USB3.0 HD Video Camera
User Manual
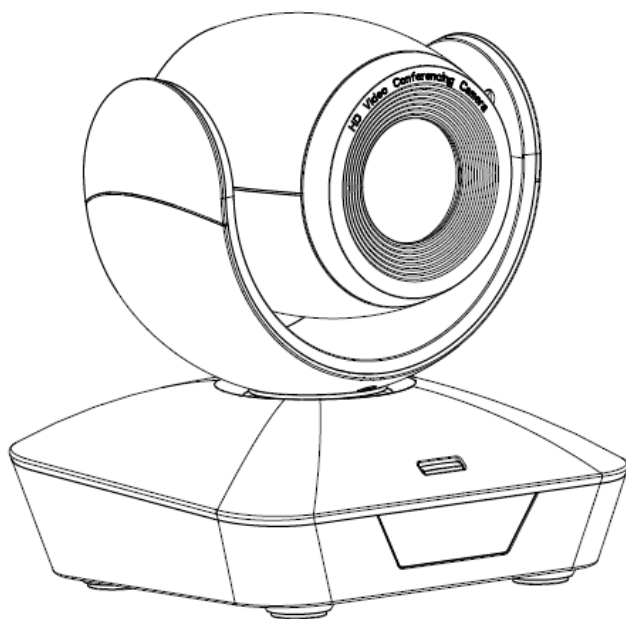
Version V1.0
（**English**）

CONTENTS

SAFETY GUIDES

1.Before operation, please fully read and follow all instructions in the manual. For your safety, always keep this manual with the camera.

2.The camera power input range is 100-240VAC(50-60Hz),ensure the power supply input within this rate before powering on.

3.The camera power voltage is 12VDC, rated currency is 1.5A. We suggest you use it with the original power supply adapter supplied by the factory.

4.Please keep the power cable, video cable and control cable in a safe place. Protect all cables especially the connectors.

5.Operational environment: 0℃-50℃, humidity less than 90%.To avoid any danger, do not put anything inside the camera, and keep away from the corrosive liquid.

6.Avoid stress, vibration and damp during transportation, storage and installation.

7.Do not detetch the camera housing and cover. For any service, please contact authorized technicians.

8.RF cable and control cable should be individually shielded, and cannot be substituted with other cables. Do not direct the camera lens towards strong light, such as the sun or the intensive light.

9.Use a dry and soft cloth to clean the camera housing. Applied with neutral cleaning agent when there is need to clean. To avoid damage on the camera lens, never use strong or abrasive cleaning agents on the camera housing.

10.Do not move the camera by holding the camera head. To avoid mechanical trouble, do not rotate the camera head by hand.

11.Put the camera on fixed and smooth desk or platform, avoid leaned installation.

12. Power Supply Polarity(Drawing)
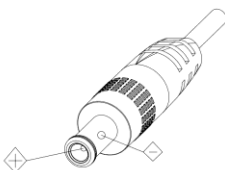
ACCESSORIES

Check all bellow items when open the package:
Camera ……………………………………………………1
Power Adapter ……………………………………………1
Power Cable ………………………………………………1
RS232 Control Cable ……………………………………1
USB3.0 Cable………………………………………………. 1
Remote Controller ………………………………………1
User Manual ………………………………………………1
Double-sided Adhesive………………………………….. 1

QUICK START

1.Check all cable connections before power on.
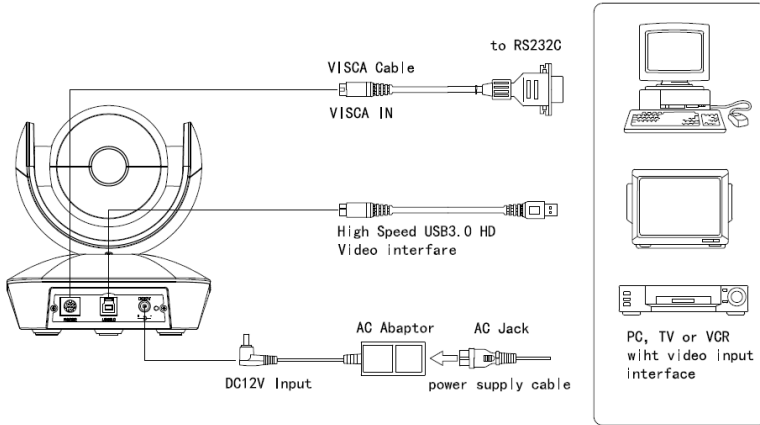
2.DIP Switch Setting (at the bottom of the camera):
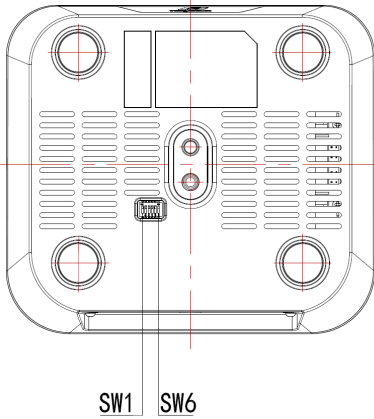
SW1   SW6

Function（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

Function （IR CODE TYPE）			
	SW-3	SW-4	Instruction
1	OFF	OFF	Off(Close IR receiver)
2	ON	OFF	Undefined
3	OFF	ON	SEJIN 4PPM CODE
4	ON	ON	NEC CODE(standard)

Function （USB）			
	SW-5	SW-6	Instruction
1	OFF	OFF	Undefined
2	ON	OFF	Working mode
3	OFF	ON	Updating mode
4	ON	ON	Undefined

PRODUCT HIGHLIGHTS

- Smart and fashion design, ideal for cloud-based conferencing
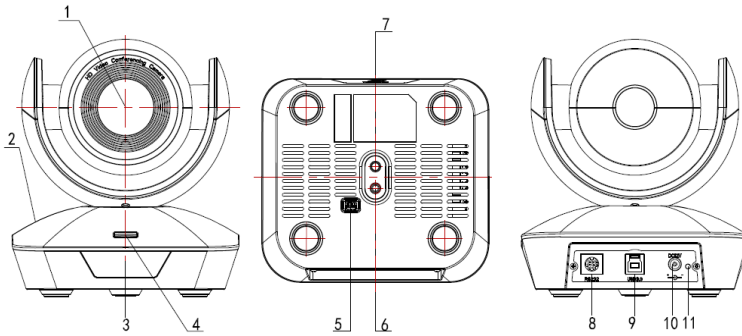- Adopts advanced Ambarella DSP，1/2.8 inch 5MP image sensor, and high quality 10X 62.5degree FOV optical lens, provides fluent and crystal image quality
- Fast switching between different video formats: less than 1 second
- 10X Optical Zoom + 12XDigital Zoom
- Fast and accurate focus performance
- Easy firmware upgrade-(field-upgradable)
- USB3.0 super speed output, USB2.0 compatible
- Effective RS232/485 serial control
- Up to 128 presets
- Compatible with the majority of videoconferencing software (UVC1.5 protocol standard)
- With powerful functional remote controller
- IR transfer/IR pass function: except receiving the camera remote controller signal, the camera can also receive other codec's IR remote control signal, and pass these IR control signal to the codec's IR receiver (via VISCA IN port).
- Multi-language OSD menu: English, Chinese, Spanish, Russian

PRODUCT SPEC

Video Format	USB3.0	1080P60/50/30/25、720P60/50/30/25、1024*768P30、800*600P30、1024*576P30、960*540P30 、 704*576P30 、 640*480P30 、 576*448P30 、 768*448P30 、 640*360P30、512*288P30、352*288P30、176*144P30
	USB2.0	720P25、1024*768P30、800*600P30、1024*576P30、960*540P30、704*576P30、640*480P30 、 576*448P30 、 768*448P30 、 640*360P30 、 512*288P30 、 352*288P30、176*144P30
Video Port	USB3.0, USB2.0	
Sensor	1/2.8 inch high quality 5MP CMOS sensor	
Lens	F4.7~47.mm(10X), F1.8 – 14, Field of view: 62.5°(wide)-6.43°(tele)	
Pan/tilt Rotation	Pan:±170°, Tilt:-30°~+90°, support up-side down installation	
Pan/tilt Speed	Pan: 0.1°-120°/s; Tilt: 0.1°-80°/s	
Preset	10 via IR remote setting, 128 via VISCA control, preset accuracy :0.1°	
Control Port	RS232/RS485 , USB3.0/USB2.0	
Min. Lux	0.01 Lux	
White Balance	Auto/Manual	
Focus	Auto/Manual	
Iris	Auto/Manual	
Shutter	Auto/Manual	
WDR	Supported	
BLC	Supported	
2D Noise Reduction	Supported	
3D Noise Reduction	Supported	
Input Voltage	12VDC	
Dimension	220mm×173mm×117mm	
Net weight	0.9KGS（2LBS）	

CAMERA INTERFACE

1.Camera Lens	5.Dial Switch	9.USB3.0 Port
2.Camera Base	6. Tripod Screw Hole	10.12VDC Power Input
3.IR Receiver Panel	7.Installation Hole	11.Power Indicator light（red）
4.Indicator Light	8.RS232(VISCA IN) Port	

CAMERA DIMENSION(MM)
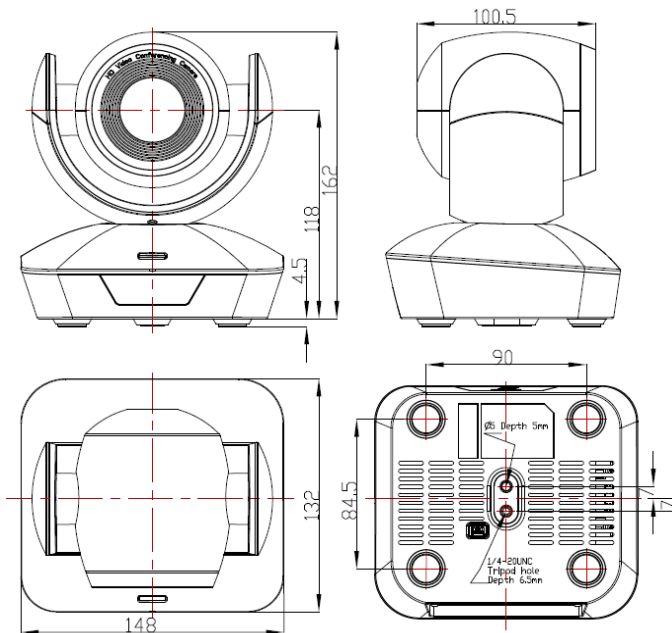
IR REMOTE CONTROLLER

LED Function Instruction

Press any button and shows in red color: Current selection is to control the camera;
Press any button and shows in green color: Current selection is to control the codec;
Press any button and shows in blue color: Current selection is to control the TV;

Power button
Red button: in normal work mode, short press one time, camera will enter standby mode; short press again, the camera will start self-configuration and go to HOME position; it will go to No.0 preset position if that was set;
Green button: Codec power button(need to learn the button coding);
Blue button: TV power button(need to learn the button coding);

Focus (Left): +/-
Manual focus, only valid under manual focus model;
Zoom (Right): +/-
Control the lens zoom rate;
Navigate : Up/Down/Left/Right
In normal working mode, use navigate key to control pan/tilt;
Confirm/Home button:
In normal working mode, short press to let the camera go back to Home position.
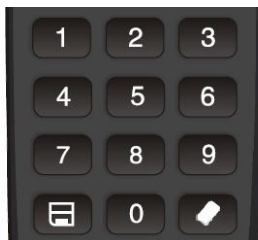
Menu button:
Enter the OSD menu

Number buttons
Set Preset: Long press(3seconds) the number button to save preset;

Clear Preset: +number button to clear the relative preset;
Long press(3seconds) the Clear button to clear all preset;

Run Preset: Short press the number button to run the relative preset.

LEARNING FUNCTION：

1. Press the green button, the LED indicator light will show in green color for 1 second, means switch to video terminal/codec control mode;

2.**Single Button Coding:** long press(3seconds) Home +number"1" button simultaneously, the green indicator LED will light, enter button learning mode, press the buttons which need to be learned, LED will start flickering(1HZ), now can start button learning: get the codec remote point to the camera remote's infrared tube(about 10cm distance), then press the button which need to be learned, the LED re-flickering when learning finishes ; press other buttons which also need to be learned; Press the Home+"0" buttons simultaneously to exit and save all remote data.

If the button learning fails, the camera will enter normal working mode after 15seconds, LED will extinguish.

3. **All Button Coding:** long press (3seconds) Home+number"2" button simultaneously, the green indicator LED will start flickering(1HZ), to enter all button learning mode: get codec remote point to the camera remote's infrared tube(about 10cm distance), to start all button coding mode, the LED will extinguish when learning finished.

If the button learning fails, the camera will enter normal working mode after 15seconds, LED will extinguish.

4. **All Button Sending Mode:** long press (3seconds) the Menu+ number "3" button simultaneously, the remote will enter all button sending mode.

5. Similar operation for the TV control mode learning.

VISCA IN (RS232) PORT
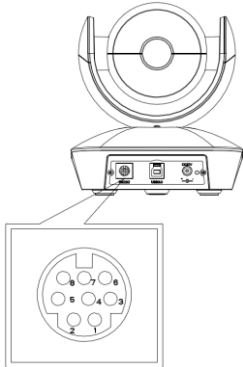
No.	Function
1	DTR
2	DSR
3	TXD
4	GND
5	RXD
6	A
7	IR OUT
8	B

VISCA IN &RS485 Connection

Camera VISCA IN		RS485
1	DTR	
2	DSR	
3	TXD	
4	GND	GND
5	RXD	
6	A(+)	A(+)
7	IR OUT	
8	B(-)	B(-)

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(-)		

SERIAL PORT CONFIGURATION:

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

VISCA PROTOCOL

Part1 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 adderss+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.

Part2 Camera Control Command

Command	**Funnation**	**Command Packet**	**Note**
AddressSet	Broadcast	88 30 01 FF	Address setting
IF_Clear	Broadcast	88 01 00 01 FF	I/F Clear
CommandCancel		8x 21 FF	
CAM_Power	On	8x 01 04 00 02 FF	Power ON/OFF
	Off	8x 01 04 00 03 FF	
CAM_Zoom	Stop	8x 01 04 07 00 FF	
	Tele(Standard)	8x 01 04 07 02 FF	
	Wide(Standard)	8x 01 04 07 03 FF	
	Tele(Variable)	8x 01 04 07 2p FF	p = 0(low)~7(high)
	Wide(Variable)	8x 01 04 07 3p FF	
	Direct	8x 01 04 47 0p 0q 0r 0s FF	pqrs: Zoom Position (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	
	Direct	8x 01 04 48 0p 0q 0r 0s FF	pqrs: Focus Position
	One Push AF	8x 01 04 18 01 FF	
CAM_ZoomFocus	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	

Command	Funnation	Command Packet	Note
	Outdoor	8x 01 04 35 02 FF	
	OnePush	8x 01 04 35 03 FF	
	Manual	8x 01 04 35 05 FF	
	Outdoor Auto	8x 01 04 35 06 FF	
	Sodium Lamp Auto	8x 01 04 35 07 FF	
	Sodium Auto	8x 01 04 35 08 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 (0~0xFF)
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 (0-0xFF)
CAM_AE	Full Auto	8x 01 04 39 00 FF	Automatic Exposure mode
	Manual	8x 01 04 39 03 FF	Manual Control 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	
	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
	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
	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 Positon (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 Positon ()
CAM_WDR	On	8x 01 04 3D 02 FF	WDR ON/OFF

Command	Funnation	Command Packet	Note
	Off	8x 01 04 3D 03 FF	
	Direct	8x 01 04 D3 0p FF	pq: WDR Position (1~0x06)
CAM_BackLight	On	8x 01 04 33 02 FF	BackLight On
	Off	8x 01 04 33 03 FF	BackLight Off
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 (0~0x04)
CAM_Memory	Reset	8x 01 04 3F 00 0p FF	p: Memory Number(=0 to 127) Corresponds to 0 to 9 on the Remote Commander
	Set	8x 01 04 3F 01 0p FF	
	Recall	8x 01 04 3F 02 0p 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_MountMode	UP	8x 01 04 A4 02 FF	Mount Up
	Down	8x 01 04 A4 03 FF	Mount Down
CAM_ColorGain	Direct	8x 01 04 49 00 00 00 0p FF	(0~0x0E)
CAM_2D Noise Reduction	Direct	8x 01 04 53 0p FF	(0~0x05)
CAM_3D Noise Reduction	Direct	8x 01 04 54 0p FF	(0~0x03)
FLICK	50HZ	81 01 04 23 01 FF	
	60HZ	81 01 04 23 02 FF	
Freeze	Freeze On	81 01 04 62 02 FF	Freeze On Immediately
	Freeze Off	81 01 04 62 03 FF	Freeze Off Immediately
	Preset Freeze On	81 01 04 62 22 FF	Freeze On When Running Preset
	Preset Freeze Off	81 01 04 62 23 FF	Freeze Off When Running Preset
VideoSystem Set		8x 01 06 35 00 pp FF	pp: 0~21 Video format 0:1080P60 1:1080P50 2:1080I60 3:1080I50 4:1080P30 5:1080P25 6:720P60 7:720P50 8:720P30 9:720P25 10:1024*768P30 11:800*600P30 12:1024*576P30 13:960*540P30 14:704*576P30 15:640*480P30 16:576*448P30 17:768*448P30 18:640*360P30 19:512*288P30 20:352*288P30 21:176*144P30

Command	Funnation	Command Packet	Note
CAM_IDWrite		8x 01 04 22 0p 0q 0r 0s FF	pqrs: Camera ID (=0000 to FFFF)
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_Transfer	Transfer On	8x 01 06 1A 02 FF	Receive IR(remote commander) CODE from VISCA communication ON/OFF
	Transfer Off	8x 01 06 1A 03 FF	
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	
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	
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(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	
	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	

Part3　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_FocusModeInq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
CAM_FocusPosInq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM_WBModeInq	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_RGainInq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq: R Gain
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM_AEModeInq	8x 09 04 39 FF	y0 50 00 FF	Full Auto
		y0 50 03 FF	Manual
		y0 50 0A FF	Shutter priority
		y0 50 0B FF	Iris priority
		y0 50 0D FF	Bright
CAM_ShutterPosInq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM_IrisPosInq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM_GainPosiInq	8x 09 04 4C FF	y0 50 00 00 0p 0q FF	pq: Gain Position
CAM_ BrightPosiInq	8x 09 04 4D FF	y0 50 00 00 0p 0q FF	pq: Bright　Position
CAM_ExpCompModeInq	8x 09 04 3E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ExpCompPosInq	8x 09 04 4E FF	y0 50 00 00 0p 0q FF	pq: ExpComp Position
CAM_ApertureInq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM_MemoryInq	8x 09 04 3F FF	y0 50pp FF	pp: Memory number last operated.
SYS_MenuModeInq	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_IDInq	8x 09 04 22 FF	y0 50 0p 0q 0r 0s FF	pqrs: Camera ID
CAM_VersionInq	8x 09 00 02 FF	y0 50 ab cd mn pq rs tu vw FF	
VideoSystemInq	8x 09 06 23 FF	y0 50 pp FF	pp: 0~21　Video format 0:1080P60　　　　1:1080P50 2:1080I60　　　　3:1080I50 4:1080P30　　　　5:1080P25 6:720P60　　　　7:720P50 8:720P30　　　　9:720P25 10:1024*768P30　11:800*600P30 12:1024*576P30　13:960*540P30 14:704*576P30　15:640*480P30 16:576*448P30　17:768*448P30 18:640*360P30　19:512*288P30 20:352*288P30　21:176*144P30

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
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	CAM_Backlight
		y0 07 7D 01 04 3F FF	CAM_Memory
		y0 07 7D 01 06 01 FF	Pan_tiltDrive
Pan-tiltMaxSpeedInq	8x 09 06 11 FF	y0 50 ww zz FF	ww: PanMaxSpeed zz: Tilt Max Speed
Pan-tiltPosInq	8x 09 06 12 FF	y0 50 0w 0w 0w 0w 0z 0z 0z 0z FF	wwww: PanPosition zzzz: Tilt Position

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

VISCA PAN TILT ABSOLUTE POSITION 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		

VISCA PAN TILT SPEED VALUE

Pan(degree/second)		tilt(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		

		60/30mode	50/25mode			
	21	1/10000	1/10000		0	close
	20	1/6000	1/6000		1	F14
	19	1/4000	1/3500		2	F11
	18	1/3000	1/2500		3	F9.6
	17	1/2000	1/1750		4	F8
	16	1/1500	1/1250		5	F6.8
	15	1/1000	1/1000		6	F5.6
	14	1/725	1/600		7	F4.8
	13	1/500	1/425	Iris	8	F4
	12	1/350	1/300		9	F3.4
Shutter speed	11	1/250	1/215		10	F2.8
	10	1/180	1/150		11	F2.4
	9	1/125	1/120		12	F2
	8	1/100	1/100		13	F1.6
	7	1/90	1/75			
	6	1/60	1/50			
	5	1/30	1/25		16	f2.0
	4	1/15	1/12		17	f1.8
	3	1/8	1/6			
	2	1/4	1/3			
	1	1/2	1/2			
	0	1/1	1/1			
	0	0dB			8	16dB
	1	2dB			9	18dB
	2	4dB			10	20dB
	3	6dB		Gain	11	22dB
Gain	4	8dB			12	24dB
	5	10dB			13	26dB
	6	12dB			14	28dB
	7	14dB			15	30dB

PELCO-D PROTOCOL

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
Set Preset	0xFF	Address	0x00	0x03	0x00	Preset ID	SUM
Clear Preset	0xFF	Address	0x00	0x05	0x00	Preset ID	SUM
Call Preset	0xFF	Address	0x00	0x07	0x00	Preset ID	SUM
Query Pan Position	0xFF	Address	0x00	0x51	0x00	0x00	SUM
Query Pan Position Response	0xFF	Address	0x00	0x59	Value High Byte	Value Low Byte	SUM
Query Tilt Position	0xFF	Address	0x00	0x53	0x00	0x00	SUM
Query Tilt Position Response	0xFF	Address	0x00	0x5B	Value High Byte	Value Low Byte	SUM
Query Zoom Position	0xFF	Address	0x00	0x55	0x00	0x00	SUM
Query Zoom Position Response	0xFF	Address	0x00	0x5D	Value High Byte	Value Low Byte	SUM

PELCO-P PROTOCOL

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
Focus Far	0xA0	Address	0x00	0x80	0x00	0x00	0xAF	XOR
Focus Near	0xA0	Address	0x01	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

OSD MENU

1.under working mode, press the menu button ▤ on the IR remote, to enter the OSD menu ;

2.Use the navigate button to select the main menu. Once been selected, the main menu will change to blue color

background, and the right side will show all parameters under this sub menu :

```
                  MENU
SYSTEM    PROTOCOL  <  VISCA  >
EXPOSUR   ADDRESS   <  001    >
IMAGE     BAUDRATE  <  9600   >
QUALITY   PTL LOCK  <  OFF    >
PTZ       RS485     <  OFF    >
FORMAT    VGA OUT   <  YPbPr  >
RESET     TRANSFER  <  OFF    >
INFO      LANGUAGE  <ENGLISH>
```

3.Press the right navigate button to enter sub menu, use up and down navigate button to select parameter;

4. Press the menu button ▤ again to return to previous menu; Press it continuously to exit the OSD menu.

Before exiting, will show up a window to remind whether need to save all settings(use left and right button to set)

```
                  MENU
SYSTEM
EXPOSUR
IMAGE
QUALITY   SAVE?    <   YES   >
PTZ
FORMAT
RESET
INFO
```

5.OSD Menu Setting List

SYSTEM	PROTOCOL	VISCA、PELCO-P、PELCO-D
	ADDRESS	VISCA:1~7　　　　PELCO-P/D:1~255
	BAUD RATE	2400、4800、9600、115200
	PTL LOCK	Protocol Lock: once set, above protocol will be locked, to avoid accidental changes
	RS485	RS485 ON/OFF
	VGA	VGA output can be YPbPr or VGA output (customized)
	TRANSFER	IR Transfer/IR Pass function via VISCA or USB port
	LANGUAGE	Chinese, English, Spanish, Russian

EXPOSURE	EXPOSURE MODE	AUTO、MANUAL、BRIGHT、SHUTTER、IRIS
	SHUTTER	Shutter speed:1/8~1/10000, only valid under manual mode
	IRIS	Iris setting:CLOSE~F1.8, only valid under manual mode
	GAIN	Gain setting:0dB~28dB , only valid under manual mode

	BRIGHT	Bright setting:0~15, only valid under bright priority mode
	EC MODE	Exposure compensation ON/FF
	EC POSI	Set exposure compensation lever
	BLC	Back light compensation ON/FF

IMAGE	WB MODE	White Balance: AUTO、INDOOR、OUTDOOR、MANUAL
	R GAIN	Red Gain Level: 0~255, only available under manual white balance mode
	B GAIN	Blue Gain Level: 0~255,only available under manual white balance mode
	COLOR G	Color gain setting(not supported)
	FLICK	Anti-Flicker setting: 50HZ/60HZ, to reduce video flicker
	FREEZE	Video freeze during running preset
	D ZOOM	Digital Zoom: ON/OFF
	FOCUS	Focus mode

QUALITY	2D NR	2D Noise Reduction: OFF/ON;
	3D NR	3D Noise Reduction: OFF/AUTO、2~5
	SHARPNESS	Sharpness setting: 0~15, the higher value, the higher resolution.
	CONTRAST	Image Contrast level setting
	SATURATION	Image Saturation level setting
	TRACKMODE	Absolute position mode selection: PRECISE/FLUENT
	GAMMA	Not supported

PTZ	PWR ACT	Set power on action: OFF, PRE1, PRE2
	SPEEDBYZ	Speed by zoom: proportional speed, the bigger zoom, the slower speed.
	MOUNT M	Mount mode: up, down
	FLIP.HOR	Flip horizontal
	FLIP VER	Flip vertical
	PT SPD	Set pan tilt speed
	ZOOM SPD	Set zoom speed
	MENU MIR	Turn on/off left/menu mirror function.

VIDEO FORMAT	1080P60	720P30	576*448P30	Only for display current video format, can't switch video format via OSD.
	1080P50	720P25	768*448P30	
	1080I60	1024*768P30	640*360P30	
	1080I50	800*600P30	512*288P30	
	1080P30	1024*576P30	352*288P30	
	1080P25	960*540P30	176*144P30	
	720P60	704*576P30		
	720P50	640*480P30		

RESET	SYS RESET	System reset
	CAM RESET	Camera reset
	PT RESET	Pan tilt reset
	ALL RESET	All reset

MESSAGE	IR ADDR	Camera IR control address
	FOCUS	Focus mode
	CLIENT	Client protocol, can't be changed
	MODEL NO.	Model number
	ARM VER	ARM version
	FPGA VER	FPGA version
	CAM VER	Camera version
	RELEASE	Software release date

IR TRANSFER(IR PASS)

1. Currently the camera support NEC code format.   For customized with other codes, pls contact us.

2. Once the camera finish power configuration, enable the IR transfer function via sending COM command.

3. Get the targeted remote controller point to the camera IR receiver, press keys on the remote controller, then the camera will output the received IR code via VISCA IN port.

4. IR Transfer output format: XX XX XX XX FF

XX XX XX XX: Remote Controller Code	FF: End Code

5. The camera can save all setting, no need to re-set after power circle.

UVC CONTROL

1. Only run the client software after the USB3.0 camera has completed self-configuration(the IR indicator in blue color and will not flash); otherwise may casue black video issue.

2. Make sure the USB3.0 camera is recognized by the PC Device Manager.

3．Make sure the interval of video format switching more than 3 seconds, otherwise black video maybe caused.

4．Make sure the interval of control command sending from the server(via USB) to the camera no less than 250ms.

5．Support standard UVC interface.

UVC Property	Corresponded VISCA Command
PU_BACKLIGHT_COMPENSATION_CONTROL	8x 01 04 33 02 FF
PU_BRIGHTNESS_CONTROL	8x 01 04 4D 00 00 0p 0q FF
PU_GAIN_CONTROL	8x 01 04 49 00 00 00 0p FF
PU_SHARPNESS_CONTROL	8x 01 04 42 00 00 0p 0q FF
PU_WHITE_BALANCE_TEMPERATURE_CONTROL	8x 01 04 35 0p FF
CT_ZOOM_ABSOLUTE_CONTROL	8x 01 04 47 0p 0q 0r 0s FF
CT_PANTILT_ABSOLUTE_CONTROL	8x 01 06 02 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z F
CT_PANTILT_RELATIVE_CONTROL	8x 01 06 01 pp qq rr ss FF
CT_ZOOM_RELATIVE_CONTROL	8x 01 04 07 pp FF
PU_CONTRAST_CONTROL	8x 01 04 53 0p FF
PU_HUE_CONTROL	8x 01 04 54 0p FF

6. Note: different to standard UVC protocol, PU_CONTRAST_CONTROL means 2D noise reduction, not CONTRAST value;   PU_HUE_CONTROL means 3D noise reduction, not HUE（chroma）value.