Ex-mark: Exd II C T6 Gb/ Ex tD A21 IP68 T80°C

Explosion-Proof IR Camera (ECA3A1)

Installation Manual

ZHEJIANG DAHUA VISION TECHNOLOGY CO., LTD. V1.0.1

Foreword

General

This manual introduces the structure and installation of the Explosion-Proof IR Camera (hereinafter referred to as "the Camera").

Figures in this manual are only for reference, and the actual product shall prevail.

Safety Instructions

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

Signal Words	Meaning
DANGER	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
WARNING	Indicates a medium or low potential hazard which, if not avoided, could result in slight or moderate injury.
CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, lower performance, or unpredictable result.
TIPS	Provides methods to help you solve a problem or save you time.
NOTE	Provides additional information as the emphasis and supplement to the text.

Revision History

Version	Revision Content	Release Time
V1.0.0	Updated explosion-proof structure description.	July 2020
V1.0.0	First release.	June 2020

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

The manual will help you to use the Camera properly. Read the manual carefully before using the Camera, and keep it well for future reference.

Power Requirements

- Make sure that the power supply conforms to the requirements on the nameplate before powering the Camera, provide stable long-time power supply, and use the power adapter recommended by the manufacturer. Do not connect several cameras to one power adapter; otherwise it might result in overheat or fire if it exceeds the rated load.
- Make sure that the Camera is properly grounded, and if the Camera will not be used for a long time, unplug the power cable.
- Cut off the power before camera maintenance and overhaul, and consult after-sale service, and make sure that the power is off when you connect the cables, install or remove the Camera.
- All installation and operations shall conform to local electrical safety regulations.
- The power source shall conform to the requirements of the Safety Extra Low Voltage (SELV) standard, and supply power with rated voltage that conforms to Limited power Source requirement according to IEC60950-1. Note that the power supply requirement is subject to the device label.

Safety Requirements

- A control cable around 1.5 meters is provided when the Camera leaves the factory. When connected to the explosion-proof control cabinet, the control cable shall be protected by explosion-proof flexible tube.
- Make sure that all the explosion-proof components are complete without any cracks and defects.
- Keep the packing box well for future transportation.
- Avoid heavy stress, violent vibration, and water splash during transportation, storage, and installation. Complete package is necessary during the transportation when the Camera is delivered or is returned to the manufacturer for repair. We will assume no responsibility for any damage or problem caused by the incomplete package during the transportation.
- Protect the Camera from falling down or heavy vibration.
- Buckle the safety hook before installing the Camera if it is included.
- To avoid damage, keep the Camera away from televisions, radio transmitters, electromagnetic devices, electric machine, transformers, and speakers; do not install the Camera in places with smoke or vapor, high temperature, and lots of dust; do not install the Camera near the heating furnace and other heat sources, such as spotlight, kitchen, and boiler room.
- Do not dissemble the Camera; otherwise it might cause dangers or device damage. Contact your local retailer or customer service center for internal setup or maintenance requirement.

- Make sure that there is no metal, or inflammable, explosive substance in the Camera; otherwise it might cause fire, short-circuit, or other damage. Power off the Camera and disconnect the power cable immediately if there is water or other liquid falling into the Camera. And contact your local retailer or after-sale service center. Avoid seawater or rain eroding the Camera.
- Avoid the lens aiming at intense light source, including sunlight, and incandescent light; otherwise the lens might be damaged.
- Clean the enclosure with soft cloth. To remove the dirt, you can dip the soft cloth in proper detergent, wring the soft cloth out, and then dry the enclosure with soft cloth. Do not use gasoline, paint thinner, or other chemicals to clean the enclosure; otherwise it might result in enclosure transfiguration or paint flake. Avoid long time touch between the plastic or rubber material and the enclosure; otherwise it might result in device damage and paint flake.
- It is recommended to use the Camera with a lightning-proof device for better lightning-proof effect.
- Before installing the Camera, you need to confirm the salt spray tolerance level. Do not install the Camera in an environment with higher salt spray level than the Camera can tolerate. There are three salt spray tolerance levels of cameras.
  - Cameras with higher salt spray tolerance level can be installed in an area within 1500 meters by the sea, or offshore platform.
  - Cameras with medium salt spray tolerance level can be installed in an area 1500 meters away from the sea.
  - Cameras not salt spray tolerant can only be installed in an area 3000 m away from the sea.
- For the Camera that supports laser, do not aim the laser directly at eyes. And keep a proper distance from the flammable to avoid fire.
- Power off the Camera and disconnect the power cord immediately if there is any smoke, disgusting smell, or noise from the Camera. And contact your local retailer or customer service center.
- We will assume no responsibility for any problems (such as water intrusion or loose cables) caused by unauthorized modifications, disassembly or repair, incorrect installation or use, and overuse of certain components.

Requirements for Installation and Maintenance Personnel

- Have certificates or experiences related to installation and maintenance of the closed-circuit television (CCTV), and have certificates related to working at height.
- Have basic knowledge and installation skills of CCTV system.
- Have basic knowledge and operation technique for low-voltage wiring and low-voltage electronic circuit connection.
- Have the ability to read and understand the manual.
- Have explosion-proof related certificates.

Requirements for Lifting the Camera

- Select appropriate tools to lift the Camera.

- Make sure that the selected tools reach the installation height.
- Make sure that the selected tools have high safety performance.

Storage Requirements

- The warehouse should be well ventilated and free from corrosive gases; the ambient temperature should be -40°C to 55°C; the relative humidity should be no more than 85%; there should be no strong mechanical vibration, impact or strong magnetic field.
- Keep the Camera away from fire source, and do not store it with corrosive, inflammable and explosive materials.
- If the Camera has been stored in the company for more than 18 months, it should be resubmitted for inspection and confirmation.

Transportation Requirements

- Handle the Camera with care, and do not throw, roll or trample it.
- Avoid damp, extrusion and rain during transportation.
- Shipping the Camera with corrosive, inflammable and explosive materials is strictly prohibited.

Table of Contents

1 Packing List

Check the Camera and accessories in the packing box carefully after unpacking. If any discrepancy or anything is missing, contact local supplier or customer service center. The product is subject to change without further notice. If there is any question or dispute, refer to our final explanation.

Figure 1-1 Packing list

No.	Name	Quantity	Notes
1	Explosion-proof IR camera	1	—
2	Installation manual	1	—
3	Certificate	1	—
4	Screws and nuts	1 set	Used to fix bottom bracket
5	Hexagon wrench	1	—

2 Overview

2.1 Introduction

As a new generation of explosion-proof monitoring device, the Camera adopts advanced manufacturing technique and new design. It is integrated with clear image, digitization, intelligence, and easy installation. After installing the Camera, the overall aesthetics of the monitoring site is not affected.

The Camera is designed and manufactured in strict accordance with standards such as IEC60079-0 *EXPLOSIVE ATMOSPHERES Part 0: Equipment General Requirements* and IEC60079-1 *Explosive Atmospheres, Part 1: Equipment Protection by Flameproof Enclosures 'd'*. The enclosure is rust-proof and it is rated IP68. The Camera can be widely used in oil, chemical engineering, wharf, port, mine, aerospace, military, food processing, and other sites.

2.2 Application

The Camera is suitable for area Ⅱ with explosive gas, and area A21 & A22 with explosive dust.

2.3 Appearance

Figure 2-1 Appearance

2.4 Explosion-Proof Structure

- The enclosure will not cause external explosion due to internal electric apparatus operation even if explosive gas mixture enters into the Camera. Several factors have been considered to guarantee the explosion-proof performance, such as enclosure intensity,

junction surface gap and length among components, and maximum surface temperature of the enclosure.

- After the welding and finish machining, the enclosure can sustain the severe hydrostatic test. With test pressure 2MPa and the duration 10 seconds to 12 seconds, there is no water dripping and transformed structure.
- When the Camera is working normally, the maximum surface temperature of the enclosure is no more than 80°C.
- The observation window is made of tempered glass, and it has passed impulse test and thermal shock test.
- IP68 (2 m/2 h).
- The Camera adopts compression nut equipment to lead the cable in, which makes the cable fully compressed without being loose.

Figure 2-2 Explosion-proof structure

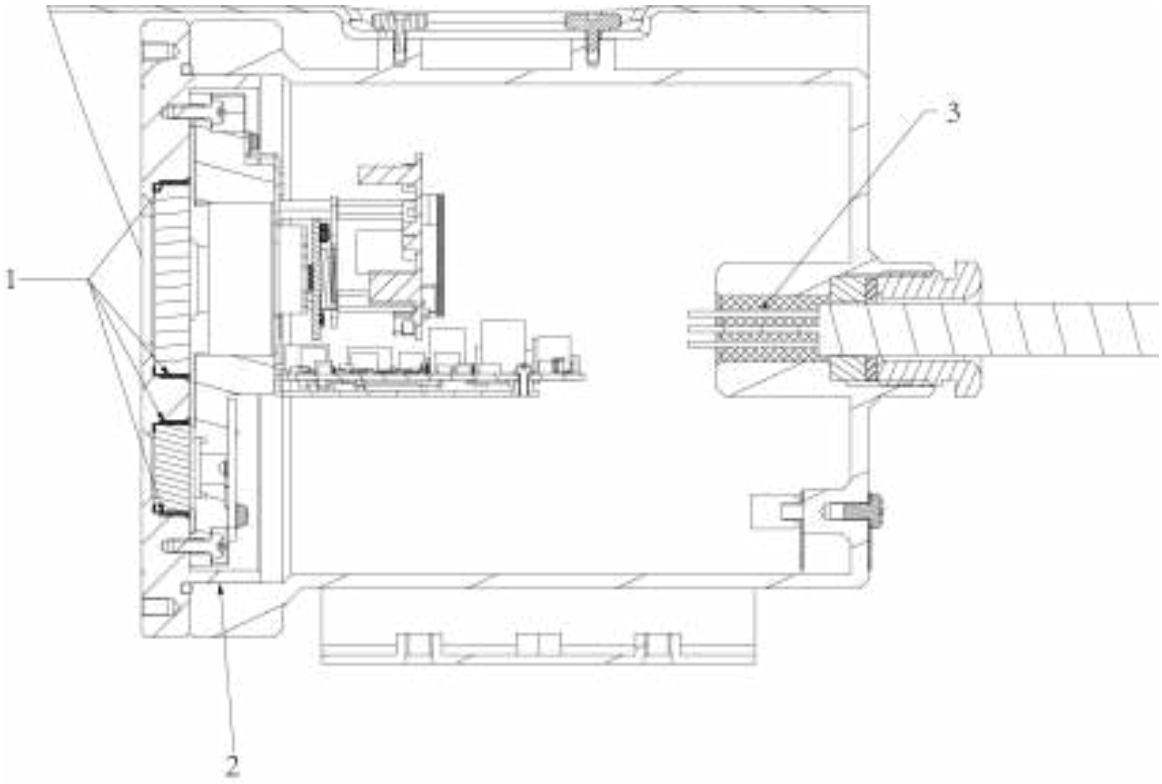
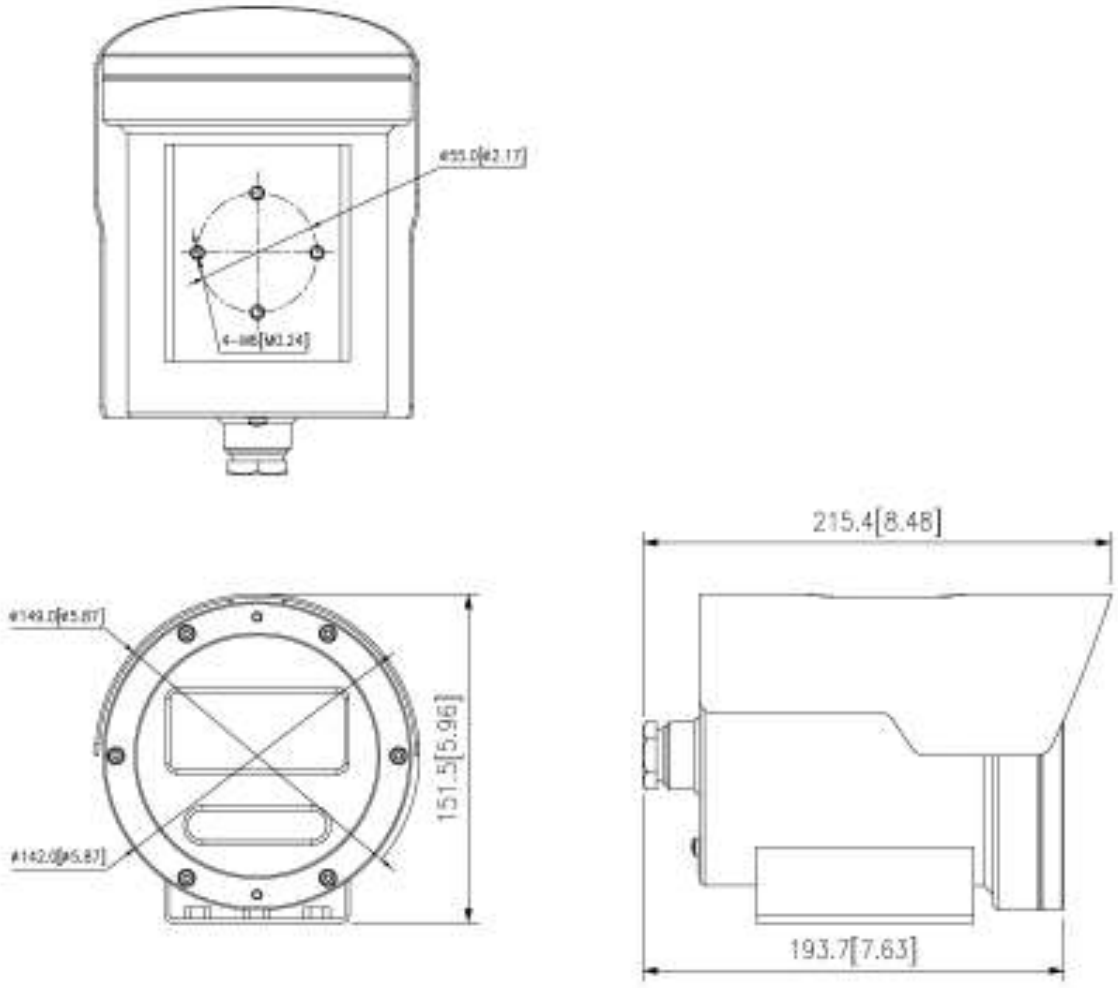


Table 2-1 Explosion-proof structure description

No.	Name	Description
1	Explosion-proof surface 1	Radial clearance is 1.0 mm; cemented joint length > 10 mm; filled with WQ-05HP AB glue.
2	Explosion-proof surface 2	The spigot joint length is 16 mm; fit clearance < 0.15 mm.
3	Explosion-proof surface 3	Filled with AB glue; gluing length ≥ 20 mm.

2.5 Dimensions

Figure 2-3 Dimensions (mm [inch])



2.6 Mechanical Specification

Table 2-2 Mechanical specification

Parameter	Description
Material	Stainless steel 304 by default; stainless steel 316L customizable
IP rating	IP68
Cable outlet hole	1
Cable outlet hole thread	1 G3/4 internal thread
Installation	Wall mount

2.7 Electric Specification

Table 2-3 Electric specification

Parameter	Description
Input voltage	DC 12V or PoE (AF standard)
Maximum current	≤ 1.5A
Power consumption	≤ 12 W
Electrical connection	There are power, network and audio ports on the control cable by default. A flexible cube is needed to connect these ports.

2.8 Environment Requirements

Table 2-4 Environment requirements

Parameter	Description
Air pressure	80 kPa–110 kPa
Operating temperature	-40°C to +60°C
Operating humidity	≤ 95% RH (+25°C)

3 Installation

Before installing the Camera, pay attention to the following instructions.

- Make sure that there is no obvious damage of the Camera, and the accessories are complete.
- Do not disassemble the Camera randomly. Operate it in accordance with the manual.
- Connect the Camera to power supply specified in "2.7 Electric Specification."
- Always use the Camera under the air pressure, operating temperature and operating humidity specified in "2.8 Environment Requirements."
- Explosion-proof products are special. Power and debug them indoors, and familiarize them before installation.

3.1 Installation Accessories and Tools

Figure 3-1 Dimensions of the bracket and installation holes (mm)

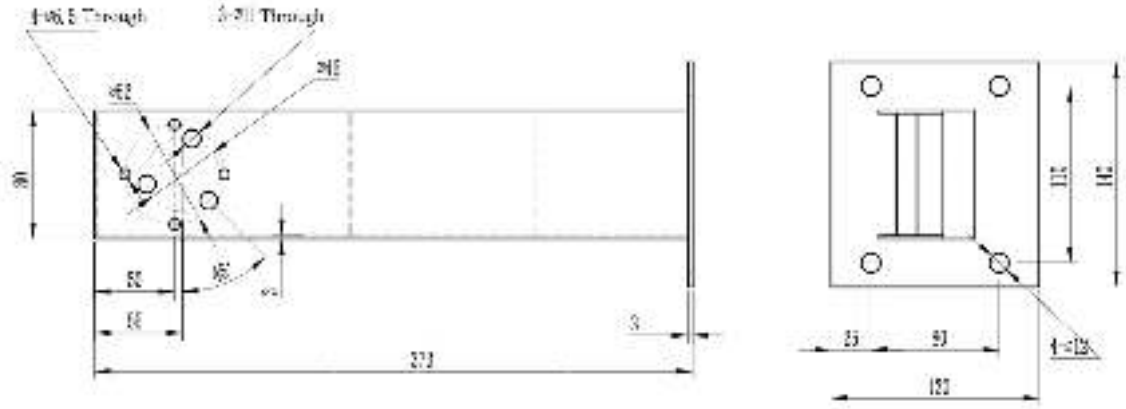


Table 3-1 Tools

Tool	Description
	1 cross screwdriver: 6 × 150
	1 hexagon adjustable wrench: 300 × 36

3.2 Connecting Cable and Flexible Tube

3.2.1 Cable Description

Before leaving the factory, a composite cable is connected to the Camera. The cable threads out from the outlet hole at the camera rear and it is 1.5 m by default. When in use, the cable needs to be covered with a 1-meter-long explosion-proof flexible tube, and then led into explosion-proof control cabinet to connect to the system bus.

Table 3-2 Cable description

Cable	Function	Description
Power	DC 12V+	Red
	DC 12V-	Black
	Grounding	Yellow and green
Network	Cat 5	—
Audio	Audio output	Yellow
	Audio input	White
	Grounding	Gray
Fiber (for select models)	Fiber output	Blue

3.2.2 Connecting Explosion-Proof Flexible Tube

Step 1 Unscrew the nut (G3/4 internal thread) from the camera rear and cover the cable with explosion-proof flexible tube.

Figure 3-2 Connecting component (1)

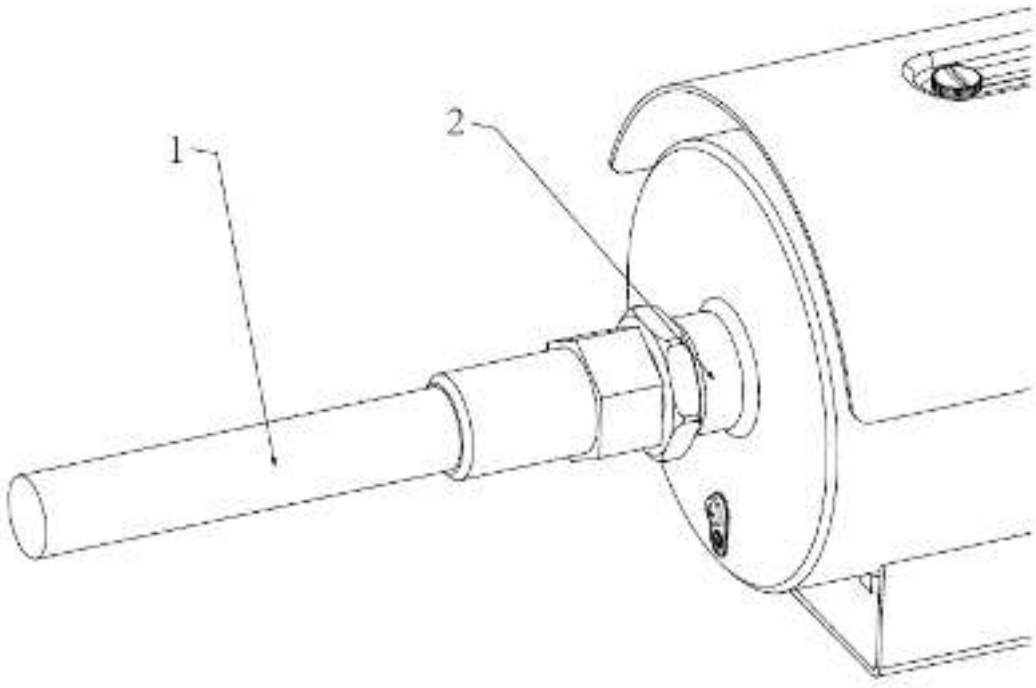


Table 3-3 Connecting component (1)

No.	Description	No.	Description
1	Explosion flexible tube	2	Outlet hole

Step 2 Tighten the thread connector and then the explosion flexible tube. Keep the silicone ring and metal gasket provided with the Camera properly for further use.

Figure 3-3 Connecting component (2)

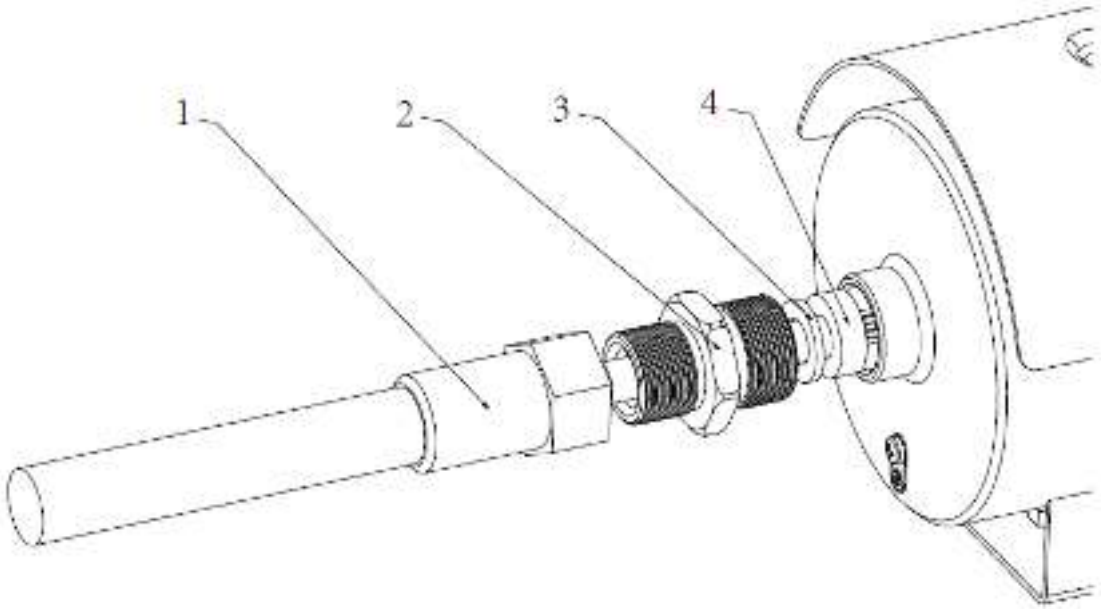


Table 3-4 Connecting component (2)

No.	Description	No.	Description
1	Explosion flexible tube	3	Metal gasket
2	Thread connector	4	Silicone ring

3.3 Installing the Camera

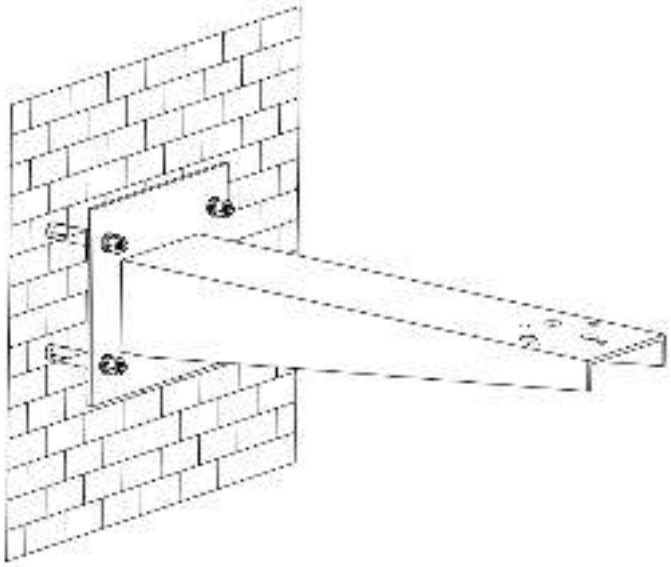
3.3.1 Precautions

- Choose a proper hole location for the bracket and use high-quality expansion bolts to fix the bracket.
- Install the explosion-proof control cabinet in a location that is easy to install and maintain.
- Lay the cable to the control cabinet through a groove.
- Lead the cable attached at the Camera rear to the hole on the bracket when installing the Camera.
- Use explosion-proof flexible tube to protect the cable when connecting it to the control cabinet.

3.3.2 Procedure

Step 1 Fix the wall mount bracket on the wall through 4 expansion bolts.

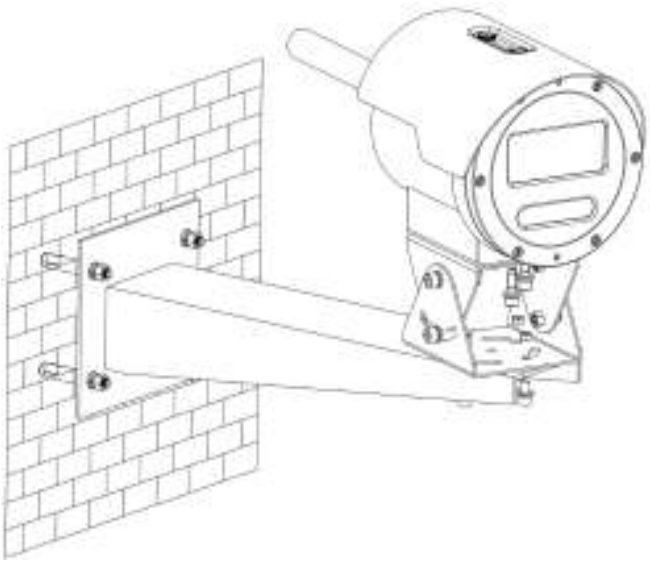
Figure 3-4 Install the bracket



Step 2 Use 4 M6×20 hexagon socket head cap set screws and nuts to fix the Camera on the bracket or universal joint.

It is recommended that you use a universal joint. Use 4 M6×20 hexagon socket head cap set screws and nuts to fix the universal joint on the bracket, and then fix the Camera on the universal joint. The following steps take using a universal joint as an example.

Figure 3-5 Fix the camera



Step 3 Connect the cables among the Camera, bracket, flexible tube and control cabinet.

Figure 3-6 Installation and cable layout

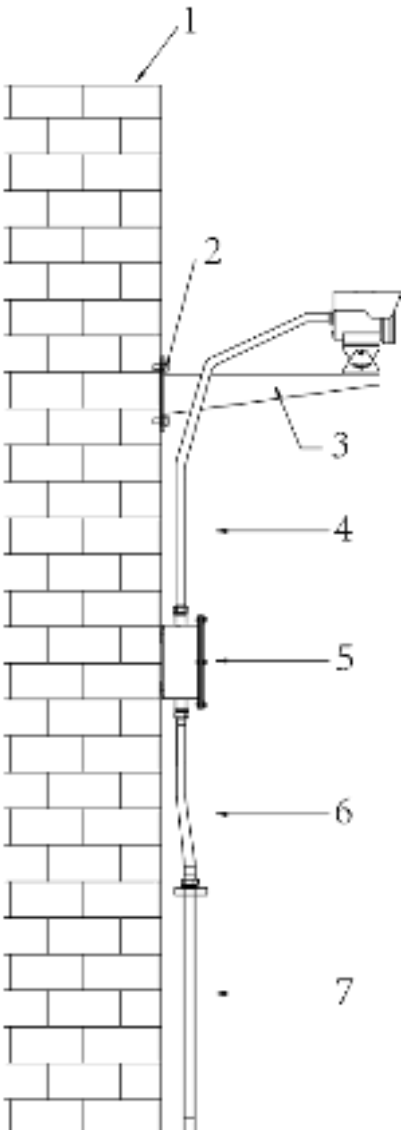


Table 3-5 Installation and cable layout

No.	Description
1	Wall
2	4 M6 expansion screws used to fix the bracket on the wall
3	Wall mount bracket
4	Flexible tube
5	Junction box
6	Flexible tube
7	Galvanized steel pipe connected to the terminal

4 Troubleshooting

For some common issues, you can solve them through the following solutions.

Malfunction	Reason	Solution
No image on the web	Power supply disconnected.	Check whether the power supply is normal.
	Video signal cable is in poor contact.	Check whether the video signal cable is normal.
Intermittent image	Video signal cable is in poor contact.	Check whether the video signal cable is normal.
	Signal cable is not properly connected.	Check whether the signal cable is correctly connected.
	Communication distance is too long, thus reducing the signal.	Add repeaters to extend the communication distance.

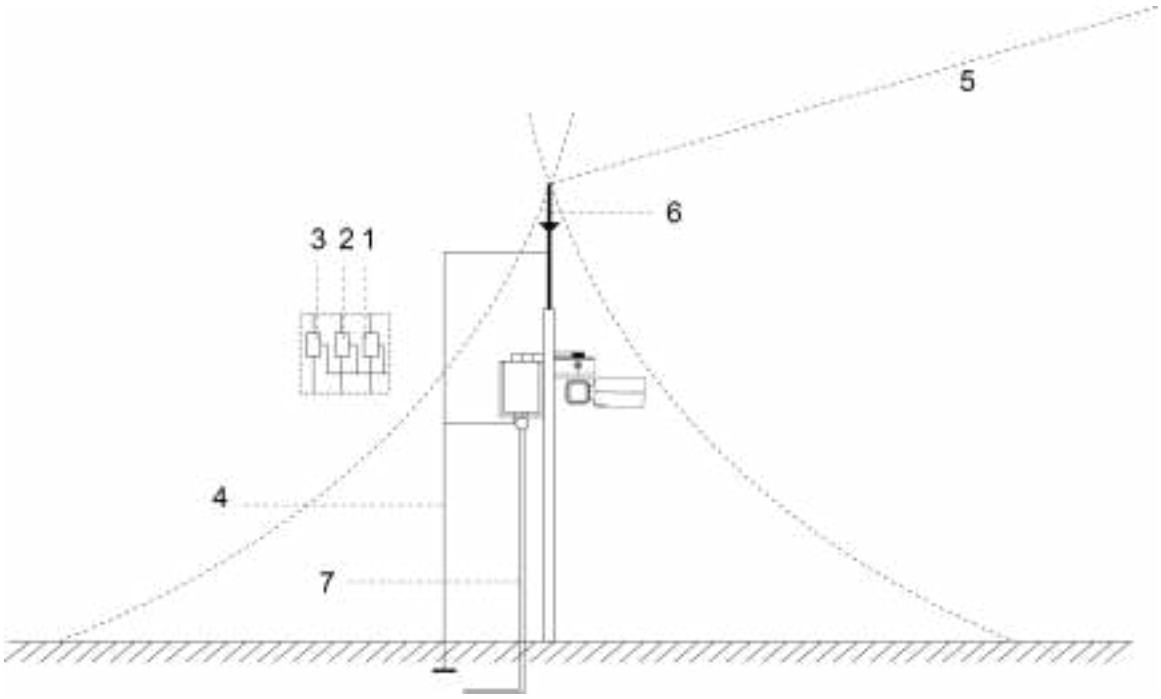
Appendix 1 Thunder-Proof and Surge Protection

Appendix 1.1 Install Lightning Protection Devices Outdoors

Transient voltage suppressor (TVS) is applied to protect the Camera against voltage spikes and overvoltage below 6000V. However, it is still necessary to take safeguard measures when installing the Camera 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 might 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 25 mm^2.

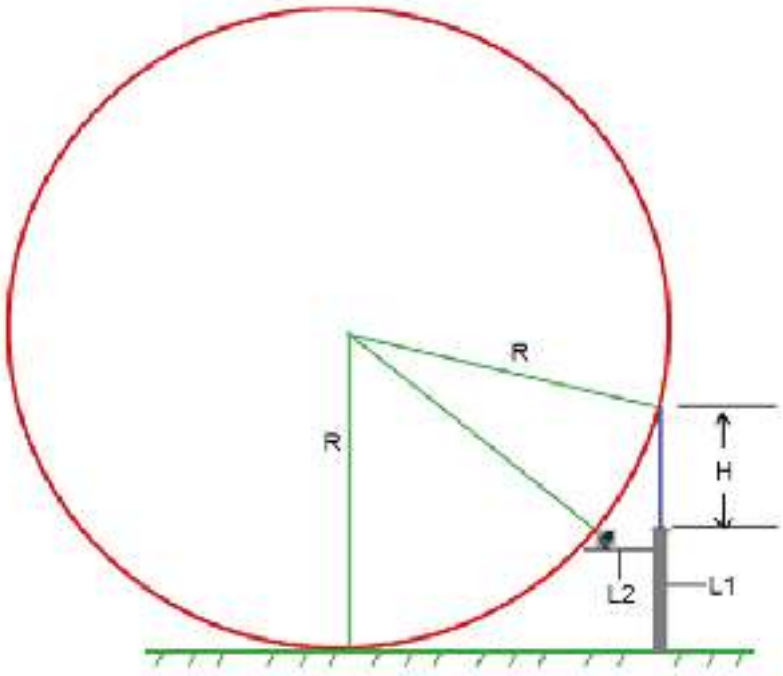
Appendix Figure 1-1 Install lightning protection devices outdoors (1)



Appendix Table 1-1 Install lightning protection devices

No.	Description
1	Video lightning conductor.
2	Communication lightning conductor.
3	Power supply lightning 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 lightning protection devices (2)



- 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.

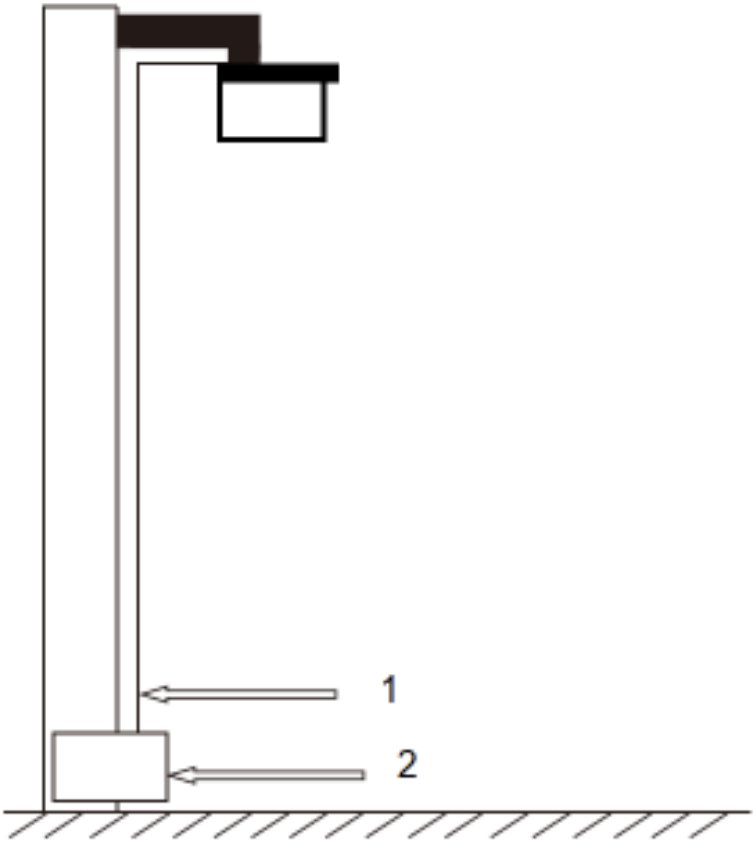
To get the value of L1, you need to use the formula:

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

Appendix 1.2 Install Lightning Protection Devices Indoors

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

Appendix Figure 1-3 Install lightning protection devices indoors



Appendix Table 1-2

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

Appendix 2 Cable Diameter (12V DC) and Transmission Distance

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

In the following table, the unit for diameter is mm, and the unit for transmission distance is foot (m).

Transmission Power (W)	Transmission Distance (Diameter: 0.80)	Transmission Distance (Diameter: 1.00)	Transmission Distance (Diameter: 1.25)	Transmission Distance (Diameter: 2.00)
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 3 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

Appendix 4 Cybersecurity Recommendations

Cybersecurity is more than just a buzzword: it's something that pertains to every device that is connected to the internet. IP video surveillance is not immune to cyber risks, but taking basic steps toward protecting and strengthening networks and networked appliances will make them less susceptible to attacks. Below are some tips and recommendations on how to create a more secured security system.

Mandatory actions to be taken for basic equipment network security:

1. **Use Strong Passwords**

   Please refer to the following suggestions to set passwords:

   - The length should not be less than 8 characters;
   - Include at least two types of characters; character types include upper and lower case letters, numbers and symbols;
   - Do not contain the account name or the account name in reverse order;
   - Do not use continuous characters, such as 123, abc, etc.;
   - Do not use overlapped characters, such as 111, aaa, etc.;

2. **Update Firmware and Client Software in Time**

   - According to the standard procedure in Tech-industry, we recommend to keep your equipment (such as NVR, DVR, IP camera, etc.) firmware up-to-date to ensure the system is equipped with the latest security patches and fixes. When the equipment is connected to the public network, it is recommended to enable the "auto-check for updates" function to obtain timely information of firmware updates released by the manufacturer.
   - We suggest that you download and use the latest version of client software.

"Nice to have" recommendations to improve your equipment network security:

1. **Physical Protection**

   We suggest that you perform physical protection to equipment, especially storage devices. For example, place the equipment in a special computer room and cabinet, and implement well-done access control permission and key management to prevent unauthorized personnel from carrying out physical contacts such as damaging hardware, unauthorized connection of removable equipment (such as USB flash disk, serial port), etc.

2. **Change Passwords Regularly**

   We suggest that you change passwords regularly to reduce the risk of being guessed or cracked.

3. **Set and Update Passwords Reset Information Timely**

   The equipment supports password reset function. Please set up related information for password reset in time, including the end user's mailbox and password protection questions. If the information changes, please modify it in time. When setting password protection questions, it is suggested not to use those that can be easily guessed.

4. **Enable Account Lock**

   The account lock feature is enabled by default, and we recommend you to keep it on to guarantee the account security. If an attacker attempts to log in with the wrong password several times, the corresponding account and the source IP address will be locked.

5. **Change Default HTTP and Other Service Ports**

   We suggest you to change default HTTP and other service ports into any set of numbers between 1024~65535, reducing the risk of outsiders being able to guess which ports you are using.

6. **Enable HTTPS**

   We suggest you to enable HTTPS, so that you visit Web service through a secure communication channel.

7. **Enable Whitelist**

   We suggest you to enable whitelist function to prevent everyone, except those with specified IP addresses, from accessing the system. Therefore, please be sure to add your computer's IP address and the accompanying equipment's IP address to the whitelist.

8. **MAC Address Binding**

   We recommend you to bind the IP and MAC address of the gateway to the equipment, thus reducing the risk of ARP spoofing.

9. **Assign Accounts and Privileges Reasonably**

   According to business and management requirements, reasonably add users and assign a minimum set of permissions to them.

10. **Disable Unnecessary Services and Choose Secure Modes**

    If not needed, it is recommended to turn off some services such as SNMP, SMTP, UPnP, etc., to reduce risks.

    If necessary, it is highly recommended that you use safe modes, including but not limited to the following services:

    - SNMP: Choose SNMP v3, and set up strong encryption passwords and authentication passwords.
    - SMTP: Choose TLS to access mailbox server.
    - FTP: Choose SFTP, and set up strong passwords.
    - AP hotspot: Choose WPA2-PSK encryption mode, and set up strong passwords.

11. **Audio and Video Encrypted Transmission**

    If your audio and video data contents are very important or sensitive, we recommend that you use encrypted transmission function, to reduce the risk of audio and video data being stolen during transmission.

    Reminder: encrypted transmission will cause some loss in transmission efficiency.

12. **Secure Auditing**

    - Check online users: we suggest that you check online users regularly to see if the device is logged in without authorization.
    - Check equipment log: By viewing the logs, you can know the IP addresses that were used to log in to your devices and their key operations.

13. **Network Log**

    Due to the limited storage capacity of the equipment, the stored log is limited. If you need to save the log for a long time, it is recommended that you enable the network log function to ensure that the critical logs are synchronized to the network log server for tracing.

14. **Construct a Safe Network Environment**

    In order to better ensure the safety of equipment and reduce potential cyber risks, we recommend:

    - Disable the port mapping function of the router to avoid direct access to the intranet devices from external network.

- The network should be partitioned and isolated according to the actual network needs. If there are no communication requirements between two sub networks, it is suggested to use VLAN, network GAP and other technologies to partition the network, so as to achieve the network isolation effect.
- Establish the 802.1x access authentication system to reduce the risk of unauthorized access to private networks.
- It is recommended that you enable your device's firewall or blacklist and whitelist feature to reduce the risk that your device might be attacked.

ENABLING A SAFER SOCIETY AND SMARTER LIVING

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