Network PTZ Camera

Installation Manual

V1.0.0

Mandatory actions to be taken towards cybersecurity

1. Change Passwords and Use Strong Passwords:

The number one reason systems get "hacked" is due to having weak or default passwords. It is recommended to change default passwords immediately and choose a strong password whenever possible. A strong password should be made up of at least 8 characters and a combination of special characters, numbers, and upper and lower case letters.

2. Update Firmware

As is standard procedure in the tech-industry, we recommend keeping NVR, DVR, and IP camera firmware up-to-date to ensure the system is current with the latest security patches and fixes.

"Nice to have" recommendations to improve your network security

1. Change Passwords Regularly

Regularly change the credentials to your devices to help ensure that only authorized users are able to access the system.

2. Change Default HTTP and TCP Ports:

● Change default HTTP and TCP ports for systems. These are the two ports used to communicate and to view video feeds remotely.

● These ports can be changed to any set of numbers between 1025-65535. Avoiding the default ports reduces the risk of outsiders being able to guess which ports you are using.

3. Enable HTTPS/SSL:

Set up an SSL Certificate to enable HTTPS. This will encrypt all communication between your devices and recorder.

4. Enable IP Filter:

Enabling your IP filter will prevent everyone, except those with specified IP addresses, from accessing the system.

5. Change ONVIF Password:

On older IP Camera firmware, the ONVIF password does not change when you change the system's credentials. You will need to either update the camera's firmware to the latest revision or manually change the ONVIF password.

6. Forward Only Ports You Need:

● Only forward the HTTP and TCP ports that you need to use. Do not forward a huge range of numbers to the device. Do not DMZ the device's IP address.

● You do not need to forward any ports for individual cameras if they are all connected to a recorder on site; just the NVR is needed.

7. Disable Auto-Login on SmartPSS:

Those using SmartPSS to view their system and on a computer that is used by multiple people should disable auto-login. This adds a layer of security to prevent users without the appropriate credentials from accessing the system.

8. Use a Different Username and Password for SmartPSS:

In the event that your social media, bank, email, etc. account is compromised, you would not want someone collecting those passwords and trying them out on your video surveillance system. Using a different username and password for your security system will make it more difficult for someone to guess their way into your system.

9. Limit Features of Guest Accounts:

If your system is set up for multiple users, ensure that each user only has rights to features and functions they need to use to perform their job.

10. UPnP:

● UPnP will automatically try to forward ports in your router or modem. Normally this would be a good thing. However, if your system automatically forwards the ports and you leave the credentials defaulted, you may end up with unwanted visitors.

● If you manually forwarded the HTTP and TCP ports in your router/modem, this feature should be turned off regardless. Disabling UPnP is recommended when the function is not used in real

11. SNMP:

Disable SNMP if you are not using it. If you are using SNMP, you should do so only temporarily, for tracing and testing purposes only.

12. Multicast:

Multicast is used to share video streams between two recorders. Currently there are no known issues involving Multicast, but if you are not using this feature, deactivation can enhance your network security.

13. Check the Log:

If you suspect that someone has gained unauthorized access to your system, you can check the system log. The system log will show you which IP addresses were used to login to your system and what was accessed.

14. Physically Lock Down the Device:

Ideally, you want to prevent any unauthorized physical access to your system. The best way to achieve this is to install the recorder in a lockbox, locking server rack, or in a room that is behind a lock and key.

15. Connect IP Cameras to the PoE Ports on the Back of an NVR:

Cameras connected to the PoE ports on the back of an NVR are isolated from the outside world and cannot be accessed directly.

16. Isolate NVR and IP Camera Network

The network your NVR and IP camera resides on should not be the same network as your public computer network. This will prevent any visitors or unwanted guests from getting access to the same network the security system needs in order to function properly.

General

This Installation Manual (hereinafter referred to as "Manual") introduces the appearance, preparation before installation, and installation of the Network PTZ Camera (hereinafter referred to as "camera").

Safety Instructions

The following categorized signal words with defined meaning might appear in the Manual.

Signal Words	Meaning
◻NOTE	Provides additional information as the emphasis and supplement to the text.

Revision History

No.	Version	Revision Content	Release Time
1	V1.0.0	First Release.	November, 2018

Privacy Protection Notice

As the device user or data controller, you might collect personal data of other such as face, fingerprints, car plate number, Email address, phone number, GPS and so on. You need to be in compliance with the local privacy protection laws and regulations to protect the legitimate rights and interests of other people by implementing measures include but not limited to: providing clear and visible identification to inform data subject the existence of surveillance area and providing related contact.

About the Manual

- The Manual is for reference only. If there is inconsistency between the Manual and the actual product, the actual product shall prevail.
- We are not liable for any loss caused by the operations that do not comply with the Manual.
- The Manual would be updated according to the latest laws and regulations of related regions. For detailed information, see the paper manual, CD-ROM, QR code or our official website. If there is inconsistency between paper manual and the electronic version, the electronic version shall prevail.
- All the designs and software are subject to change without prior written notice. The product updates might cause some differences between the actual product and the Manual. Please contact the customer service for the latest program and supplementary documentation.
- There still might be deviation in technical data, functions and operations description, or

errors in print. If there is any doubt or dispute, please refer to our final explanation.

- Upgrade the reader software or try other mainstream reader software if the Manual (in PDF format) cannot be opened.
- All trademarks, registered trademarks and the company names in the Manual are the properties of their respective owners.
- Please visit our website, contact the supplier or customer service if there is any problem occurred when using the device.
- If there is any uncertainty or controversy, please refer to our final explanation.

Important Safeguards and Warnings

Read the Manual carefully before using the camera, comply with them when using, and keep it well for future reference.

Requirements

- Requirements for installation personnel:
  - ◇ Have certificates related to installation and maintenance of the closed-circuit television (CCTV).
  - ◇ Have certificates related to working at height.
  - ◇ Have basic knowledge and operation technique for low-voltage wiring and low-voltage electronic circuit connection.
  - ◇ Read the Manual carefully and comprehend all the content.
- Requirements for lifting appliance
  - ◇ Select appropriate lifting appliances.
  - ◇ The lifting appliances can reach the installation height.
  - ◇ The lifting appliances shall have high safety performance.
- Requirements for installation
  - ◇ All installation and operation here should conform to your local electrical safety regulations, fire protection regulations, and relevant regulations.
  - ◇ Make sure the application scenarios of the camera conforms to the installation requirements. Contact your local retailer or customer service center if there is any problem.
  - ◇ Keep the original packing material well, you may need it to pack the camera and send it back for repair.

Notice

- Do not press hard, violently vibrate, and soak the radar when transporting, storing, and installing it.
- If smoke and abnormal odor occur, you should power off the camera, and then contact us.
  - ◇ Do not look directly at the laser light.
  - ◇ Do not disassemble or refit the camera.
- Do not put metal objects or flammable materials into the camera; otherwise fire, short-circuit, or other damage will occur.
- Power off the camera and disconnect the power supply immediately if water or liquid flows into the camera, and then contact the customer service center. Avoid the sea water or rain eroding the camera.
- Keep the camera away from devices that generate electromagnetic field like televisions, radio transmitters, electromagnetic devices, electric machine, transformers, and speakers; otherwise image quality will be influenced.
- Keep the camera away from smoke, vapor, heat, and dust.

- Install the camera at places with good condition of ventilation and cooling.
- Do not aim the lens directly at intense light like the sun, illuminators; otherwise the lens will be damaged.

Cleanning

- Use soft cloth that moistened with cleaning solution to clean the camera, and then dry the camera. Do not use gasoline, paint diluent, or other chemicals to clean the camera; otherwise deformation and paint peeling might occur.
- Read all the manuals included before you use chemical cloth. Do not let the housing of the camera be in contact with plastic or rubber materials for too long; otherwise damage to the housing or peeling paint will occur.

Table of Contents

1 Structure

After unpacking the box, check if there is obvious damage to the appearance of the camera, and make sure the components are complete against the packing list.
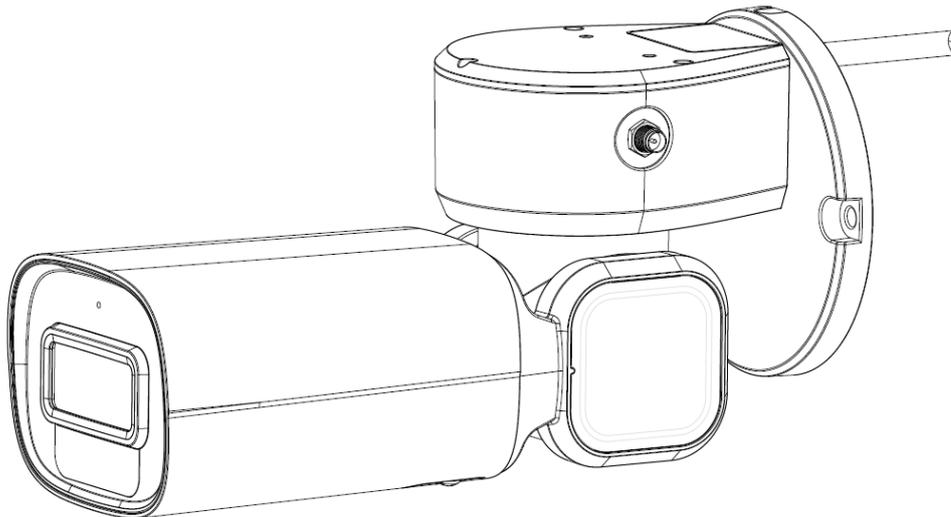
1.1 Appearance and Components

Appearance

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The camera has two types: Wi-Fi type and PoE type.
◇   Wi-Fi type: with antenna;
◇   PoE type: without antenna.
◇   Wi-Fi type camera will be taken as an example to introduce the installation.

For appearance of the camera, see Figure 1-3.

Figure 1-1 Appearance

1.2 Component

Unscrew screws at the bottom, remove the bottom cover, and then you can see the reset button and TF card. See Figure 1-3.
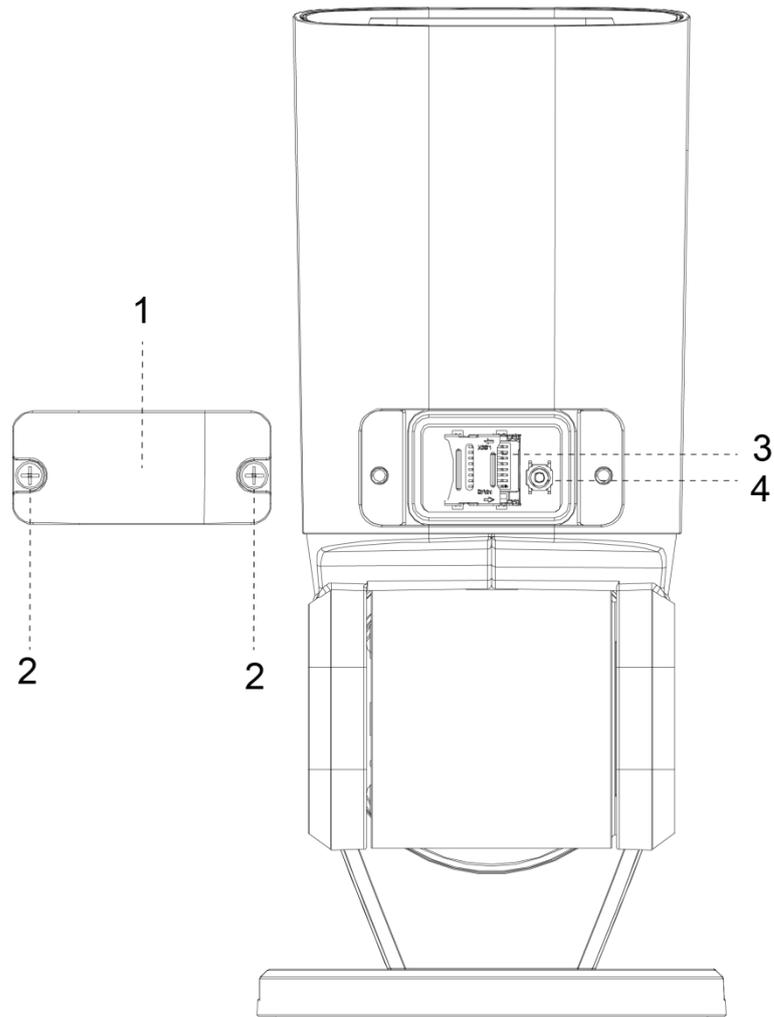
Figure 1-2 Reset button and TF card

Table 1-1

No.	Name
1	Cover
2	Screw
3	TF card slot
4	Reset button

Reset Button

- The reset button is used to restore the camera to the factory settings.
- After you have opened the camera rear cover, press and hold the reset button for over 10 seconds, and the camera will be restored to the factory default settings.

TF Card

The TF card is for data storage.

Make the side with metal dots face downwards, and insert the card into the card slot.

⊞

- When removing the TF card, if you push the card inside a little, and the card will be ejected automatically.
- Make sure that the TF card is removed when the camera is not communicating or transferring information; otherwise files will be corrupted and the TF card will be damaged.

1.3 Cables

1.3.1 Cable Preparation

Select video cables and video coaxial cables depending on the transmission distance.

1.3.2 Cable Requirement

- 75 ohm.
- Pure copper cored cables.
- 95% braided copper shielding.
- For RS-485 communication cable, see "Appendix 2 RS-485 Cable".

Table 1-2 Cable model

Domestic Model	International Model	Maximum Transmission Distance
RG59/U	RG59/U	750 ft/229 m
5C–2 V	RG6/U	1,000ft/305m
7C–2 V	RG11/U	1,500ft/457m

⊞

Cable specifications above are only applicable to network cameras.

1.3.3 Select Power Cables

For 24V AC power source devices, see "Appendix 3 Relationship between Cable Diameter (12V DC) and Transmission Distance ".

For PoE power source devices, see Table 1-3.

Table 1-3 Cable model

PoE specification	Cable specification
AF	CAT4 and above
AT	CAT5 and above
HiPoE or BT	CAT5E and above

Cable Description

The camera is equipped with a multi-functional cable including power cord, video cable, audio cable, RS-485 control cable, alarm cable, network cable, audio cable, and optical fiber cable. For picture of the multi-functional cable, see Figure 1-3.

Figure 1-3 Cables

Table 1-4 Cable descriptions

No.	Description
1	FC connector.
2	DC power input port.
3	24V AC power input. ● Red: V+; ● Black: V–; ● Yellow-green: ground cable.
4	RS-485: Yellow: A+, Orange: B–.
5	Video output port.
6	Ethernet port: ● White: audio input; ● Red: audio output; ● Black: audio ground cable.
7	● Blue: alarm output 1; ● Black: alarm output 2; ● Green: contact switch 1; ● Pink: contact switch 2; ● Yellow-green: ground cable.
8	● Red: alarm input 1; ● Brown: alarm input 2;

No.	Description
	● Grey: alarm input 3; ● Light green: alarm input 4; ● Purple: alarm input 5; ● White: alarm input 6; ● Yellow-black: alarm input 7.

Do not carry the camera as displayed in Figure 1-4.

Figure 1-4 Wrong way of carrying the camera

Cable Connection

Connect the multi-functional cable of the bracket to the multi-functional cable (including power cord, video cable, audio cable, RS-485 control cable, alarm cable, network cable, high-frequency signal cable, and optical fiber cable) of the camera. Wrap the cable joints around with insulated rubber tape and do waterproof operations.

The cable diameter of the RS-485 control cable can not be too large; otherwise the control performance can be influenced. For details of the RS-485 cable, see "Appendix 2 RS-485 Cable".

There are thermal contraction tube around the video output port. After the connection is finished, heat the two ends of the tube to make the video output port moistureproof and waterproof.

Ground Cable Connection

Connect the yellow-green power cord of the multi-functional cable to the anti-thunder device, and make sure the lightning protection device is connected to the ground cable.

2 Install the Camera

2.1 Check before Installation

Before installation

- Make sure that the wall where the camera is installed and the bracket have the capacity to bear the weight of the speed dome and its accessories.
- Make sure the wall is thick enough to allow expansion bolts to be installed.

During installation

The following conditions must be met when installing the camera:
- Make sure that the place where the camera is installed has enough space to hold the camera and its mounting accessories.
- Make sure that the bracket and wall where the camera is installed have the capacity to bear eight times the weight of the speed and its accessories.
- Make sure the wall is thick enough to allow bolts to be installed.
- If the camera is laser camera, the installation height should be above 6 meters.
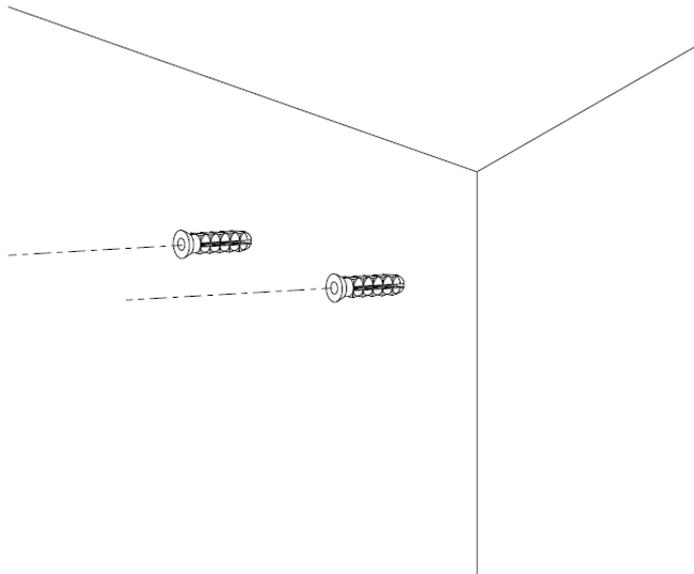
2.2 Installation Procedure

Depending on the installation base, the camera can be installed in two manners: installed on the wall and installed on the ceiling.

2.2.1 Installed on the Wall

Step 1 Drill bolt holes.

Drill bolt holes in the wall according to holes on the camera base. See Figure 2-1.

Figure 2-1 Drill holes

Step 2 Fix the camera on the wall (put cables into the junction box).
Step 3 Place the camera base on the wall, tighten the the expansion screws to fix the camera on the wall. See Figure 2-2.
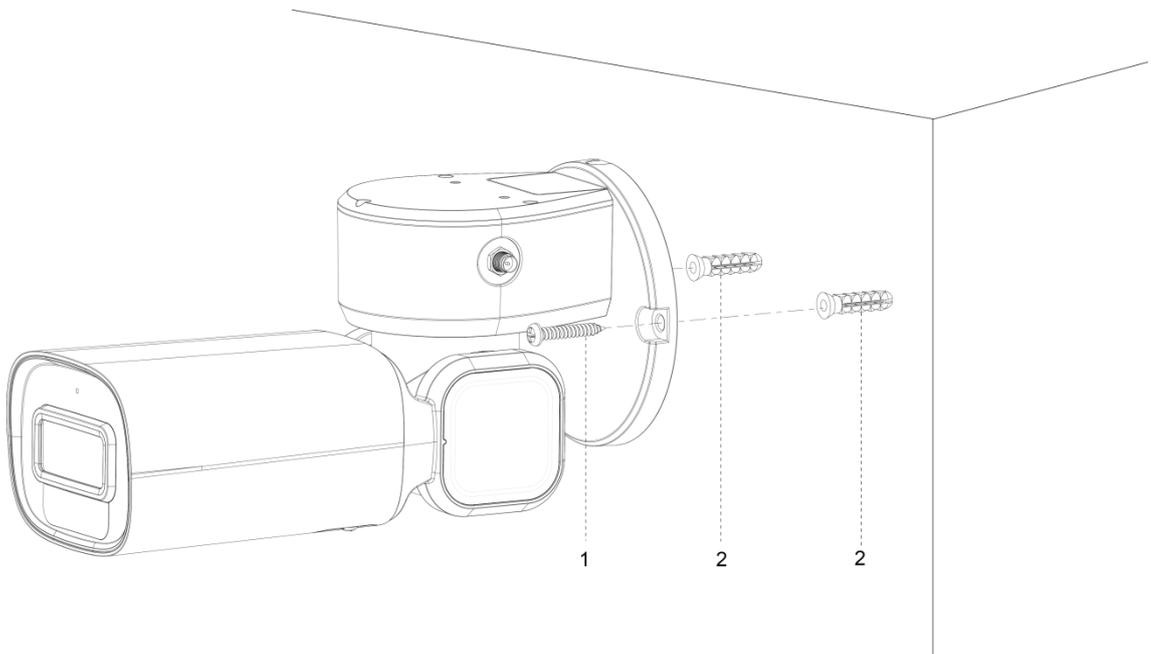
Figure 2-2 Fix the camera on the wall

Table 2-1

No.	Name
1	ST4 Screw
2	Expansion

Step 4 (Optional) Choose whether to install a junction box between the camera base and the wall or not. See Figure 2-2.
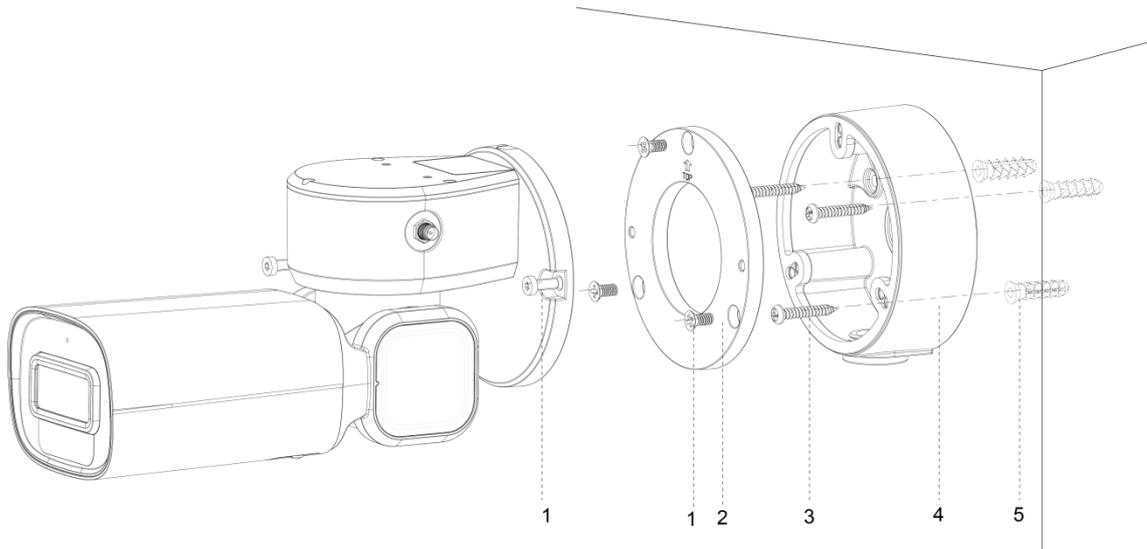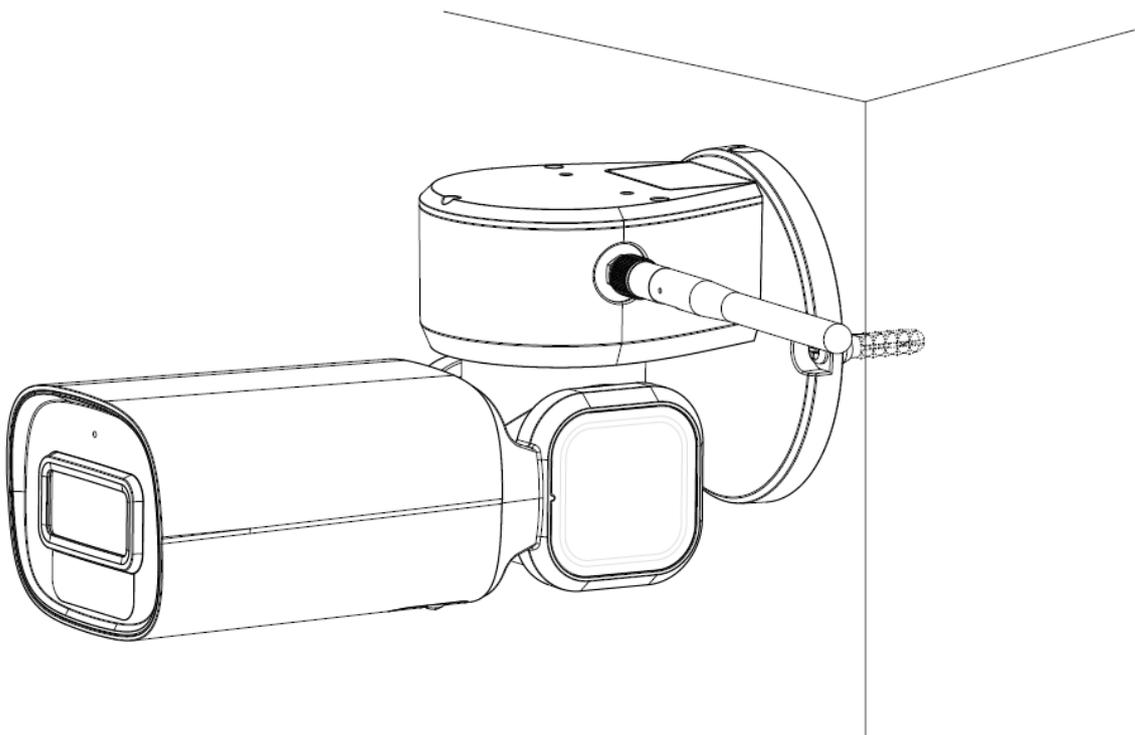
Figure 2-3 Install the junction box

Table 2-2

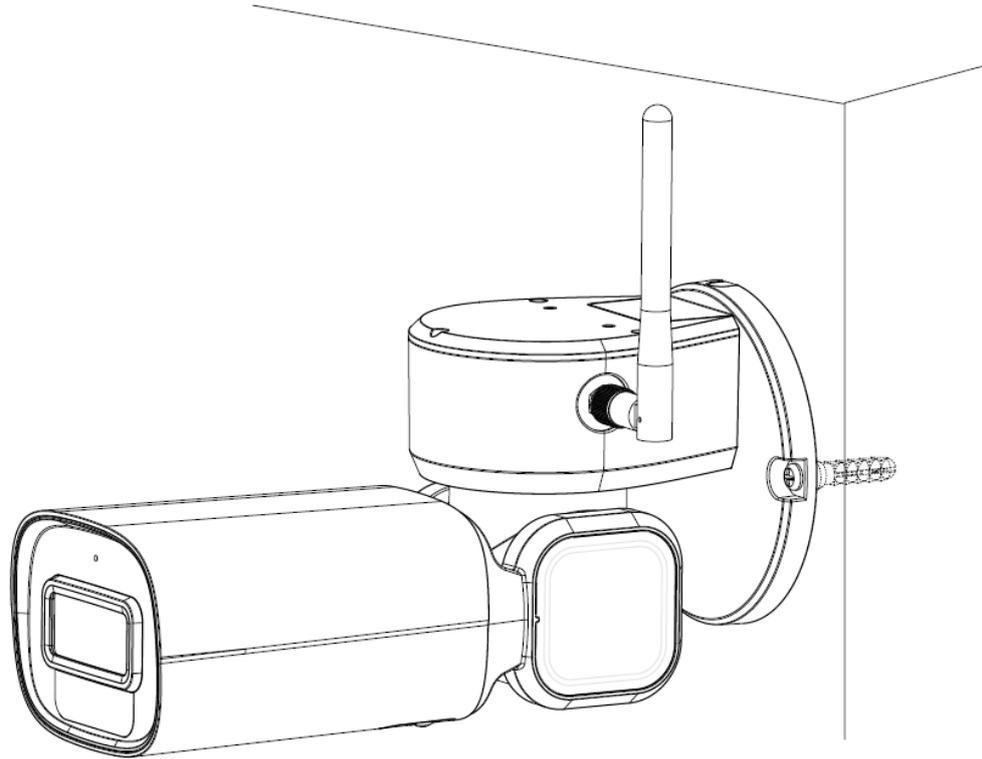| No.	Name
1	M4 Screw
2	Mounting plate
3	ST4 Screw
4	Junction box
5	Expansion screw

Step 5 Install the Wi-Fi antenna to the camera cover. See Figure 2-2.

Figure 2-4 Install the Wi-Fi antenna

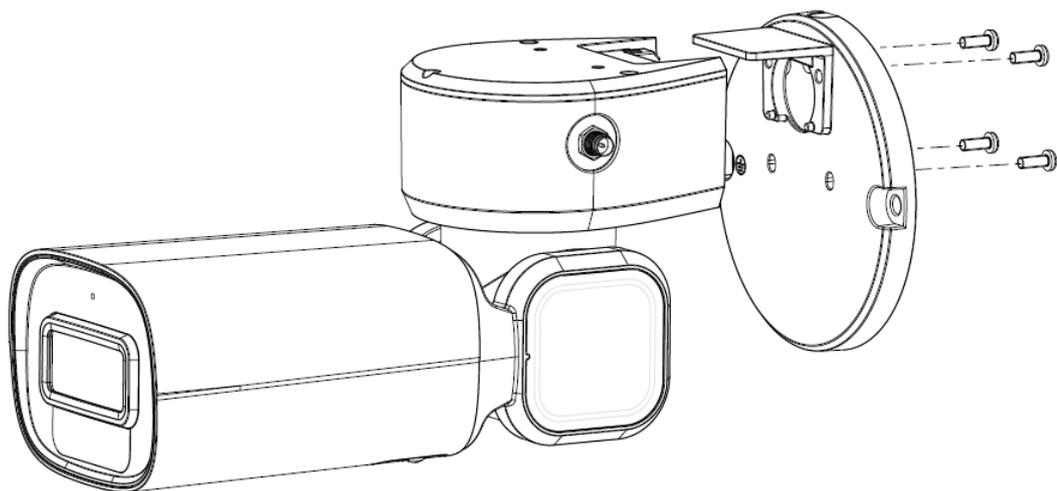Step 6 Pull the Wi-Fi antenna up to complete the installation. See Figure 2-2.

Figure 2-5 Pull the Wi-Fi antenna up

2.2.2 Installed on the Ceiling

Step 1 Detach the mounting plate from the back of the camera. See Figure 2-6.
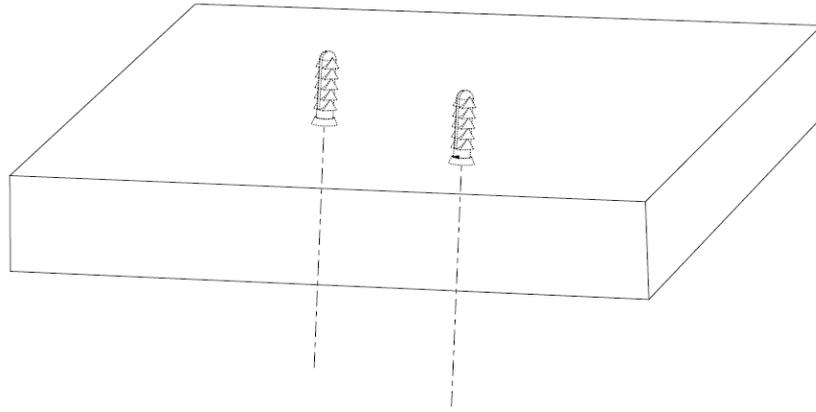
Figure 2-6 Detach the mounting plate

Step 2 Drill bolt holes in the ceiling according to holes on the camera base.
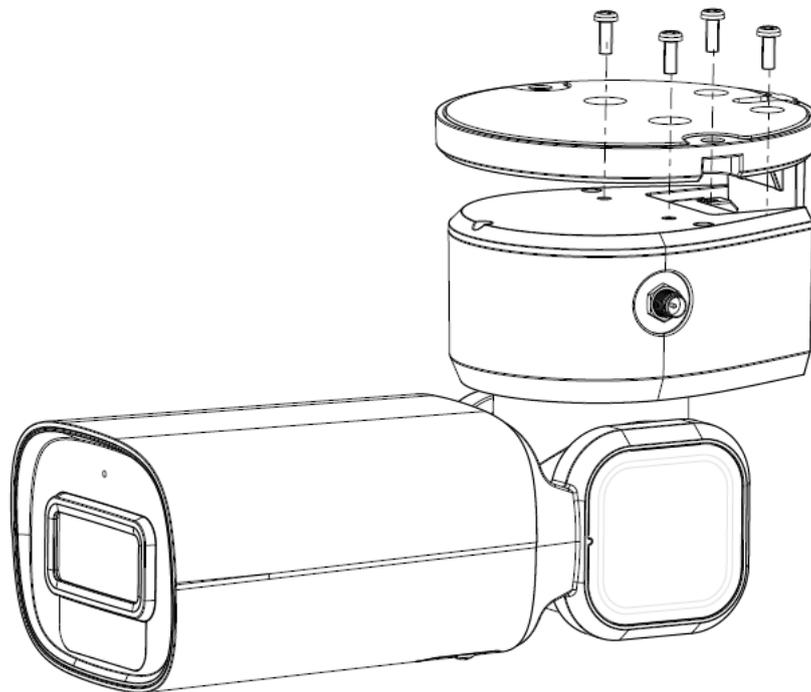Step 3 Place expansion screws into the wall. See Figure 2-6.

Figure 2-7 Place expansion screws into the ceiling

Step 4   Fix the mounting plate on the top of the camera. See Figure 2-6.
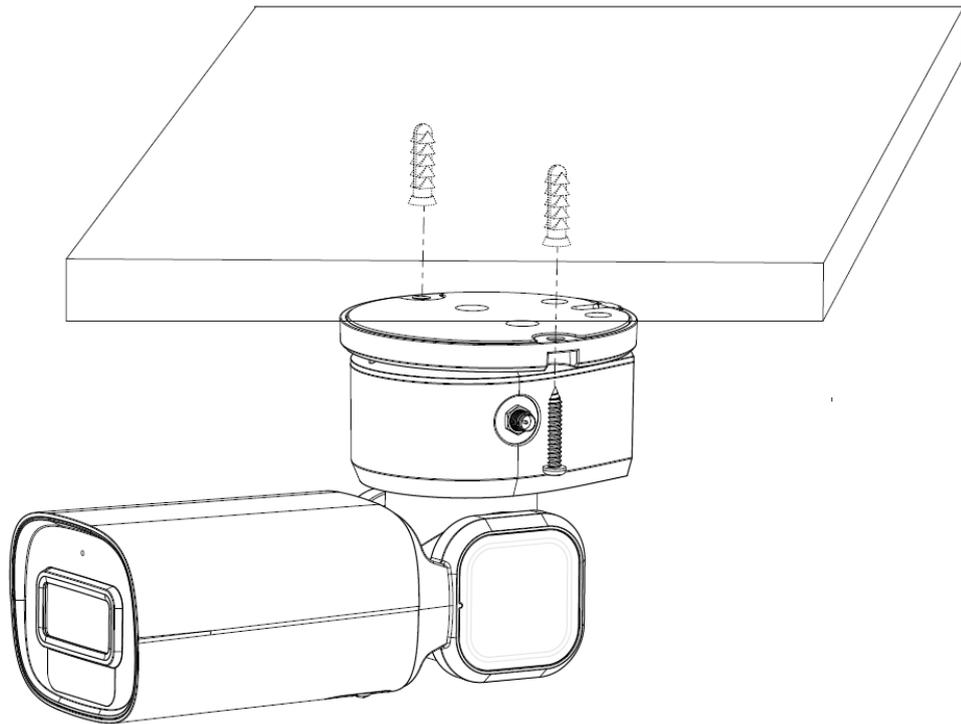
Figure 2-8 Fix the mounting plate

Step 5   Connect cables, do waterproof operations, and put cables into the junction box.
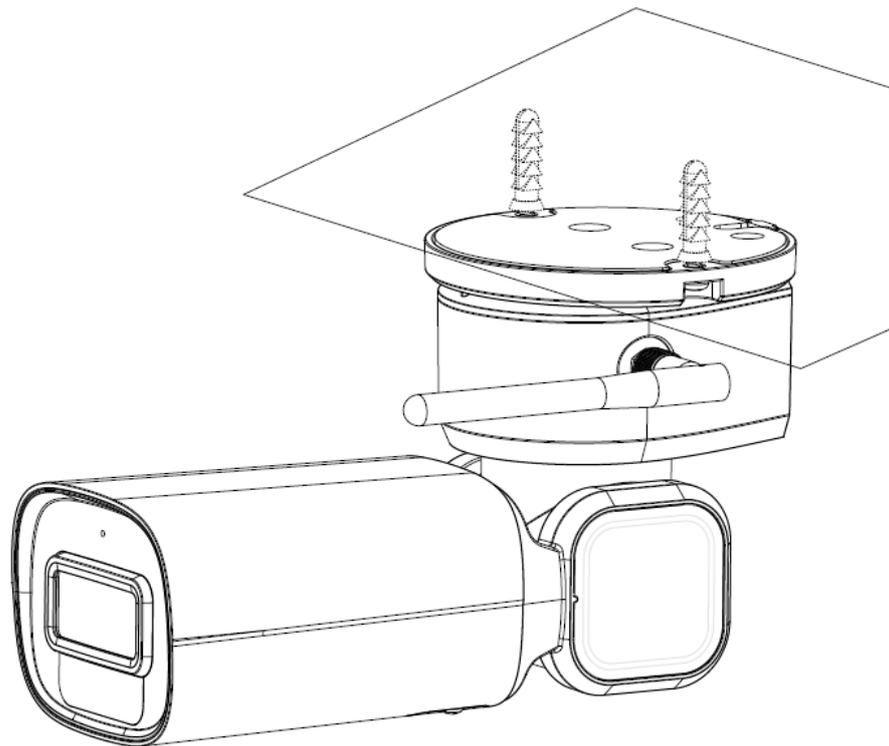
Step 6   Fix the camera on the ceiling. See Figure 2-6.

Figure 2-9 Fix the Camera on the ceiling

Step 7 Install the Wi-Fi antenna and pull it up to complete the installation. See Figure 2-6.

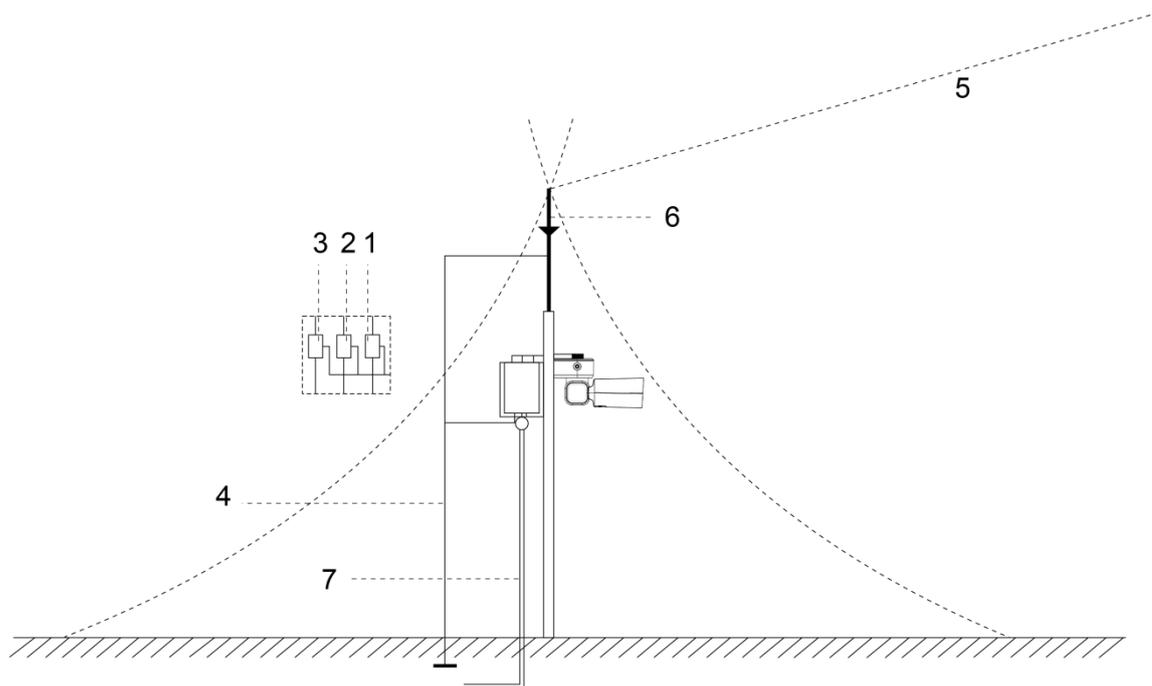Figure 2-10 Install the Wi-Fi antenna

Install Lightning Protection Devices Outdoors

Transient voltage suppressor (TVS) is applied to protect devices against voltage spikes and overvoltage below 6000V. However, it is still necessary to take safeguard measures when installing the camera outdoors according to your local electrical safety regulations.

- The distance between the signal transmission cable and high-voltage device (or high-voltage cable) shall be at least 50 meters.
- When laying cables outdoors, try to lay them under the eaves.
- At open places, lay cables underground by hermetic steel tube, and then do equipotential grounding to both ends of steel tubes. Laying overhead power cables is prohibited.
- At places with severe thunderstorms and induced voltage (like substation), high-powered lightning protection devices and lightning conductors are required.
- When laying cables and connecting lightning protection devices, you must comply with regional laws and regulations.
- The grounding devices must have strong anti-interference ability and must comply with electrical safety standards. Make sure that cable connections are correct; otherwise short circuit and accidents may occur. When the electrical system is connected to the ground cable, the impedance shall not exceed 4Ω, and the cross-sectional area of the ground cable shall not exceed 25mm^2.

For the installation of camera lightning protection devices outdoors, see Appendix figure 1-1 and Appendix figure 1-1.
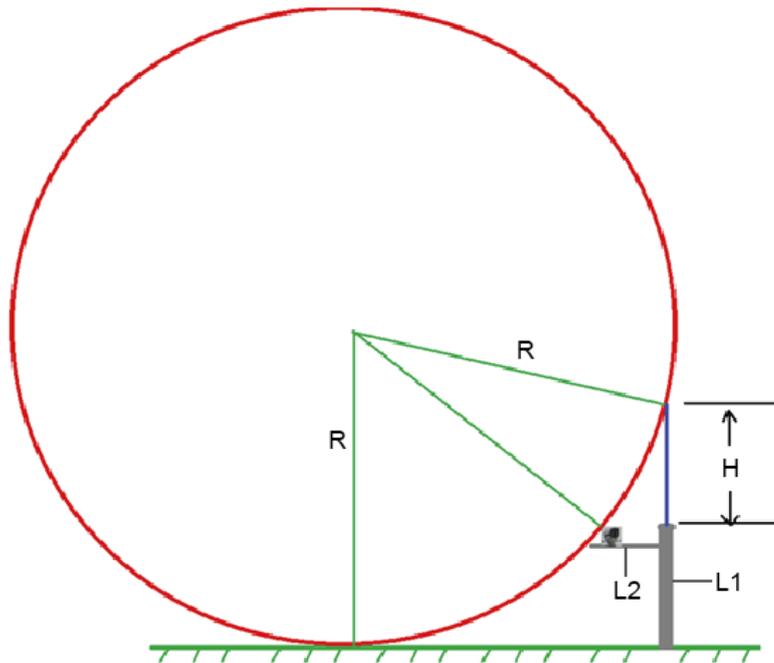
Appendix figure 1-1 Install camera lightning protection devices outdoors(1)

Appendix table 1-1 Install PTZ lightning protection devices

No.	Description
1	Video lightning conductor.
2	Communication lightning conductor.
3	Power supply lighting conductor.
4	Impedance of the cable connected to the ground wire should be less than 4Ω.
5	The radius is 60 m.
6	Lightning conductor.
7	Steel tube.

Appendix figure 1-2 Install PTZ lightning protection devices (2)

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- R: The radius of the circle, and R=60 m;
- L1: The length of the pole that holds the lightning conductor;
- L2: The length of the rail that holds the camera;
- H: The length of the lightning conductor.

To get the value of L1, you need to use the formula:

$$\left(\sqrt{R^2 - [R - (L1 + H)]^2} - L2\right)^2 + (R - L1)^2 = R^2$$

Install Lightning Protection Devices Indoors

You shall use multiple copper cables whose cross-sectional area are not less than 25mm^2 to connect the yellow-green ground cable/ground screws to the indoor equipotential earthing terminals. See Appendix figure 1-1.
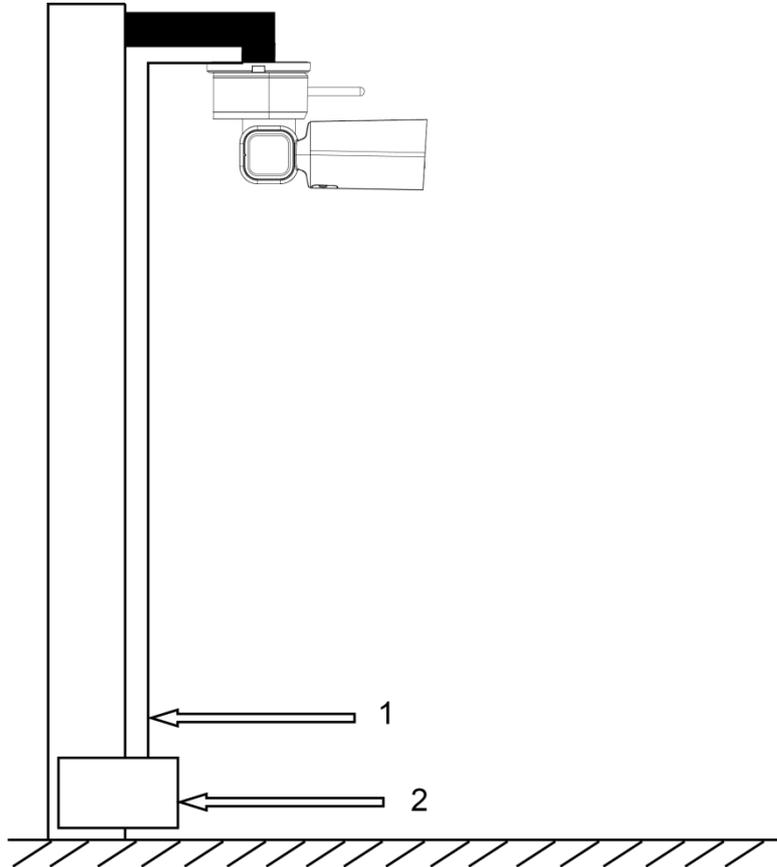
Appendix figure 1-3

Table 2-3

No.	Name
1	Yellow-green ground cable
2	Indoor equipotential earthing terminal

General

RS-485 industrial buses are half-duplex communication buses whose characteristic impedance is 120Ω. Its maximum load is 32 payloads (including drivers and receivers).

RS-485 Transmission Distance

When using 0.56 mm (24AWG) twisted pair, depending on different baud rates, the maximum theoretical transmission distances are listed. See Appendix table 2-1.

Appendix table 2-1 Theoretical maximum transmission distance

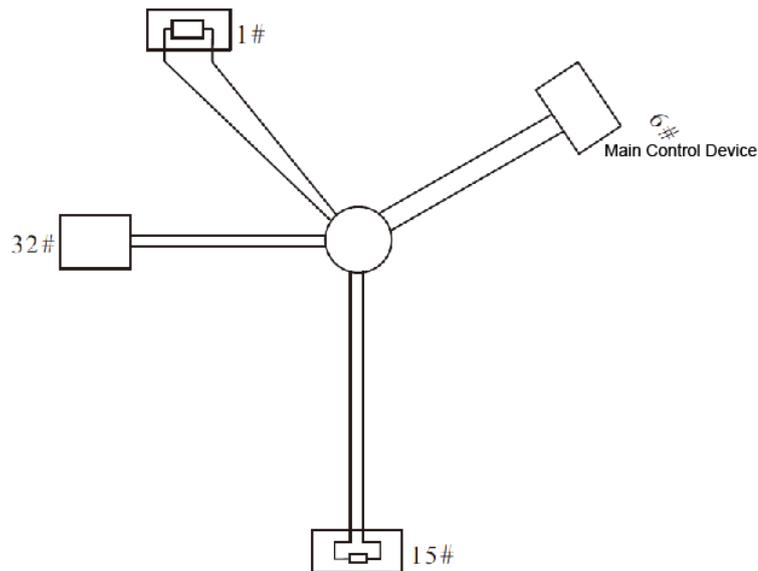| Baud rate	Maximum transmission distance
2400 bps	1800 m
4800 bps	1200 m
9600 bps	800 m

The maximum transmission distance might be reduced in the following conditions; otherwise, maximum transmission distance will be increased.

- When thinner communication cables are used;
- The camera is used in places with intense electromagnetic interference;
- Too many devices are connected to the RS-485 cable.

Frequently Occurred Problems

Customers tend to connect devices as the way displayed in Appendix figure 2-2. In this condition, the terminal resistance must be connected to the two devices whose cable length is the largest among all the devices (in Appendix figure 2-2, cable length between 1# and 15# is the largest). However, this connection manner dose not comply with the RS-485 industrial bus standard. As a result, problems like signal reflection and anti-interference capability reduction might occur. Due to the above mentioned problems, the camera can be out of control.

Appendix figure 2-2 The common manner of connecting devices

To solve the problems, we recommend that you use RS-485 distributors. The RS-485 distributor can avoid the common manner of connection so as to improve transmission quality. See Appendix figure 2-3.

Appendix figure 2-3 RS-485 distributor applied

FAQ

Problem	Possible reason	Solution
The camera can do self-check but can not be controlled.	Baud rate and IP address of the host and camera are not properly configured.	Modify the baud rate/IP address of the host and camera to make them the same.
	Positive electrode and negative electrode of RS-485 cable are misconnected.	Connect cables to the positive electrode and negative electrode correctly.
	Loose connection	Connect the cables firmly.
	RS-485 cable is broken.	Replace the broken RS-485 cable with a new one.
You can control the camera but it is not	RS-485 cable is in poor contact.	Connect the RS-485 cable firmly.
	One of the RS-485 cables is	Replace the broken RS-485 cable with a

Problem	Possible reason	Solution
smooth.	broken.	new one.
	The distance between the host and camera is too long.	Install terminal resistance.
	Too many cameras are connected in parallel.	Install RS-485 distributors.

Diameter (12V DC) and Transmission Distance

- The recommended transmission distances are for reference only, and the actual conditions shall prevail.
- The chart below gives the maximum transmission distance of cables with certain diameters when the 12V DC power source voltage lose rate is bellow 10%.
- For cameras powered by direct current, the maximum voltage loss rate allowed is 10%.
- Cables mentioned in the table below are copper cables (the resitivity of copper $\rho = 0.0175\Omega * \text{mm}^2/\text{m}$)

Transmission power (W)	Cable diameter (mm)			
	0.8000	1.000	1.250	2.000
	Transmission distance Feet (m)			
5	122.13 (37.23)	190.83 (58.16)	298.17 (90.88)	763.31 (232.66)
10	61.06 (18.61)	95.41 (29.08)	149.08 (45.44)	381.66 (116.33)
15	40.71 (12.41)	63.61 (19.39)	99.39 (30.29)	254.44 (77.55)
20	30.53 (9.31)	47.71 (14.54)	74.54 (22.72)	190.83 (58.16)
25	24.43 (7.45)	38.17 (11.63)	59.63 (18.18)	152.66 (46.53)
30	20.35 (6.20)	31.80 (9.69)	49.69 (15.15)	127.22 (38.78)
35	17.45 (5.32)	27.26 (8.31)	42.60 (12.98)	109.04 (33.24)
40	15.27 (4.65)	23.85 (7.27)	37.27 (11.36)	95.41 (29.08)
45	13.57 (4.14)	21.20 (6.46)	33.13 (10.10)	84.81 (28.85)
50	12.21 (3.72)	19.08 (5.82)	29.82 (9.09)	76.33 (23.27)
55	11.10 (3.38)	17.35 (5.29)	27.11 (8.26)	69.39 (21.15)
60	10.18 (3.10)	15.90 (4.85)	24.85 (7.57)	63.61 (19.39)
65	9.39 (2.86)	14.68 (4.47)	22.94 (6.99)	58.72 (17.90)
70	8.72 (2.66)	13.63 (4.15)	21.30 (6.49)	54.52 (16.62)
75	8.14 (2.48)	12.72 (3.88)	19.88 (6.06)	50.89 (15.51)
80	7.63 (2.33)	11.93 (3.64)	18.64 (5.68)	47.71 (14.54)
85	7.18 (2.19)	11.23 (3.42)	17.54 (5.35)	44.90 (13.69)
90	6.78 (2.07)	10.60 (3.23)	16.56 (5.05)	42.41 (12.93)
95	6.43 (1.96)	10.04 (3.06)	15.69 (4.78)	40.17 (12.25)
100	6.11 (1.86)	9.54 (2.91)	14.91 (4.54)	38.17 (11.63)

Appendix 4 Wire Gauge Reference Sheet

Metric bare wire diameter (mm)	AWG	SWG	Bare wire cross section area (mm^2)
0.050	43	47	0.00196
0.060	42	46	0.00283
0.070	41	45	0.00385
0.080	40	44	0.00503
0.090	39	43	0.00636
0.100	38	42	0.00785
0.110	37	41	0.00950
0.130	36	39	0.01327
0.140	35	/	0.01539
0.160	34	37	0.02011
0.180	33	/	0.02545
0.200	32	35	0.03142
0.230	31	/	0.04115
0.250	30	33	0.04909
0.290	29	31	0.06605
0.330	28	30	0.08553
0.350	27	29	0.09621
0.400	26	28	0.1257
0.450	25	/	0.1602
0.560	24	24	0.2463
0.600	23	23	0.2827
0.710	22	22	0.3958
0.750	21	/	0.4417
0.800	20	21	0.5027
0.900	19	20	0.6362
1.000	18	19	0.7854
1.250	16	18	1.2266
1.500	15	/	1.7663
2.000	12	14	3.1420
2.500	/	/	4.9080
3.000	/	/	7.0683