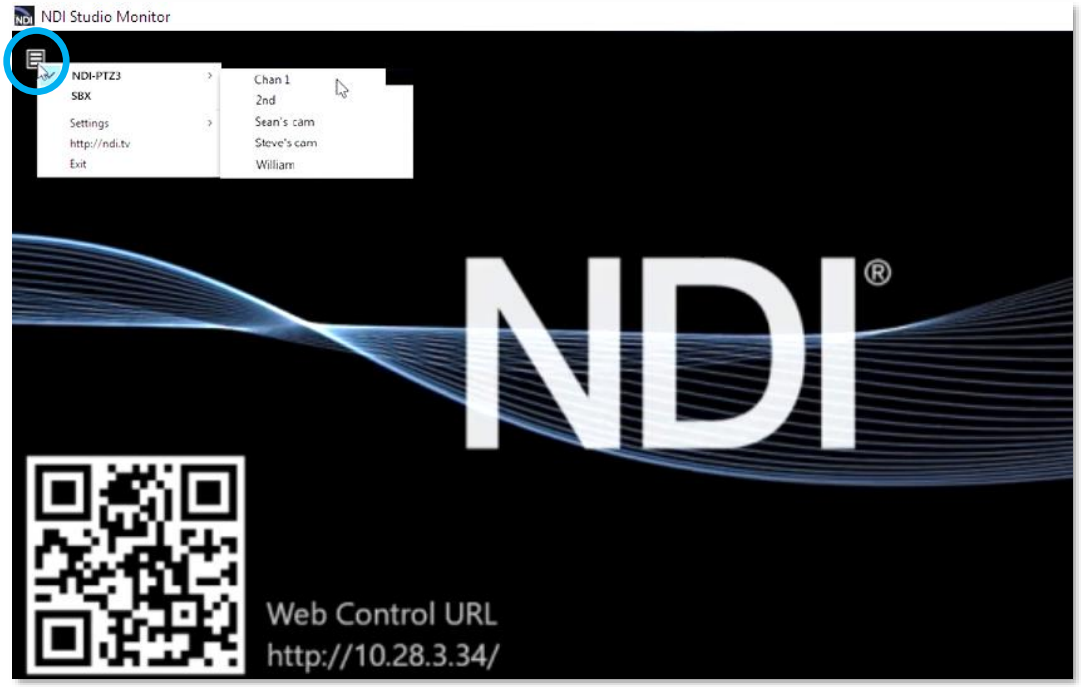


FIGURE 3

LOCATING YOUR CAMERA ON THE NETWORK – WINDOWS®

1. Having launched Studio Monitor, click the small menu gadget ('hamburger') at upper left to open the application menu. Among other things, this menu displays all NDI sources detected on your network.

2. Shortly, you should see a new main entry named NDI-PTZ3 listed in the menu. Rolling the mouse pointer over this label shows the individual names for the NDI output channels of any NDI-PTZ3 cameras detected on the network.

Select the newly-listed channel for the camera you wish to configure. In a few moments, its NDI video output will appear in the Studio Monitor window.

LOCATING YOUR CAMERA ON THE NETWORK – OS X®

The process is very similar for OS X (Mac) users, but please note the slight name change to Video Monitor.

1. Having launched the *Video Monitor* application, use the File menu to locate a new main entry named NDI|HX-PTZ3. Rolling the mouse pointer over this label shows the individual names for the NDI output channels of any PTZ3 cameras detected on the network.

2. The Video Monitor application's Settings menu shows an option near the bottom that lets you open the Device Webpage in your system web browser. Select this item, and continue as follows.

Select the newly listed channel for the camera you wish to configure. In a few moments, its video output will appear in the Video Monitor window.

Hint: Detection of newly-connected NDI sources can take a few moments; in network settings with a great number of NDI sources available, a complete refresh of the source list can take a minute or even more.

FIGURE 4

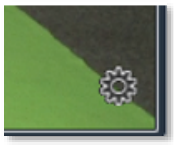


FIGURE 5

Once you have pulled up your NDI camera in *Studio Monitor (or Video Monitor)*, position, zoom and focus tools will appear on the right of the screen. You can save and recall camera positionings using the nine preset buttons.

For NDI sources (like PTZ3) that supply a configuration webpage, Studio Monitor displays a small configuration (gear) icon at lower right when you roll the mouse pointer over it window – Figure 5.

Click the gear to open PTZ3's webpage, which will first ask for you to enter login credentials.

1.7.2 LOGGING IN

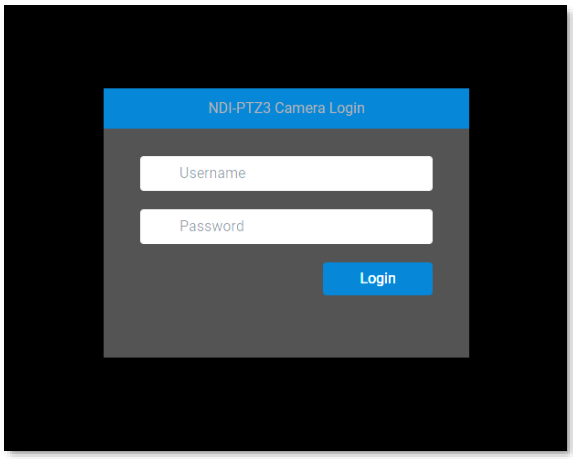


FIGURE 6

Enter the User Name "admin" and the default Password "admin" to login to the camera. It is highly recommended that you change the camera's password to a strong password after first login.

1.8 VIDEO SOURCE

After logging in, your camera's options and controls are shown in your web browser.

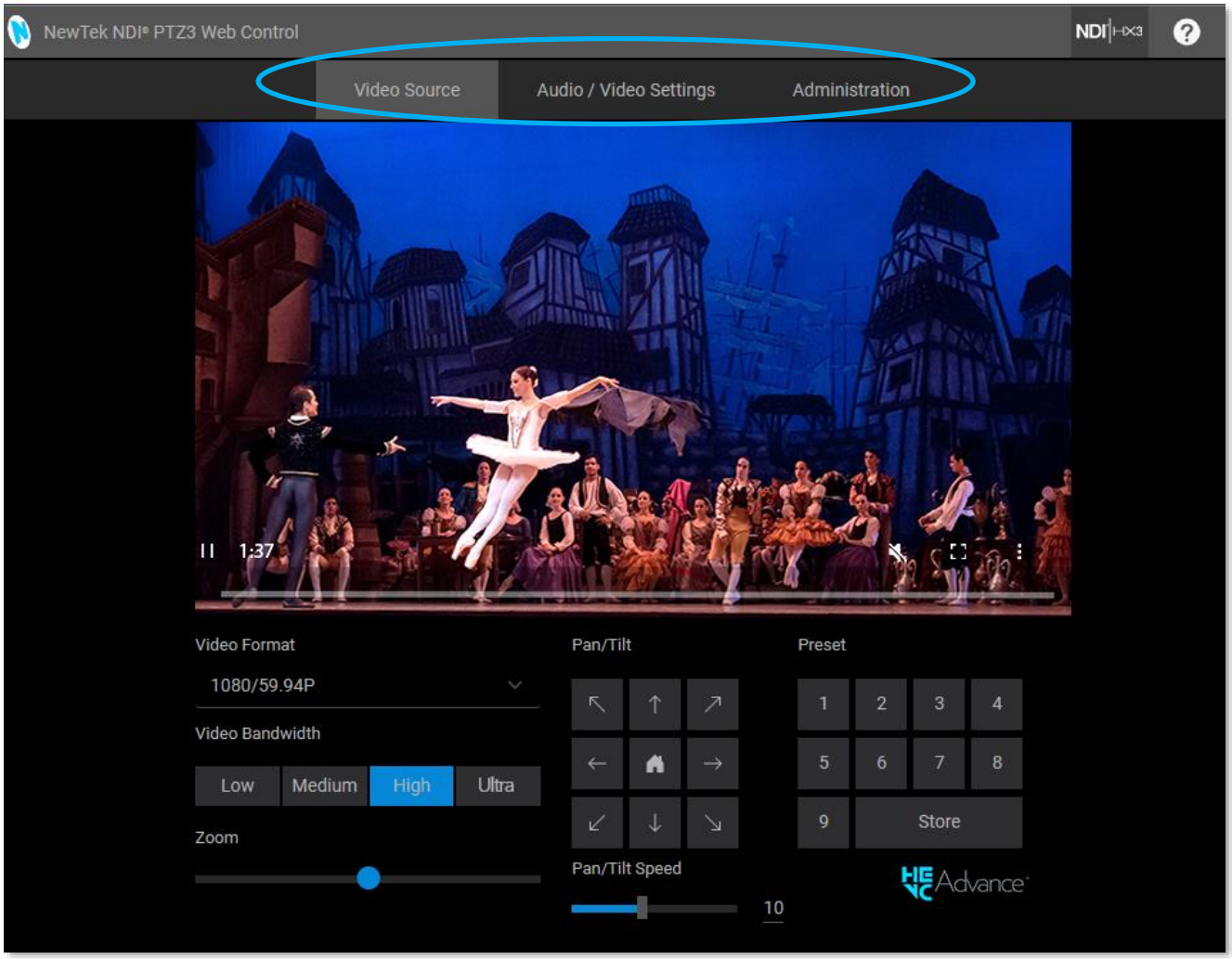


FIGURE 7

The first tab shown on this web page is labeled Video Source. Below this, you will see:

- *Video Format* drop down menu
- *Video Bandwidth* buttons
- Live *Pan, Tilt*, and *Zoom* controls
- *Preset* buttons

Hint: Studio Monitor provides an excellent alternative to almost all of the settings on this first tab.

1.8.1 VIDEO BANDWIDTH

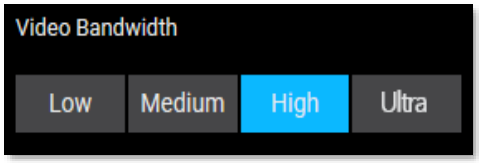


FIGURE 8

Video Bandwidth controls allow you to select between *Low, Medium, High* and *Ultra* bandwidth options. The Ultra button will enable NDI|HX3 for better video with reduced latency. Choosing which option works best is dependent on your network throughput capabilities and other traffic.

1.8.2 PAN, TILT AND ZOOM

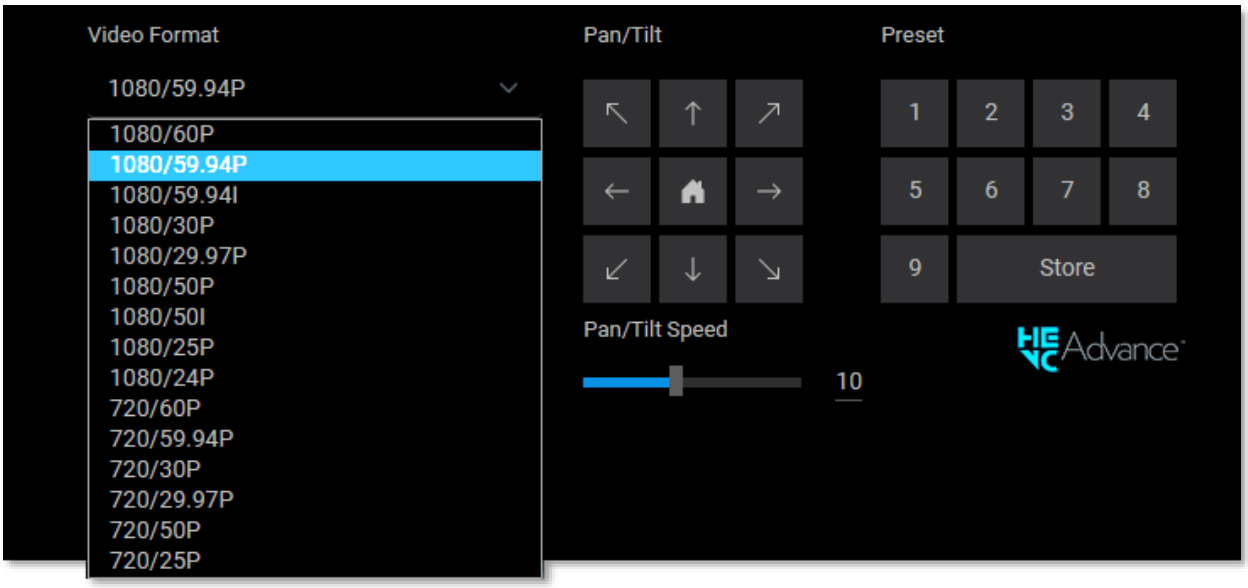


FIGURE 9

The *Video Format* pull down menu lists several video output formats for the camera. The *Pan/Tilt* controls and *Zoom* slider (hidden under the video format pull down menu in the screenshot above) work much as you would expect. Likewise the neighboring preset buttons are easy to use. Drag the *Pan/Tilt Speed* slider to set the speed level of the camera *Pan/Tilt* function.

Simply click *Store* followed by a numbered *Preset* button to store the current PTZ3 position; click the numbered Preset button to send the camera to the stored position.

1.9 AUDIO VIDEO SETTINGS

1.9.1 VIDEO

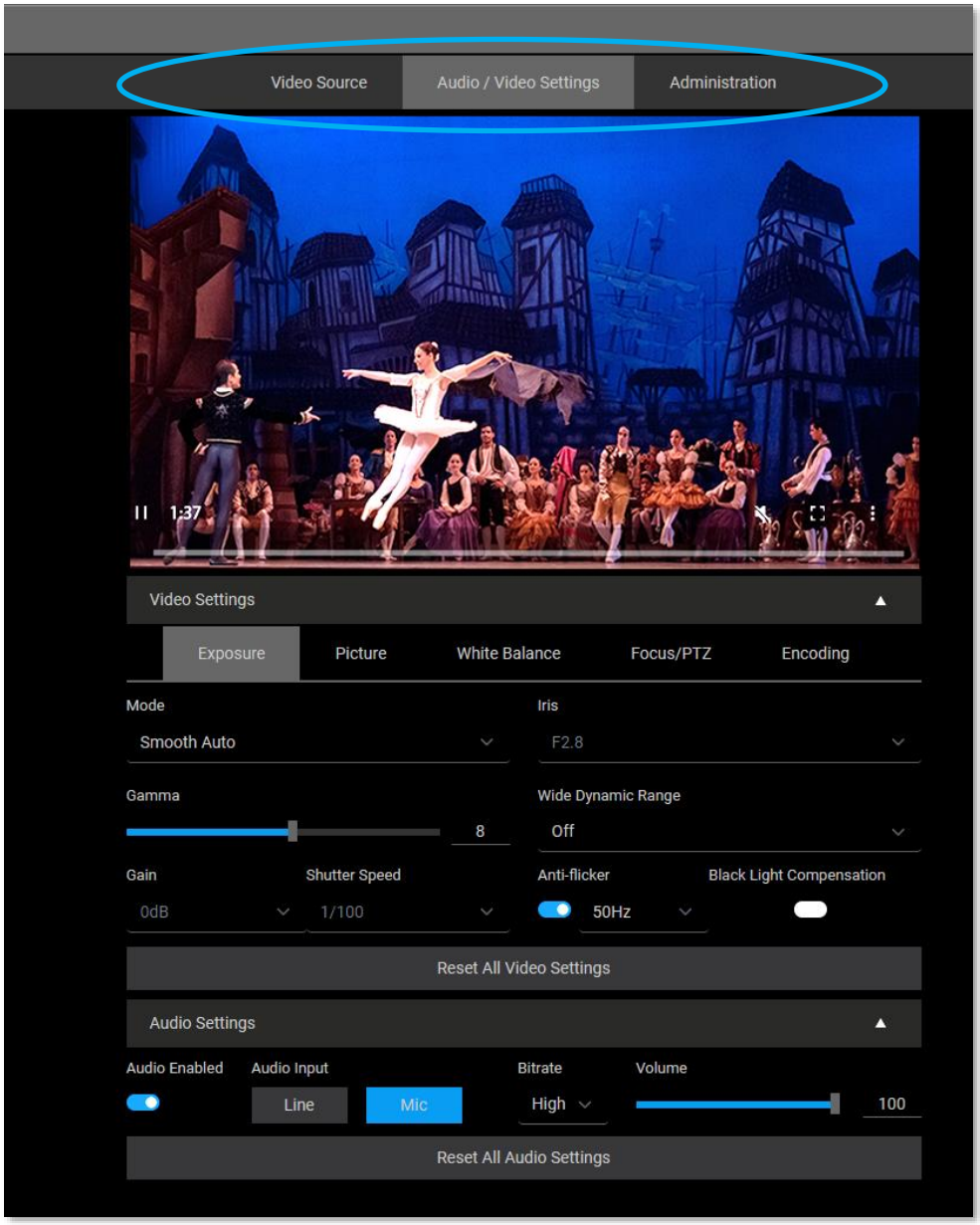


FIGURE 10

Click the second webpage tab to reveal more advanced *Audio/Video Settings* (Figure 10).

Expanding the *Video Settings* control group shows additional nested tabs with various *Exposure, Picture, White Balance*, *Focus/PTZ* options and *Encoding* options.

1.9.2 EXPOSURE

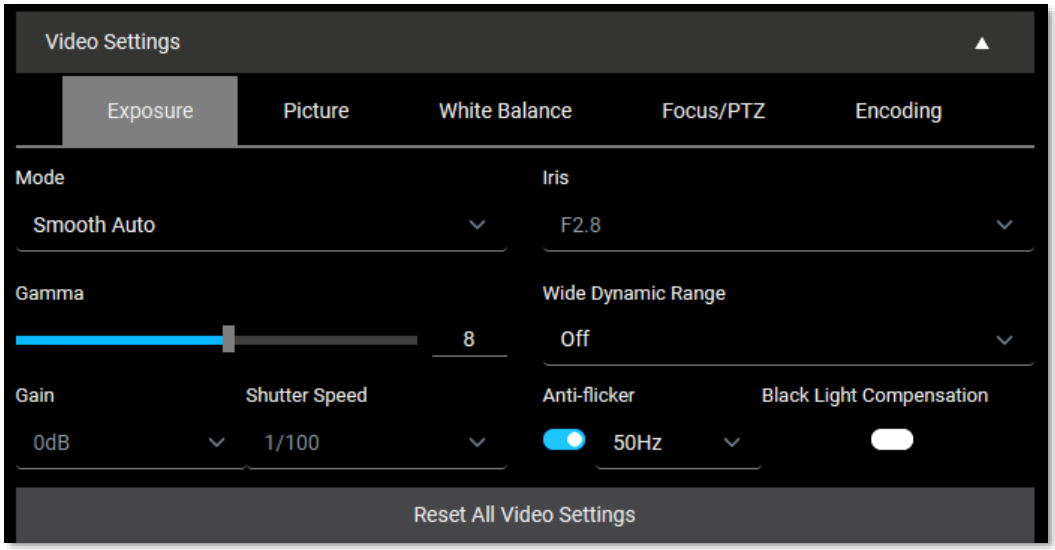


FIGURE 11

Under the Exposure tab you can set parameters such as the video *Mode, Iris, Gamma, WDR* (Wide Dynamic Range), *Gain, Shutter Speed, Anti-flicker and BLC* (Black Light Compensation).

1.9.3 PICTURE

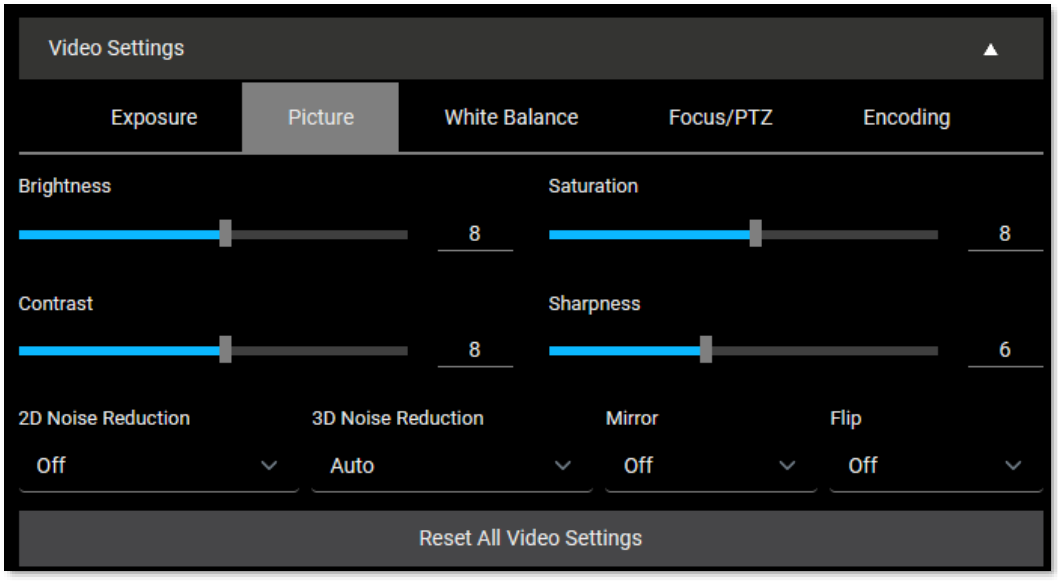


FIGURE 12

Under the *Picture* tab, you can set parameters such as *Brightness, Saturation, Contrast, Sharpness, 2D Noise Reduction, 3D Noise Reduction, Mirror* and *Flip*.

1.9.4 WHITE BALANCE

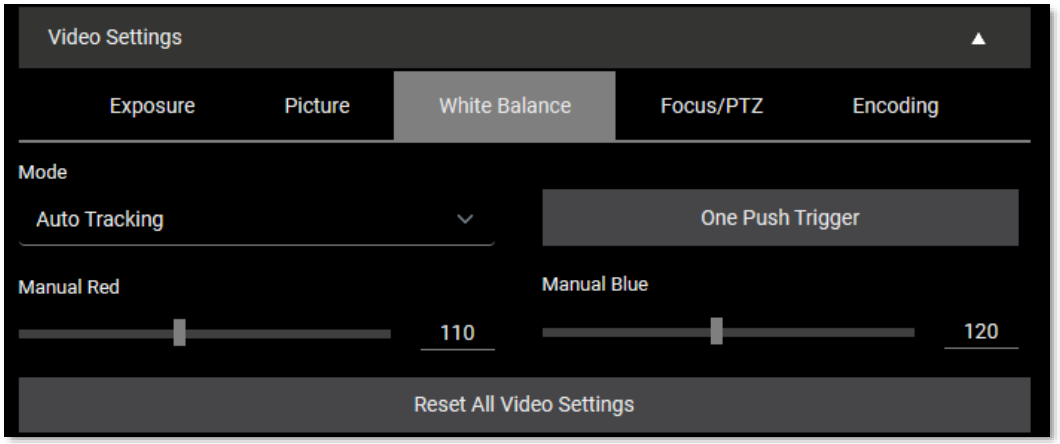


FIGURE 13

Under the *White Balance* tab, you can set parameters such as *Mode, Manual Red* and *Manual Blue*. Press the *One Push Trigger* button to calibrate the white balance of the room.

1.9.5 FOCUS/PTZ

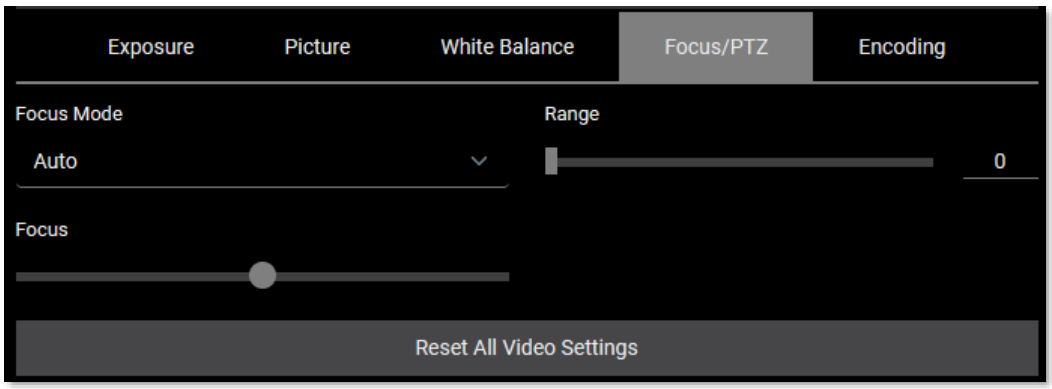


FIGURE 14

Under the *Focus/PTZ* tab you can select *Auto* or *Manual* focus.

1.9.6 ENCODING

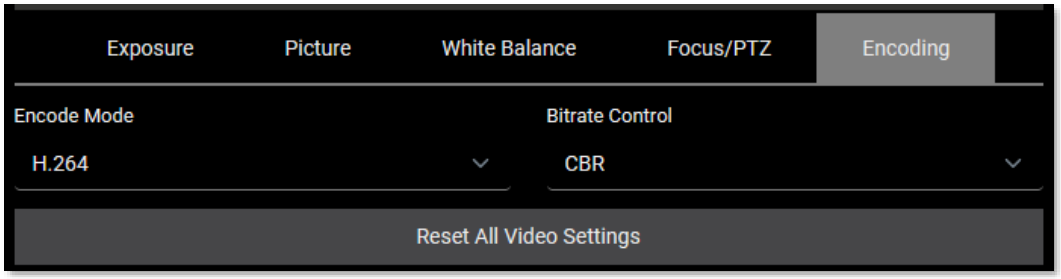


FIGURE 15

The *Encoding* tab allows you to set your *Encode Mode* to H.264 or HEVC and the ability to control the Bitrate with CBR or VBR.

Note: CBR stands for constant bitrate and is an encoding method that keeps the bitrate the same. VBR, by contrast, is a variable bitrate. When audio data is encoded by a codec, a fixed value is used.

1.10 AUDIO

A little lower on the page, you can expand the Audio Settings control group (Figure 16).

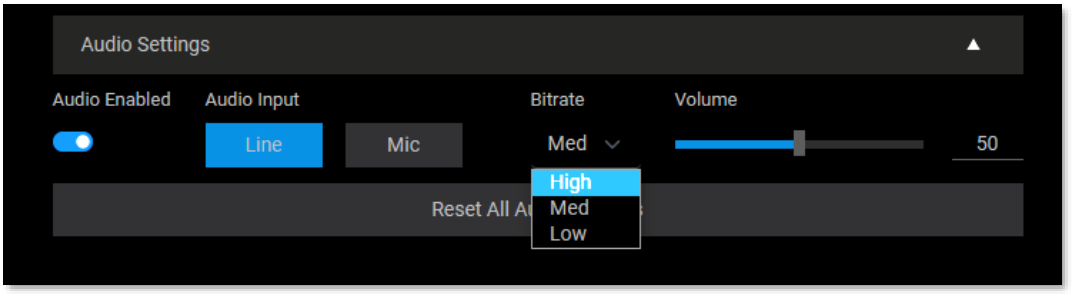


FIGURE 16

The *Audio Settings* group includes support for *Mic* and *Line* level *Audio Input*, *Bitrate* options from Low, Med to High, along with adjustable *Volume* slider. The switch at left allows you to completely disable audio output.

Hint: Use the Mini-XLR connection in addition to the standard line-in. When combined with NDI Audio Direct, the XLR audio connects to the NDI receivers and virtually any audio software providing an array of connectivity options.

1.11 ADMINISTRATION

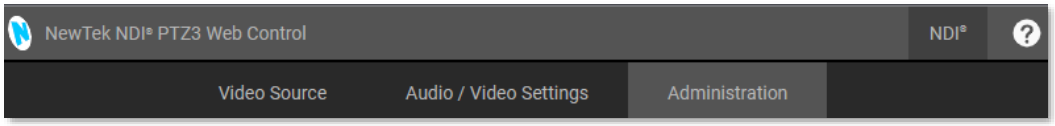


FIGURE 17

The third tab on the configuration webpage is labeled *Administration*. Here you will find information and settings related to your camera, and its network connection.

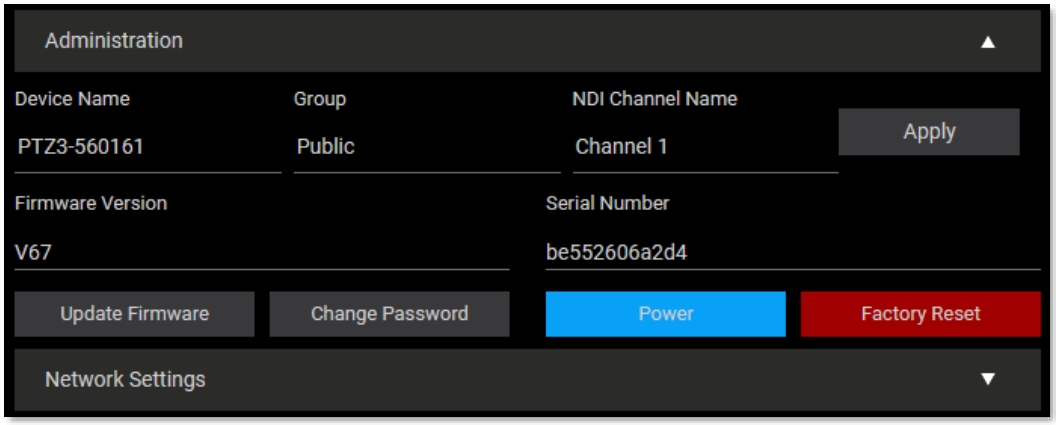


FIGURE 18

The uppermost section of this tab displays the *Device Name, Group*, and *NDI Channel Name* fields, which determine how your camera is identified on your NDI network. These names are editable, allowing you a convenient way to identify the output of specific cameras to other NDI-enabled devices and systems connected downstream.

You will also see the *Firmware Version* for your camera displayed in this area, along with its unique *Serial Number*. Buttons just below allow you to update the installed firmware, change the default administration password, restart the camera (by clicking the *Power* button), or perform a factory reset if needed.

1.11.1 NETWORK SETTINGS

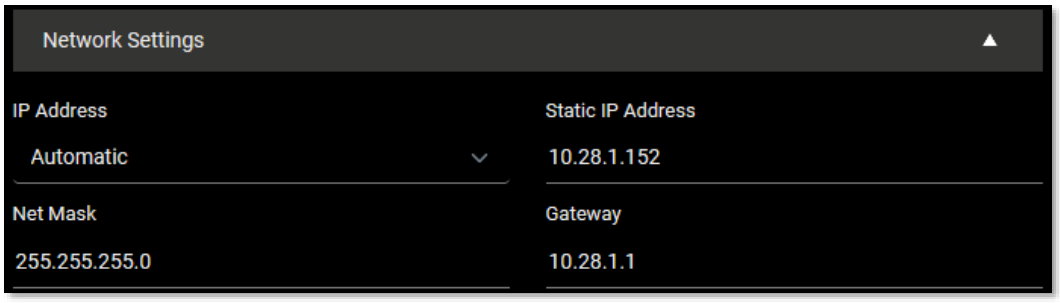


FIGURE 19

Controls in the Network Settings section will be familiar to anyone who has connected a computer or mobile device to a network, and thus require little explanation.

Typically, your network will be configured to automatically supply IP addresses to devices you connect to it by means of a DHCP server. Your camera's IP Address resolution method is set to Dynamic by default, to take advantage of this scheme. To assign a static IP address, change the *IP Address* setting to *Manual,* enter a new *IP Address*, and click *Apply* (changes will not take effect until *Apply* is clicked).

NOTE: Should the default IP Address mode (Dynamic) fail to provide a usable IP address within a minute or two of powering up – as when an active DHCP server is not found on the network – PTZ3 will automatically switch to Manual mode and attempt to connect using a static IP address. The default IP address is 192.168.100.168.

1.11.2 MULTICAST

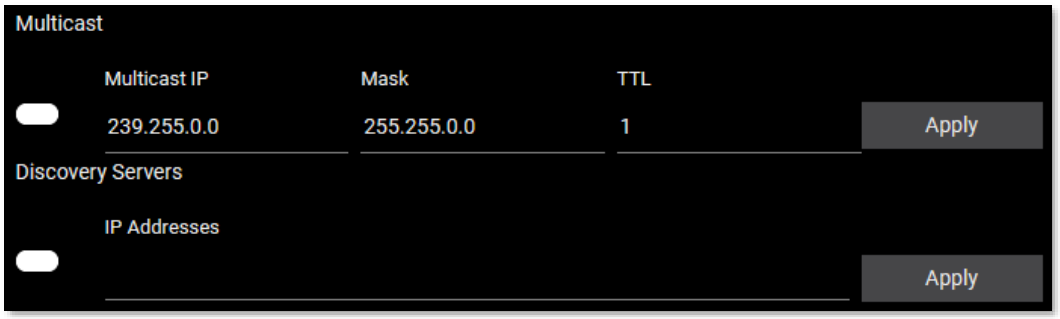


FIGURE 20

Enable *Multicast* to transmit video using multicast, rather than the default unicast method. A suitable Multicast address is generated, but you can edit the result manually if you need to. To update the address you can enter a new address and click *Apply*. *Please take time to consider the following information before enabling this feature.*

Multicast can seem like a bandwidth-saving miracle. Unlike NDI's default mode (unicast), multicast does not require a unique stream from the source to each receiver. When using unicast, each connection to the sender reduces the bandwidth available by a similar amount.

By contrast, multicast connections do *not* add significantly to the bandwidth required as connections multiply. You could be forgiven for wondering why anyone would ever turn this option off - yet, it is off by default. Why?

This is because multicast requires more careful network configuration. While you might not notice any issues in a simple network setting; a poorly configured environment can have a serious impact on more complex networks.

- Specifically, it is essential that IGMP snooping be enabled for each switch on the network. This lets the device listen to traffic between other hosts, switches and routers, and identify receiving ports using various IP multicast streams.

- In addition, we strongly recommend that all network switches be of the 'managed' type (see the sidebar "Managed vs. Un-managed").

1.12 TALLY

Your camera unit provides 'tally' notification from NDI devices supporting it. The light located on the front of the pedestal base will light up in red or green to tell you when video output from the device is visible on the Program output or Preview, as listed in the following table.

POWER	Indicates (tally state)
Green	On preview
Red	On program
Amber	On program and preview
Off	Not on output

Managed vs. Unmanaged

An un-managed (a.k.a., 'dumb') network switch will cause a multicast stream to revert to unicast. This can have serious ramifications.

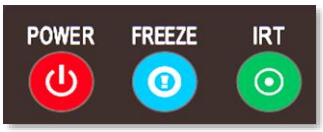
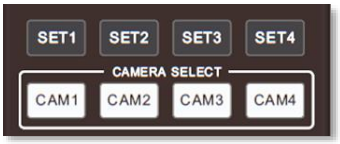
For example, even though a device broadcasts a multicast stream, the un-managed switch will pass *unicast* packets to downstream switches and clients. This can flood parts of the network with unnecessary traffic. It can even slow down the rest of the network, as upstream devices are forced to wait for responses from the over-saturated devices.

The net result of such a poor setup can be likened to a self-inflicted denial of service attack.

Some of the more exotic settings and options available on your NDI|HX-PTZ3 are supported by means of the onscreen display, and accessed via the included remote control. This section first describes the features of the latter, then provides a full list of options and settings in the 'OSD'.

2.1 REMOTE CONTROL

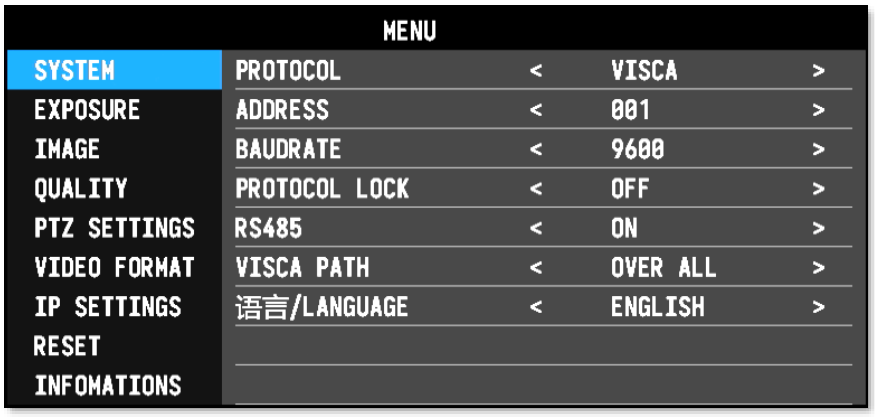
The following table identifies the various controls and buttons on your NDI|HX-PTZ3 remote control.

	**Power** Under normal working mode, short press POWER key, to enter standby mode. Press it again, the camera will do self-configuration, then go back to HOME position. It will go to preset position if power on model has been set before. **FREEZE (Not Supported in OSD)** Short press FREEZE key to freeze/ unfreeze the image. **IRT (IR Transfer/IR Pass)** Open/close the IR pass function. Press the IRT key the camera will receive and Pass the IR remote control signal to the codec/terminal (via VISCA IN port).
	**SET1-SET4 Address Setting** Long press for 3 seconds until the key light ON **CAM1-CAM4 (Camera Selecting)** Short press to select the relative camera.
	**NUMBER KEY (1-9)** Set preset: long press (3 seconds) the number key to set preset. Run preset: Short press the number key to run preset. **CLR PRE (CLEAR PRESET)** CLR PRE+ number key: to clear the relative preset. Long press to clear all presets.

	**FOCUS KEYS (ON THE LEFT)** Manual focus, only valid in manual focus model. **ZOOM KEYS (ON THE RIGHT SIDE)** Set the zoom rate. **NAVIGATE KEY: UP/DOWN/LEFT/RIGHT** Use navigate key to set the pan tilt, and select menu when using the OSD. **OK /HOME KEY** Short press OK to make the camera go back to the HOME position; and confirm the selection when entering the OSD.
	**AF:** Auto Focus **MF:** Manual Focus **RESET:** Press for 3 seconds to reset camera to its defaults. **MENU:** Enter OSD menu.
	**LEARN+LIMIT L key:** Set the pan tilt left limit position. **LEARN+LIMIT R key:** Set the pan tilt right limit position. **LEARN+LMT CLR key:** Clear the limit position.
	**BLC OFF/BLC ON**： Not Available. **BRIGHT-/BRIGHT+:** Set image brightness, only valid under bright priority exposure mode.
	**Video Format Keys:** Long press 3 seconds to select different video formats.

2.2 OSD MENU

1. Press the MENU key on the IR remote controller, to enter the OSD menu as below:



2. After entering the main menu, use the navigate UP/DOWN key to select the main menu. Once selected, the main menu will change to blue background, and the right side will show all sub menu options.
3. Press the navigate RIGHT key to enter sub menu; use UP/DOWN key to select the sub menu options; use LEFT/RIGHT key to change parameters.
4. Press the MENU key again to return to previous menu. Press the MENU key continuously to exit the OSD menu.
5. OSD Menu Settings List.

SYSTEM	PROTOCOL	Optional item VISC / PLC.P / PLC.D	Default: VISCA
	ADDRESS	VISCA: 1~7 PLC.P /PLC.D: 1~255	Default: 1
	BAUDRATE	Optional item: 2400 / 4800 / 9600 / 115200	Default: 9600
	PROTOCOL LOCK	Once set, above protocol setting will be locked	Default: OFF
	RS485	RS485 ON / OFF	Default: ON
	VISCA PATH	Optional Item: OVER ALL / OVER IP / OVER COM	Default: OVER ALL
	语言/LANGUAGE	Optional Item: Chinese / English	Default: English

EXPOSURE	EXPOSURE MODE	AUTO / MANUAL / IRIS / BRIGHT	Default: AUTO
	SHUTTER	Shutter speed: 1/30 - 1/10000, only valid under MANUAL mode	Default: AUTO
	IRIS	Iris setting: CLOSE - F1.8, only valid under MANUAL and IRIS mode	Default: AUTO
	GAIN	Gain setting: 0dB - 30dB, only valid under MANUAL mode	Default: AUTO
	EXPOSURE BRIGHT	Bright setting: 0 ~ 27, only valid under BRIGHT priority mode	Default: AUTO
	BRIGHT	0 ~ 15	Default: 8
	BLC	ON/OFF	Default: OFF

IMAGE	WHITE BALANCE MODE	Optional: ATW / MANUAL / AUTO / INDOOR / OUTDOOR / PUSH	Default: ATW
	RED GAIN	Red gain level: 0~255, only valid under manual white balance mode	Default: AUTO
	BLUE GAIN	Blue gain level: 0~255 , only valid under manual white balance mode	Default: AUTO
	FLICKER	Anti-Flicker setting: 50/60HZ, to reduce the video flicker	Default: 50HZ
	FOCUS MODE	Select focus mode	Default: AUTO

QUALITY	2D NOISE REDUCTION	2D noise reduction: the bigger value is, the less noise on image is, the lower resolution is.	Default: OFF
	3D NOISE REDUCTION	3D noise reduction: OFF /AUTO / 0~4, the bigger value is, the less motion noise on image is. High value will cause image smear.	Default: AUTO
	SHARPNESS	Sharpness setting: 0~15, the higher value is, edge of the image will be sharpen.	Default: 6
	CONTRAST	Set contrast level	Default: 8
	SATURATION	Set saturation	Default: 8
	GAMMA	Select gamma level	Default: 8
	AF SENSITIVITY	Optional: LOW / NORMAL / HIGH	Default: NORMAL

PTZ SETTINGS	SPEED BY ZOOM	Speed By Zoom: proportional speed, the bigger the zoom is, the slower the speed is.	Default: ON
	FLIP	Flip horizontal	Default: OFF
	MIRROR	Flip vertical	Default: OFF
	PT SPEED	Pan Tilt speed	Default: 18
	ZOOM SPEED	Zoom speed	Default: 5
	PRESET FREEZE	Open / Close Video Freeze when running presets.	Default: OFF
	PRESET PT SPEED	Preset head speed: 2~24	Default: 24
	PRESET ZOOM SPEED	Preset zoom speed: 1~7	Default: 5

VIDEO FORMAT	1080P59.94	1080P50	After selecting the system, press OK to switch the system. If it is the currently selected system, it will not be activated.
	1080I59.94	1080I50	
	1080P29.97	1080P25	
	720P59.94	720P50	
	720P29.97	720P25	
	1080P60	1080P30	
	720P60	720P30	
	1080I60	1080P24	

IP SETTINGS	DHCP	ON / OFF	Using up / down / left / right navigation button to select item to set, and using number button to set parameter. Press menu button to return.
	IP	192.168.001.188	
	MASK	255.255.255.000	
	GATEWAY	192.168.001.001	

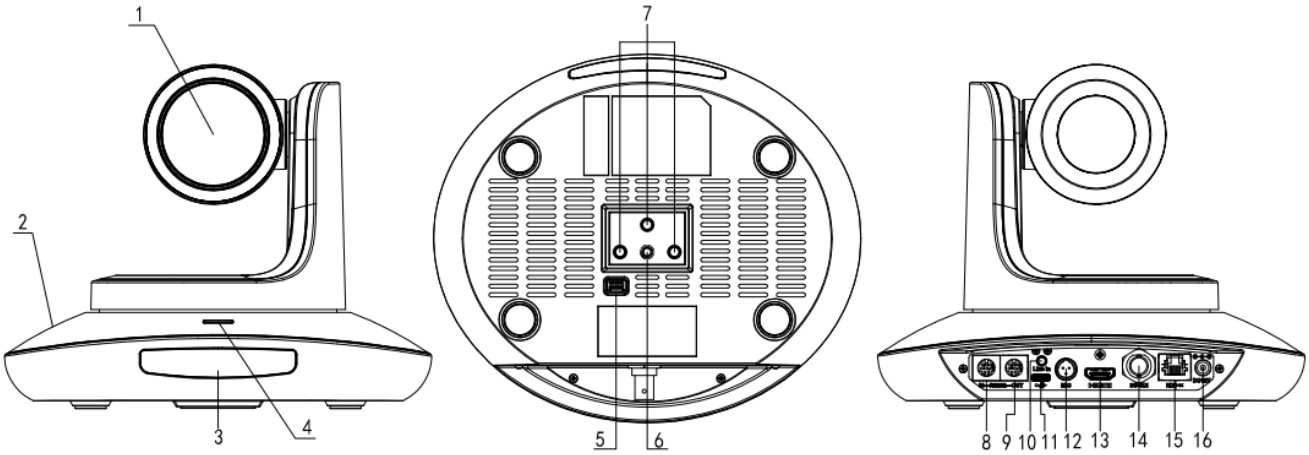
RESET	SYSTEM RESET	Reset communication parameter to default
	CAMERA RESET	Reset camera parameter to default
	PAN TILT RESET	Reset pan / tilt parameter to default
	ALL RESET	Reset all parameter to default

INFOMATION	IR ADDRESS	Camera IR control address
	CLIENT	Default client end protocol: VISCA
	MODEL NO.	Model number
	ARM VERSION	ARM firmware version
	ISP VERSION	Camera version
	RELEASE DATE	Software release date

Video Format	HDMI	1920*1080P60/59.94/50/30/29.97/25/29.97/24 1920*1080I60/59.94/50 1280*720P60/59.94/50/30/29.97/25
	SDI	1920*1080P60/59.94/50/30/29.97/25/29.97/24 1920*1080I60/59.94/50 1280*720P60/59.94/50/30/29.97/25
	NDI	1920*1080P60/59.94/50/30/29.97/25/29.97/24 1280*720P60/59.94/50/30/29.97/25
Video Interface	HDMI, SDI, NDI|HX	
Audio Interface	Line in, Mini XLR	
Upgrade Interface	Type-C	
Sensor	1/2.8”2.4MP CMOS sensor	
Zoom	f 4.9～98mm(20X)	
Iris	F1.5(Wide)~F3.0 (Tele)	
View Angle	60°(Far)-3.2°(Near)	
Rotation Angle	Pan: -170° ~ +170°; Tilt: -30° ~ +90°	
Rotation Speed	Pan: 0°~120°/s ; Tilt: 0°~80°/s	
Preset:	Remote controller: 10; RS232: 128; Accuracy: 0.1°	
Control Port	RS232, RS485, NDI|HX (VISCA over IP)	
Network Speed	1000M	
Video encode	H.264 / HEVC	
Bit Rate Control	Variable Bit Rate, Constant Bit Rate	
Video Bit Rate	Low / Medium / High / Ultra	

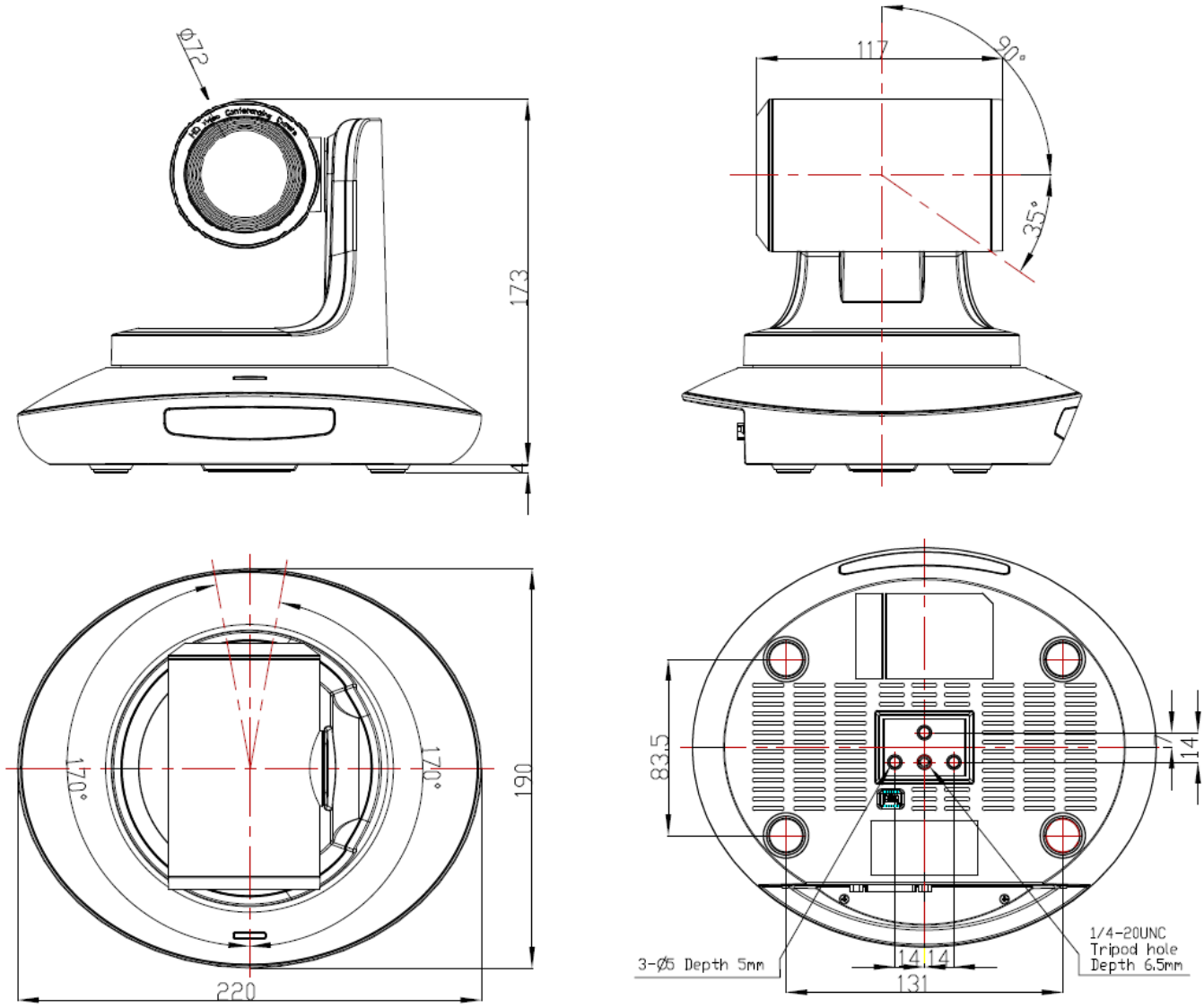
Supported Protocol	HTTP, RTSP, DHCP, RTMP, HTML5, NDI, ONVIF, VISCA TCP, VISCA UDP, VISCA over IP, VISCA Serial, Pelco-P, Pelco-D
POE+	Supported
NDI	Supported
Daisy Chain	Support RS232 serial daisy chain
Minimum Lux	0.1lux
White Balance	ATW / Manual / Auto/ Indoor / Outdoor / Push
Exposure	Auto / Manual / Iris / Bright
Focus	Auto / Manual
Iris	Auto / Manual
Electric Shutter	Auto / Manual
Gamma	Supported
WDR	Supported
BLC	Supported
2D Noise Reduction	Supported
3D Noise Reduction	Supported
Anti-Flicker	OFF / 50Hz / 60Hz
Pan Tilt Flip	Supported
Input Voltage	DC12V/POE+(IEEE802.3at)
Dimension	220mm×190mm×173mm
Net Weight	1.35kg
Working Temperature	-10℃~50℃
Working Humidity	20%~80%
Storage Temperature	-20℃~60℃
Storage Humidity	0~90%

3.1 CAMERA INTERFACE



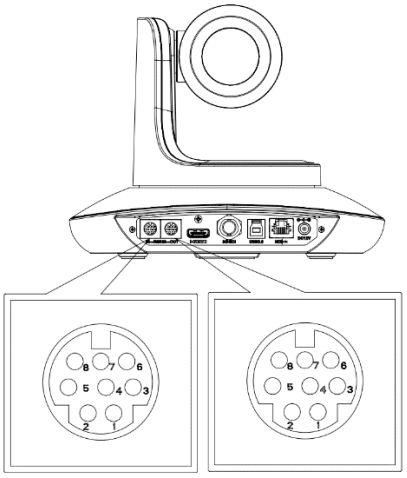
1 Camera Lens	7 Installation Hole	13 HDMI Port
2 Camera Base	8 RS232 Control Port (input)	14 3G-SDI Port
3 IR Receiver Panel	9 RS232 Control Port (output)	15 NDI|HX Port
4 Power Indicator Light	10 Line In Port	16 DC12V Plug
5 Dial Switch	11 Upgrade Port	
6 Tripod Screw Hole	12 Mini XLR Port	

3.2 CAMERA DIMENSION (MM)



3.3 VISCA

3.3.1 VISCA IN (RS232 PORT)



No.	V_IN	V_OUT
1	DTR	DTR
2	DSR	DSR
3	TXD	TXD
4	GND	GND
5	RXD	RXD
6	A	
7	IR OUT	
8	B	

VISCA IN	RS485
1	
2	
3	
4	
5	
6	A(+)
7	IR OUT
8	B(-)

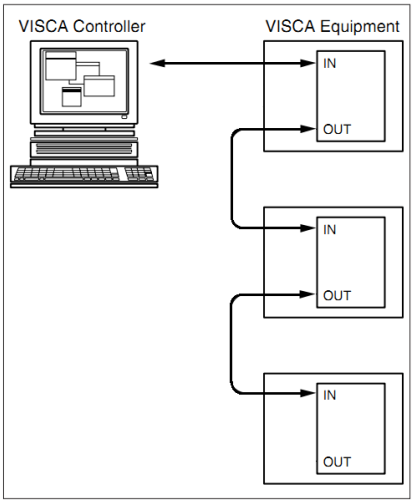
VISCA IN &Mini DIN Connection

Camera VISCA IN		Mini DIN	
1	DTR	1	DSR
2	DSR	2	DTR
3	TXD	5	RXD
4	GND	4	GND
5	RXD	3	TXD
6	A(+)	6	NC
7	IR OUT	7	NC
8	B(-)	8	NC

VISCA IN & DB9 Connection

Camera VISCA IN		Windows DB-9	
1	DTR	6	DSR
2	DSR	4	DTR
3	TXD	2	RXD
4	GND	5	GND
5	RXD	3	TXD
6	A(+)		
7	IR OUT		
8	B(-)		

3.3.2 VISCA Network Construction



3.3.3 SERIAL PORT CONFIGURATION

Parameter	Value	Parameter	Value
Baud rate	2400/4800/9600/115200	Stop Bit	1bit
Start Bit	1 bit	Check Bit	None
Date Bit	8 bit		

3.3.4 VISCA PROTOCOL

PART 1 - CAMERA RETURN COMMANDS

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.

PART 2 – CAMERA CONTROL COMMANDS

Command type	Function	Command	
Address Set	Broadcast	88 30 01 FF	Address setting
IF Clear	Broadcast	88 01 00 01 FF	I/F Clear
Command Cancel		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	

Command type	Function	Command	
	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 (0(wide) ~0x4000(tele))
	Direct with speed	8x 0A 04 47 0t 0p 0q 0r 0s FF	t: spd 0~7 pqrs: Zoom Position (0(wide) ~0x4000(tele))
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) to 7 (High)
	Near (Variable)	8x 01 04 08 3p FF	p=0 (Low) to 7 (High)
	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 AF	8x 01 04 18 01 FF	
CAM Zoom Focus	Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs: Zoom Position (0(wide)~ 0x4000(tele)) tuvw: Focus Position
CAM_WB	Auto	8x 01 04 35 00 FF	
	Indoor	8x 01 04 35 01 FF	
	Outdoor	8x 01 04 35 02 FF	
	One Push	8x 01 04 35 03 FF	

Command type	Function	Command	
	ATW	8x 01 04 35 04 FF	
	Manual	8x 01 04 35 05 FF	
	Sodium lamp	8x 01 04 35 08 FF	
	fluorescent	8x 01 04 35 09 FF	
	One Push Trigger	8x 01 04 10 05 FF	
CAM_R Gain	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 (0~0xFF)
CAM_B gain	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 (0-0xFF)
CAM_AE	Full Auto	8x01 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 (Manual control)
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	

Command type	Function	Command	
	Direct	8x 01 04 4A 00 00 0p 0q FF	pq: Shutter Position (0~0x15)
CAM Iris	Reset	8x 01 04 0B 00 FF	Iris Setting(0~0xD)
	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 (0~ 0x11)
CAM Gain	Reset	8x 01 04 0C 00 FF	Gain Setting (0~0x0F)
	Up	8x 01 04 0C 02 FF	
	Down	8x 01 04 0C 03 FF	
	Direct	8x 01 04 0C 00 00 0p 0q FF	pq: Gain Position (0~0x0E)
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 l Position (0~0x1B)
CAM_WDR	On	8x 01 04 3D 02 FF	Exposure Compensation ON/OFF
	Off	8x 01 04 3D 03 FF	
	Direct	8x 01 04 D3 pq FF	pq: ExpComp Position (0~0x6)
CAM Back Light (BLC)	On	8x 01 04 33 02 FF	BackLight On
	Off	8x 01 04 33 03 FF	BackLight Off
CAM Sharpness	Reset	8x 01 04 02 00 FF	Aperture Control

Command type	Function	Command	
	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 (0~0x0F)
CAM Memory (preset)	Reset	8x 01 04 3F 00 pp FF	pp: Preset Number(=0 to 127) Corresponds to 0 to 9 on the Remote Commander
	Set	8x 01 04 3F 01 pp FF	
	Recall	8x 01 04 3F 02 pp FF	
CAM LR Reverse	On	8x 01 04 61 02 FF	Image Flip Horizontal ON/OFF
	Off	8x 01 04 61 03 FF	
CAM Picture Flip	On	8x 01 04 66 02 FF	Image Flip Vertical ON/OFF
	Off	8x 01 04 66 03 FF	
CAM_RS485Ctl	On	8x 01 06 A5 02 FF	
	Off	8x 01 06 A5 03 FF	
CAM Saturation	Saturation	8x 01 04 A1 00 00 0p 0q FF	pq: saturation level 0x00~0x0f
CAM Contrast	Contrast	8x 01 04 A2 00 00 0p 0q FF	pq: Contrast level 0x00~0x0f
CAM Speed By Zoom	On	8x 01 06 A0 02 FF	
	Off	8x 01 06 A0 03 FF	
CAM_PT Speed	PT Speed	8x 01 04 C1 00 00 0p 0q FF	pq: PT speed 0x05~0x18
CAM Zoom Speed	Zoom Speed	8x 01 04 D1 00 00 0p 0q FF	pq: Zoom speed 0x01~0x07

Command type	Function	Command	
CAM Zoom Display	On	8x 01 06 C2 02 FF	
	Off	8x 01 06 C2 03 FF	
CAM Freeze	Freeze	8x 01 04 75 0p FF	p: Freeze switch 3=OFF, 2=ON
CAM Preset Freeze Set	Preset Freeze Set	8x 01 04 76 0p FF	p: Preset Freeze switch 3=OFF, 2=ON
CAM Preset Speed Set	Preset Speed Set	8x 01 7E 01 0B pp qq FF	pp: Preset NO. qq: Preset Speed 2~24 default:15
CAM Preset Speed Adj	Preset Speed Adj	8x 01 7E 01 1B 0p FF	p: Adjustment of direction 3=down, 2=up
CAM_IR address	IR address	8x 01 06 D8 0p FF	P: IR address 1~4
CAM Gamma	Gamma set	8x 01 04 5B 0p FF	P: Gamma NO. (0~4)
CAM_2D Noise Reduction	Direct	8x 01 04 A5 0p FF	(0~0x01)
CAM_3D Noise Reduction	Direct	8x 01 04 53 0p FF	(0~0x05)
FLICK	50HZ	8x 01 04 23 01 FF	
	60HZ	8x 01 04 23 02 FF	
	OFF	8x 01 04 23 00 FF	
CAM_ID Write		8x 01 04 22 0p 0q 0r 0s FF	pqrs: Camera ID (=0000 to FFFF)
DHCP control	DHCP off	8x 01 04 AE 00 FF	DHCP off
	DHCP on	8x 01 04 AE 01 FF	DHCP on
IP address control	IP set	8x 01 04 AB 0p 0q 0r 0s 0m 0n 0x 0y FF	Set ip to: pq.rs.mn.xy
	Mask set	8x 01 04 AC 0p 0q 0r 0s 0m	Set mask to: pq.rs.mn.xy

Command type	Function	Command	
		0n 0x 0y FF	
	Gateway set	8x 01 04 AD 0p 0q 0r 0s 0m 0n 0x 0y FF	Set gateway to: pq.rs.mn.xy
Color adjust	Color adjust OFF	8x 01 04 B6 00 FF	Color adjust off
	Color adjust ON	8x 01 04 B6 01 FF	Color adjust on
	brightness balance OFF	8x 01 04 B7 00 FF	Keep Brightness
	brightness balance ON	8x 01 04 B7 01 FF	No keep Brightness
	Flare red	8x 01 04 B8 dat FF	Flare mode red value Default is 32
	Flare green	8x 01 04 B9 dat FF	Flare mode green value Default is 32
	Flare green	8x 01 04 BA dat FF	Flare mode blue value Default is 32
SYS Menu	Menu On	8x 01 06 06 02 FF	Turn on the menu
	Menu Off	8x 01 06 06 03 FF	Turn off the menu
	Menu Back	8x 01 06 06 10 FF	Menu step back
	Menu OK	8x 01 7E 01 02 00 01 FF	Menu ok
IR Receive	On	8x 01 06 08 02 FF	IR (remote commander) receive ON/OFF
	Off	8x 01 06 08 03 FF	
	On/Off	8x 01 06 08 10 FF	
Cam Tally	RGB	8x 01 7E 01 0A 00 0p FF	P=0: OFF P=1: RED P=2: GREEN P=3: RED&GREEN P=4: BLUE P=5: RED&BLUE P=6: GREEN&BLUE P=7: RED&GREEN&BLUE

Command type	Function	Command	
Pan tilt Drive	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(TBD) ZZZZ: Tilt Position(TBD)
	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	
	Up left	8x 01 06 01 VV WW 01 01 FF	
	Up right	8x 01 06 01 VV WW 02 01 FF	
	Down Left	8x 01 06 01 VV WW 01 02 FF	
	Down Right	8x 01 06 01 VV WW 02 02 FF	
	Stop	8x 01 06 01 VV WW 03 03 FF	
	Absolute Position	8x 01 06 02 VV WW 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	

Command type	Function	Command	
	Relative Position	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 Limit Set	Set	8x 01 06 07 00 0W 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	W:1 Up Right 0:Down Left 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	

PART 3 – CAMERA INQUIRY COMMANDS

Command type	command	return	note
CAM Power Inq	8x 09 04 00 FF	y0 50 02 FF	On
		y0 50 03 FF	Off(Standby)
CAM Zoom Pos Inq	8x 09 04 47 FF	y0 50 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM DZoom On Off Inq	8x 09 04 06 FF	y0 50 0p FF	p 2: ON 3: OFF
CAM DZoom Mode Inq	8x 09 04 36 FF	y0 50 0p FF	p 0:combination mode 1:separate mode
CAM DZoom Posi Inq	8x 09 04 46 FF	y0 50 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM Speed By Zoom Inq	8x 09 06 A0 FF	y0 50 0p FF	p 2: ON 3: OFF
CAM_PT Speed Inq (IR)	8x 09 04 C1 FF	y0 50 pp FF	pp: 0x05~0x18
CAM Zoom Speed Inq (IR)	8x 09 04 D1 FF	y0 50 0p FF	p:0x00~0x07
CAM Focus Mode Inq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
CAM Focus Pos Inq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM_2D_Inq	8x 09 04 A5 FF	y0 50 03 FF	(0~0x01) p: 0: off 1: on

CAM_3D_Inq	8x 09 04 53 FF	y0 50 03 FF	(0~0x05) p:0: off 1: auto 2~5: noise level
CAM_WB Mode Inq	8x 09 04 35 FF	y0 50 00 FF	Auto
		y0 50 01 FF	Indoor mode
		y0 50 02 FF	Outdoor mode
		y0 50 03 FF	OnePush mode
		y0 50 04 FF	ATW
		y0 50 05 FF	Manual
CAM RGain Inq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq: R Gain
CAM BGain Inq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM Saturation Inq	8x 09 04 A1 FF	y0 50 00 00 0p 0q FF	pq: saturation
CAM Contrast Inq	8x 09 04 A2 FF	y0 50 00 00 0p 0q FF	pq: contrast
CAM_AE Mode Inq	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 Flicker Mode Inq	8x 09 04 AA FF	y0 50 0p FF	p 0: OFF 1: 50HZ 2: 60HZ
CAM Shutter Pos Inq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM Iris Pos Inq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM Gain Posi Inq	8x 09 04 4C FF	y0 50 00 00 0p 0q FF	pq: Gain Position
CAM_ Bright Posi Inq	8x 09 04 4D FF	y0 50 00 00 0p 0q FF	pq: Bright Position
CAM_WDR Mode Inq	8x 09 04 3D FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_WDR Pos Inq	8x 09 04 D3 FF	y0 50 0p FF	p: WDR Position
CAM Aperture Inq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM Preset Exist Inq	8x 09 04 3F pp FF	y0 50 0q FF	pp: Memory number q: 1=preset exist 0=preset not saved
SYS Menu Mode Inq	8x 09 06 06 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM LR Reverse Inq	8x 09 04 61 FF	y0 50 02 FF	On

		y0 50 03 FF	Off
CAM Picture Flip Inq	8x 09 04 66 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ID Inq	8x 09 04 22 FF	y0 50 0p 0q 0r 0s FF	pqrs: Camera ID
CAM_DHCP Inq	8x 09 04 AE FF	y0 50 pp FF	
CAM_IP Inq	8x 09 04 AB FF	y0 50 0p 0p 0q 0q 0r 0r 0s 0s FF	
CAM_MASK Inq	8x 09 04 AC FF	y0 50 0p 0p 0q 0q 0r 0r 0s 0s FF	
CAM_GATEWAY Inq	8x 09 04 AD FF	y0 50 0p 0p 0q 0q 0r 0r 0s 0s FF	
CAM Version Inq	8x 09 00 02 FF	y0 50 ab cd mn pq rs tu vw FF	
Video System Inq (Factory)	8x 09 06 23 FF	y0 50 pp FF	pp: Video format
Video System Inq (Sony)	8x 09 04 24 72 FF	y0 50 0p FF	pp: Video format
IR Transfer	8x 09 06 1A FF	y0 50 02 FF	On
		y0 50 03 FF	Off
IR Receive	8x 09 06 08 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
Pan-tilt Max Speed Inq	8x 09 06 11 FF	y0 50 ww zz FF	ww: Pan Max Speed zz: Tilt Max Speed
Pan-tilt Pos Inq	8x 09 06 12 FF	y0 50 0w 0w 0w 0w 0z 0z 0z 0z FF	wwww: Pan Position zzzz: Tilt Position

Note:【means the camera address ;【y】=【x + 8】

3.3.5 VISCA PAN TILT ABSOLUTE VALUE

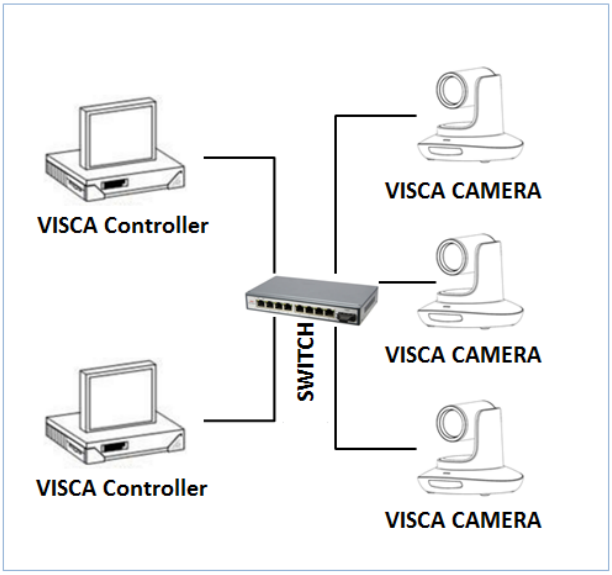
Pan Angle	VISCA Value	Tilt Angle	VISCA Value
-170	0xF670	-30	0xFE50
-135	0xF868	0	0x0000
-90	0xFAF0	30	0x01B0
-45	0xFD78	60	0x0360
0	0x0000	90	0x510
45	0x0288		
90	0x0510		
135	0x0798		
170	0x0990		

3.3.6 VISCA PAN TILT SPEED VALUE

Pan(Degree/Second)		Pan(Degree/Second))	
0	0.3	0	0.3
1	1	1	1
2	1.5	2	1.5
3	2.2	3	2.2
4	2.4	4	3.6
5	2.6	5	4.7
6	2.8	6	6
7	3.0	7	8
8	3.2	8	10
9	3.4	9	12
10	3.8	10	15
11	4.5	11	18
12	6	12	23
13	9	13	30
14	15	14	39
15	19	15	48
16	25	16	59
17	32	17	69
18	38	18	80
19	45		
20	58		
21	75		
22	88		
23	105		
24	120		

3.4 VISCA OVER IP

VISCA over IP means VISCA protocol transmit via IP, to reduce RS232/RS485 cable layout (the controller must support IP communication function).



Communication port spec:

- Control port: RJ45 Gigabit LAN
- IP protocol: IPv4
- Transmit Protocol: UDP
- IP address: set via web end or OSD menu
- Port address: 52381
- Confirm send/transmission control: depend on applied program
- Applied range: in the same segment, not suitable for bridge network
- Turn on camera: in the menu, set VISCA option to OVER IP

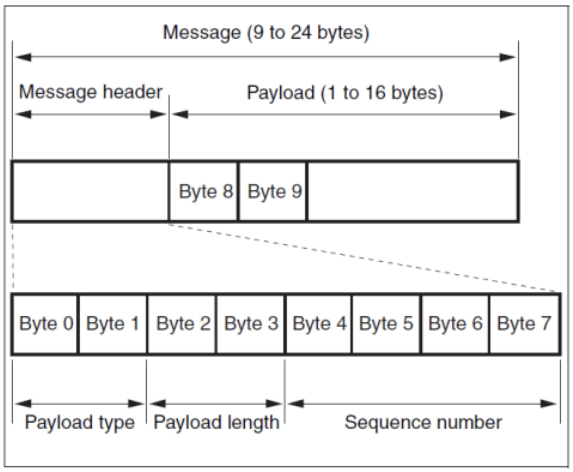
3.4.1 HOW TO USE VISCA OVER IP

VISCA Command - commands from controller to peripheral equipment, when peripheral equipment receives commands, then return ACK (acknowledgement). When commands executed, will return complete message. For different commands, camera will return different message.

VISCA Inquiry - inquiry from controller to peripheral equipment when peripheral equipment receives this kind of command, it will return required message.

VISCA Reply - ACK (acknowledged), complete message, reply or error reply, it is sent from peripheral equipment to controller.

Command format: the following is message head and valid message format.



Note: LAN output way is big-endian, LSB is in the front.

3.4.2 PAYLOAD TYPE

Name	Value (Byte 0)	Value (Byte1)	Value
VISCA command	0x01	0x00	Stores the VISCA command
VISCA inquiry	0x01	0x10	Stores the VISCA inquiry
VISCA reply	0x01	0x11	Stores the reply for the VISCA command and VISCA inquiry, or VISCA device setting command
VISCA device setting command	0x01	0x20	Stores the VISCA device setting command
Control command	0x02	0x00	Stores the control command
Control reply	0x02	0x01	Stores the reply for the control command

Payload length

Valid data length in Payload (1~16), is command length.

For example, when valid data length is 16 byte
Byte 2 : 0x00
Byte 3 : 0x10

Controller will save sequence number of each command, when one command sent the sequence number of the command will add 1, when the sequence number becomes the max value, it will change to 0 for next time. The peripheral equipment will save sequence number of each command, and return the sequence number to the controller.

Payload

According to Payload type, the following data will be saved.

- VISCA command
  Save VISCA command packet

- VISCA inquiry
  Save VISCA message packet

- VISCA reply
  Save VISCA return packet

- VISCA device setting command
  Save VISCA equipment setting command packet.

- Control command
  The following data is saved in control command payload

Name	Value	Description
RESET	0x01	Resets the sequence number to 0. The value that was set as the sequence number is ignored
ERROR	0x0Fyy	yy=01:Abnormality in the sequence number
		yy=02:Abnormality in the message(message type)

- Controlled reply
  The following data is saved in return command payload of control command.

Message	Value	Description
ACK	0x01	Reply for RESET

3.4.3 DELIVERY CONFIRMATION

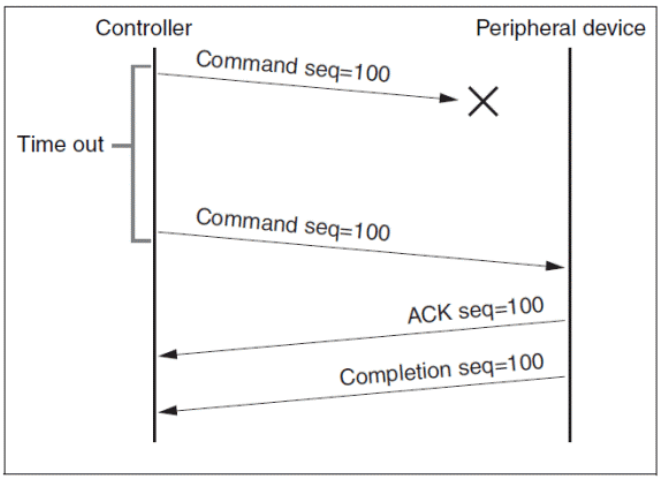
VISCA over IP uses UDP as transmission communication protocol. UDP communication message transmission is not stable, it is necessary to confirm delivery and resend in application.

Generally when controller sends a command to peripheral equipment, the controller will wait for the return message, then send the next command. It can detect and confirm if the peripheral equipment received the commands from return message's lag time. If controller shows it is overtime, it is regarded as error transmission.

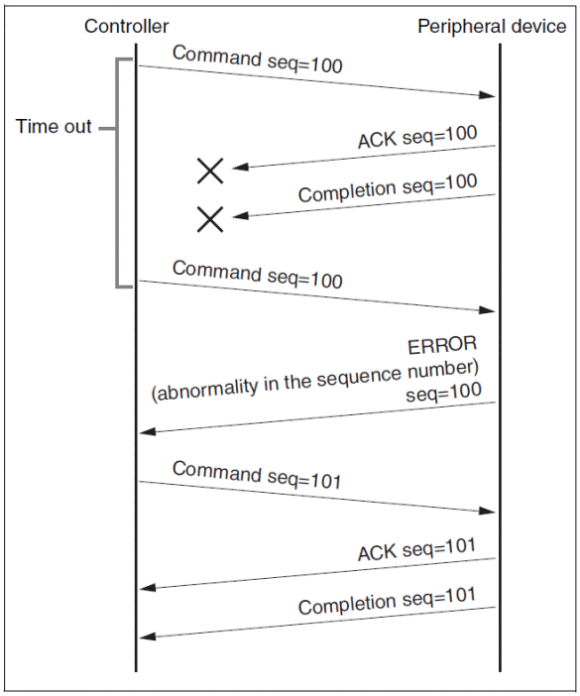
If controller shows it is overtime, resend the commands to check peripheral's status. Resent command sequence number is the same as last command, the following chart lists the received message and status after resending the commands

Lost message	Received message for retransmission	Status after retransmission	Correspondence after retransmission
Command	ACK message	Command is performed by retransmission	Continue processing
Completion message for the command	ERROR (Abnormality in the sequence number)	Command has been performed If only the ACK message is lost, the completion message returns	If the result by the completion message is needed, retransmit by updating the sequence number
Completion message for the command	ERROR (Abnormality in the sequence number)	Command has been performed	If the result by the completion message is needed, retransmit by updating the sequence number
Inquiry	Reply message	Inquiry is performed by retransmission	Continue processing
Reply message for the inquiry	ERROR (Abnormality in the sequence number)	Inquiry has been performed	If the result by the reply message is needed, retransmit by updating the sequence number
Error message	Error message	Command is not performed. If the error cause eliminates, normal reply is return (ACK, reply message)	Eliminate the error cause. If normal reply returns, continue processing
Inquiry of the VISCA device setting command	Reply message of the VISCA device setting command	Inquiry has been performed by retransmission	Continue processing
Reply message of the VISCA device setting command	ERROR (Abnormality in the sequence number)	Inquiry has been performed	If the result by the reply message is needed, retransmit by updating the sequence number

Sequence chart when command lost



Sequence chart when returned message lost



Note: Do not set IP address, sub net mask, gateway paramter in VISCA over IP command, otherwise it will cause network to break off. Due to change in these parameters, network will be in off status.

3.5 PELCO

3.5.1 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
Up left	0xFF	Address	0x00	0x0C	Pan Speed	Tilt Speed	SUM
Up right	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
Set Preset	0xFF	Address	0x00	0x03	0x00	Preset ID	SUM
Stop	0xFF	Address	0x00	0x00	Pan Speed	Tilt Speed	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

3.5.2 PELCO-P 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
Up left	0Xa0	Address	0x00	0x0C	Pan Speed	Tilt Speed	0Xaf	XOR
Up right	0Xa0	Address	0x00	0x0A	Pan Speed	Tilt Speed	0Xaf	XOR
Down Left	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
Focus Far	0Xa0	Address	0x00	0x80	0x00	0x00	0Xaf	XOR
Focus Near	0Xa0	Address	0x01	0x00	0x00	0x00	0Xaf	XOR
Stop	0Xa0	Address	0x00	0x00	Pan Speed	Tilt Speed	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

Section 4 ABOUT NDI®

NDI is much more than simply 'video over IP'. As you begin using it, you'll increasingly discover its many advantages. Soon you'll realize you never want to go back to simple 'point A to point B' methods of video transport. This section provides a brief overview of NDI and the power it delivers to unleash your creativity and provide newfound production efficiency.

We live in a world in which virtually every computer system in the world is potentially connected to every other. Likewise, our countless mobile devices are connected too. These devices have high quality screens, fast processors and cameras. It is no surprise, then, that efficient, economical, non-linear video transfer in IP space is augmenting and even superseding traditional linear connection methods (SDI, HDMI, etc.) and systems.

NewTek NDI® (Network Device Interface) makes it easy to share high-quality video over a local Ethernet network. However, the NDI vision is vastly more exciting than any mere 'cable upgrade'. Production systems using IP to integrate data, video, and audio are transforming live video production in ways that would have seemed miraculous just a few years ago. You can think of NDI as turning your network into a 'video internet'.

4.1 A 'VIDEO INTERNET'

Like a webpage, each NDI source is instantly available to many viewers and devices. Wherever your network extends – throughout your office, broadcast studio, hospital, campus (etc.) – NDI is ready for immediate display, capture, replay, production, and more. NDI operates bi-directionally over a local area network, and supports many ultra-low latency, ultra-high quality video streams on shared connections. It is resolution and framerate independent, and natively supports tally, metadata, access management, and more.

NDI's superb performance over standard 1Gbit/s networks makes it possible to transition facilities to an incredibly versatile IP video production pipeline without negating existing investments in SDI infrastructure, or costly new high-speed network installations. NDI|HX is a high-efficiency NDI mode expressly designed to facilitate Wi-Fi and long distance connections.

4.2 NDI BENEFITS

The NDI concept is simple: You supply a video source – in this case, an NDI stream from your NewTek NDI|HX-PTZ3. At that point, anyone else on that network can see it and work with it just as if it was locally connected to their system (unless you deliberately limit access).

In this brave new world of IP video, you hardly need to think about capture cards, SDI, HDMI connections, a/v formats, etc. You also enjoy freedom from dependency on distribution amps, video matrix routers, and the like. There are many hundreds of software and hardware systems with native NDI input and output support – both commercial and open source. Now you can supply your video to these without running bulky cables over long distances.

More than simply replacing a cable, though, NDI enables multiple applications to access the same sources at the same time. For example, you might simultaneously send high-quality, low latency video to your video mixer system, while also streaming it and capturing it elsewhere on your network.

For a deeper introduction to the world of NDI, download and install the free NewTek NDI Tools from ndi.tv/tools/.

4.3 NDI WEBCAM INPUT

FIGURE 21

If you installed the NDI|HX driver for Windows®, you were given the opportunity to install NDI *Webcam Input* at the same time. This is a very useful application that allows you to make a designated NDI source available on the local network as a proxy 'webcam'.

In turn, this means that you can quickly and flexibly assign NDI sources from your network to supply video to applications like Skype™, Google + Hangouts™, GoToMeeting™, and many more.

When running, NDI *Webcam Input* adds a small icon to the Windows task tray, (Figure 22) and the first time Webcam is opened, click the notification to launch NDI Tools Help for Webcam Input.

Configuring (and using) Webcam Input is very easy:

- Simply right-click the icon to select an NDI® source from your network (Webcam Input requires that at least one NDI source must be detected on the network for this to work).
- The Settings menu item allows you mute or adjust audio levels, or select a Low Bandwidth mode, as you might do to make optimal use of your network when a lower resolution image will suffice.

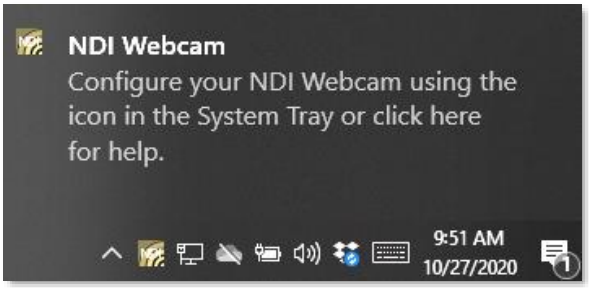


FIGURE 22

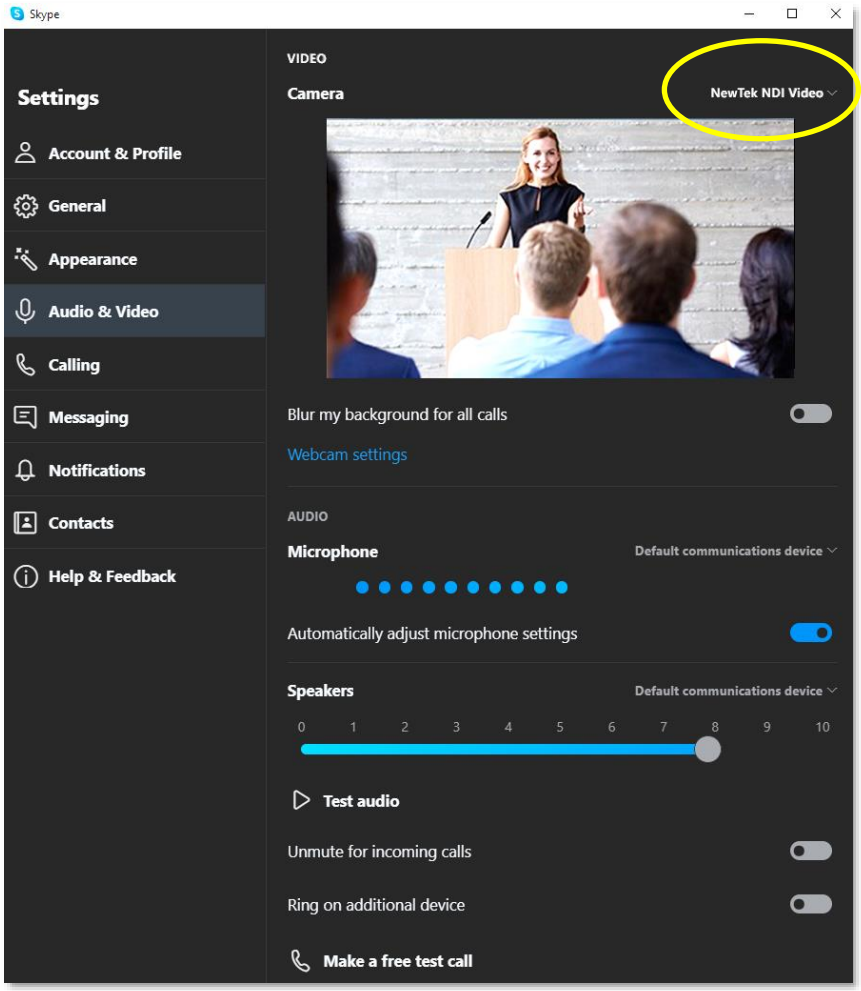


FIGURE 23

- Afterward, you will see an entry named NewTek NDI Video (or Audio) listed along with any other qualified sources available to applications like Skype™, etc.

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b. NewTek is solely responsible for the TalkShow product.

c. You agree that NewTek may share certain information about the use and performance of the TalkShow system with Skype™ and Microsoft

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This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

The above warranty limitations will not apply in case of personal injury only where and to the extent that applicable law requires such liability.

For certain purchasers in Australia of certain of our Products governed by the Australian Consumer Law, the following applies:

"Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. Goods presented for repair may be replaced by refurbished goods of the same type rather than being repaired. Refurbished parts may be used to repair the goods. If you have any questions please contact NewTek at the above address. If goods covered by this Limited Warranty are defective, NewTek will reimburse you for the reasonable direct costs which you incur in making your claim subject to you providing us with original receipts of those direct costs with your claim."

This Limited Hardware Warranty will be construed under the laws of the State of Texas, USA, except for that body of law dealing with conflicts of law. If any provision shall be held by a court of competent jurisdiction to be contrary to law that provision will be enforced to the maximum extent permissible and the remaining provisions of this Limited Warranty will remain in full force and effect.

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