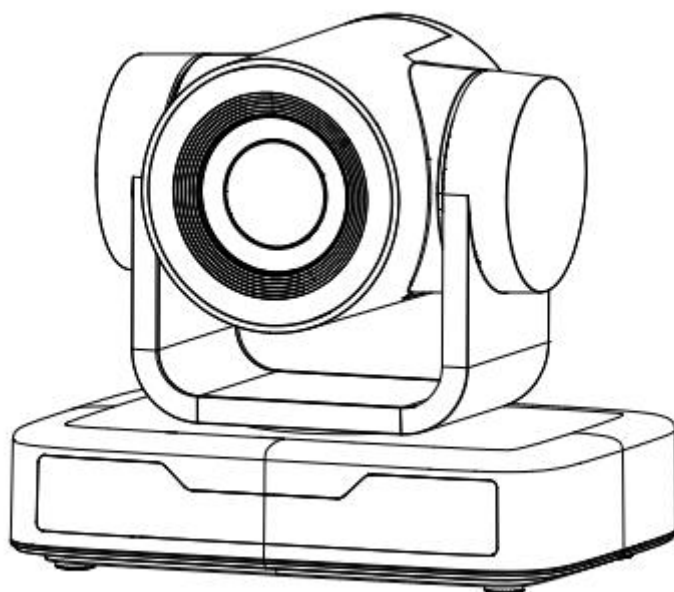
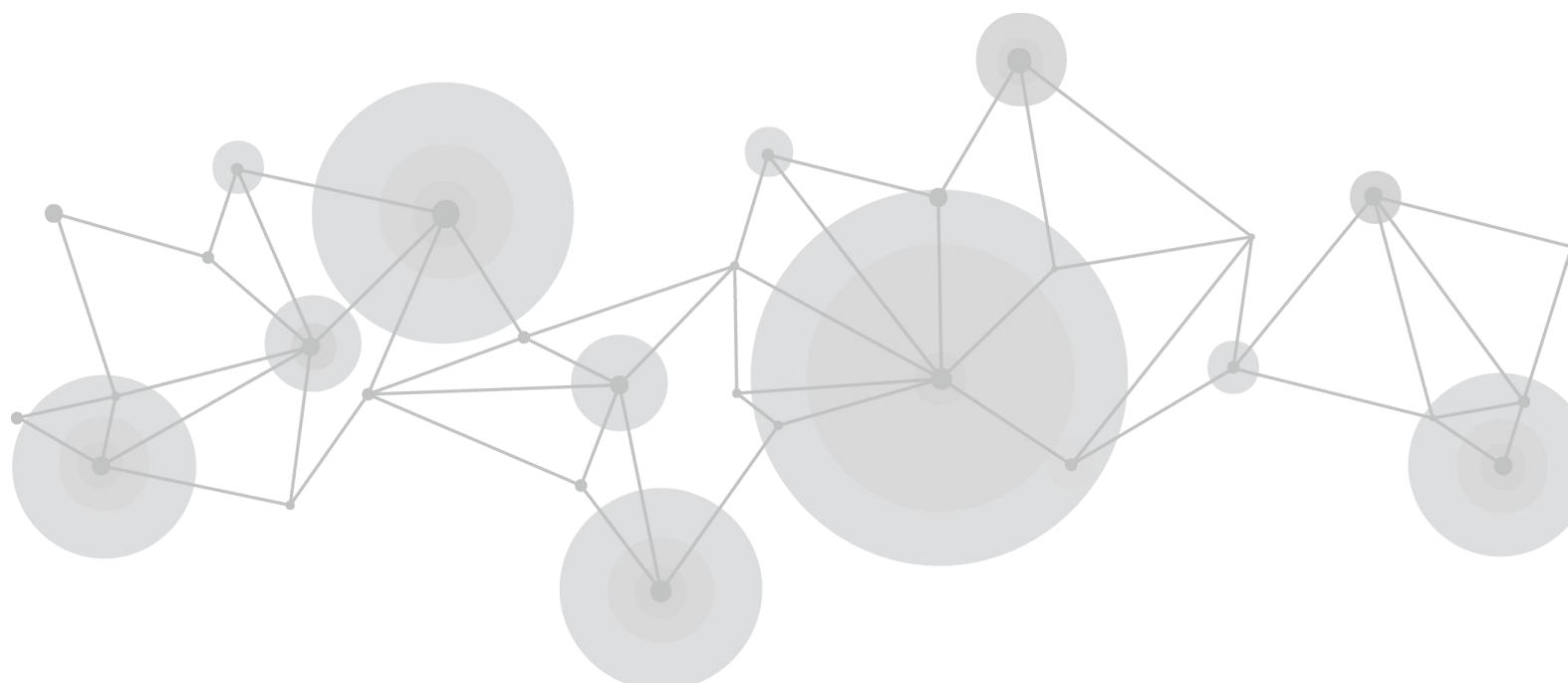


PTZ Camera



User Manual



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Thank you for choosing our product!

This User Manual is designed to show you how to use this camera quickly and make use of all the features. Please read all directions and instructions carefully before using this product.

Declarations

Operators Safety Summary

The general safety information in this summary is for operating personnel.

Do Not Remove Covers or Panels

There are no user-serviceable parts within the unit. Removal of the top cover will expose dangerous voltages. To avoid personal injury, do not remove the top cover. Do not operate the unit without the cover installed.

Power Source

This product is intended to operate from a power source that will not apply more than 230 volts rms between the supply conductors or between both supply conductor and ground. A protective ground connection by way of grounding conductor in the power cord is essential for safe operation.

Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Use the Proper Power Cord

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition. Refer cord and connector changes to qualified service personnel.

Use the Proper Fuse

To avoid fire hazard, use only the fuse having identical type, voltage rating, and current rating characteristics. Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere.

Installation Safety Summary

Safety Precautions

For all camera installation procedures, please observe the following important safety and handling rules to avoid damage to yourself and the equipment.

To protect users from electric shock, ensure that the chassis connects to earth via the ground wire provided in the AC power Cord.

The AC Socket-outlet should be installed near the equipment and be easily accessible.

Unpacking and Inspection

Before opening camera shipping box, inspect it for damage. If you find any damage, notify the shipping carrier immediately for all claims adjustments. As you open the box, compare its contents against the packing slip. If you find any shortages, contact your sales representative.

Once you have removed all the components from their packaging and checked that all the listed components are present, visually inspect the system to ensure there was no damage during shipping. If there is damage, notify the shipping carrier immediately for all claims adjustments.

Site Preparation

The environment in which you install your camera should be clean, properly lit, free from static, and have adequate power, ventilation, and space for all components.

Electric Safety

Installation and operation must accord with electric safety standard

Polarity of power supply

The power supply of the product is $\pm 12V$, the max electrical current is 2A .Polarity of the power supply drawing.

Careful of installation

Never move the camera by seizing the camera head. Don't rotate camera head by hand; otherwise, mechanical trouble will occur.

This series item must be put on the smooth desk or platform, and it can not be installed slant ways; If the camera is installed on TV or computer, the base can be fixed by four double - sided adhesive trays. Don't apply in corrosive liquid, as or solid environment to avoid the cover which is made up of organic material.

To make sure no obstacle in rotation range.

Never power on before installation is completed.

Don't disassemble discretionarily.

We are not responsible for any unauthorized modification or dismantling.

Chapter 1 Your Product

1.1 In the Box

Standard: Power Adapter \times 1, USB2.0 cable \times 1, Remote control \times 1

Optional: ceiling mount, wall mount

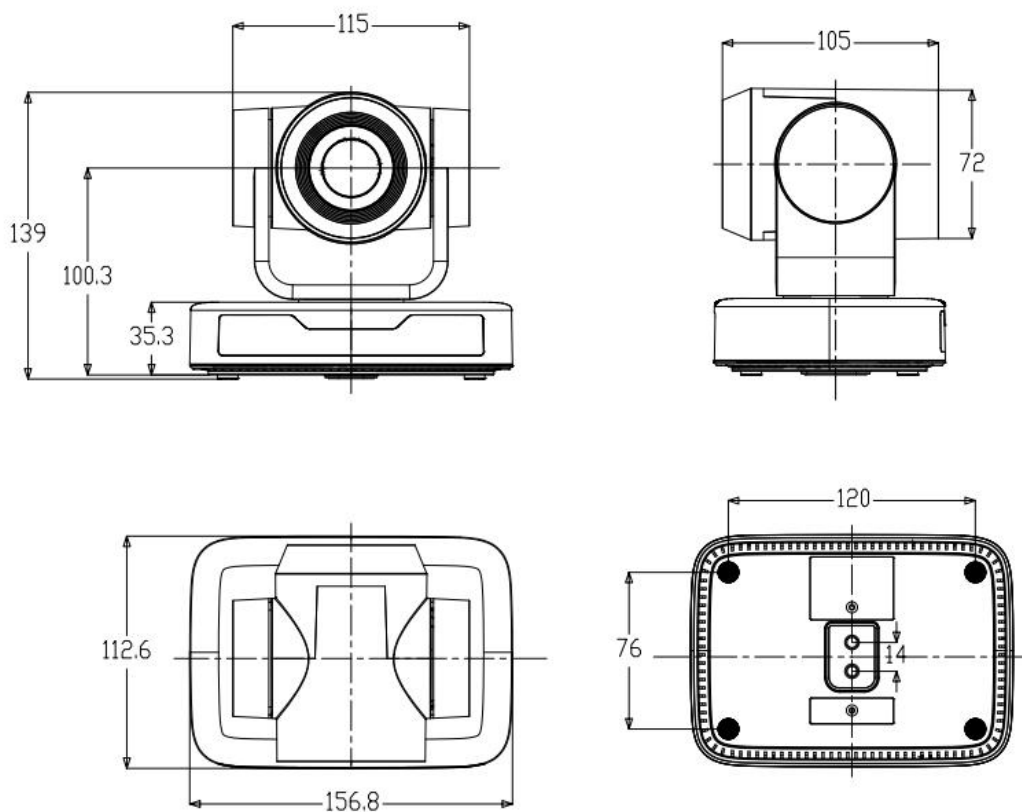
USB2.0 video cable: If USB2.0 video cable is required for power supply without power adapter, in which power is supplied by red end and USB video signal is transmitted by black end; if power adapter is used, USB2.0 video cable is not required for power supply, and ordinary USB2.0 video cable is enough.

1.2 Product Overview

1.2.1 Product Model

The User Manual is applicable to: USB10X PTZ Camera

1.2.2 Dimension



1.2.3 Main Features

Camera Performance

This series camera has perfect functions, superior performance and rich video output interfaces; Featuring with advanced ISP processing algorithms, offering vivid and high resolution video with a strong sense of depth and fantastic color rendition.

- **Full HD Resolution:** 1/2.9 inch high quality CMOS sensor. Resolution is up to 1920x1080 with frame rate up to 30 fps.
- **Multiple Optical Zoom Lens:** 10X optical zoom lens.
- **Leading Auto Focus Technology:** Fast, accurate and stable auto focusing technology.
- **Low Noise and High SNR:** Super high SNR image is achieved with low noise CMOS. Advanced 2D/3D noise reduction technology further reduces the noise while ensuring high image clarity.
- **Control Interface:** RS485, RS232 (cascade connection)
- **Multiple Control Protocol:** Support VISCA, PELCO-D, PELCO-P protocols; Support automatic identification protocols.
- **Quiet Pan / Tilt Movement:** With high accuracy step driving motor, camera can pan / tilt extremely quiet and smooth.
- **Multiple presets:** Up to 255 presets (10 presets via remote control).
- **Multiple Application:** Online-education, Lecture Capture, Webcasting, Video conferencing, Tele-medicine, Unified Communication, Emergency command and control systems, etc.

Technical Parameter

Technical Parameter

Model	10X	
Camera Parameter		
Sensor	1/2.9 inch high quality CMOS sensor	
Effective Pixels	2.07 megapixel, 16: 9	
Video Format	1920×1080P@30 fps/25fps; 1280×720P@30fps/25fps; 1024×576P@30fps/25fps; 960×540P@30fps/25fps; 800×448P@30fps/25fps; 640×360P@30fps/25fps; 320×176P@30fps/25fps, etc	
View Angle	34.1°～85°	8.8°～ 66°
Focus Length	f=3.35mm～10.05mm	f=4.34mm～41.66mm
AV	F1.7～3.0	F1.85 – F2.43
Optical Zoom	3X	10X
Digital Zoom	10X	
Minimum Illumination	0.5Lux(F1.8, AGC ON)	
DNR	2D & 3D DNR	
White Balance	Auto / Manual/ One Push//3000K/3500K/4000K/4500K/5000K/5500K/6000K/6500K/7000K	

Focus	Auto / Manual/ One Push Focus
Exposure	Auto / Manual
BLC	On/Off
Video Adjustment	Brightness, Color, Saturation, Contrast, Sharpness, B/W mode, Gamma curve
SNR	>50dB

Input/output Interface	
Video Output	USB2.0 Interface, A Type Interface
Video Compression Format	MJPEG, H.264, H.265
Control Interface	RS232 (IN/OUT), RS485
Control Protocol	VISCA/Pelco-D/Pelco-P
Power Interface	HEC3800 outlet (DC12V)

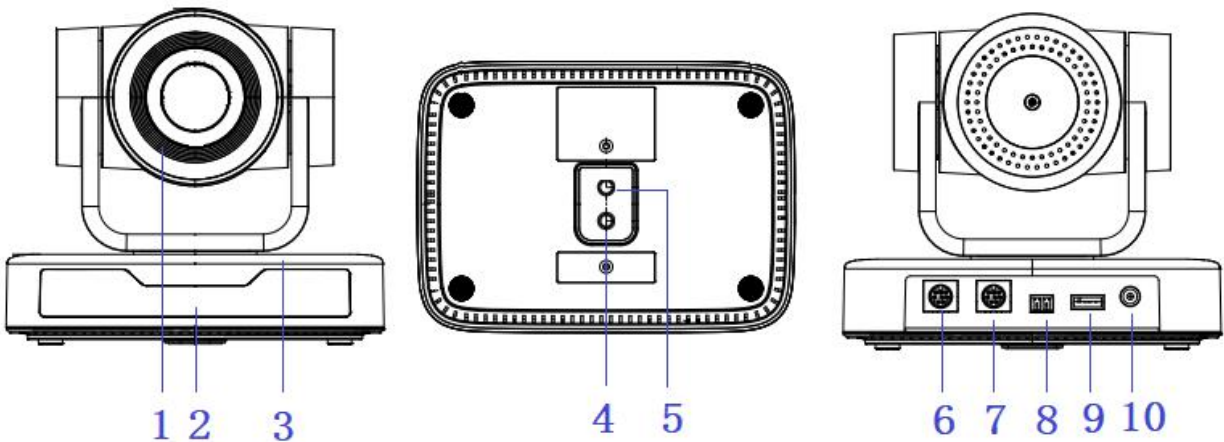
USB Feature	
Operation Systems	Windows 7, Windows8, Windows10, Mac osx, Linux, etc
Video Compression Format	MJPEG/H264/H265
USB Communication Protocol	UVC

PTZ Parameter	
Pan Rotation	-170°~+170°
Tilt Rotation	-30°~+30°
Pan Control Speed	0.1 ~ 60°/sec
Tilt Control Speed	0.1~ 40°/sec
Preset Speed	Pan: 60°/sec, Tilt: 40°/sec
Preset Number	255 presets (10 presets via remote control)

Other Parameter	
Input Voltage	12V
Input Current	Maximum: 4.98A
Power Consumption	Maximum: 2.5W
Stored Temperature	-40℃~+70℃
Storage Humidity	20%~90%
Working Temperature	-10℃~+50℃
Working Humidity	20%~80%
Dimension (W*H*D)	156.8mm×112.6mm×139.5mm
Weight	1KG
Application	Indoor
Package	Power Supply, RS232 Control Cable, IR Remote Control, User Manual, Warranty Card, USB2.0 Cable
Optional Accessories	Ceiling / Wall Mount (Extra Cost)

Chapter 2 Install Your Product

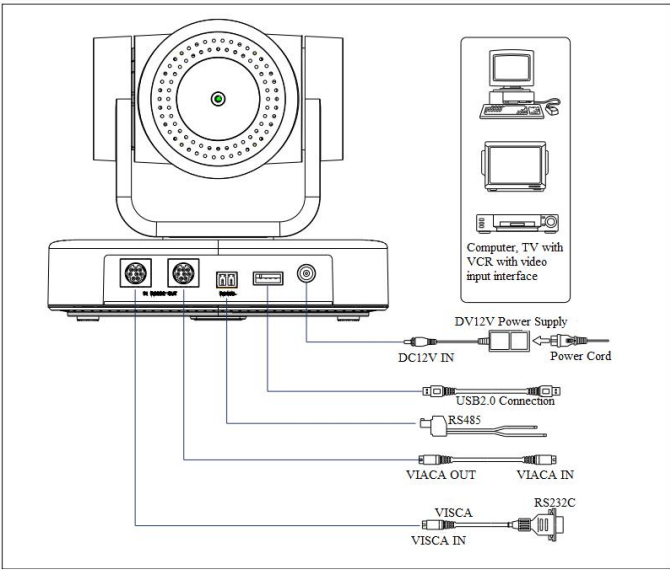
2.1 Camera Interface Explanation



Product Interfaces

- | | | |
|---------------------------------------|-------------------------------------|-------------------------------------|
| 1. Camera Lens | 5. Screw Hole for Tripod | 9. USB 2.0 Interface |
| 2. Remote Control Receiving Indicator | 6. RS232 Control Interface (Input) | 10. DC12V Input Power Supply Socket |
| 3. Camera Base | 7. RS232 Control Interface (Output) | |
| 4. Tripod Screw Hole | 8. RS485 Input (left +, right-) | |

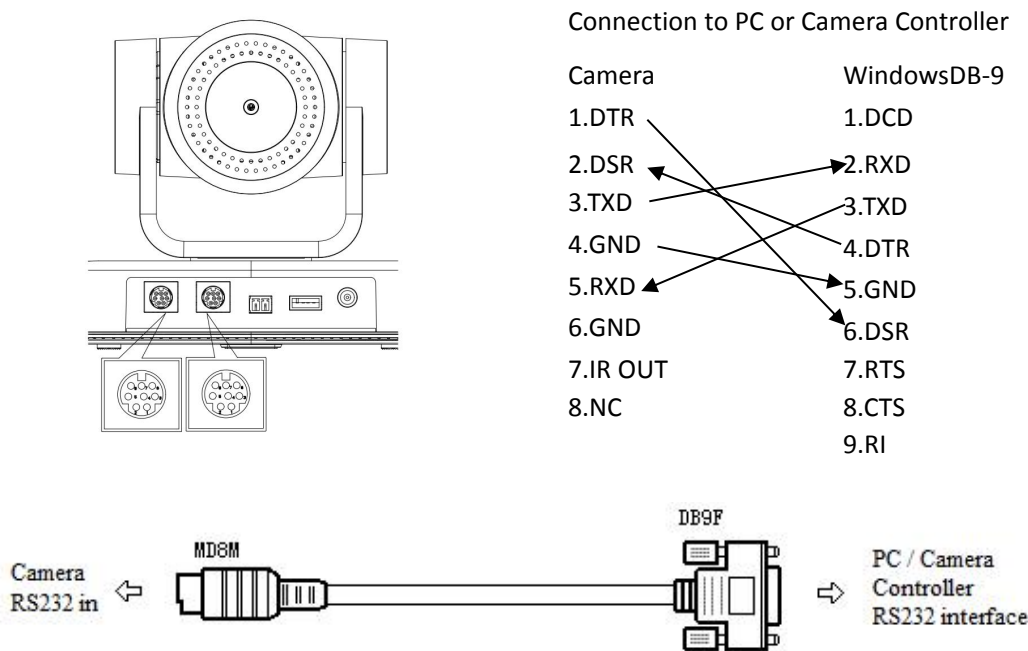
2.1.1 External Interface



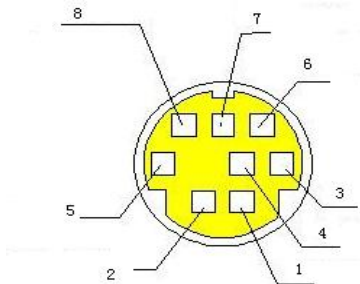
Wiring Diagram

2.1.2 RS-232 Interface

1) RS-232 Interface Definition

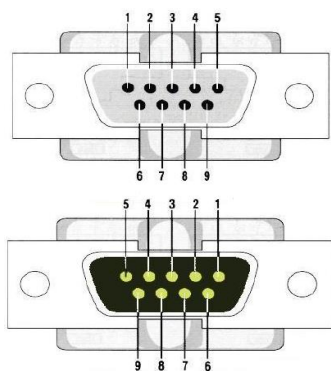


2) RS-232 Mini-DIN 8-pin Port Definition



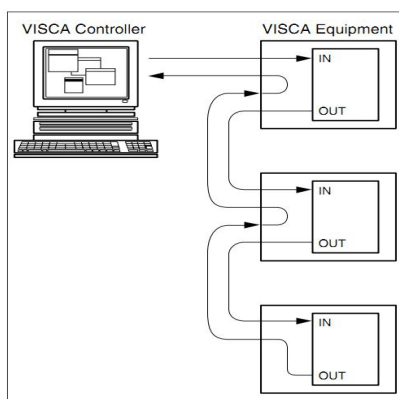
NO.	Port	Definition
1	DTR	Data Terminal Ready
2	DSR	Data Set Ready
3	TXD	Transmit Data
4	GND	Signal Ground
5	RXD	Receive Data
6	GND	Signal Ground
7	IR OUT	IR Commander Signal
8	NC	No Connection

3) RS232(DB9) Port Definition

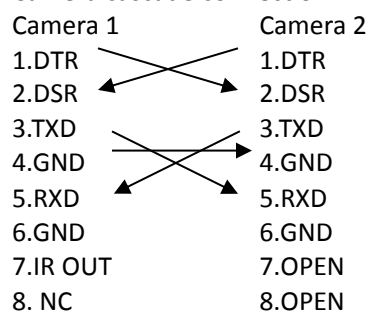


NO.	Port	Definition
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	System Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

4) VISCA networking as shown below



Camera cascade connection

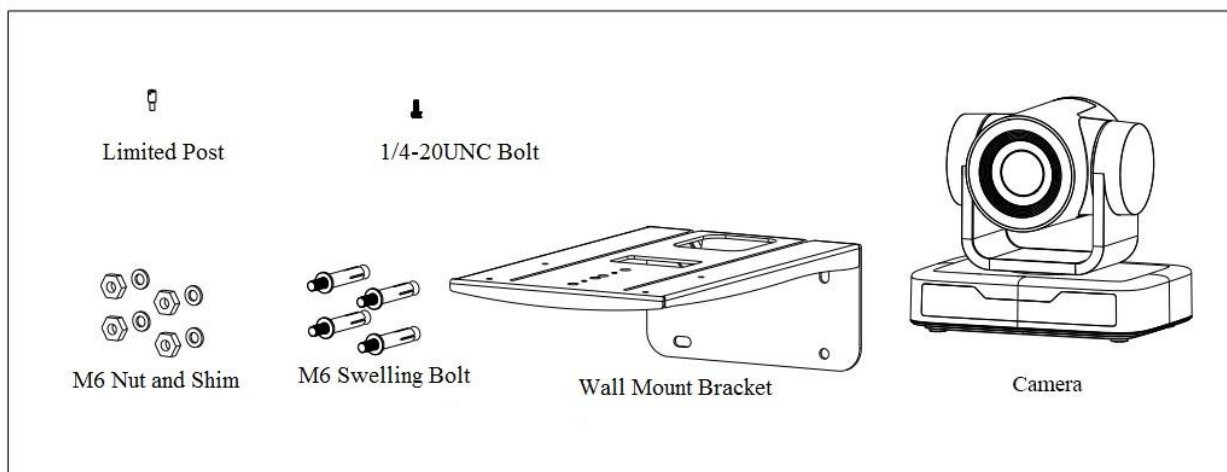


2.2 Bracket Mount

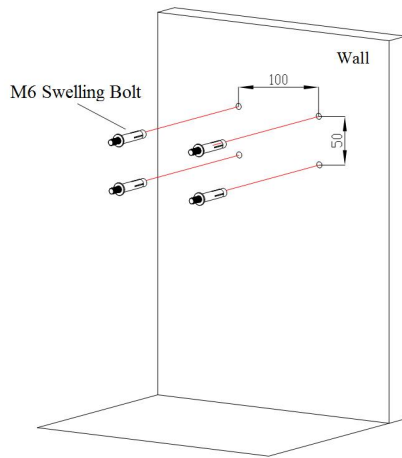
Notes: Ceiling or wall mounting brackets can only be mounted on template and concrete wall.

For safety reason, plasterboard is not recommended.

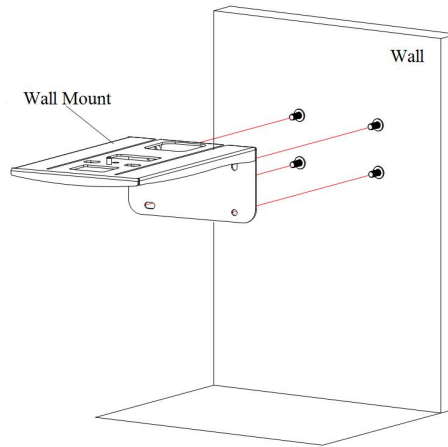
1) Wall Mounting:



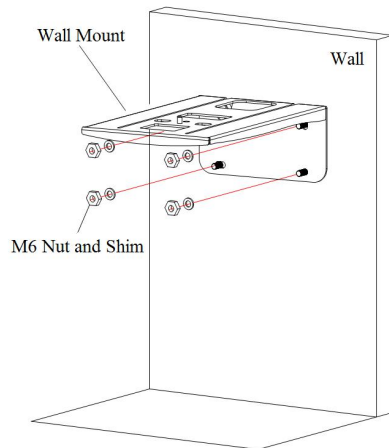
STEP 1



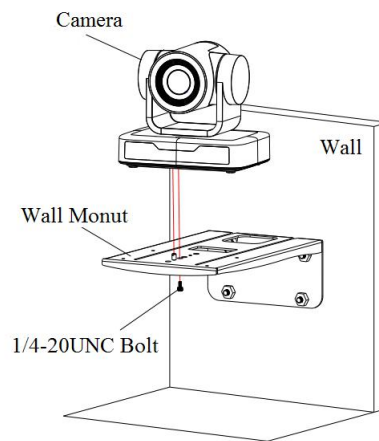
STEP 2



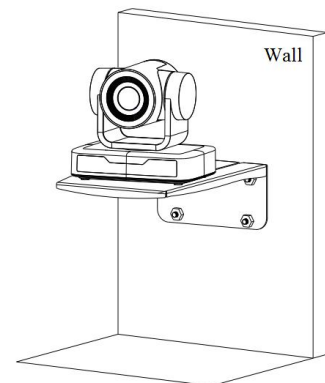
STEP 3



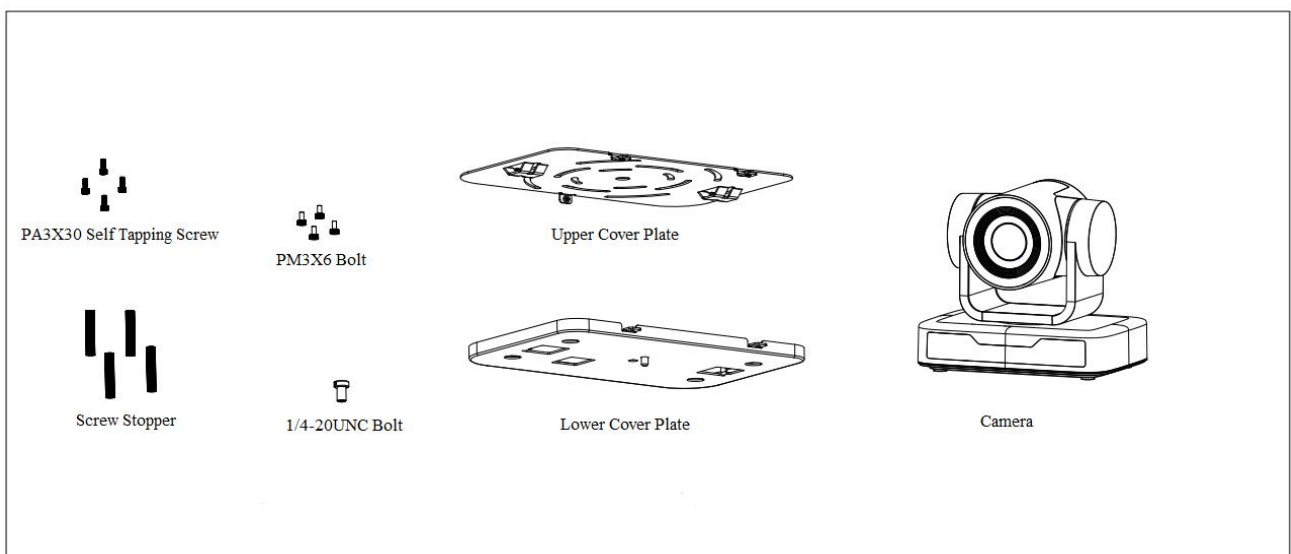
STEP 4



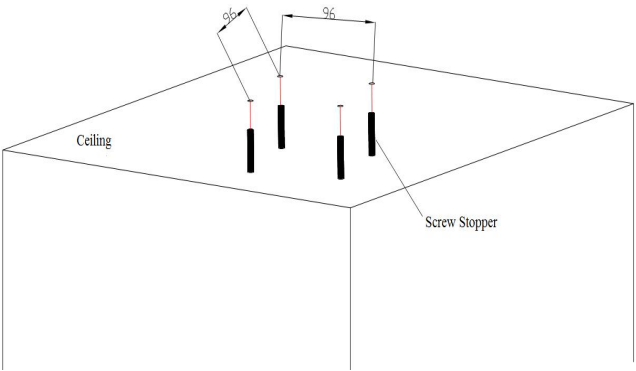
FINISH



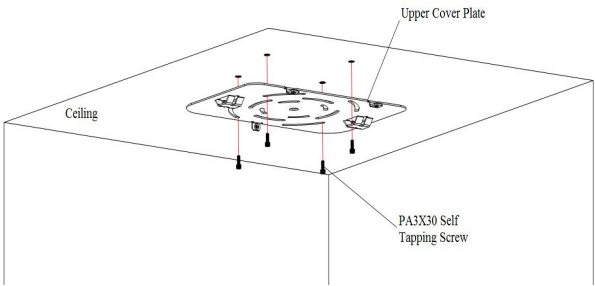
2) Ceiling Mounting



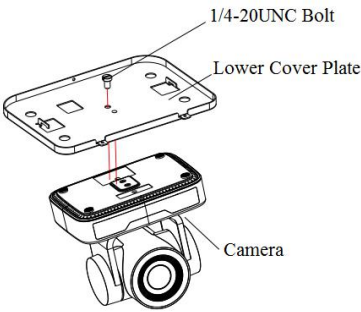
STEP 1



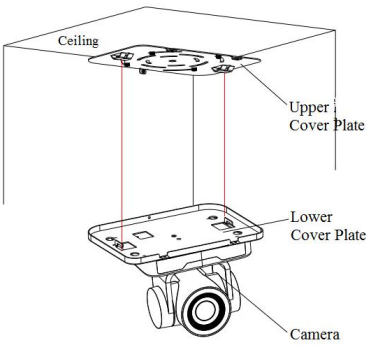
STEP 2



STEP 3

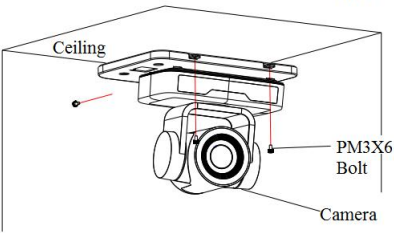


STEP 4



FINISH

STEP 5



Chapter 3 Use Your Product

3.1 Video Output

3.1.1 Power on initial configuration

The remote control receiving indicator flashes after power on, the pan-tilt turns left to the lowest left to the lowest, and then turns to the HOME position (both the horizontal and vertical positions are in the middle), while the movement first shrinks and then stretches. When remote control receiving indicator stops flashing, the self-checking is completed. After power on and self-checking, the camera will automatically return to the preset 0 position if it's pre-set.

3.1.2 Video Output

Connect to the video output cable: the user can refer to Figure 1.1 product interfaces.

USB2.0 output: Connect the camera with the computer USB2.0 interface (black), open the Device Manager to see whether there is an imaging device and whether the Universal Serial Bus controllers recognize the USB2.0 device. After properly identified, open the software, choose the imaging device, and then it will output the image.

3.2 Remote Controller

3.2.1 Keys Instruction



1) 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.

2) 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 long press 3s on standby key;

Long press 3s again on the standby key, the camera will self-check again and return to HOME position (If preset 0 position is set, the camera will return to preset 0 position).

2. Camera Selection



Select the camera address to control.

3. Focus Control



Auto: auto focus mode

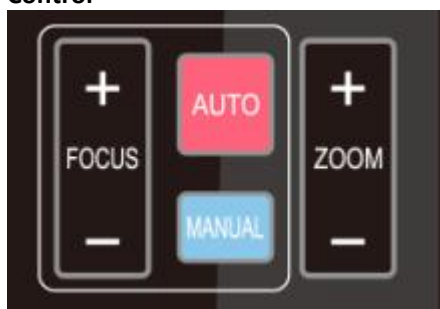
Manual: manual focus mode

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, the action of focus will keep continue and stop as soon as the key is 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 focus will keep continue and stop as soon as 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 via remote control.

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

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

Note : press the **【#】** key three times continually 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; 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

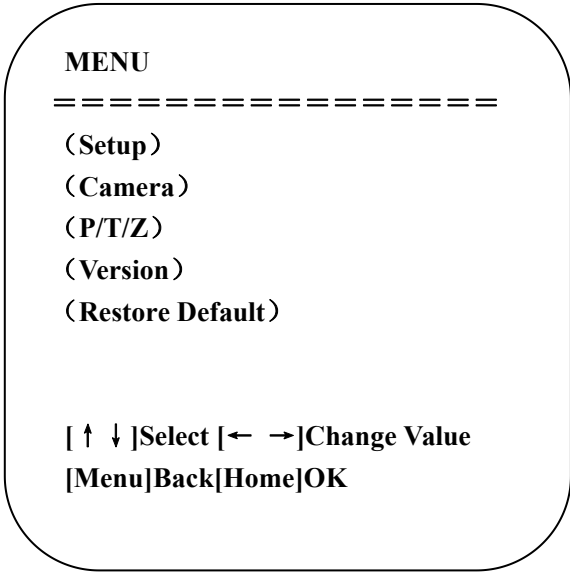


【*】 + 【#】 + 【F1】 :Camera Address No.1
 【*】 + 【#】 + 【F2】 :Camera Address No. 2
 【*】 + 【#】 + 【F3】 :Camera Address No. 3
 【*】 + 【#】 + 【F4】 :Camera Address No. 4

3.3 Menu Setting

3.3.1 Main Menu

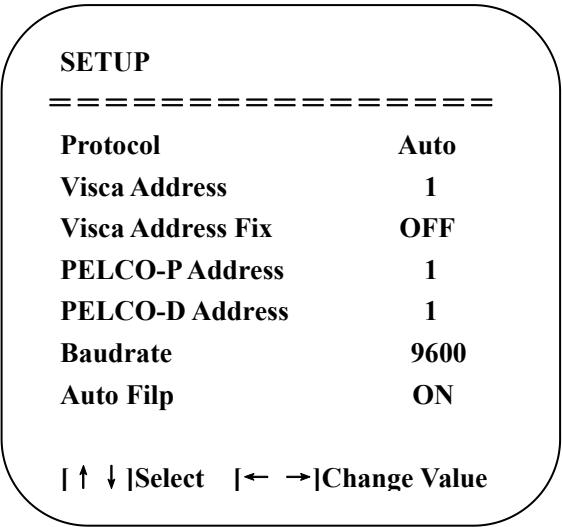
In normal working mode, press 【MENU】 key to display the menu, using scroll arrow to point at or highlight the selected items.



- Setup:** System parameter setting
- Camera:** Camera parameter setting
- P/T/Z:** Enter into sub menu
- Version:** Enter into sub menu
- Restore Default:** Enter into reset setting, select YES or NO to confirm
- [↑↓] Select:** For selecting menu
- [← →] Change Value:** For modifying parameters
- [MENU] Back:** Press [Menu] to return
- [Home] OK:** Press [Home] to confirm

3.3.2 System Setting

Move the pointer to the (Setup) in the Main Menu, click the **【HOME】** key and enter into the (System Setting) as shown below,



- Protocol:** VISCA/Pelco-P/Pelco-D/Auto
- Visca Address:** VISCA=1~7 Pelco-P=1~255 Pelco-D=1~255
- Baudrate:** 2400/4800/9600/115200
- Visca Address Fix:** On/Off

Auto Filp: On/Off

3.3.3 Camera Setting

Move the pointer to the (CAMERA) in the Main Menu, click the **【HOME】** key and enter the (CAMERA) as follow,

CAMERA

=====

(Exposure)

(Color)

(Image)

(Focus)

(Noise Reduction)

Style

Default

[↑ ↓]Select [← →]Change Value

[Menu]Back [Home]OK

Exposure: Enter into Exposure setting

Color: Enter into color setting

Image: Enter into image setting

Focus: Enter into focus setting

Noise Reduction: Enter into noise reduction

1) Exposure Setting

Move the pointer to the (EXPOSURE) in the Main Menu, click the **【HOME】** key and enter into the (Exposure sub menu) as shown below,

EXPOSURE

=====

Mode

Auto

EV

OFF

BLC

OFF

Flicker

50Hz

G.Limit

3

DRC

2

[↑ ↓]Select [← →]Change Value

[Menu]Back

Mode: Auto, Manual, Shutter priority, Iris priority and Brightness priority.

EV: On/Off (only available in auto mode)

Compensation Level: -7~7 (only available in auto mode when EV is ON)

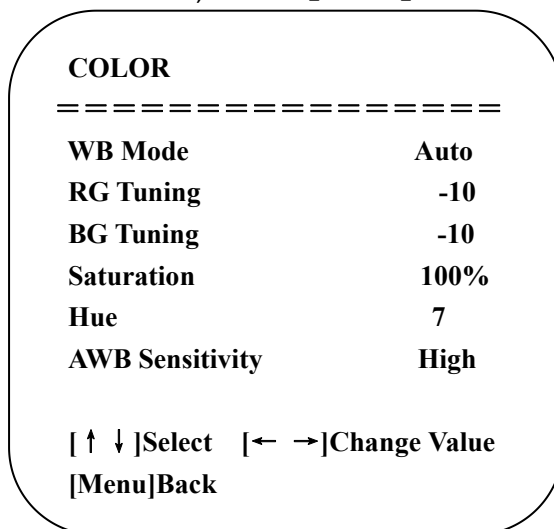
BLC: ON/OFF for options (only available in auto mode)

Dynamic Range: 1~8, close

Anti-Flicker: OFF/50Hz/60Hz for options (only available in Auto/Iris priority/Brightness priority modes)
Gain limit: 0~15 (only available in Auto/ Iris priority /Brightness priority mode)
WDR: Off, 1~8
ShutterPriority:1/25,1/30,1/50,1/60,1/90,1/100,1/120,1/180,1/250,1/350,1/500,1/1000,1/2000,1/3000,1/4000,1/6000, 1/10000 (only available in Manual and Shutter priority mode)
IRIS Priority: OFF, F11.0, F9.6, F8.0, F6.8, F5.6, F4.8, F4.0, F3.4, F2.8, F2.4, F2.0, F1.8(only available in Manual and Iris priority mode)
Brightness: 0~23 (only available in Brightness priority mode)

2) Color

Move the pointer to the (COLOR) in the Main Menu, click the【HOME】and enter the (COLOR sub menu) as follow,



WB Mode: Auto, Manual, One Push, 3000K, 3500K, 4000K, 4500K, 5000K, 5500K, 6000K, 6500K,7000K
Saturation: 60%,70%,80%,90%,100%,110%,120%,130%,140%,150%,160%,170%,180%,190%,200%
Red fine-tuning: -10~10 (only available in automatic mode)
Blue fine-tunable: -10~10 (only available in automatic mode)
RED GAIN: 0~255(only available in Manual mode)
BLUE GAIN: 0~255(only available in Manual mode)
AWB Sensitivity: high/middle/low
Chroma: 0~14

3) Image

Move the pointer to the (IMAGE) in the Menu, click the【HOME】and enter into the (IMAGE sub menu) as follow,

IMAGE	
=====	
Brightness	7
Contrast	8
Sharpness	3
Flip-H	OFF
Flip-V	OFF
B&W-Mode	Color
Gamma	Default
DCI	Close
Low-Light Mode	OFF
[↑ ↓]Select [← →]Change Value	
[Menu]Back	

Brightness: 0~14

Contrast: 0~14

Sharpness: 0~15

Flip-H: On/Off

Flip-V: On/Off

B&W Mode: color, black/white

Gamma: Default/0.45/0.50/0.5/0.63

DCI: Dynamic Contrast: Off/1~8

Minimum Illumination: On/Off

4) Focus

Move the pointer to the (FOCUS) in the Menu, click the **【HOME】** and enter the (FOCUS) as follow,

FOCUS	
=====	
Focus Mode	Auto
AF-Zone	All
AF-Sensitivity	Low
[↑ ↓]Select [← →]Change Value	
[Menu]Back	

Focus Mode: Auto/manual

AF-Zone: Up/middle/down

AF-Sensitivity: High/middle/low

5) Noise Reduction

Move the pointer to the (NOISE REDUCTION) in the Menu, click the **【HOME】** and enter the (NOISE REDUCTION) as follow,

NOISE REDUCTION

=====

NR-2D	4
NR-3D	2
Dynamic Hot Pixel	OFF

[↑ ↓]Select

[← →]Change Value

[Menu]Back

2D Noise Reduction: Auto, close, 1~7
3D Noise Reduction: Close, 1~8
Dynamic Hot Pixel: Close, 1~5

3.3.4 P/T/Z

Move the pointer to the (P/T/Z) in the Main Menu, click the **【HOME】** and enter the (P/T/Z) as follow,

P/T/Z

=====

Speed by zoom	ON
Zoom speed	8
Acc Curve	Slow

[↑ ↓]Select

[← →]Change Value

[Menu]Back

Depth of Field: Only effective for the remote controller, On/ Off;
 (When zooming in, the PT control speed by remoter will become slow)
Zoom Speed: Set the zoom speed for the remote controller, 1~8
Image Freezing: On/Off
Accelerating Curve: Fast/Slow

3.3.5 Version

Move the pointer to the (VERSION) in the Main Menu, click the **【HOME】** and enter the (VERSION) as follow,

VERSION		
=====		
MCU Version	3.1.0	2019-09-26
Camera Version	1.0.5	2019-09-27
AF Version	1.0.0	2019-09-07
[↑ ↓]Select	[← →]Change Value	
[Menu]Back	[Home]OK	

MCU Version: Display MCU version information
Camera Version: Display camera version information
AF Version: Display the focus version information

3.3.6 Restore Default

Move the pointer to the (RESTORE DEFAULT) in the Main Menu, click the **【HOME】** and enter the (RESTORE DEFAULT) as follow,

RESTORE DEFAULT		
=====		
Restore	Default?	NO
[↑ ↓]Select	[← →]Change Value	
[Menu]Back	[Home]OK	

Restore default: YES/NO. Color style and video format cannot be restored to factory default

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

Chapter 4 Support

4.1 Camera Maintenance and Troubleshooting

4.1.1 Camera Maintenance

- 1) Please power off the camera and disconnect the power adapter and socket, if it's not used for a long run.
- 2) Use 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.

4.1.2 Troubleshooting

1) No video output

- a. Check whether the camera power supply is connected, the voltage is normal, the power indicator is lit.
- b. Whether the machine could do self-check after restarted.
- c. Check whether the bottom of the DIP switch is the normal operating mode
- d. Check whether the video output cable or video display is normal

2) No image sometimes

- a. Check whether the video output cable or video display is normal

3) Video dithering when zoom-in or zoom-out

- a. Check whether the camera installation position is solid
- b. Whether there is shaking machine or objects around the camera

4) Remote control not works

- a. Remote control address is set to 1 (if the machine is set back to the factory defaults, remote control addresses need to be back to 1 too)
- b. Check whether the battery is installed on the remote controller or low.
- c. Check the camera working mode is the normal operating mode. Check the menu whether is closed, camera control through remote controller is only available after exiting the menu. If video output from LAN, menu will not be displayed, menu will automatically exists 30s later, and then it can be controlled by remote controller.

5) Serial port not works

- a. Check whether the camera serial device protocol, baud rate, address is consistent
- b. Check whether the control cable is connected properly
- c. Check whether the camera working mode is the normal operating mode

Chapter 5 Appendix

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.

After power on, the camera first goes left, then back to the middle position. Self-test is finished after the zoom moved to the farthest and then back to the nearest position. If the camera saved 0 preset before, it will be back to that position after initialization. At this point, the user can control the camera by the serial commands.

5.1 VISCA Protocol List

5.1.1 Camera 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.

5.1.2 Camera 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

Command	Function	Command packet	Note
	Auto Focus	8x 01 04 38 02 FF	
	Manual Focus	8x 01 04 38 03 FF	
	One Push mode	8x 01 04 38 04 FF	
CAM_Zoom Focus	Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs: Zoom Position tuvw: Focus Position
CAM_WB	Auto	8x 01 04 35 00 FF	
	3000K	8x 01 04 35 01 FF	
	4000k	8x 01 04 35 02 FF	
	One Push mode	8x 01 04 35 03 FF	
	5000k	8x 01 04 35 04 FF	
	Manual	8x 01 04 35 05 FF	
	6500k	8x 01 04 35 06 FF	
	3500K	8x 01 04 35 07 FF	
	4500K	8x 01 04 35 08 FF	
	5500K	8x 01 04 35 09 FF	
	6000K	8x 01 04 35 0A FF	
	7000K	8x 01 04 35 0B FF	
CAM_RGain	Reset	8x 01 04 03 00 FF	Manual Control of R Gain
	Up	8x 01 04 03 02 FF	
	Down	8x 01 04 03 03 FF	
	Direct	8x 01 04 43 00 00 0p 0q FF	pq: R Gain
CAM_Bgain	Reset	8x 01 04 04 00 FF	Manual Control of B Gain
	Up	8x 01 04 04 02 FF	
	Down	8x 01 04 04 03 FF	
	Direct	8x 01 04 44 00 00 0p 0q FF	pq: B Gain
CAM_AE	Full Auto	8x 01 04 39 00 FF	Automatic Exposure mode
	Manual	8x 01 04 39 03 FF	Manual Control mode
	Shutter priority	8x 01 04 39 0A FF	Shutter Priority Automatic Exposure mode
	Iris priority	8x 01 04 39 0B FF	Iris Priority Automatic Exposure mode
	Bright	8x 01 04 39 0D FF	Bright mode
CAM_Shutter	Reset	8x 01 04 0A 00 FF	Shutter Setting
	Up	8x 01 04 0A 02 FF	
	Down	8x 01 04 0A 03 FF	
	Direct	8x 01 04 4A 00 00 0p 0q FF	pq: Shutter Position
CAM_Iris	Reset	8x 01 04 0B 00 FF	Iris Setting
	Up	8x 01 04 0B 02 FF	
	Down	8x 01 04 0B 03 FF	
	Direct	8x 01 04 4B 00 00 0p 0q FF	pq: Iris Position
CAM_Gain Limit	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

Command	Function	Command packet	Note
	Up	8x 01 04 0E 02 FF	pq: ExpComp Position
	Down	8x 01 04 0E 03 FF	
	Direct	8x 01 04 4E 00 00 0p 0q FF	
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
CAM_NR (3D)		8x 01 04 54 0p FF	P=0-8 0:OFF
CAM_Gamma		8x 01 04 5B 0p FF	p = 0 – 4 0: Default 1: 0.45 2: 0.50 3: 0.55 4: 0.63
CAM_Flicker	OFF	8x 01 04 23 00 FF	OFF
	50HZ	8x 01 04 23 01 FF	50HZ
	60HZ	8x 01 04 23 02 FF	60HZ
CAM_Aperture	Reset	8x 01 04 02 00 FF	Aperture Control
	Up	8x 01 04 02 02 FF	
	Down	8x 01 04 02 03 FF	
	Direct	8x 01 04 42 00 00 0p 0q FF	pq: Aperture Gain
CAM_Memory	Reset	8x 01 04 3F 00 pq FF	pq: Memory Number(=0 to 254) Corresponds to 0 to 9 on the Remote Commander
	Set	8x 01 04 3F 01 pq FF	
	Recall	8x 01 04 3F 02 pq FF	
CAM_LR_Reverse	On	8x 01 04 61 02 FF	Image Flip Horizontal ON/OFF
	Off	8x 01 04 61 03 FF	
CAM_PictureFlip	On	8x 01 04 66 02 FF	Image Flip Vertical ON/OFF
	Off	8x 01 04 66 03 FF	
CAM_ColorSaturation	Direct	8x 01 04 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	8x 01 06 35 00 0p FF	P: 0~E Video format

Command	Function	Command packet	Note
	system		0:1080P60 8:720P30 1:1080P50 9:720P25 2:1080i60 A: 1080P59.94 3:1080i50 B: 1080i59.94 4:720P60 C: 720P59.94 5:720P50 D: 1080P29.97 6:1080P30 E: 720P29.97 7:1080P25
Pan_tiltDrive	Up	8x 01 06 01 VV WW 03 01 FF	VV: Pan speed 0x01 (low speed) to 0x18 (high speed) WW: Tilt speed 0x01 (low speed) to 0x14 (high speed) YYYY: Pan Position ZZZZ: Tilt Position
	Down	8x 01 06 01 VV WW 03 02 FF	
	Left	8x 01 06 01 VV WW 01 03 FF	
	Right	8x 01 06 01 VV WW 02 03 FF	
	Upleft	8x 01 06 01 VV WW 01 01 FF	
	Upright	8x 01 06 01 VV WW 02 01 FF	
	DownLeft	8x 01 06 01 VV WW 01 02 FF	
	DownRight	8x 01 06 01 VV WW 02 02 FF	
	Stop	8x 01 06 01 VV WW 03 03 FF	
	AbsolutePosition	8x 01 06 02 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	RelativePosition	8x 01 06 03 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	Home	8x 01 06 04 FF	
	Reset	8x 01 06 05 FF	
Pan-tiltLimitSet	Set	8x 01 06 07 00 0W 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	W:1 UpRight 0:DownLeft YYYY: Pan Limit Position(TBD) ZZZZ: Tilt Limit Position(TBD)
	Clear	8x 01 06 07 01 0W 07 0F 0F 0F 07 0F 0F 0F FF	

5.1.3 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_WBModelInq	8x 09 04 35 FF	y0 50 00 FF	Auto
		y0 50 01 FF	3000K
		y0 50 02 FF	4000K
		y0 50 03 FF	One Push Mode
		y0 50 04 FF	5000K
		y0 50 05 FF	Manual
		y0 50 00 FF	6500K
		y0 50 06 FF	6500K
		y0 50 07 FF	3500K
		y0 50 08 FF	4500K
		y0 50 09 FF	5500K
		y0 50 0A FF	6000K
CAM_RGainInq	8x 09 04 43 FF	y0 50 0B FF	7000K
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM_AEModelInq	8x 09 04 39 FF	y0 50 00 FF	Full Auto
		y0 50 03 FF	Manual
		y0 50 0A FF	Shutter priority
		y0 50 0B FF	Iris priority
		y0 50 0D FF	Bright

CAM_ShutterPosInq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM_IrisPosInq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM_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
		y0 50 01 FF	Flip-H
		y0 50 02 FF	Flip-V
		y0 50 03 FF	Flip-HV
CAM_GammaInq	8x 09 04 5B FF	y0 50 0p FF	p: Gamma setting
CAM_VersionInq	8x 09 00 02 FF	y0 50 ab cd mn pq rs tu vw FF	ab cd : vender ID (0220) mn pq : model ID ST (0510) 、 U2(0512)、 U3 (0513) rs tu : ARM Version vw : reserve
VideoSystemInq	8x 09 06 23 FF	y0 50 0p FF	P: 0~E Video format 0:1080P60 8:720P30 1:1080P50 9:720P25 2:1080i60 A: 1080P59.94 3:1080i50 B: 1080i59.94 4:720P60 C: 720P59.94 5:720P50 D: 1080P29.97 6:1080P30 E: 720P29.97 7:1080P25
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 zzzz: Tilt Position
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Note:[X] in the above table indicates the camera address to be operated, **【y】 = 【x + 8】** .

5.2 Pelco-D Protocol Command List

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Up	0xFF	Address	0x00	0x08	Pan Speed	Tilt Speed	SUM
Down	0xFF	Address	0x00	0x10	Pan Speed	Tilt Speed	SUM
Left	0xFF	Address	0x00	0x04	Pan Speed	Tilt Speed	SUM
Right	0xFF	Address	0x00	0x02	Pan Speed	Tilt Speed	SUM
Upleft	0xFF	Address	0x00	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

5.3 Pelco-P Protocol Command List

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Up	0xA0	Address	0x00	0x08	Pan Speed	Tilt Speed	0xAF	XOR
Down	0xA0	Address	0x00	0x10	Pan Speed	Tilt Speed	0xAF	XOR
Left	0xA0	Address	0x00	0x04	Pan Speed	Tilt Speed	0xAF	XOR
Right	0xA0	Address	0x00	0x02	Pan Speed	Tilt Speed	0xAF	XOR
Upleft	0xA0	Address	0x00	0x0C	Pan Speed	Tilt Speed	0xAF	XOR
Upright	0xA0	Address	0x00	0x0A	Pan Speed	Tilt Speed	0xAF	XOR
DownLeft	0xA0	Address	0x00	0x14	Pan Speed	Tilt Speed	0xAF	XOR
DownRight	0xA0	Address	0x00	0x12	Pan Speed	Tilt Speed	0xAF	XOR
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