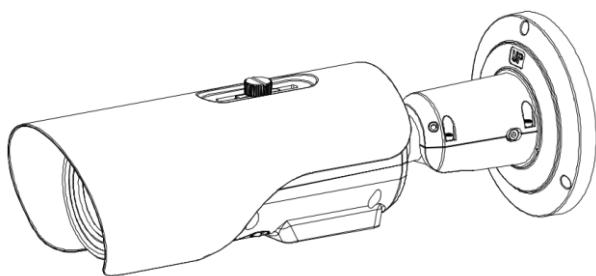# Thermal Imaging Bullet Network Camera
User Manual

Issue V1.0

Date 2025-11-06

Precautions

Precautions

Fully understand this document before using this device, and strictly observe the rules in this document when using this device. If you install this device in public places, put a sign "You have entered the area of electronic surveillance" in an eye-catching place. Failure to correctly use electrical products may cause fire and severe injuries. To prevent accidents, carefully read the following context:

Symbols

This document may contain the following symbols whose meanings are described accordingly.

Symbol	Description
⚠ 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 results.
☞ TIP	Provides methods to help you solve a problem or save you time.
📖 NOTE	Provides additional information to emphasize or supplement important points of the main text.

⚠ **DANGER**

To prevent electric shocks or other dangers, keep power plugs dry and clean.

⚠ **WARNING**

- Strictly observe installation requirements when installing the device. The manufacturer shall not be responsible for device damage caused by users' operation of non-conformance.

- Strictly conform to local electrical safety standards and use power adapters that are marked with the LPS standard when installing and using this device. Otherwise, this device may be damaged.

- Use accessories delivered with this device. The voltage must meet the input voltage requirements for this device.

- If this device is installed in places with unsteady voltage, ground the device to discharge high energy, such as electrical surges, in order to prevent the power supply from burning out.

- When this device is in use, ensure that no water or any liquid flows into the device. If water or liquid unexpectedly flows into the device, immediately power off the device and disconnect all cables (such as power cables and network cables) from this device.

- Do not place the thermal imaging camera and unpackaged products at a radiation source with a high intensity, regardless of whether the device is in the normal power-on state, for example, the sun, laser, or electric arc welder. Do not place the thermal imaging camera and unpackaged products against objects with a high heat source, for example, the sun. Otherwise, the accuracy of the thermal imaging camera will be affected. In addition, the detector in the thermal imaging camera may be permanently damaged.

- If this device is installed in places where thunder and lightning frequently occur, ground the device nearby to discharge high energy, such as thunder strikes, in order to prevent device damage.

⚠ CAUTION

- Unless otherwise specified in the user manual, do not use the thermal imaging camera in an environment with a temperature lower than -40°C (-40 F) or higher than 60°C (+140 F). Otherwise, the images displayed by the thermal imaging camera are abnormal, and the device may be damaged because of working beyond the temperature range for a long period.

- As for the outdoor installation, avoid the morning or evening sunlight incidence on the lens of the thermal imaging camera. The sunshade must be installed and adjusted according to the angle of the sunlight illumination.

- During transportation and storage, avoid damage to products caused by heavy pressure, severe vibration, and soaking. The warranty does not cover any damage that is caused during secondary packaging and transportation after the original packaging is taken apart.

- This device is sensitive to static. Improper static may damage the thermal imaging camera. ESD protection measures and reliable grounding must be well prepared for device installation and uninstallation.

- Protect this device from falling down and intense strikes, keep the device away from magnetic field interference, and do not install the device in places with shaking surfaces or under shocks.

- Clean the device body with a soft and dry cloth. In case the dirt is hard to remove, use a dry cloth dipped in a small amount of mild detergent and gently wipe the device, and then dry it again. Pay special attention to the front window of the thermal imaging camera because this is precision optics. If the front window has water spots, use a clean and soft cloth moistened with water and wipe it. If the front window needs further cleaning, use a soft cloth dampened with isopropyl alcohol or detergent. Improper cleaning can cause damage to the device.

- The lens window of the thermal imaging camera is designed to be applicable to an outdoor environment. The window is coated with durable coating material, but may require frequent cleaning. When you find lens image degradation or excessive accumulation of pollutants, you should clear the window in a timely manner. Exercise caution when you use this device in severe sandstorms (such as deserts) or corrosive environments (such as offshore). Improper use may cause the surface coating to wear off.

- Do not jam the ventilation opening. Follow the installation instructions provided in this document when installing the device.

- Keep the device away from heat sources such as radiators, electric heaters, or other heat equipment.

- Keep the device away from moist, dusty, extremely hot, or cold places, or places with strong electric radiation.

- If the device is installed outdoors, take insect- and moisture-proof measures to avoid circuit board corrosion that can affect monitoring.

- Remove the power plug if the device is idle for a long time.

- Before unpacking, check whether the fragile sticker is damaged. If the fragile sticker is damaged, contact customer services or sales personnel. The manufacturer shall not be held responsible for any artificial damage to the fragile sticker.

Special Announcement

All complete products sold by the manufacturer are delivered along with nameplates, operation instructions, and accessories after strict inspection. We shall not be responsible for counterfeit products.

The manual may contain inaccurate information on function and operation, misprints. The manufacturer will update this manual according to product function enhancement or changes, and regularly update the software and hardware described in this manual. Updated information will be added to new versions of this manual without prior notice.

Pictures for reference only, subject to our available products.

Contents

1 Product Overview

1.1 Thermal Imaging Principles and Advantages

For any object, as long as its temperature is above absolute zero (-273.15°C), even if the object does not give out light, it can radiate infrared. The infrared is also known as thermal radiation. A temperature change occurs when the infrared radiated by objects at different temperatures is absorbed by the infrared thermal detector, thereby generating an electrical effect. An electrical signal is amplified and processed to obtain a thermal image corresponding to the distribution of heat on the surface of the object, that is, infrared thermal imaging.

Applicable to any light environment

Traditional cameras rely on natural or ambient light for imaging. However, the infrared thermal imaging camera can clearly image the object with the infrared heat radiation of the object without relying on any light. The infrared thermal camera applies to any light environment and is free from glare impact. It can clearly detect and find the target as well as identify the camouflaged and hidden target in both day and night. Therefore, it achieves real 24-hour surveillance.

Monitoring the temperature field of the target heat distribution

The infrared thermal camera can display the temperature field of the object and change the surface temperature distribution of the object that cannot be directly seen by human eyes to a thermal image representing the surface temperature distribution of the object. By monitoring the temperature field, you can immediately identify temperature abnormalities, thereby preventing potential risks caused by the temperature, such as fire.

Providing the cloud penetration capability

Atmosphere, dust, and clouds can absorb visible light and near-infrared, but are clear to the thermal infrared for 3 to 5 microns (medium wave infrared region) and 8 to 14 microns (long wave infrared). Therefore, it is difficult for conventional cameras to capture clear images under dense clouds, while the thermal imaging camera is able to effectively penetrate the atmosphere and clouds to capture clear images.

1.2 Device Structure

Figure 1-1 shows the rear panel of the Thermal Imaging Network Bullet Camera. For details of the interfaces, see Table 1-1.

Figure 1-1 Appearance and interfaces of the camera 1
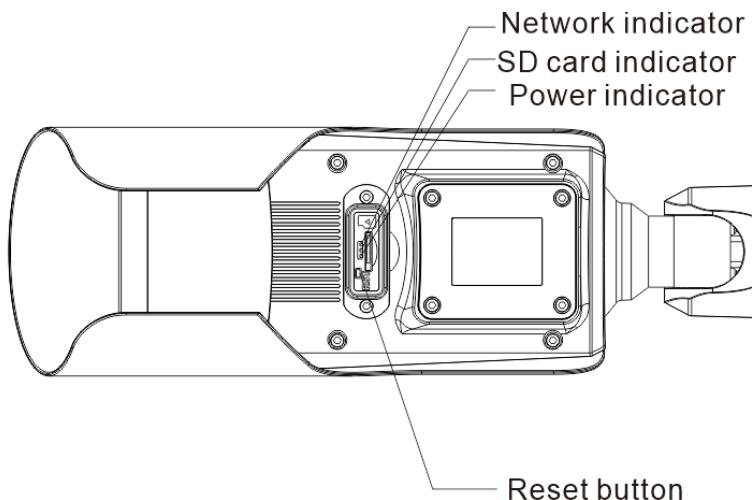
Table 1-1 Interfaces of the Device

No.	Physical Interface	Connection
1	Network indicator	The network is working normally, and the light is on. When it is transferring data, the light flashes.
2	SD card indicator	The SD indicator has the following states: OFF: The Micro SD card is not inserted. ON: The Micro SD card is inserted.
3	Power indicator	The power supply is plugged in and works normally; the red light is on.
4	Reset button (RESET)	The configuration returns to the factory settings after you press the reset button for 5 seconds. The default value is 192.168.0.121.
5	SD card slot	It places the SD card. Note: When you install the micro SD card, ensure that the micro SD card is not in the write-protection state, and then insert the micro SD card in the slot. When you remove the micro SD card, ensure that the micro SD card is not in the write-protection state. Otherwise, the data may be lost, or the micro SD card may be damaged.

No.	Physical Interface	Connection
		When hot-plugging the micro SD card, stop recording and then perform the corresponding operation.
-	Loudspeaker	Play the audio files and two-way audio.

Figure 1-2 Appearance and interfaces of the camera 2
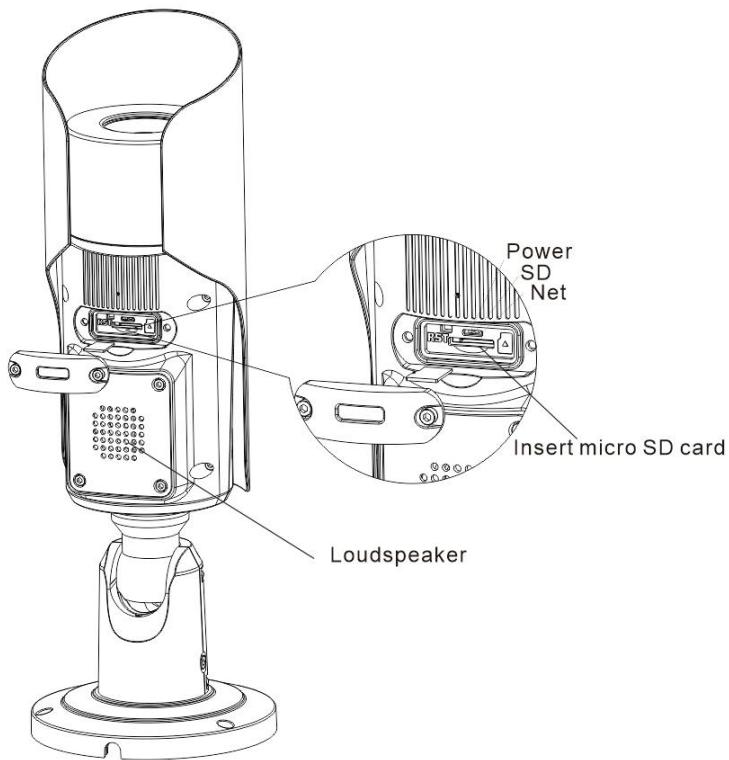
1.3 Device Dimensions

The different brackets of the device have different dimensions; please refer to the actual product.

Figure 1-3 The A bracket dimensions (unit: mm)
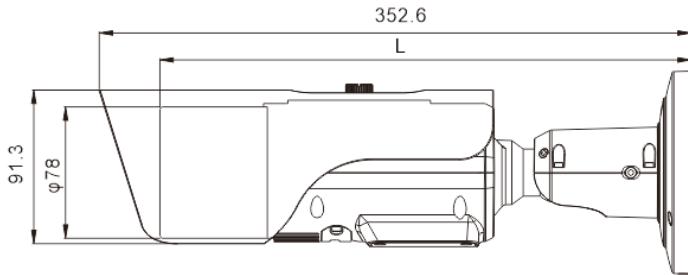
F50/35/25

F50 L=316.5mm
F35 L=305.3mm
F25 L=296.8mm
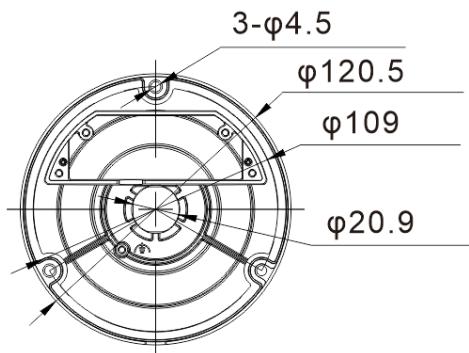
Figure 1-4 The A-1 bracket with junction box Dimensions (unit: mm)
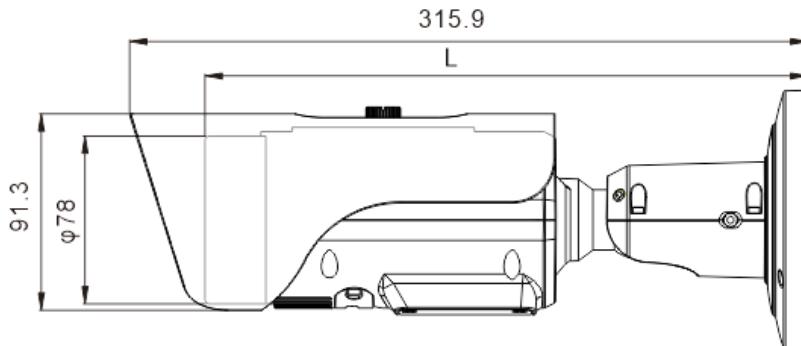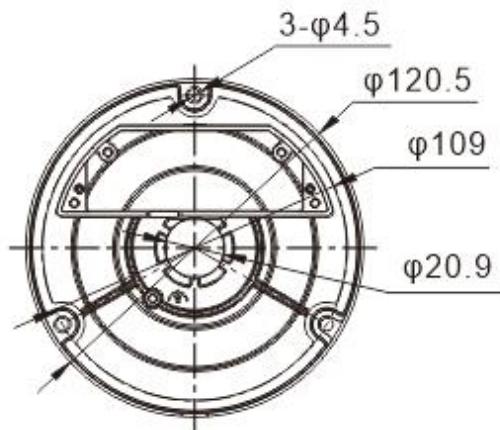
F 15/9

Figure 1-5 The B bracket with junction box dimensions (unit: mm)

F50/35/25
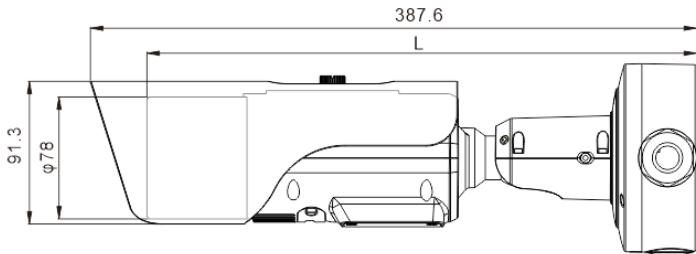
F50　L=351.5mm
F35　L=340.3mm
F25　L=331.8mm
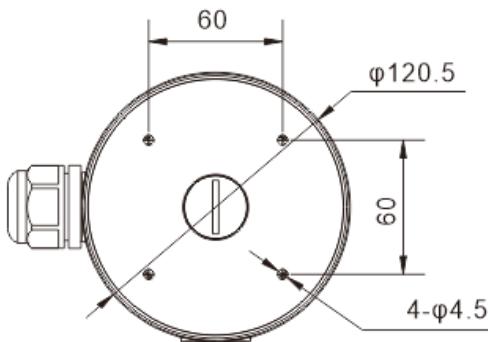
Figure 1-6 The B bracket with junction box dimensions (unit: mm)

F15/9
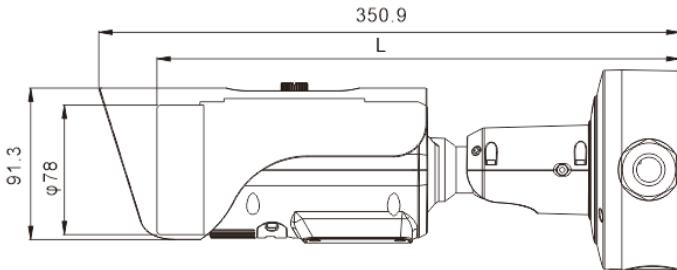
F15/F9 L=315.8mm
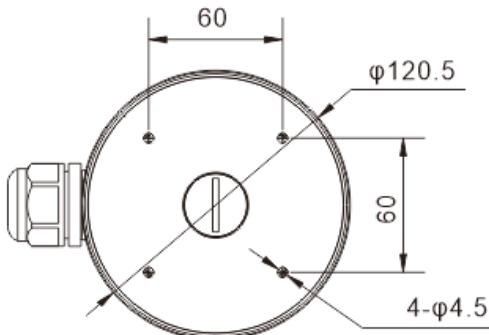
1.4 Out Wire Connection

There are two ways to connect the Thermal Imaging Network Bullet Camera: the multi-core cables and the integrated cable management bracket. Users can choose the corresponding method and installation method according to their bracket.

1.4.1 The Multi-connector Cables

The following three figures show the multi-core cables of the Thermal Imaging Network Bullet Camera. The different models have different multi-core cables; please refer to the

actual product. For details of the multi-connector combination cable, please refer to Table 1-2.

Figure 1-7 Multi-core cables 1
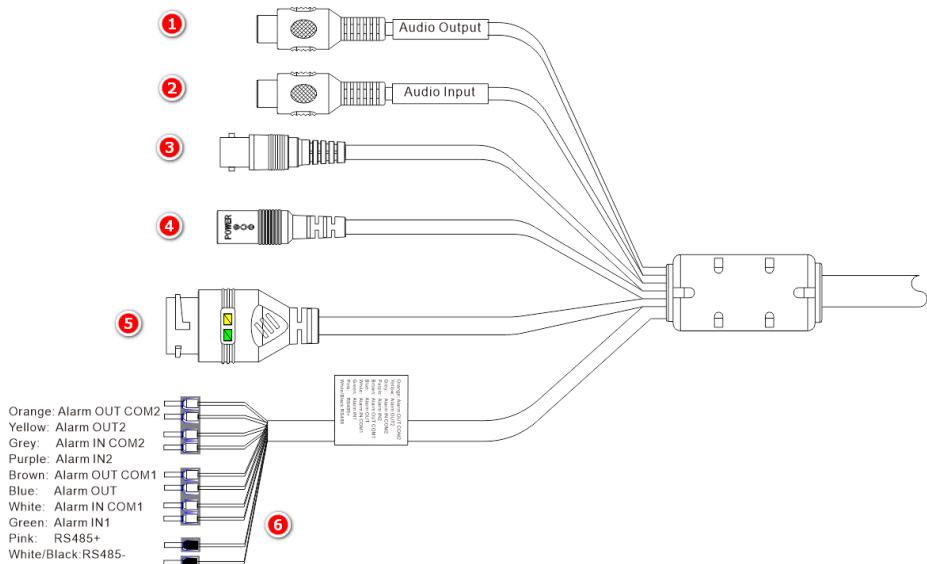
Table 1-2 Multi-core cables 1

ID	Core of Cable	Functions	Connection
1	--	Audio output	Connect to the external audio device, such as the voice box.
2	--	Audio input port (cable input)	Input the audio signal and receive the analog audio signals from the sound pick-up device.
3	--	CVBS	Analog video output.
4	--	DC12V /AC 24V	Power interface, connect to the 12 V DC (AC 24V) power supply.
5	--	Network interface	Connect to the standard Ethernet cable.
6	Orange	Alarm out com 2	Connect to the alarm devices.
	Yellow	Alarm out 2	
	Grey	Alarm in com 2	

ID	Core of Cable	Functions	Connection
	Purple	Alarm in 2	
	Brown	Alarm out 1com	
	Blue	Alarm out 1	
	white	Alarm in 1 com	
	Green	Alarm in 1	
	Pink	RS485+	RS-485 interface, connect to devices with PTZ function.
	Black/white	RS485-	

1.4.2 Integrated Cable Management Bracket

Figure 1-8 Integrated cable management bracket port
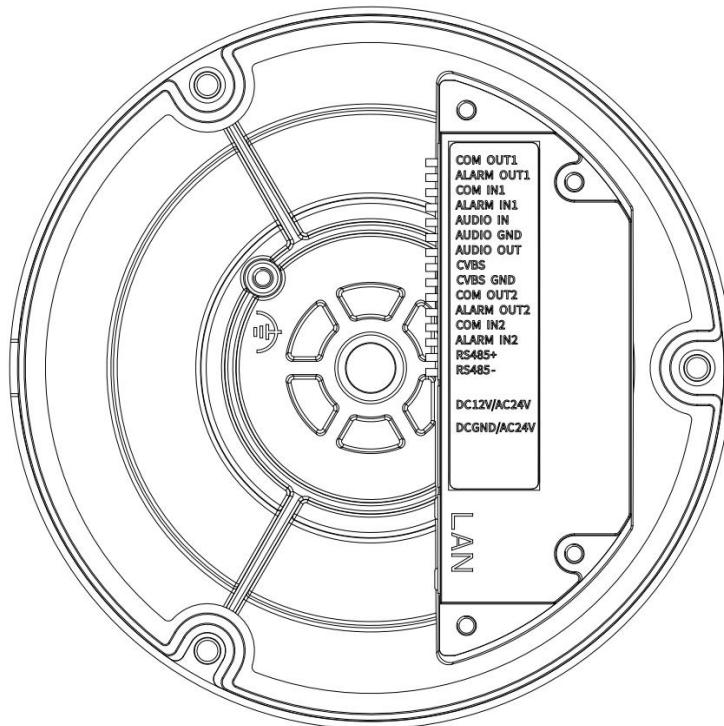
Table 1-3 Integrated cable management bracket port

Port Name	Description	Remark
COM OUT 1	Alarm out com 1	
ALARM OUT1	Alarm out 1	
COM IN 1	Alarm in 1 com	
ALARM IN1	Alarm in 1	
AUDIO IN	input port (cable input)	Applied for audio devices.
AUDIO GND	Audio port GND	
AUDIO OUT	Audio output	

CVBS	Analog video output.	
CVBS GND	Analog video output ground port。	
COM OUT2	Alarm out com 2	
ALARM OUT2	Alarm out 2	
COM IN2	Alarm OUT com 2	
ALARM IN2	Alarm in 2	
RS485+	RS485+	Applied for connecting to the external PTZ
RS485-	RS485-	
DC 12 V/AC24 V	DC 12 V +	Support AC 24V
DC GND/AC24 V	DC 12V -	
LAN	Network port, connect to the internet. Support PoE supply.	

1.5 Packing List

Unpack and check the appearance of the product for no obvious damage, and confirm that the item list for Table 1-4 is consistent.

Table 1-4 Packing list

Item	Quantity	Remark
Thermal camera	1	
User manual	1	
Installation location label	1	
Network interface protective cover	1	
Plastic anchor	3/4	
Self-tapping screw	3/4	
Allen Key	2	Two types
T15 wrench	1	Configured for the

Plug and sealing ring	2	junction box
Cable gland	1	
Junction box and accessories	1	

1.6 Installation

1.6.1 Preparations

Tools needed (Not included) and supplied parts are shown in Table 1-5.

Table 1-5 Installation tools

Tools	Appearance
Phillips screwdriver (Not included)	
Claw hammer (Not included)	
Hammer drill (Not included)	
Spirit level (Not included)	
Hex Allen L-wrench (Included)	
Self-tapping screw (Included)	
Plastic anchor (Included)	

1.6.2 Installation Mode

The thermal imaging network bullet camera can be installed on the ceiling or the wall. You can select the appropriate installation according to your requirements. If the camera needs to be installed on the cement wall, you need to install the expansion screws (the mounting holes of the screws must be consistent with those of the support), and then install the support.

 📖 **NOTE**

> The wall where the support is mounted must be able to withstand at least three times the total weight of the support and the camera.
>
> The different brackets have different installation methods; please choose the corresponding method according to the purchased product.

1.6.2.1 Installing Bracket A Without Junction Box

Step 1 Take out the installation location label from the package, stick it on the ceiling or the wall. According to the location hole positions shown in the installation location label, punch three location holes in the ceiling or the wall.

Step 2 Drive the plastic anchors into the holes, as shown in Figure 1-9.

 📖 **NOTE**

> If you choose the back leading mode, drill a leading-out hole on the ceiling or the wall, as shown in the area highlighted. (This manual uses the back leading mode as an example.)
>
> If you choose the side leading mode, lead the multi-connector combination cable from the side notch on the bottom of the camera.

Figure 1-9 Installation location label
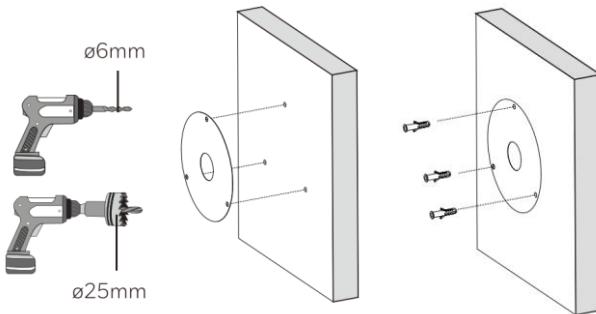
Step 3 Align the holes in the bracket with the plastic anchors in the ceiling or wall.

Step 4 Connect the multi-core cables. Loosen the screw 1 and screw 2, adjust the surveillance angle, as shown in Figure 1-12

Figure 1-10 Connect the multi-core cables
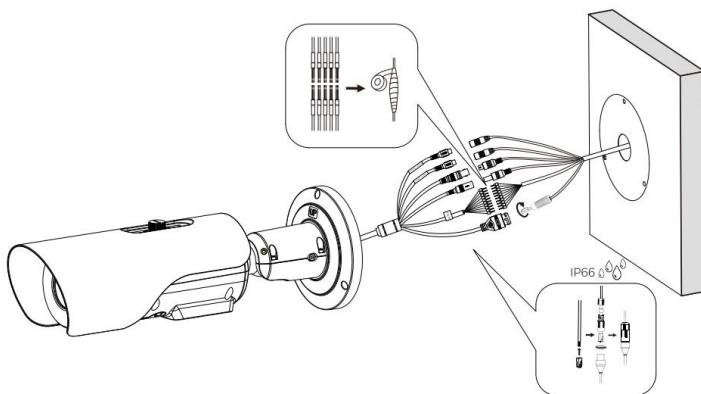
Step 5 Fix the bracket with self-tapping screws, as shown in Figure 1-11.

Figure 1-11 Fixing camera
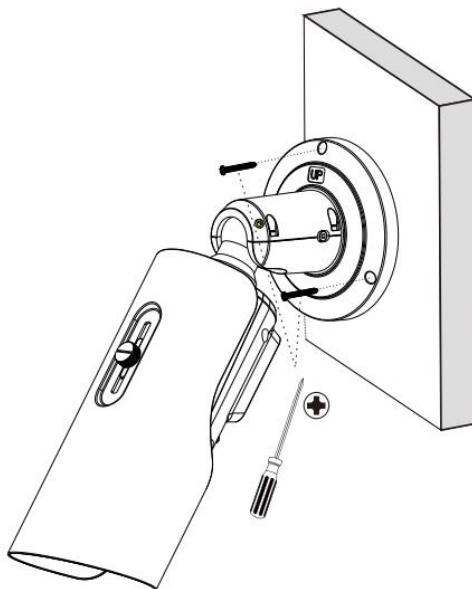
Step 6 After adjusting the angle, fix the screws in turn to finish installation, as shown in Figure 1-12.

Figure 1-12 Adjust the surveillance angle
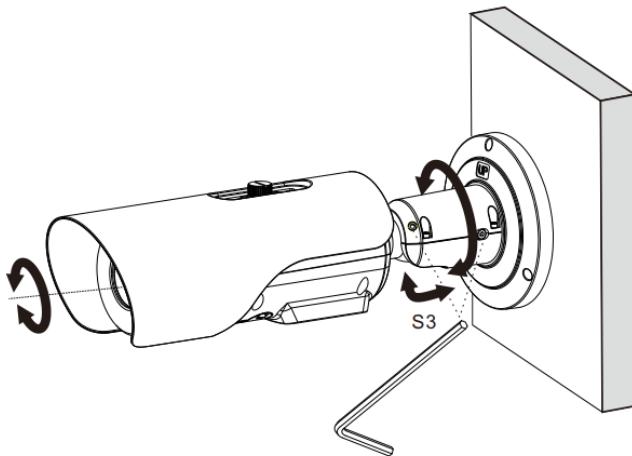
----End

1.6.2.2 Installing Bracket B With Junction Box

Step 1 Take out the installation location label from the package, and stick it on the ceiling or the wall. According to the location hole positions shown in the installation location label, punch four location holes in the ceiling or the wall.

Step 2 Drive the plastic anchors into the holes, and fix the junction box with self-tapping screws, as shown in Figure 1-13.

Figure 1-13 Fixing the junction box
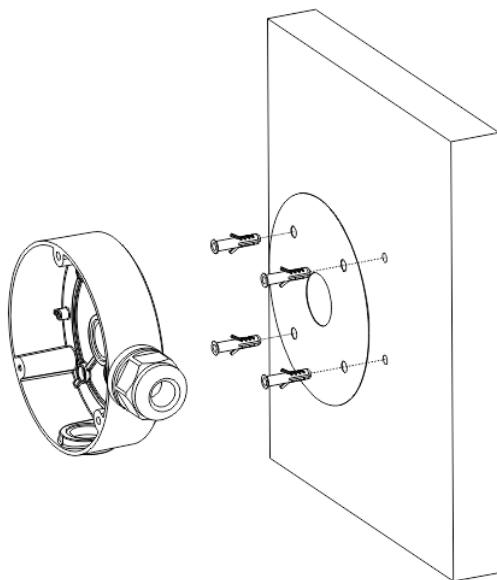
Step 3 Wiring of the junction box. Align the holes in the bracket with the box and fix the camera to the box with self-tapping screws, as shown in Figure 1-14.

Figure 1-14 Fix the camera to the junction box
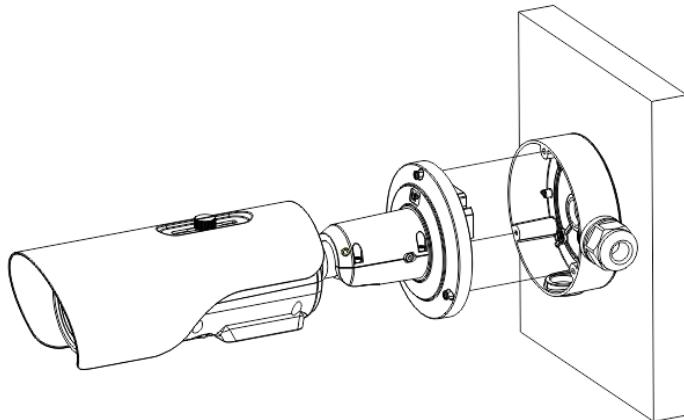
Step 4 Connect the multi-connector cable. Loosen screw 1 and screw 2, adjust the surveillance angle, as shown in Figure 1-15.

Figure 1-15 Adjust the surveillance angle
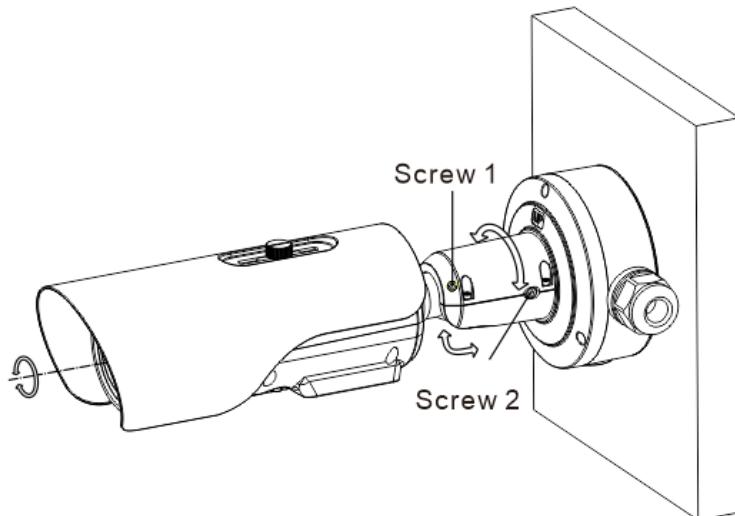
Step 5 After adjusting the angle, fix screw 2 and screw 1 in turn to finish the installation.

📖 **NOTE**

There are three pipe thread interfaces in the junction box, one of which needs to be used with a cable gland, so our company provides two plugs.

Figure 1-16 Installing plug
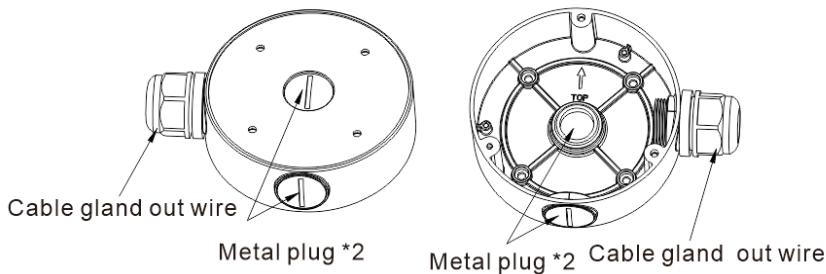
----End

2 Device Login

2.1 Login and Logout

📖 **NOTE**

To access the camera's web interface, use **Microsoft Edge, Google Chrome, or Mozilla Firefox**. Other browsers may not support all functions.

Login

1. **Open a web browser** (Chrome recommended) and enter the camera's IP address in the address bar.
   o **Default IP address**: `192.168.0.121`
2. **First-time users**: Create a password when prompted, then proceed to the login page.

Figure 2-1 Create password

3. **Enter your username and password** to log in.
   o **Default username**: `admin`
   o You must set a password during the first login.
4. Set an **email address** for password recovery, and set the questions for recovery. If you don't want to set these, you can skip them.

Figure 2-2 password recover
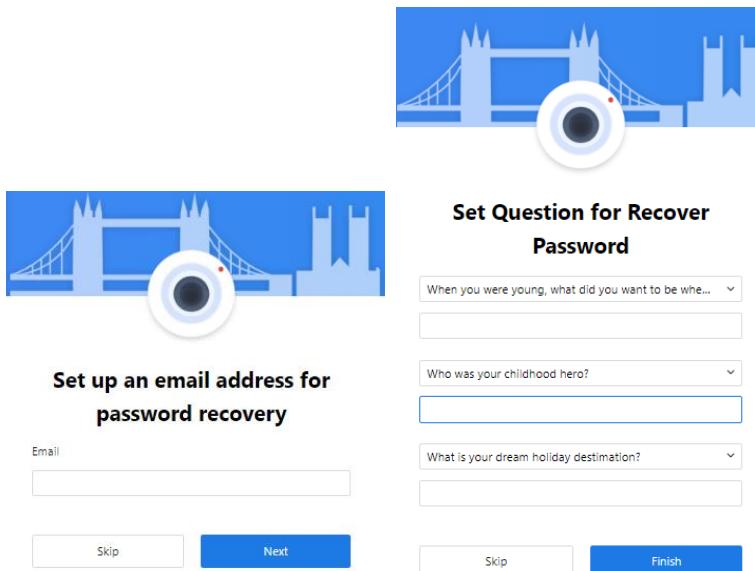
2.1.2 Forget Password

Input the **super administrator** user name to show the "**Forget password**". If you forget the password, click this button to jump to the "Forget password" page.

Figure 2-3 Login page
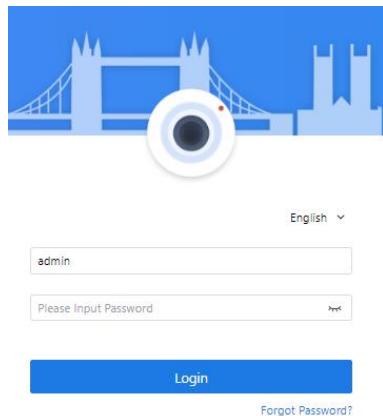
There are three methods available for recovering the password. For Email and Question, the user should set them first during the activation of the camera.

Method 1: **Email.** The camera should be connected to the network so that it can send the temporary password to the email address. The temporary password is **valid for five minutes**; create a new password immediately.

Figure 2-4 Forget password
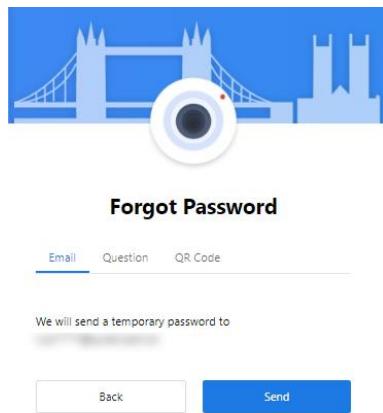
Method 2: **Question** Answer the security questions correctly to enter the "New Password" page.

Method 3: **QR Code.** If the user did not set the recovery email and question, the user can scan the QR Code on the login page and send it to the reseller. We will provide a temporary password that will be valid until 11:59:59PM. Use the temporary or new password to log in and then create a new one.

Figure 2-5 QR Code

Note: DHCP is enabled by default. Use the provided tool to search for the camera IP. Default IP: `192.168.0.121`.

Important: After updating the password, wait at least 3 minutes before powering off the device to ensure the changes are saved. Alternatively, log in with the new password to verify.

You can change the system language on the login page.

Click **Login** to access the homepage.

Figure 2-6 Login page
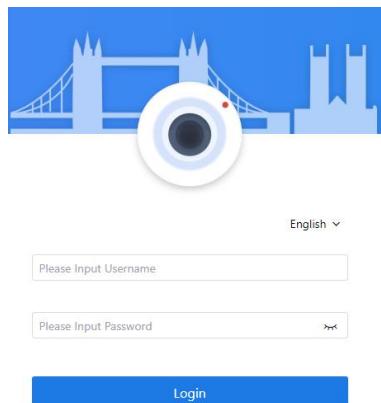
📖 **NOTE**

The default username is admin. Users should create a password for the first time to log in.

DHCP is enabled by default, meaning the IP address may change if your network assigns a new one. You can use the provided tool to search for the current IP address.

Changing the password requires a reboot: After modifying the password, wait **at least three minutes** before powering off the device. Alternatively, log in again to confirm the new password.

For security, regularly update your password.

You can change the system language from the login page.

Logout
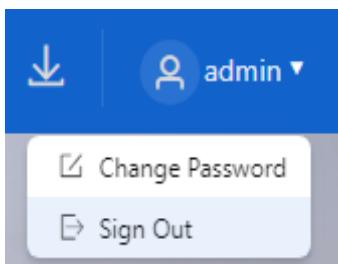
Click "**Sign Out**" in the upper right corner to return to the login page.

2.2 Change Password

Description

Step 1 Click the username on the upper right, choose **Change Password** to enter the change password as shown in Figure 2-7. Or choose **Setting > System > Change Password**.

Figure 2-7 Change the default password page

Step 2 Input the old password, new password, and confirm password.

Step 3 Click **OK**.

> If the message " Change your password success!" pops up, the password is successfully changed. If the password fails to be changed, there will be some tips for changing the password. (For example, the new password length couldn't be less than eight.)

> It is advised to restart the device three minutes after modifying the password.

Step 4 Click **OK**. The login page is displayed.

The "admin" user can set the bind email and binding authentication issue, so that when "admin" user forgets the password via the email and authentication issue to recovery the password.

Figure 2-8 Bind email

IP Camera	Live View	Playback	Snapshot	IVS	Setting

Quick Start

System ⌃

   Settings

   Change Password

   User

   Device Log

   Maintenance

   Security

Network ⌄

Video/Audio ⌄

Image

Event

Storage

Change Password   Bind email   Binding Authentication Issue

Email

OK
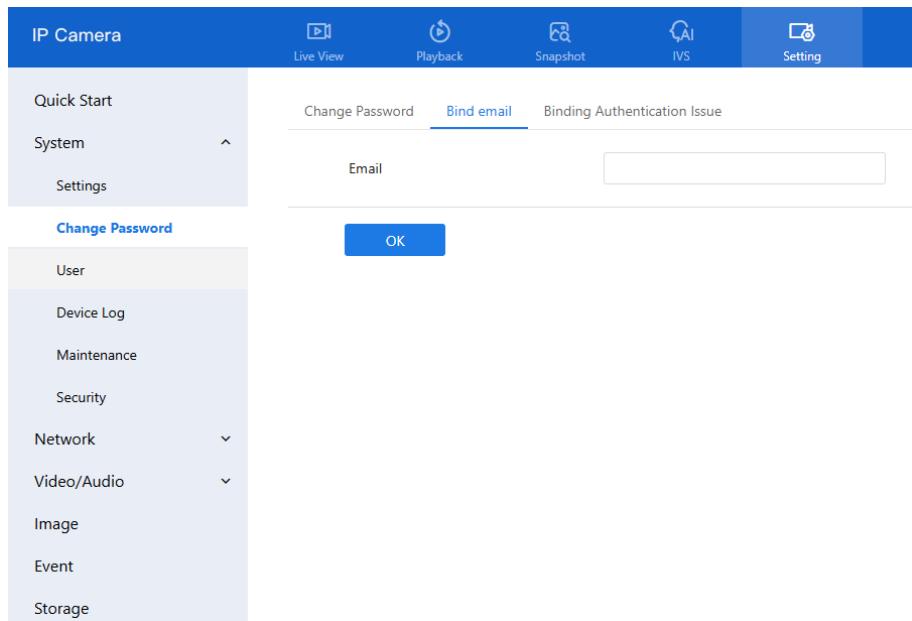
Figure 2-9 Binding authentication issue
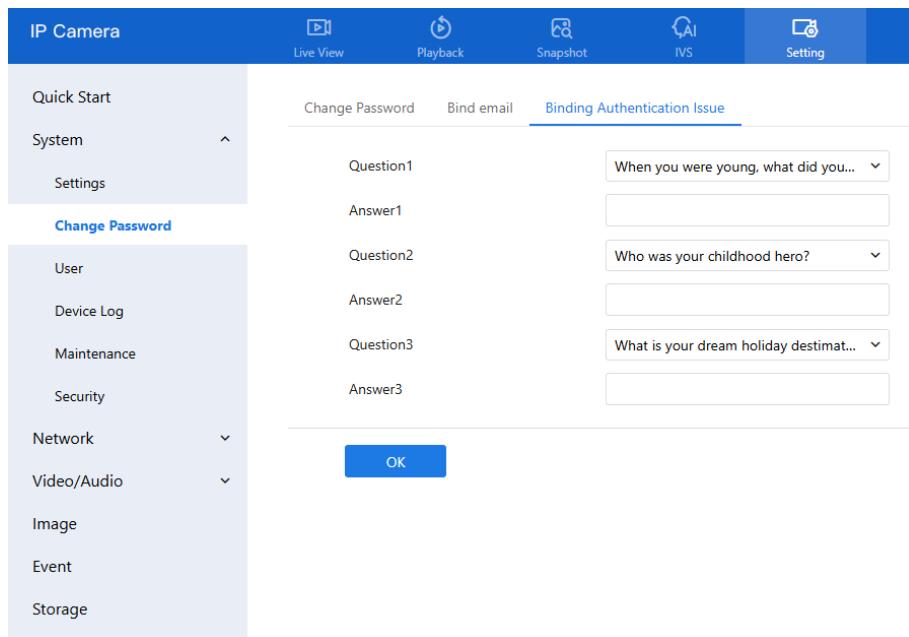
----End

2.3 Homepage Layout

On the homepage, you can view real-time videos, receive alarm and fault notifications, set parameters, change the password, and log out of the system. The figure shows the homepage layout. Table 2-1 describes the elements on the homepage.

Figure 2-10 Homepage layout

Table 2-1 Elements on the homepage

No.	Element	Description
1	Live View	Real-time videos are played on this page.
2	Playback	You can query the playback videos in this area. NOTE Only when the SD card or NAS has videos can you query the playback videos.
3	IVS setting	Intelligent Video System, set the AI multi-target, intelligent analysis (intrusion, smart motion, single line crossing, double line crossing, multi-loitering, wrong-way, general parameters), people counting, and so on.
4	Thermal	Set the parameters of thermal, such as temperature parameter, temperature alarm, schedule linkage, LED control, and so on.
5	Setting	You can choose a menu to set device parameters, quick start, system, network, audio/video, image, event, and storage.
6		About the intercom function.

No.	Element	Description
7		When the device accepts an alarm signal, the alarm icon will display . You can click to view the alarm information.
8		SD card video backup and download status.
9		Current user, sign out or change password.
10		Set brightness, saturation, contrast, and sharpness.
11		Window scale, switch the scale of play live video.
12		Full screen, click the icon to play live video at full screen.
13		Stream, click the icon to switch streams. There are two modes of stream.
14		Pause/Start. Close live video or play live video.
15		Audio. Open or close audio.
16		Two-way audio. Open or close the intercom, the computer should be plugged in microphone in advance.
17		Click the icon to snapshot the video and save the images to the specified location.
18		Record the video and save the file to the specified location.

No.	Element	Description
19	⊡	Target Frame Intelligent marking Target frame: when detecting the target, it will show the frame on the target. Intelligent marking: the detection area frame of the intelligent analysis in IVS will be displayed in the live video interface.
20	[60fps] [2592x1944] [3.333Mbps][H.264]	Frame rate / resolution / bit rate / video encode type.
21	👆	I/O output, control the I/O alarm output manually. Click [Open Close] to open the alarm or close the alarm.

Figure 2-11 About the intercom function

About The Intercom Function: ×

Description: Only For Enabling the Two-way Audio (Camera) in Chrome on HTTP in Chrome for (local) insecure origins. On HTTPS, all browsers are compatible with Two-way Audio (Camera).

HTTP Environment Chrome Opens The Intercom Step:

1.Ensure That The Computer is Plugged Into a Usable Microphone Device

2.Navigate to 'chrome://flags/#unsafely-treat-insecure-origin-as-secure' in Chrome.

3.Find and Enable The 'Insecure Origins Treated as Secure'

4.Add any camera addresses you want to ignore the secure origin policy for on the input box. The comma (',') is used to separate multiple camera addresses. For Example http://192.168.0.123, http://192.168.0.123:8045

5.Left-Click Outside The Input Box to Save It and Relaunch Chrome.

2.4 Playback

Click "Playback" at the web interface. If users install a micro SD card, and there are videos on the SD card. Click "Playback" and the playback video will show as in Figure 2-12.

Figure 2-12 Playback page
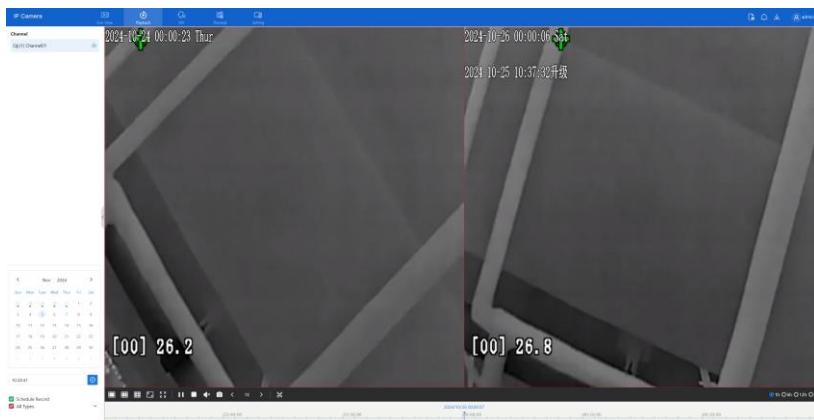
Table 2-2 Playback function

No.	Element	Description
1	Channel	The channel list of cameras.
2	Calender	![25] The green point means it has recorded video. Set the time to play the recording.

3	✅ Schedule Record ✅ All Types ⌄	**All Types** I/O Alarm Motion Alarm Day/Night Switch Alarm Abnormal Audio Alarm Intrusion Smart Motion Single Line Crossing Double Line Crossing Multi-Loitering The green timeline represents scheduled recording, and the red timeline is alarm recording. The types of alarm recording vary according to model performance.
4	▢	One screen plays a recording. Choose one day has record, click ▶ to play.
5	▯▯	Two screens play a recording. Choose the screen, choose the channel, select one day that has a recording(the date shows a green point), click ▶ to play.
6	⊞	Four screens play a recording. Choose the screen, choose the channel, select one day that has a recording(the date shows a green point), click ▶ to play.
7	⤡	Window scale: switch the scale of the play recording video.
8	⤢	Full screen, click the icon to play the video at full screen.

9	⏸ ▶	Pause/Start. Close live video or play recording video.
10	🔇 🔊	Audio. Open or close audio.
11	📷	Click the icon to snapshot the video and save the images to the specified location.
12	‹ 1X ›	Fast Forward, 1/16X, 1/8 X, 1/4 X, 1/2 X, 1 X, 2 X, 4 X
13	✂ 💾	Click the icon to start backup, drag the bar to download the recording quickly, and click the icon again to end. In the pop-up window of the tip, as shown in Figure 2-13, click the Save to save the video. Click **Cancel** to abandon. ![Backup Download List screenshot] the backup list to show the detailed information.
14	● 1h ○ 6h ○ 12h ○ 24h	Time axis, users can choose 1h, 6h,12h, or 24h.
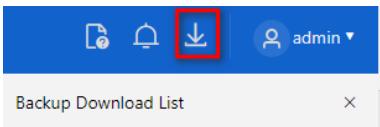
Figure 2-13 Record backup tip
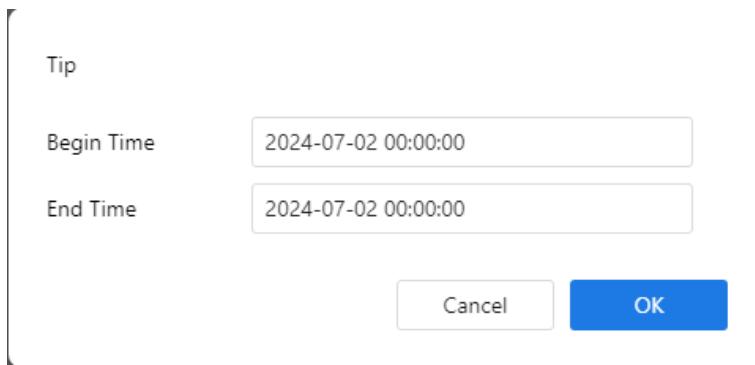
2.5 IVS Setting

Click IVS to enter the IVS setting page, where users can set the deep learning, intelligent analysis, and behavior analysis as shown in Figure 2-14. The detail settings will be introduced in the following chapters.

Figure 2-14 IVS setting page
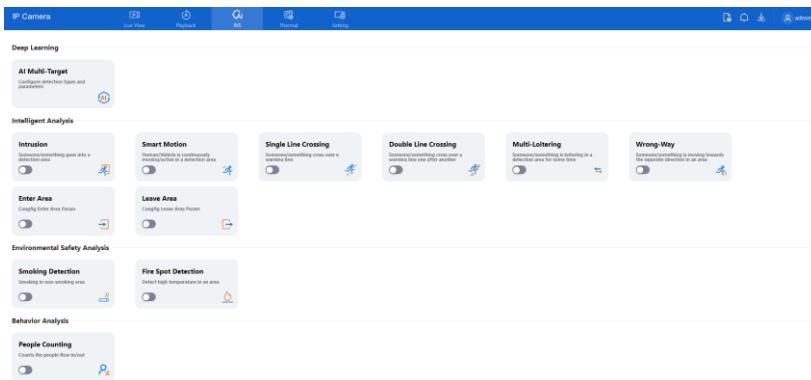
📖 **NOTE**

The different models have different IVS functions; please refer to the actual product.

----End

3 Quick Start Settings

To use the camera quickly, users need to set the Local Network, Video, Display, OSD, Date, and Time at the Quick Start interface.

3.1 Local Network

Overview

The local network settings allow you to configure essential parameters for your device's network connection, including:

- IP protocol
- IP address
- Subnet mask
- Default gateway
- Dynamic Host Configuration Protocol (DHCP)
- Preferred and alternate Domain Name System (DNS) servers
- Maximum Transmission Unit (MTU)

By default, DHCP is enabled, meaning the device will automatically receive an IP address when connected to a network with DHCP support. If no DHCP server is available, the device will use the default IP address **192.168.0.120**. If multiple devices are connected to the same network, users must manually set unique IP addresses for each device.

Steps to Configure the Local Network

1. Navigate to **Settings > Quick Start > Local Network**.
2. Adjust the parameters as needed according to the table below:

Figure 3-1 Local network page
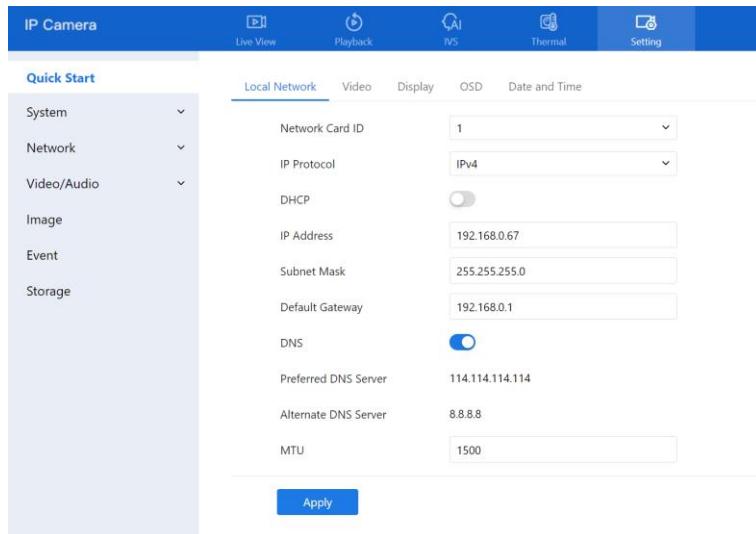
Table 3-1 Local network parameters

Parameter	Description	Setting
Network Card ID	--	[Default value] **1**
IP Protocol	IPv4 is the IP protocol that uses an address length of 32 bits. IPv6 is the IP protocol that uses an address length of 64 bits.	[Setting method] Select a value from the drop-down list box. [Default value] **IPv4**
DHCP	Enable DHCP, and the device will automatically obtain the IP address from the DHCP server.	[Setting method] Click the button to enable **DHCP**. NOTE To query the current IP address of the device, you must query it on the platform based on the device name.

Parameter	Description	Setting
IP Address	Device IP address that can be set as required.	[Setting method] Enter a value manually. [Default value] **192.168.0.121**
Subnet Mask	DHCP is off. The subnet mask of the network adapter.	[Setting method] Enter a value manually. [Default value] **255.255.255.0**
Default Gateway	DHCP is off. This parameter must be set if the client accesses the device through a gateway.	[Setting method] Enter a value manually. [Default value] **192.168.0.1**
Preferred DNS Server	DNS is on. The IP address of a DNS server.	[Setting method] Enter a value manually. [Default value] **192.168.0.1**
Alternate DNS Server	DNS is on. The IP address of a domain server. If the preferred DNS server is faulty, the device uses the alternate DNS server to resolve domain names.	[Setting method] Enter a value manually. [Default value] **192.168.0.2**
MTU	Set the maximum value of network transmission data packets.	[Setting method] Enter a value manually. NOTE The MTU value ranges from 1280 to 1500; the default value is 1500. Please do not change it arbitrarily.

3. Click **Apply**.

   o   If successful, a confirmation message will appear, and you will need to log in again with the new IP address.
   o   If an error message appears, check and correct the parameters before applying again.

----End

3.2 Video

Overview

Modifying video settings affects real-time streaming quality, playback, and storage efficiency. Adjust these settings based on available network bandwidth and storage capacity.

Steps to Configure Video Settings

1. Navigate to **Settings > Quick Start > Video**.
2. Adjust the parameters according to the table below:

Figure 3-2 Video setting page
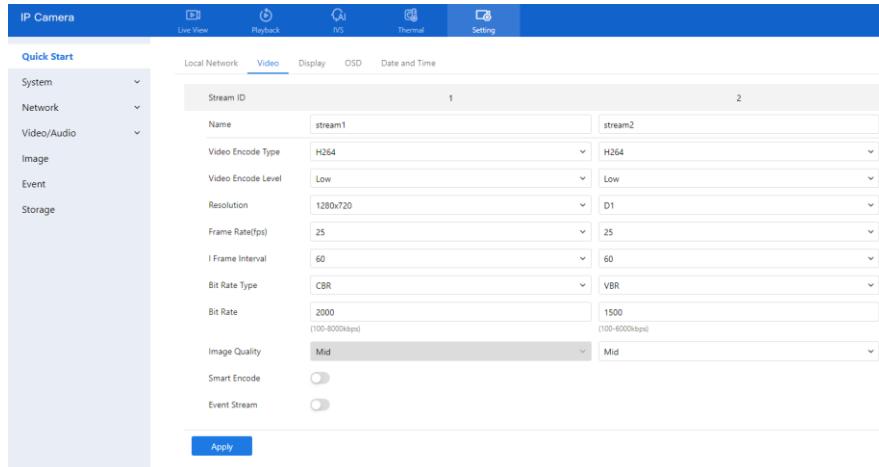
Table 3-2 Parameters of stream configuration

Parameter	Description	Setting
Stream ID	The device supports at most three streams. Streams 1 and 2 adopt the H.264 code. Stream 1 stands for the best stream performance that the device supports.	[Setting method] Select a value from the drop-down list box.

	Stream 2 usually offers comparatively low-resolution options.	
Name	Stream name. NOTE The stream name consists of characters, numbers, and underlines	[Setting method] Enter a value manually. The value cannot exceed 32 bytes. [Default value] Stream 1

Video Encode Type	The video encoding determines the image quality and network bandwidth required by a video. Currently, the following encoding standards are supported: **MJPEG** MJPEG is a standard intra-frame compression encoding. The compressed image quality is good. No mosaic is displayed on motion images. MJPEG does not support proportional compression and requires a large storage space. Recording and network transmission occupy large hard disk space and bandwidth. MJPEG does not apply to continuous recording for a long period or network transmission of videos. It can be used to send alarm images. Only the low video encoding level can be chosen. **H.264** H.264 consists of H.264 low Profile, H.264 Main Profile, and H.264 High Profile. The performance of H.264 High Profile is higher than that of H.264 Main Profile, and the performance of H.264 Main Profile is higher than that of H.264 Base Profile. If a hardware decoding device is used, select the appropriate encoding based on the decoding performance of the device. H.264 High Profile has the highest requirements for hardware performance, and H.264 Base Profile has the lowest requirements for hardware performance. Three levels can be chosen **H.265** H.265 is the advanced video encoding standard. It's the improvement standard from H.264. H.265 improves the streams, encoding quality, and algorithm complexity to make configuration optimization. Only the Mid-video encode level can be chosen.	[Setting method] Select a value from the drop-down list box. [Default value] H.264 High Profile NOTE The H.264 High Profile encoding means high requirements on the hardware. If the hard-decoding capability is low, use H.264 Main Profile or H.264 Base Profile. When users choose the MJPEG for Stream 1, some functions will be error, such as the videos of FTP upload may not be played correctly.
Audio Encode Level	The following audio encoding standards are supported: **G. 711_ULAW**: mainly used in North America and Japan. **G. 711_ALAW**: mainly used in Europe and other areas.	[Setting method] Select a value from the drop-down list box.

	RAW_PCM: encoding of the original audio data. This encoding is often used for platform data.	
Resolution	A higher resolution means better image quality. NOTE IP cameras support different resolutions based on the model.	[Setting method] Select a value from the drop-down list box.
Frame Rate(fps)	Frame rate is the number of images, snapshots, or frames that a camera can take per second. The frames per second determine the smoothness of a video. A video whose frame rate is higher than 22.5 f/s is considered smooth by human eyes. Frame rates for different frequencies are as follows: 50 Hz: 1–25 f/s 60 Hz: 1–30 f/s NOTE The frequency is set on the **Device Configuration** > **Camera** page. The biggest MJPEG coding format frame rate is 12 frames per second.	[Setting method] Select a value from the drop-down list
I Frame Interval(f)	I frame does not require other frames to decode. A smaller I-frame interval means better video quality but higher bandwidth.	[Setting method] Select a value from the drop-down list
Bit Rate Type	The bit rate is the number of bits transmitted per unit of time. The following bit rate types are supported: **Constant bit rate (CBR)** The compression speed is fast; however, improper bit rates may cause vague motion images. **Variable bit rate (VBR)** The bit rate changes according to the image complexity. The encoding efficiency is high, and the definition of motion images can be ensured.	[Setting method] Select a value from the drop-down list box.
Bit Rate Range	Indicates the maximal value of the bit rate. The different models may have different ranges. Please refer to the actual product.	[Setting method] Enter a value manually.
Image Quality	The video quality of the camera output.	[Setting method] Select a value from the drop-down list box.
Smart Encode	Smart Encode. Smart encode includes H.264 & H.265.	[Setting method] Click the button to

	The storage space will be reduced by fifty percent when Smart Encode is enabled. Only mainstream supports smart encoding.	enable **Smart Encode**.
Event Stream	Enable Event Stream. Set the event frame rate and event bit rate. It can be recording at the frame rate and bitrate set in the event stream, which facilitates recording with higher image quality when an alarm occurs. During normal periods, recording can be done according to the parameters set above.	[Setting method] Click the button to enable **Event Stream**.

3. Click **Apply**.

- If the message "Apply success!" is displayed, and the system will save the settings.

- If a message "Please enter the appropriate range" is displayed, enter a new value at the range.

----End

3.3 Image Display

3.3.1 Accessing the Display Settings

Procedure:

1. Navigate to **Setting > Quick Start > Display**.

Figure 3-3 Display settings page
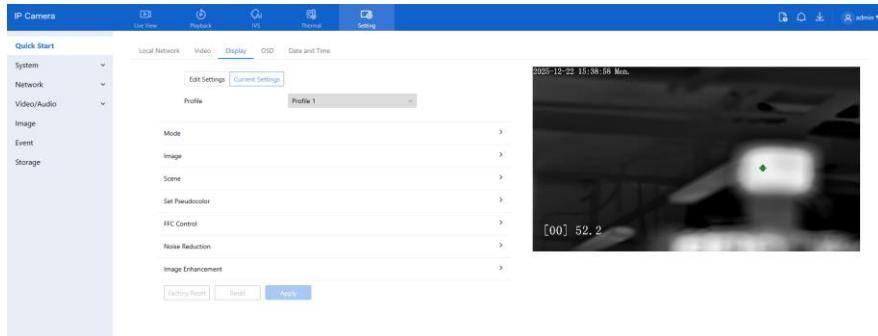
2. Select **Edit Settings** under the **Mode** section to configure the parameters. You can set up to four profiles.
    o All image settings can be modified in **Edit Settings**.
    o **Factory Reset**: Restores all parameters to factory settings.

3.3.2 Mode

Procedure:

1. Navigate to **Setting > Quick Start > Display > Mode**.

Figure 3-4 Mode page

2. Select **Switch Mode** to choose from the following modes:
    o **None**: Executes the selected profile continuously.
    o **Time Mode**: Switches profiles based on the configured start and end times.
    o **D/N Linkage Mode**: Automatically switches between **Profile 1** (Day Mode) and **Profile 2** (Night Mode) based on ambient light conditions.

3. Configure the start and end times as needed.
4. Click **Apply** to save the settings.

3.3.3 Image Settings

Users can manually adjust brightness, contrast, saturation, and sharpness based on the scene.

Procedure:

1. Navigate to **Setting > Quick Start > Display > Image**.
2. Adjust the parameters as per Table 3-3:
   ° Brightness: Adjusts the overall brightness of the image. Default: 50.
   ° Detail Enhancement: Adjust the details and edges of the higher-temperature image. Default: 50.
   ° Sharpness: Enhances image clarity. Default: 50.
   ° Contrast: Adjusts the difference between bright and dark areas. Default: 50.
3. Click Apply to save the settings.

Figure 3-5 Image interface

Table 3-3 Image setting parameter description

P	Description	Set
Brightness	It indicates the total brightness of an image. As the value increases, the image becomes brighter.	[Setting method] Drag the slider. [Default value] **50**
Detail Enhancement	Adjust the details and edges of the higher-temperature image.	[Setting method] Drag the slider. [Default value] **50**
Contrast	It indicates the contrast between the bright part and the dark part of an image. As the value increases, the contrast increases.	[Setting method] Drag the slider. [Default value] **50**
Sharpness	It indicates the sharpness of the image plane and the sharpness of the image edge. The clearer the image, the better the detail contrast.	[Setting method] Drag the slider. [Default value] **50**

----End

3.3.4 Scene

Click **Setting > Quick Start > Display, and** choose the **Scene** item. Figure 3-6 shows the scene interface.

Figure 3-6 Scene interface

Scene   ⌄

    Mirror   Normal   ⌄

    Tip: Please Update Motion Detection, Privacy Mask, Intelligent Analysis, ROI and OSD Area Settings
After [Aisle Mode]/[Mirror] was Changed.
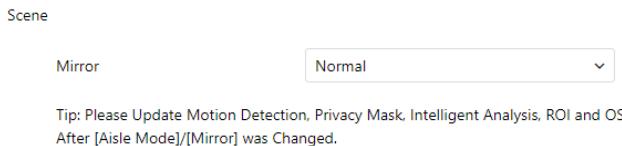
Provide the selection of image pixel locations.

Normal: the image is not flipped.

Horizontal: the image is flipped left and right.

Vertical: the image is flipped up and down.

Horizontal + Vertical: the image upside-down and reversal.

----End

3.3.5 Set Pseudocolor

Users can set the pseudocolor; the different types will show the different visual effects.

Procedure:

1. Navigate to **Setting > Quick Start > Display > Set Pseudocolor**.
2. Configure the settings as per Table 3-4:
3. Click **Apply** to save the settings.

Figure 3-7 Set Pseudocolor interface

Set Pseudocolor	⌄
Pseudo-Colors	White Hot ⌄
Legend of Temperature Value	Close ⌄

Table 3-4 Pseudocolor parameter

Parameter	Description	Setting
Pseudo-Colors	Polarity/LUT: the temperatures of the temperature fields detected by the thermal imaging camera are separately mapped to values ranging from 0 to 255 by the algorithm. In the black/white display mode, this range is converted to the grayscale tones. For example, 0 indicates completely black, and 255 indicates completely white. The temperature field of the scene is converted to images by using a grayscale ranging from 0 to 255. Different polarity modes can be converted to different display images. The most common setting is white hot (a hotter object is displayed brighter than a colder object) or black hot (a hotter object is displayed darker than a colder object). The difference between the two modes lies in that the temperatures corresponding to the darker one and the lighter one are reversed. Other modes include rainbow, iron bow, HSV, autumn, bone, and so on. 	[How to set] Select from the drop-down list box. [Default value] **White Hot**
Legend of Temperature Value	It is on, the live video will show; otherwise, there is no legend.	[How to set] Select from the drop-down list box. [Default value] **Close**
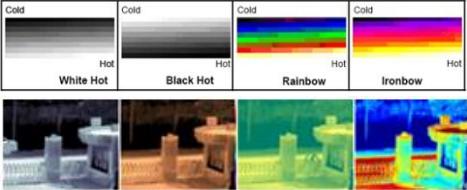
3.3.6 FFC Control

Users can adjust the flat field correction (FFC) parameter, such as mode, interval, temp deviation, shutter correction, and background correction.

1.　Navigate to **Setting > Quick Start > Display > FFC control.**

2.　Configure the settings as per Table 3-5.

3.　Click **Apply** to save the settings.

Figure 3-8 FFC control interface
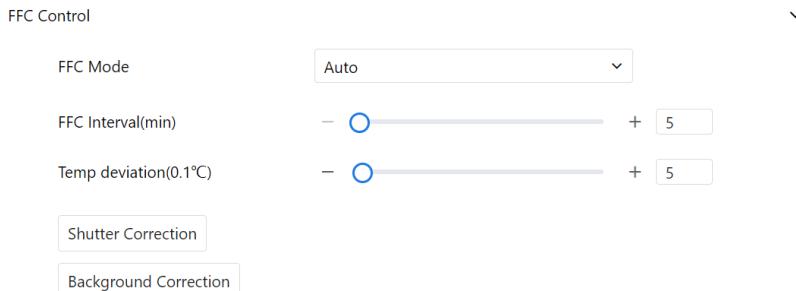
Table 3-5 FFC control parameter description

Parameter	Description	Setting
FFC Mode	The internal of the thermal imaging camera may comprise a mechanical action correction mechanism that can periodically improve the image quality. This component is called flat field correction (FFC). When controlling the FFC, the FFC shields the sensor array, so that each portion of the sensor can collect uniform temperature fields (flat field). Using FFC, the camera can update the correction coefficients to output more uniform images. Throughout the FFC process, the video image is frozen for two seconds, and a static-frame image is displayed. After the FFC is complete, the image is automatically recovered.	[How to set] Select from the drop-down list box. [Default value] **Auto**

Parameter	Description	Setting
	Repeated FFC operations can prevent grainy and image degradation problems. The FFC is especially important when the temperature of the camera changes. For example, after the camera is powered on or the ambient temperature is changed, you should immediately perform the FFC. **Auto**: In the Automatic FFC mode, the camera performs FFC whenever its temperature changes by a specified amount or at the end of a specified period (whichever comes first). When this mode is selected, the FFC interval (minutes) ranges from 5 to 30 minutes. The temperature change of the camera is based on the temperatures collected by the internal temperature probe. The temperature of the camera sharply changes when the camera is powered on. The FFC is relatively frequent, which is normal. **Manual**: In the manual FFC mode, the camera does not automatically perform the FFC based on the temperature change or the specified period. You can press the Do FFC button to select the manual FFC mode. When you feel that the image is obviously degraded but the automatic FFC is not performed, you can use the manual FFC function to check whether the image quality can be improved.	
FFC Interval (min)	In the automatic FFC mode, the FFC interval ranges from 2 to 255 minutes.	[How to set] Drag the slider. [Default value] **5**
Temper deviation(0.1°C)	In the automatic FFC mode, the	[How to set]

Parameter	Description	Setting
	FFC interval ranges from 0.2 to 25.5 centigrade.	Drag the slider. [Default value] **5**
Shutter Correction	Click the icon to adjust exposure immediately.	Click the button
Background Correction	Click the icon and cover the camera with something to adjust the image. Remove the thing to finish the adjustment.	Click the button

----End

3.3.7 Noise Reduction

Adjust noise reduction settings to improve image clarity in low-light conditions.

Procedure:

1. Navigate to **Setting > Quick Start > Display > Noise Reduction**.
2. Configure noise reduction settings according to the environment and requirements.
3. Click **Apply** to save the settings.

Figure 3-9 Noise reduction interface
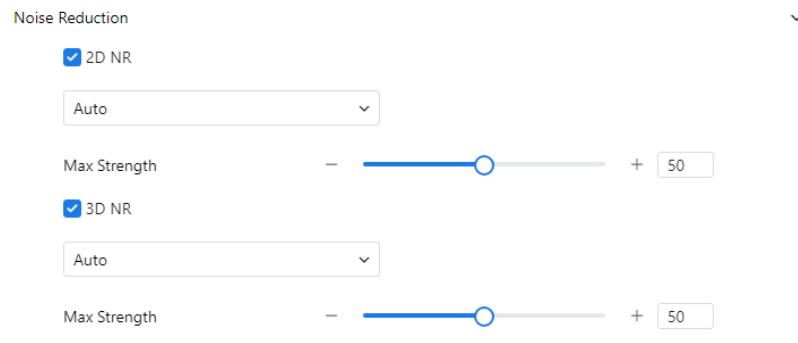
Table 3-6 DNR parameter description

Parameter	Description	Setting
2 DNR	Decrease the image noise.	[How to set] Select from the drop-down list box. Drag the slider to adjust the maximum strength. [Default value] **Auto**
3 DNR	Decrease the image noise.	[How to set] Select from the drop-down list box. Drag the slider to adjust the maximum strength. [Default value] **Auto**

----End

3.3.8 Lens control

Users can adjust the Lens when the image is blurry.

Procedure:

1. Navigate to **Setting > Quick Start > Display > Lens control**.
2. Configure lens control settings as per Table 3-7.
3. Click **Apply** to save the settings.

Figure 3-10 Lens control

Lens Control ⌄

Focus Mode   Semi-Automatic ⌄

[+]Auto Focus Once

Lens Initialization

Table 3-7 Lens control parameter description

Parameter	Description	Setting
Focus mode	Near focus/ far focus. Semi-Automatic or Manual	[How to set] Click the button
Auto focus once	Click to focus once automatically.	[How to set] Click the button
Lens Initialization	Click to initialize the lens	[How to set] Click the button

3.4 OSD

The On-Screen Display (OSD) feature overlays important information directly onto the live video feed, improving the practicality and management of your monitoring system. Commonly displayed details include time, camera location, device status, operational actions, and additional notes. It's important to arrange the information effectively to ensure it's useful without blocking the view of the footage.

What You Can Display
The OSD allows you to show the device name, channel ID, time, and other customizable content on your videos. You can drag the OSD frames to any location on the screen.

- For resolutions such as D1 and CIF, the OSD customization can display up to 22 characters.
- The OSD supports simplified Chinese, English, numbers, and some special characters.

Figure 3-11 OSD
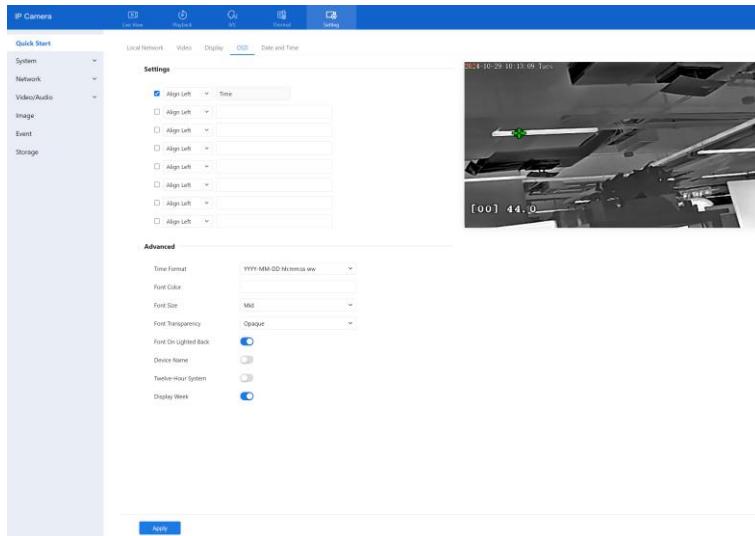
Steps to Configure OSD

1. Go to **Settings > Quick Start > OSD**. The OSD configuration page will appear.
2. Set the parameters as outlined in the table below:

Table 3-8 Parameters of OSD

Parameter	Description	Setting
Time	Indicates whether to display the time.	[Setting method] Tick the time.
Custom OSD	Tick to enable, and choose the position to show the content of the custom OSD.	[Setting method] Enter the characters.

Parameter	Description	Setting
Time Format	Format in which the time is displayed.	[Setting method] Select a value from the drop-down list box. [Default value] YYYY-MM-DD hh:mm: ss ww
Font Color	Set the font color.	[Setting method] Select a value from the drop-down list box. [Default value] Blank
Font Size	Set the font size.	[Setting method] Select a value from the drop-down list box. [Default value] Mid
Font Transparency	Set the font transparency.	[Setting method] Select a value from the drop-down list box. [Default value] Opaque
Font on Lighted Back	Enable the font on the lighted back.	[Setting method] Click the button to enable **Font on the lighted back**.
Device Name	Indicates whether to display the device name.	[Setting method] Click the button to enable the **Device Name**
Twelve-hour System	The time format shows a twelve-hour system.	[Setting method] Click the button to enable
Display Week	The week will show.	[Setting method] Click the button to enable

3. Click **Advanced** to customize settings for **Time Format**, **Font Color**, **Font Transparency**, and other options.

4.   Click **Apply** to save your settings. You should see a confirmation message, "Apply success!" indicating that your settings have been saved.

3.5 Date and Time

Description

The Date and Time settings allow you to adjust the device's time, including time zone, daylight-saving time (DST), and synchronization with an NTP server (Network Time Protocol).

Settings You Can Modify

- **Time Zone**
- **Device Time**
- **NTP Server**

Steps to Configure Date and Time

1.   Go to **Settings > Quick Start > Date and Time**. The Date and Time page will appear.
2.   Modify the settings as shown in the table below:
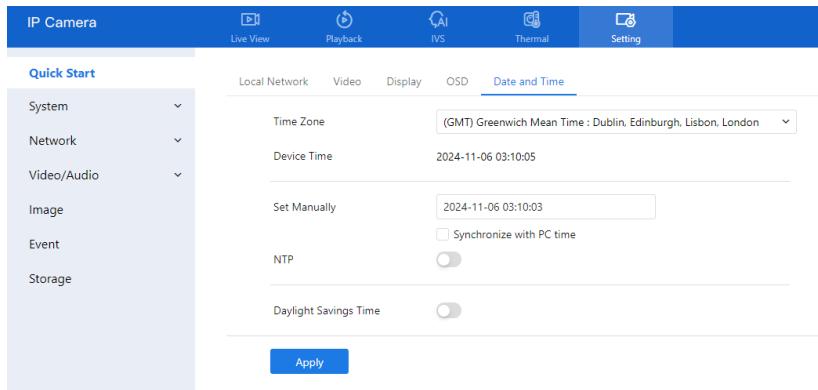
Figure 3-12 Date and time page

Table 3-9 Parameters of date and time

Parameter	Description	Setting
Time Zone	N/A	[Setting method]

Parameter	Description	Setting
		Select a value from the drop-down list box. [Default value] Greenwich Mean Time
Device Time	Device display time.	[Setting method] Synchronize the time from the PC. Enter a value manually.
Set Manually	You can set the device time manually or synchronize it with PC time.	[Setting method] Click **Set Manually** and set the date and time in the format *YYYY-MM-DD HH:MM: SS.*
NTP	IP address or domain name of the NTP server.	[Setting method] Click the button to enable **NTP** and enter a value manually.
Server Address	NTP is enabled. The NTP server IP.	[Setting method] Enter a value manually.
Port	NTP is enabled. Port number of the NTP server.	[Setting method] Enter a value manually. [Default value] **123**
Interval	NTP is enabled. Set time intervals to check if the device time has synchronized with the NTP server time.	[Setting method] Enter a value manually. [Default value] **60**
Daylight Saving Time	When the DST start time arrives, the device time will automatically be one hour earlier. When the DST end time arrives, the device time will automatically be one hour later.	[Setting method] Click the button to enable **Daylight Saving Time**.

3.   Click **Apply**. The message "Apply success!" is displayed, and the system will save the settings.

----End

4 Configuring Thermal

4.1 Settings

4.1.1 Temperature Parameters

Description

    Temperature parameters include

- **Temperature Unit**
- **Ambient Type**
- **Ambient Temperature**
- **Cavity Temperature**
- **Correctional Coefficient**
- **Area Temperature Display Mode**
- **Area Temperature Type**
- **Measure Mode**
- **Area Alarm Interval**
- **Temperature OSD**

Steps to Configure Temperature Parameter

1. Navigate to **Thermal > Settings > Temperature Parameter**.

2. Modify the settings as shown in the table below:

Figure 4-1 Temperature Parameters Interface
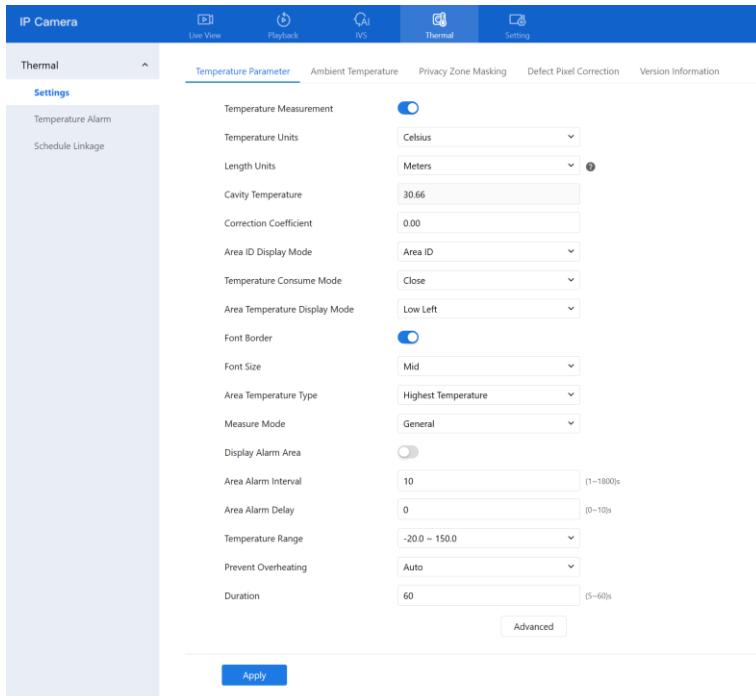
Table 4-1 Temperature Parameters

Parameter	Description	Setting
Temperature Measurement	The default is enabled.	[Setting method] Enable or disable [Default value] **Enable**
Temperature Units	Celsius and Fahrenheit temperature units are available.	[Setting method] Select a value from the drop-down list box. [Default value] **Celsius**

Parameter	Description	Setting
Length units	Meters and feet length units are available.	[Setting method] Select a value from the drop-down list box. [Default value] Meters
Cavity Temperature	The cavity temperature of the camera.	N/A
Correction Coefficient	The correction coefficient refers to the deviation of the measured object temperature and actual temperature, which is the offset value. It ranges from -100 to 100. For example: 1. The measured object temperature is 20, and the actual temperature is 20.5, so the correction coefficient should be **0.5.** 2. The measured object temperature is 20, and the actual temperature is 19.5, so the correction coefficient should be -0.5**.** NOTE The user should contact the technical support staff of our company under this condition to ensure that to application	[Setting method] Enter a value manually. [Default value] **0.00**
Area ID display mode	There are two modes to display: area ID and area name	[Setting method] Select a value from the drop-down list box. [Default value] **Area ID**
Temperature Consume Mode	Transfer temperature values or images to third-party platforms via SDK(Software development kit) protocol. You can get a custom SDK from the manufacturing company if needed.	[Setting method] Select a value from the drop-down list box. [Default value] **Close**

Parameter	Description	Setting
Area Temperature Display Mode	The display position of temperature information on the live-video image.	[Setting method] Select a value from the drop-down list box. [Default value] **Low left**
Font Border	Enable bolding the font	[Setting method] Enable or disable [Default value] **Disable**
Font size	Three font sizes can be chosen: small/mid/big	[Setting method] Enable or disable [Default value] **Mid**
Area Temperature Type	There are three types of area temperature.	[Setting method] Select a value from the drop-down list box. [Default value] **Highest Temperature**
Measure Mode	There are two types of measurement modes.	[Setting method] Select a value from the drop-down list box. [Default value] **General**
Display Alarm Area	Tick, the setting alarm area will display on live video.	[Setting method] Enable or disable [Default value] **Disable**
Area Alarm Interval	During the interval, the same alarm will only be sent once.	[Setting method] Enter a value manually that ranges from 1 to 1800s. [Default value] **10**

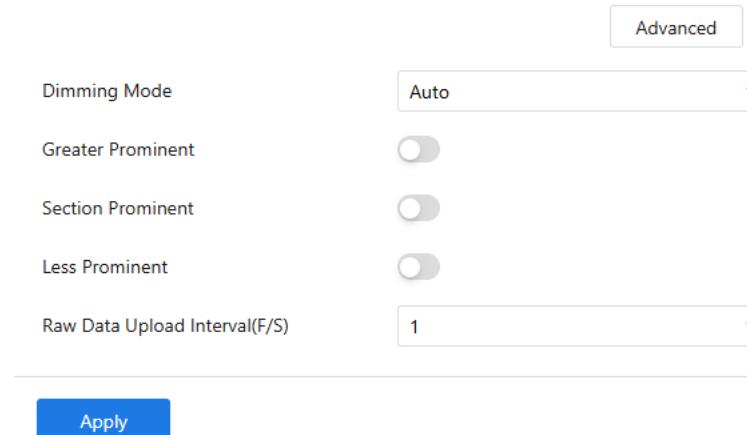| Parameter	Description	Setting
Area Alarm delay (0-10S)	The area alarm information will be delayed for the setting time.	[Setting method] Enter a value manually that ranges from 1 to 10. [Default value] **10**
Temperature range	It depends on the device. Different devices have different modes, such as -20 °C -150°C.	[Setting method] Select a value from the drop-down list box.
Prevent Overheating	Open, if the temperature of the testing area is too high, you can enable it to prevent over heat function. The control cover will be laid down to keep the detector safe. There are two types, manual and auto.	[Setting method] Select a value from the drop-down list box.
Anti Burn Protection Time (5-180 S)	When the prevent overheating takes effect, the shutter will close for the setting time.	[Setting method] Enter a value manually ranging from 5 to 180.
Protection Frequency	When the overheating time is over this setting value, the shutter will be lock for the setting lock time. The next trigger time is over 20s, the frequency will be cleared, and recount.	[Setting method] Select a value from the drop-down list.
Lock Time	The shutter will be locked during the time, or users can click the button to unlock manually. The live video will show tip "The shutter is closed. Please wait for time or manual unlock"	[Setting method] Select a value from the drop-down list.
Manually unlock	Click to unlucky manually. ⓘ Please ensure that the device is in a normal operating environment and avoid exposing the lens to high-temperature objects. Cancel Confirm	[Setting method] Click

Figure 4-2 Advanced Interface

Table 4-2 Advance Parameters

Parameter	Description	Setting
Dimming Mode	There are auto and manual modes. Auto: It will show on the temperature item depending on the full-screen temperature. Manual: It will show the manual value.	[Setting method] Select a value from the drop-down list box. [Default value] **Auto**
Greater Prominent	Enable that, and the image will show the set color if the temperature is higher than the set value.	[Setting method] Enter a value manually. Choose one color to show.
Section Prominent	Enable that, the image will show the setting color if the temperature is between the minimum and maximum temperatures.	[Setting method] Enter a value manually. Choose one color to show.
Less Prominent	Enable that, and the image will show the setting color if the temperature is lower than the set value.	[Setting method] Enter a value manually. Choose one color to show.

Parameter	Description	Setting
Raw Data Upload Interval(F/S)	Interval for uploading the raw data.	[Setting method] Select a value from the drop-down list box. [Default value] **1**

3.   Click **Apply** to save.

----End

4.1.2 Ambient Temperature

Usually, no customer configuration is required. The current ambient temperature needs to be configured only when the device has just been powered on, but the user needs to measure the temperature immediately.

- **Ambient Temperature**

Procedure:

1.   Navigate to **Thermal > Settings > Ambient Temperature**.

2.   Modify the settings as shown in the table below:

Figure 4-3 Ambient Temperature

Temperature Parameter	Ambient Temperature	Privacy Zone Masking	Thermal Mapping	Defect Pixel Correction	Version Information

| Ambient Temperature | 25.00 |
| Self-adaptive Temperature | 22.60 |

Apply

Table 4-3 Parameter of Ambient Temperature

| Parameter	Description	Setting
Ambient Temperature	The environmental temperature of the camera. When the camera is powered on for at least half an hour and the cavity temperature is stabilized, set the temperature. It is set as the environmental temperature of the camera.	[Setting method] Enter the temperature of the ambient environment. [Default value] **25**
Self-adaptive Temperature	Set the ambient temperature, click "Apply", and the camera will get the value automatically.	---

Click **Apply** to save.

----End

4.1.3 Privacy Zone Masking

Privacy zone masking means that the camera will not detect the temperature of that area. The shield areas can be set up to eight areas.

Procedure:

1. Navigate to **Thermal > Settings > Privacy Zone Masking.**

Figure 4-4 Privacy Zone Masking
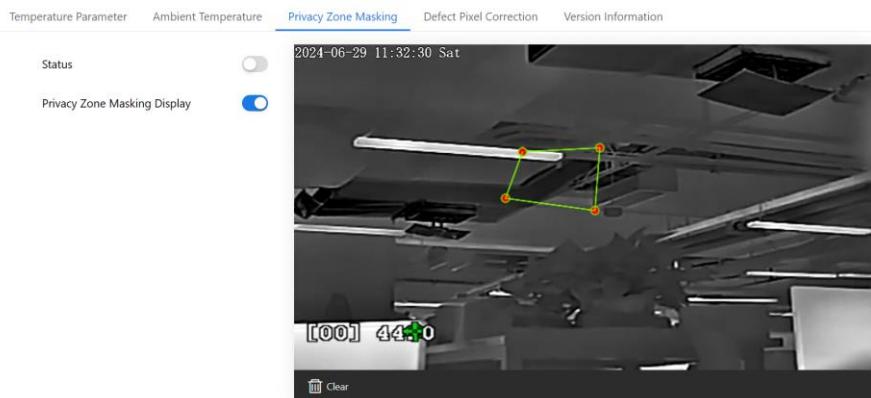
2. Enable the privacy zone masking.
3. Enable Show Privacy Zone Masking Display, then the setting shield will show on live video.
4. Click the left mouse button to set the area; click the right mouse button to end the setting.
5. Click **Clear** to clear the setting area.
6. Click **Apply** to save.

   ----End

4.1.4 Defect Pixel Correction

If the image has a white dot as shown in the figure, the user can test the function to recover the defective pixel. Users should connect with the technical support under these conditions to ensure that to apply.

Procedure:

1. Navigate to **Thermal > Settings > Defect Pixel Correction**.

Figure 4-5 Defect pixel correction
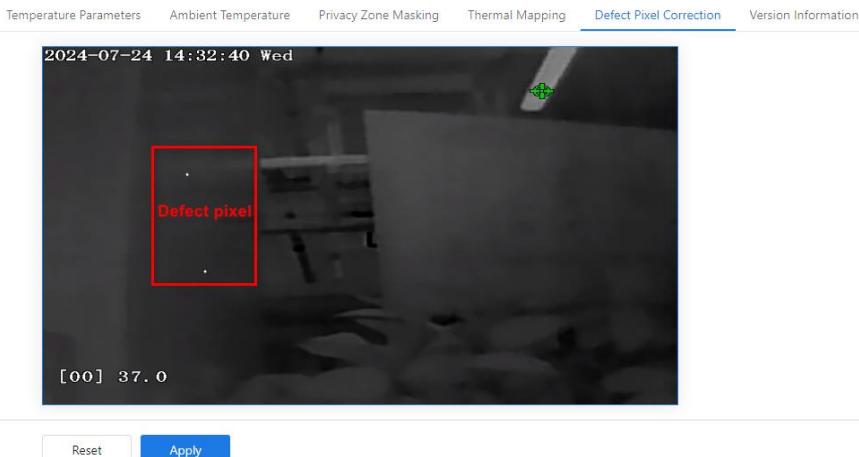
2. Click the white point in the image, and click **Reset** to recover the defect pixel, as shown in Figure 4-6.

Figure 4-6 Recover Defect Pixel

3. Click **Apply**. The message "Apply success" is displayed, and the system will save the settings.

----End

4.1.5 Version Information

Check the MCU version and MCU sequence number for easy traceability

4.2 Temperature Alarm

Users can set the alarm area and type.

- **PTZ Setting**
- **Alarm Type**
- **Warning Value**
- **Alarm Value**
- **Maximum Alarm Value**
- **Duration**
- **Emission Rate**
- **Distance**
- **Reflection Temperature**
- **Ignore Object**

Procedure:

1. Navigate to **Thermal > Temperature Alarm**.
2. Modify the settings as shown in the table below:
3. Click **Apply** to save.

Figure 4-7 Temperature Area and Alarm Configuration
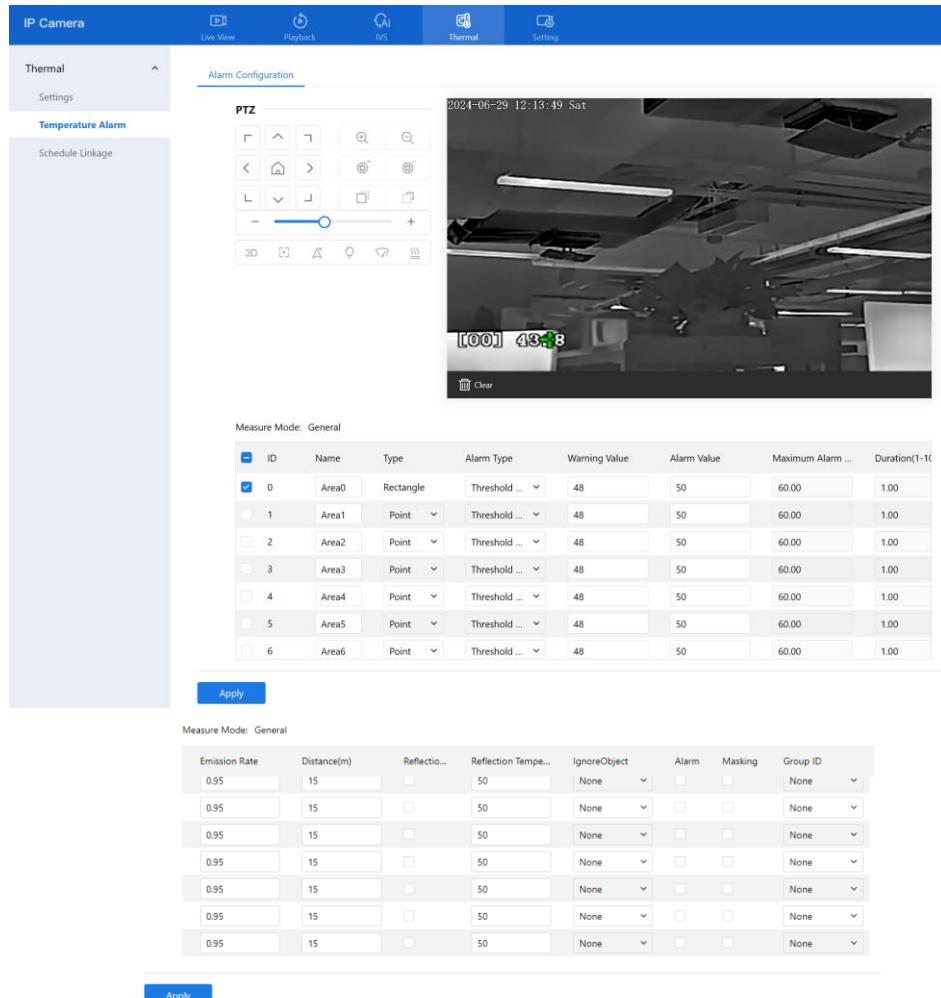

Table 4-4 Alarm configuration

Parameter	Description	Setting
Measure Mode	Set at temperature parameter interface.	N/A
Enable	Tick the ID to enable the area measuring.	[Setting method] Tick

Parameter	Description	Setting
Name	Area name of temperature area.	[Setting method] Enter a value manually.
Type	Type of temperature area. ID 0 is the default rectangle area, which is full screen. It cannot be modified. Other IDs can be set as point, line, or polygon.	[Setting method] Select a value from the drop-down list box. [Default value] **Rectangle/Point**
Alarm Type	**Temperature Difference Alarm**: Highest Temp minus Average Temp > Warning value, the 'Temperature Difference Warning' will be triggered; Highest Temp minus Average Temp > Alarm Value, the 'Temperature Difference Alarm' will be triggered. **Temperature Rise Alarm**: High Temp Increase Value > Warming Value, 'Temperature Rise Warning' will be triggered; Warning: High Temp Increase Value > Alarm Value, the 'Temperature Rise Alarm' will be triggered. **Temperature Threshold Alarm**: Highest Temp > Warning Value, the 'Temperature Threshold Warning will be triggered; Highest Temp > Alarm Value, the 'Temperature Threshold Alarm' will be triggered. **Section Alarm**: Alarm Value < Highest Temp < Maximum, 'Section Alarm' will be triggered.	[Setting method] Select a value from the drop-down list box. [Default value] **Threshold alarm**
Warning Value	The camera will trigger a warning alarm when the object's temperature reaches the warning value.	[Setting method] Enter a value manually. [Default value] **48**

Parameter	Description	Setting
Alarm Value	The camera will alarm when the object temperature reaches the alarm value.	[Setting method] Enter a value manually. [Default value] **50**
Maximum Alarm Value	In the section alarm type, the device would not alarm when the temperature is higher than the maximum alarm value.	[Setting method] Enter a value manually. [Default value] **60.00**
Duration (1-10S)	Choose the temperature rise alarm, and set the duration. If the temperature value rises within the duration setting, the alarm is triggered successfully.	[Setting method] Enter a value manually. [Default value] **1.00**
Emission Rate	The emission rate is the capability of an object to emit or absorb energy. The emission rate should be set only when the target is a special material.	[Setting method] Enter a value manually. [Default value] **0.95**
Distance(m)	The distance between the camera and the target.	[Setting method] Enter a value manually. [Default value] **15** 📖 **NOTE** Enter the actual distance when the distance between the camera and the target is less than 15m. Enter 15 when the distance between the camera and the target is greater than or equal to 15m.
Reflection Temperature on	When there are some high-temperature objects on the scene, and the temperature reflects on the other object, you can enable this function to calibrate the temperature.	[Setting method] Tick to enable

Parameter	Description	Setting
Reflection Temperature	The temperature of high-temperature objects.	[Setting method] Enter a value manually. [Default value] **50.00**
Ignore Object	Enable shielding the temperature of the area capturing AI objects.	[Setting method] Select a value from the drop-down list box.
Alarm	Enable or disable the alarm output and linkage of the area.	[Setting method] Tick to enable the alarm.
Masking	Enabling the device will shield this area's temperature.	[Setting method] Tick to shield.

Parameter	Description	Setting
Group ID	Different areas can be divided into the same group. The same group's areas will be merged to calculate the temperature difference alarm. The ID can be chosen from one of six groups or no group. The group will be alarmed following the next rules: The highest temperature of groups (the highest temperature of N regions is the largest) B = Average temperature of groups (average temperature of N regions) WA=Warning value AA=Alarm value a. If A-B >= WA, a temperature difference warning signal is generated ---> (The one with the largest difference between the N areas and the average temperature is the alarm area flashing.) b. If A-B >= AA, a temperature difference alarm signal is generated --> (the one with the largest difference between the N areas and the average temperature is the alarm area flashing) c. If the warning and alarm conditions are met at the same time, the alarm signal will be generated first.	[Setting method] Select a value from the drop-down list box.

4.   Set the temperature area.

> 1. Tick an area ID. Set the name.
>
> 2. Choose the type (point, line, polygon)
>
> 3. Press and hold the left mouse button, and drag in the video area to draw a temperature area, as shown in Figure 4-8. Right-click to finish the area selected.

Figure 4-8 Temperature Area Setting Interface

5. Click **Apply**, the message "Apply success" is displayed, and the temperature area is set successfully.

📖 **NOTE**

1. ID 0 is the full screen; The area cannot be changed.

: The lowest temperature of the full screen.

: The highest temperature of the full screen.

: The lowest temperature in the area.

: The highest temperature in the area.

Delete a temperature area:

1. Select an area ID.
2. Click **Clear**.
3. Remove the tick from the area ID.
4. Click **Apply**, the message "Apply success" is displayed, and the temperature area is deleted successfully.
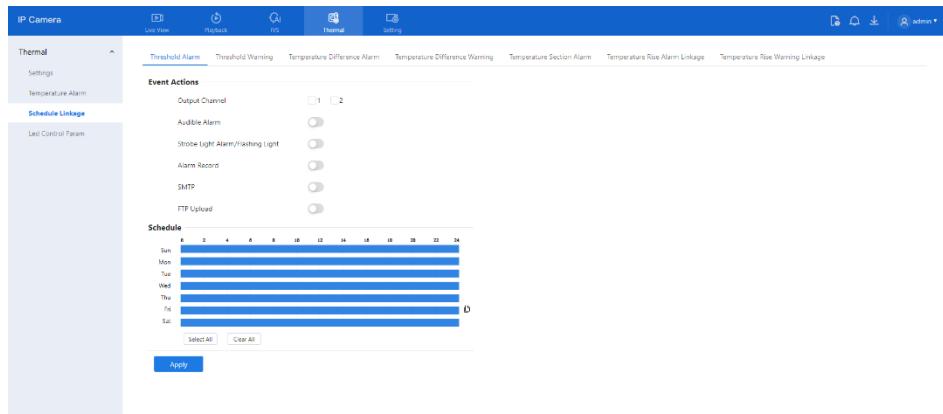
----End

4.3 Schedule Linkage

There are seven types of alarm linkage: threshold alarm, threshold warning, temperature difference alarm, temperature difference warning, temperature section alarm, temperature rise alarm, and temperature rise warning.

Procedure:

1.   Navigate to **Thermal > Schedule Linkage**.

Figure 4-9 Schedule Linkage

2.   Tick the output channel.

3.   Enable wanted linkage: "Output Channel", "Audible alarm", "Alarm Record", "SMTP",
      " FTP upload".

4.   Set schedule linkage.

   Method 1：Hold down the left mouse button, drag and release the mouse to select the
   deployment time 0:00-24:00 from Monday to Sunday.

   Method 2：Click **Select All** to deploy all the time.

   Method 3：Set one day, click   to copy to other days.

Figure 4-10 Copy

Copy:

- [ ] All
- [ ] Sun
- [ ] Mon
- [ ] Tue
- [x] Wed
- [ ] Thu
- [ ] Fri
- [ ] Sat

OK
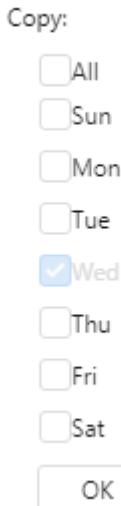
Delete schedule time: click **Clear All** to delete all times.

Click the set time, `08:30 ~ 10:00 OK Delete` click **Delete** to delete this time.

5.   The message "Apply success" is displayed, and the system will save the settings.

📖 **NOTE**

Figure 4-11 Audio file

The user can set the audio file manually. Click ⬆ to upload the audio file(The type should be WAV, size must be less than 250 Kb, the bit rate should be 128 kbps.), as shown in Figure 4-12.

Figure 4-12 Upload an audio file

----End

5 IVS Settings

On the IVS (intelligent video system) page, users can set deep learning (**AI multi-target**), intelligent analysis (i**ntrusion, smart motion, single line crossing, double line crossing, multi-loitering, wrong-way, enter area, leave area**), environmental safety analysis (**smoking, fire spot detection**), and behavior analysis (**people counting**).

5.1 AI Multi-Target

AI multi-target means the users are enabled to full-body detection, vehicle detection, and ship detection. If the camera detects the target in the defended areas at an armed schedule, it will trigger the alarm.

1. Navigate to **IVS > AI Multi-Targe**t interface.

Figure 5-1 AI Multi-Target
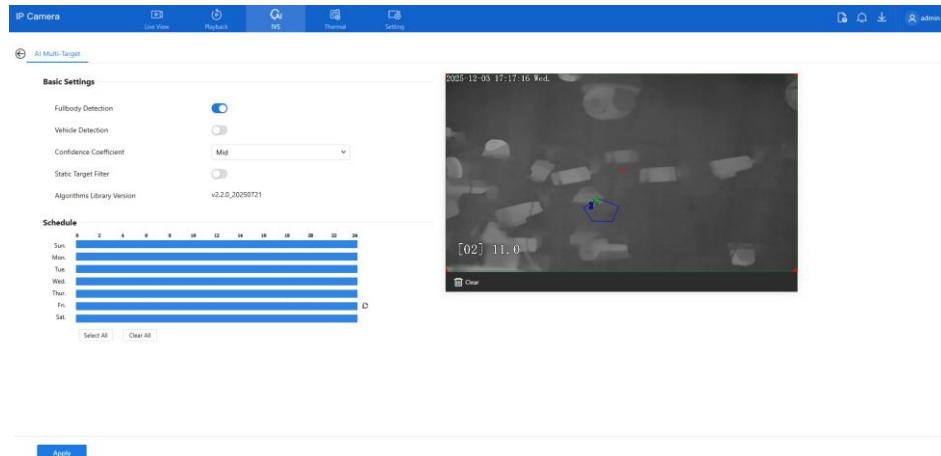
2. Set the parameters as shown in the table below:

Table 5-1 AI Multi-Target parameters

Parameter	Description	How to set
Full body detection	The camera will snap the whole body when someone appears in the live video. The detection frame is blue.	Enable
Vehicle Detection	The camera will snap the vehicle when the vehicle appears in live video. The detection frame is yellow.	Enable

Confidence Coefficient	In the range of snapshots, there are three types such as high, mid, and low. The higher the confidence, the better the snap quality and the fewer snapshots.	Choose from the drop-down list.
Static Target Filter	If the target is static, the device will filter this target. For example, if a vehicle stops for a long time, the device will be filtered.	Enable

3. Draw the detection area by using the mouse. Move the cursor to the drawing interface and click to generate a point, move the cursor to draw a line, and then click to generate another point. This is how a line is generated. In this way, continue to draw lines to form any shape, and right-click to finish the drawing.

4. To set the schedule, please refer to *Chapter 4.3* .

5. Click **Apply** to save the settings.

5.2 Intelligent Analysis

5.2.1 Intrusion

The Intrusion function refers to an alarm generated when target objects (such as Person, Vehicle, and both Person and Vehicle) enter the deployment area.

Procedure

1. Navigate to **IVS > Intelligent Analysis** > **Intrusion** to access the **Intrusion** interface, as shown in Figure 5-2.

Figure 5-2 Intrusion Setting Interface
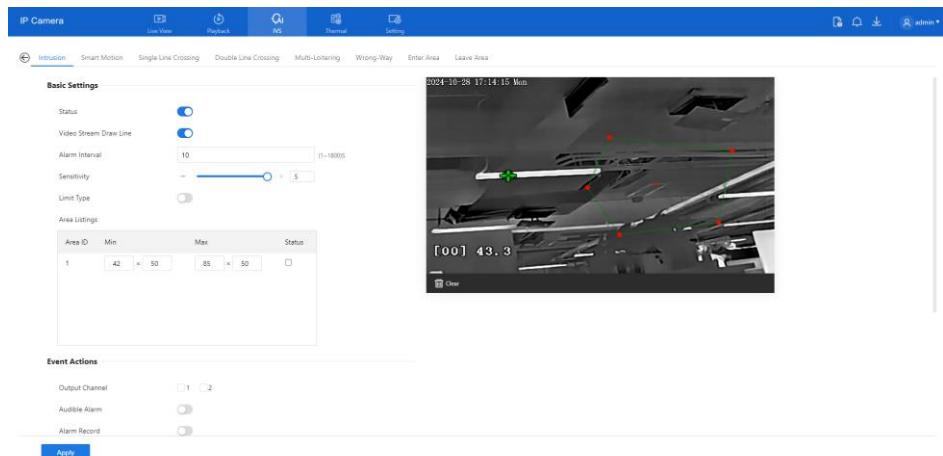
2. Set all parameters as per Table 5-2.

Table 5-2 Intrusion Parameter Description

Parameter	Description	Setting
Status	Enable the button to enable the alarm.	[How to set] Click Enable to enable. [Default value] **OFF**
Video Stream Draw Line	Enable the button, and the drawing frame of detection will show in the live video.	[How to set] Click to enable FTP Upload. [Default value] **OFF**
Alarm Interval	During the interval, the same alarm will only be sent once.	[How to set] Input a value [Default value] **10**
Sensitivity	The sensitivity of detecting smoking, when the value is high, the alarm can be triggered easily, but the accuracy will be lower.	[How to set] Choose from the drop-down list [Default value] **5**

Parameter	Description	Setting
Limit Type	Effective alarms are set based on target type, with options of Person or Vehicle, person, or vehicle. When the device is used indoors, because of the small space and large targets, to avoid wrong alarms being triggered by the person, even if the vehicle is selected, it is recommended to set the target type to person for indoor use.	[How to set] Click to enable Limit Target Type. [Default value] **OFF**
Area Listing	When users set the areas, the area will show on the listing. If the area status is on, the min and max size will show on the area, drag the frame to move, and adjust the points of the frame to change size.	
Output Channel	If you check to set the Output Channel and the device is connected to an external alarm indicator, the alarm indicator signals when an alarm is triggered.	[How to set] Click to select an ID.
Audible alarm	After enabling Audible Warning and setting Audible Alarm Output, the built-in speaker of the device or the connected external speaker plays warning sounds when an alarm happens. (set at the "**Setting > Video / Audio > Audio File**")	[How to set] Click to enable the Audible alarm [Default value] **OFF**
SMTP	Enable the button to enable the SMTP server.	[How to set] Click to enable SMTP. [Default value] **OFF**
FTP Upload	Enable the button to enable File Transfer Protocol.	[How to set] Click to enable FTP Upload. [Default value] **OFF**

Step 1 Set a deployment area. Move the cursor to the drawing interface and click to generate a point, move the cursor to draw a line, and then click to generate another point. This is how a line is generated. In this way, continue to draw lines to form any shape, and right-click to finish the drawing.

📖 **NOTE**

- · A drawn line cannot cross another one, or the line drawing fails.
- · Any shape with 32 sides at most can be drawn.
- · The quantity of deployment areas is up to 8.

3. For the set deployment time, please refer to Chapter 4.
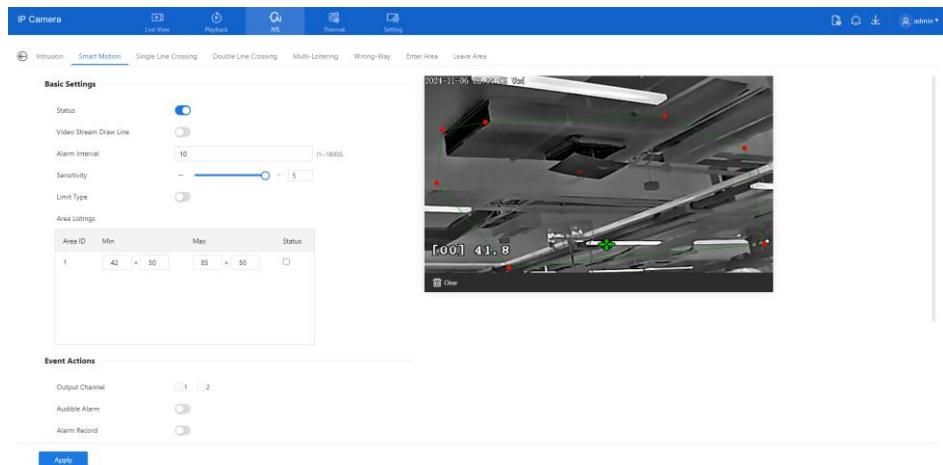
4. Click **Apply** to save the settings.

5.2.2 Smart Motion

Smart motion refers to the alert generated when a specified type of target (such as a person, vehicle, etc.) moves within the live video defense area.

Select **IVS > Intelligent Analysis** > **Smart Motion** to access the **Smart Motion** interface, as shown in.

Figure 5-3 Smart Motion

To set all parameters of smart motion, please refer to *Chapter 5.2.1*

5.2.3 Single Line Crossing

A Single Line Crossing is a line that is set at a concerned position within the monitored field of view and specifies the forbidden travel direction; An alarm is generated when the targets of specified types (such as person or vehicle) cross this line.

Procedure

1.   Navigate to **IVS > Intelligent Analysis** > **Single Line Crossing**.

Figure 5-4 Single Line Crossing Setting Interface
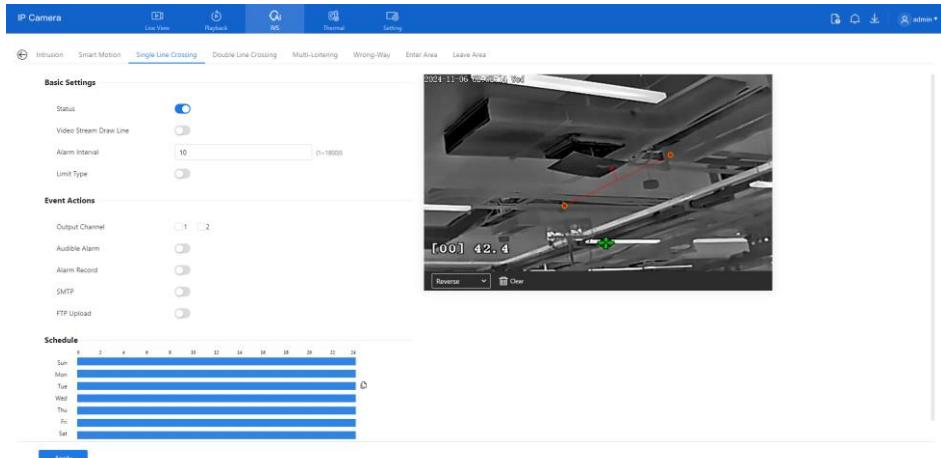
2.   Set all parameters of the Single Line Crossing as per Table 5-2.

3.   Set a deployment area.

Draw a line: Move the cursor to the drawing interface, hold down the left mouse button, and move the cursor to draw a line. When you release the left mouse button, a Single Line Crossing is generated.

Setting a Single Line Crossing: Click a line (and the trip line turns red) to select the Single Line Crossing and set its direction as Positive, Reverse, or Bidirectional, or delete the selected line. You can also press and hold the left mouse button at the endpoint of a Single Line Crossing and move the mouse to modify the position and length of this Single Line Crossing. You can right-click to delete the Single Line Crossing.

Figure 5-5 Set Single Line Crossing Line

📖 NOTE

° Try to draw the Single Line Crossing in the middle, because the recognition of a target takes time after the target appears on the screen, and an alarm is generated only when the object is recognized to have crossed the Single Line Crossing.

° The Single Line Crossing, which detects a person's foot as the recognition target, cannot be too short, because a short Single Line Crossing tends to miss targets.

4. For the set deployment time, please refer to Chapter 4.

5. Click **Apply** to save the settings.

  ----End

5.2.4 Double Line Crossing

Double Line Crossing refers to two lines that are set at a concerned special position within the field of view and specify the forbidden travel direction. When the targets of specified types (such as persons or vehicles) move along the set travel direction and cross these lines in a certain order (line 1 followed by line 2) within the pass max time, an alarm is generated.

Procedure

1. Navigate to **IVS > Intelligent Analysis** > **Double Line Crossing** to access the **Double Line Crossing** setting interface, as shown in Figure 5-6.

Figure 5-6 Double Line Crossing Setting Interface
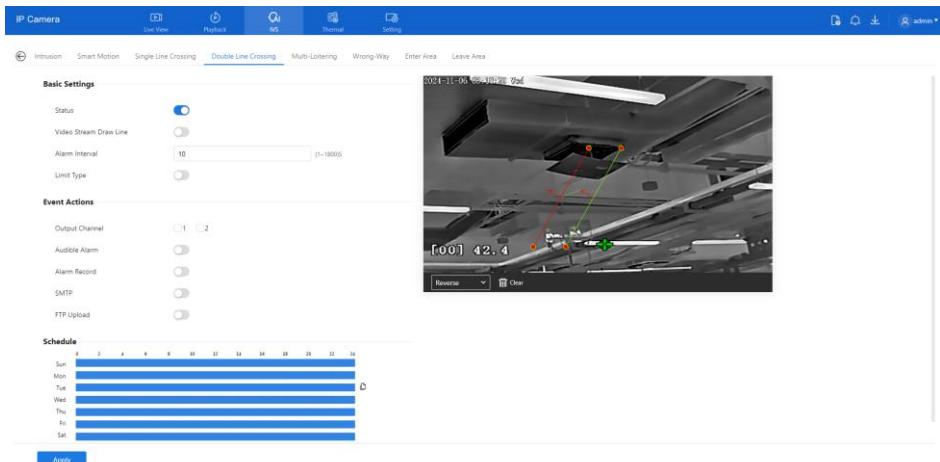
2.   Set all parameters of the Double Line Crossing. Please refer to *Chapter 5.2.1*

3.   Set a deployment area.

Draw a line: Move the cursor to the drawing interface, hold down the left mouse button, and move the cursor to draw two lines. When you release the left mouse button, two numbered virtual fences are generated. Choose either of the Double Line Crossing to set the direction to Positive or Reverse.

Set Double Line Crossing: Click one of the Double Line Crossing (and the virtual fence turns red) to select this virtual fence and set the direction to **Positive** or **Reverse**, or delete the selected line. You can also press and hold the left mouse button at the endpoint of a virtual fence and move the mouse to modify the position and length of this virtual fence. You can right-click to delete the Double Line Crossing.

📖 NOTE

- ° The two lines are in sequential order. An alarm is generated only when a target crosses virtual fence 1 and then virtual fence 2 within the set maximum passing time.

- ° Try to draw a Double Line Crossing in the middle, because the recognition of a target takes time after the target appears on the screen, and an alarm is generated only when the object is recognized to have crossed the Double Line Crossing.

- ° The Double Line Crossing, which detects a person's foot as the recognition target, cannot be too short, because a short Double Line Crossing tends to miss targets.

4.   For the set deployment time, please refer to Chapter 4.

5.   Click **Apply** to save the settings.

----End

5.2.5 Multi-Loitering

Multi-loitering allows setting the shortest loitering time for multiple targets of the specified type (such as a person or vehicle) within the deployment area in the field of view. When the loitering time of the multiple targets within this area meets the set shortest loitering time, an alarm is generated.

Procedure

1. Navigate to **IVS** > **Intelligent Analysis** > **Multi-Loitering** to access the **Multi-Loitering** setting interface, as shown in Figure 5-7.

Figure 5-7 Multi-Loitering
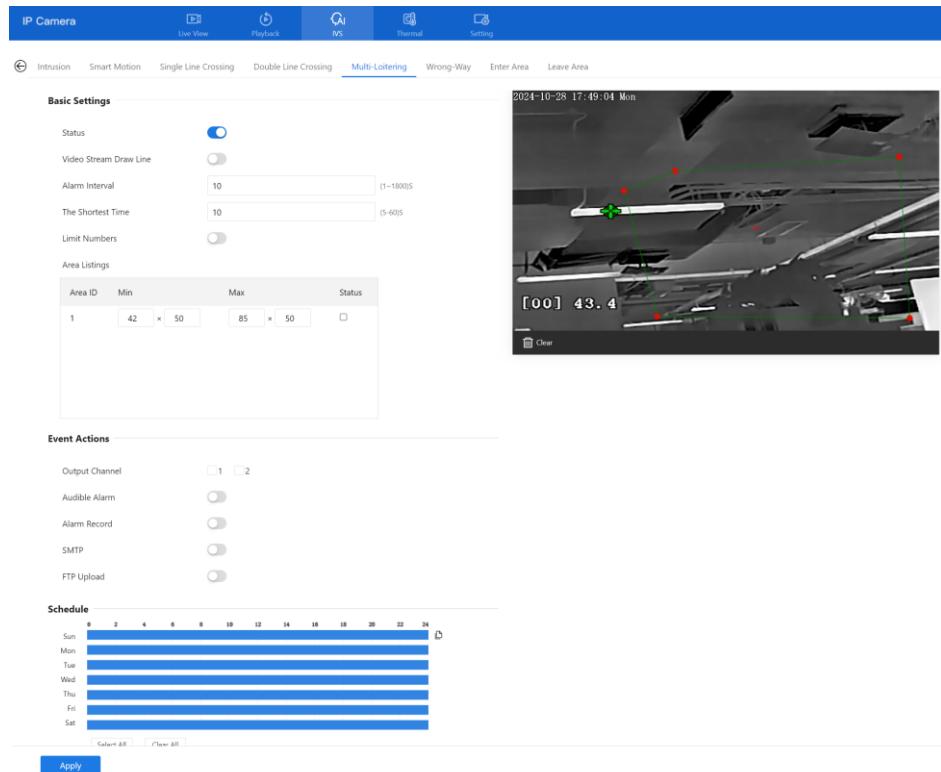
2. To set all parameters of multi-loitering, please refer to Chapter 5.2.1 .
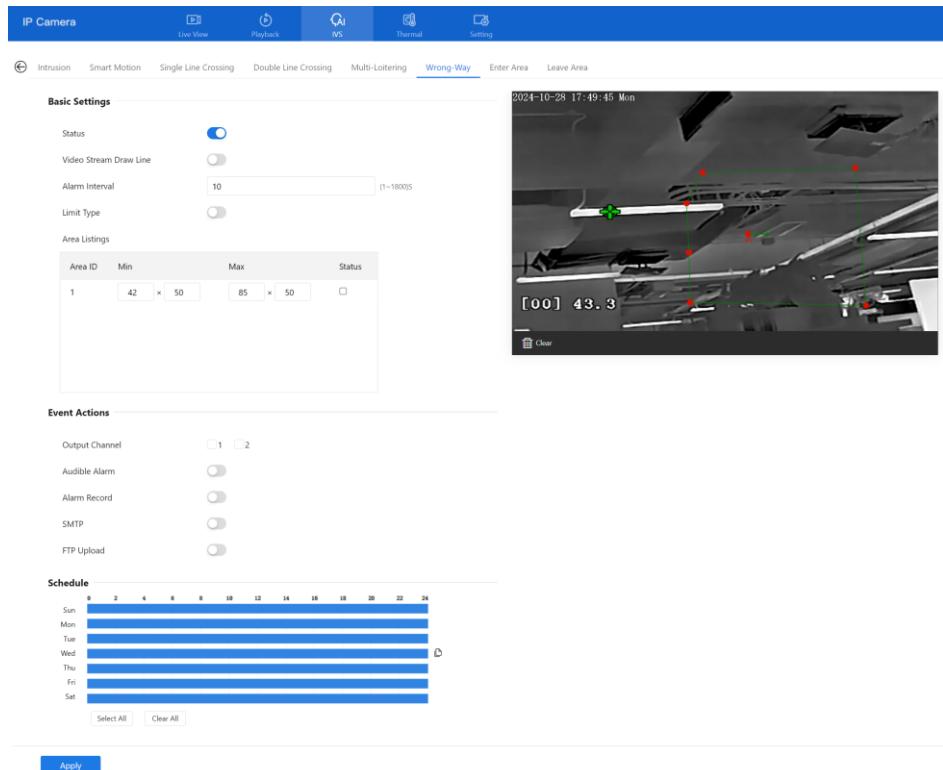
5.2.6 Wrong-Way

Wrong-way allows setting the travel direction criteria for a target within an area on the video screen.

If someone/something is moving in the opposite direction in an area, an alarm is generated.

Procedure

1. Navigate to **IVS** > **Intelligent Analysis** > **Wrong-Way** to access the **Wrong-Way** setting interface, as shown in Figure 5-8.

Figure 5-8 Wrong-Way

2. To set all parameters of wrong-way, please refer to *chapter 5.2.1*
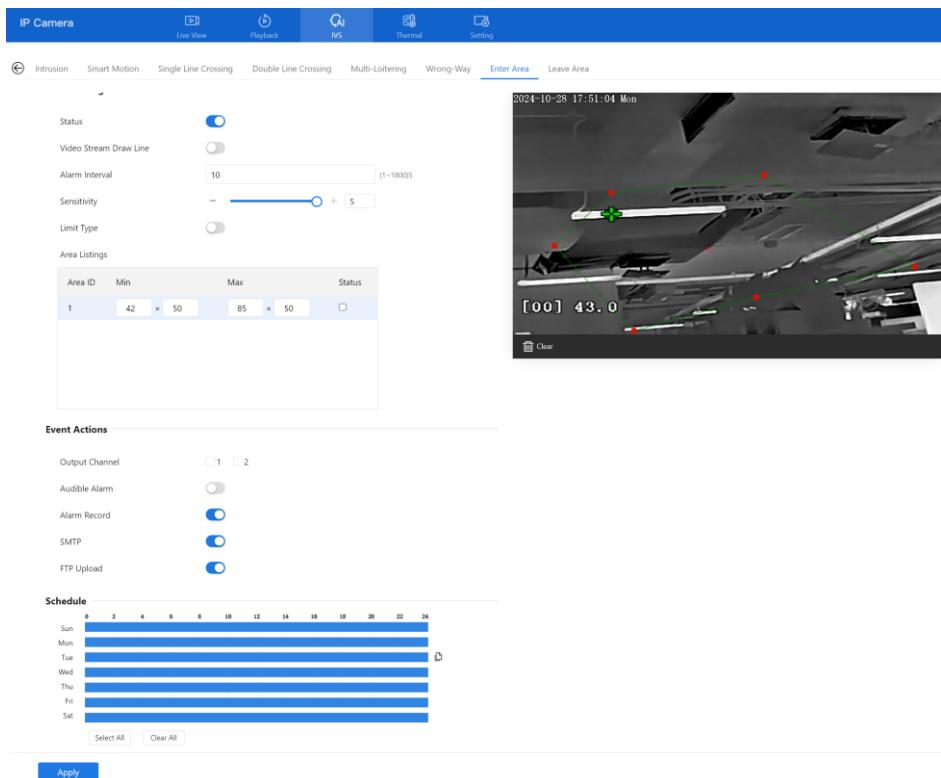
5.2.7 Enter Area

The enter area refers to an alarm generated when a target enters the deployment area at a valid time.

Procedure

1. Navigate to **IVS** > **Intelligent Analysis** > **Enter Area** to access the **Enter Area** setting interface, as shown in Figure 5-9.

Figure 5-9 Enter Area

2. To set all parameters of the entering area, please refer to *Chapter 5.2.1* .

5.2.8 Leave Area

The leave area refers to an alarm generated when a target leaves the deployment area at a valid time.

Procedure

1. Navigate to **IVS** > **Intelligent Analysis** > **Leave Area** to access the **Leave Area** setting interface, as shown in Figure 5-10.

Figure 5-10 Leave Area

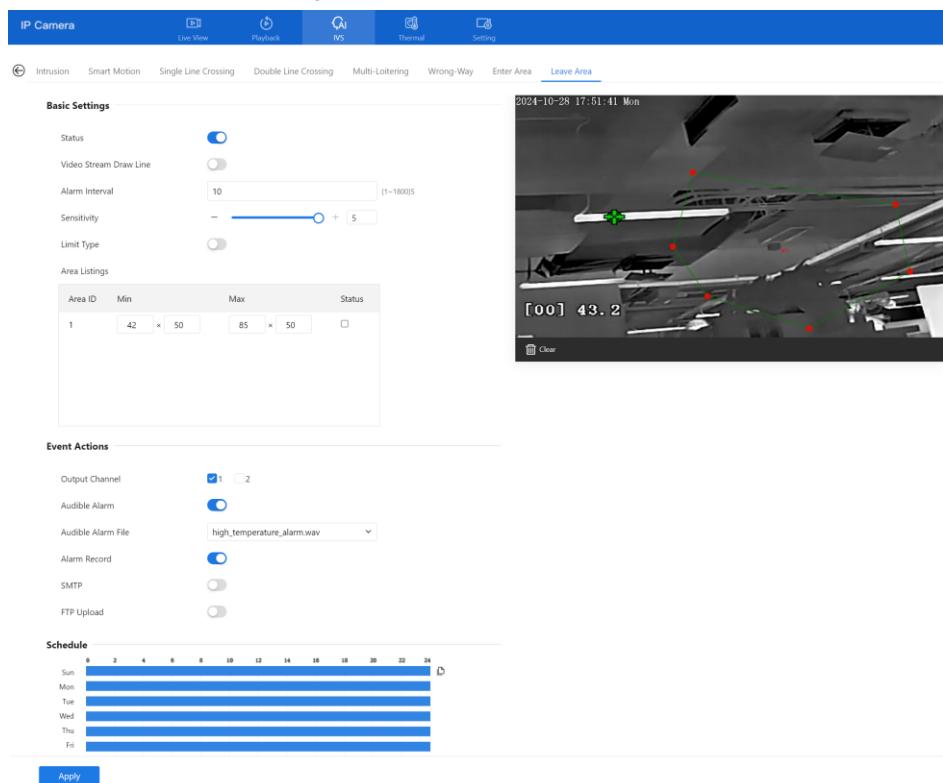2.   To set all parameters of the leaving area, please refer to Chapter 5.2.1

5.2.9 General Parameters

The target filtering is intended to improve detection accuracy; an alarm will only be triggered when the target meets the condition. It is for all intelligent analysis actions.

Figure 5-11 General parameters
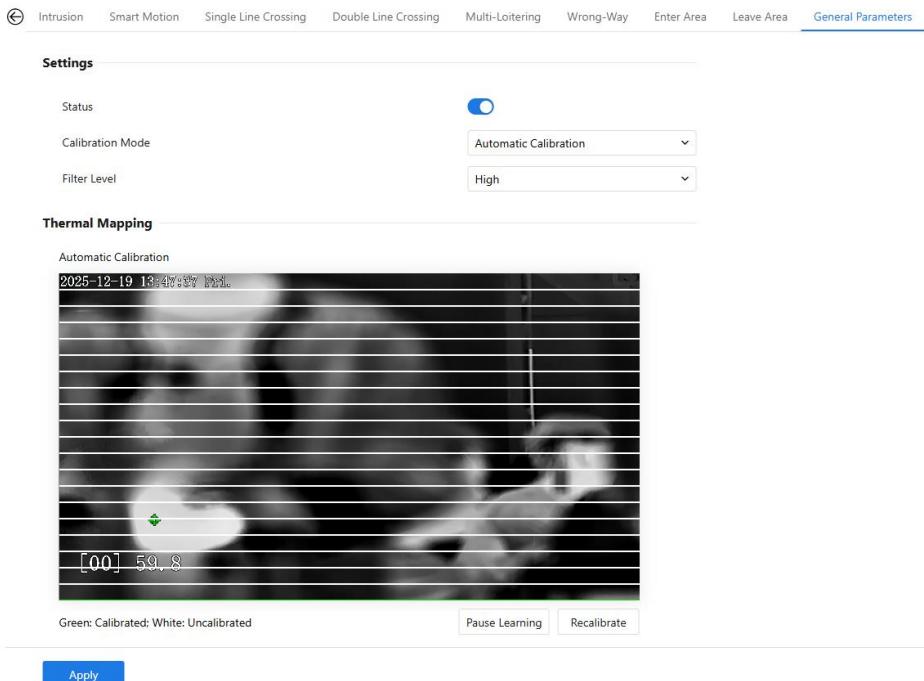
To enable **Target Filtering**, turn on the status and set the **Calibration Mode** to **Automatic Calibration**.

The Filter Level can be set to High, Middle, or Low. The filter level has two functions: it affects the calibration and the accuracy of target detection.

When using Automatic Calibration, choose the filter level and click "Continue Learning" to start calibration.

During calibration, the calibrator must go back and forth from far to near until calibration is complete (only one person should be in the frame at a time, as multiple people will affect accuracy). The algorithm automatically calculates the calibrator's height at each distance. Calibration is based on the bottom edge of the human-shaped frame, therefore the top line in the frame generally won't turn green. There is no notification of calibration completion; you must determine whether calibration is complete by observing when the lines turn green.

Filter Level	Calibration	Detection
Low	8 green lines	The height of the target is 0.3 ~ 1.7 times the height of the calibrator, which can be detected; otherwise will be filtered.
Middle	11 green lines	The height of the target is 0.65 ~ 1.35 times of the calibrator, which can be detected; otherwise will be filtered.
High	14 green lines	The height of the target is 0.8 ~ 1.2 times the height of the calibrator, which can be detected; otherwise will be filtered.

When a target is detected, its height is compared against the calibrated target height. Targets with excessive height discrepancies are filtered out to reduce potential false alarms. Filtered target boxes turn red, and this one do not trigger alarms.

5.3 Environmental Safety Analysis

At the advanced environmental Safety Analysis interface, users can set the parameters of smoking detection, smoke and flame detection, and fire spot detection. Enable the linkage actions, and the alarm information can be sent to the user through the linkage.

5.3.1 Smoking Detection

The smoking detection function refers to that an alarm is generated when someone is smoking or generating a spark in the deployment area.

Procedure

1. Navigate to **IVS** > **Environmental Analysis** > **Smoking Detection** to access the **Smoking Detection** interface, as shown in Figure 5-12.

Figure 5-12 Smoking detection interface
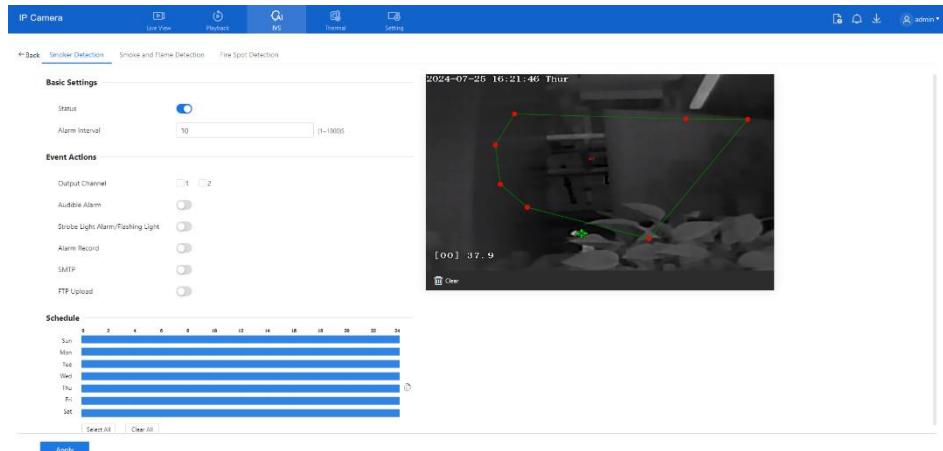
2. To set all parameters of smoking detection, please refer to Chapter 5.2.1

5.3.2 Fire Spot Detection

Description

The fire spot detection function refers to that an alarm is generated when something is on fire in the deployment area.

Procedure

1. Select **IVS** > **Environmental Analysis** > **Fire Spot Detection** to access the **Fire Spot Detection** interface, as shown in Figure 5-13

Figure 5-13 Fire spot detection interface
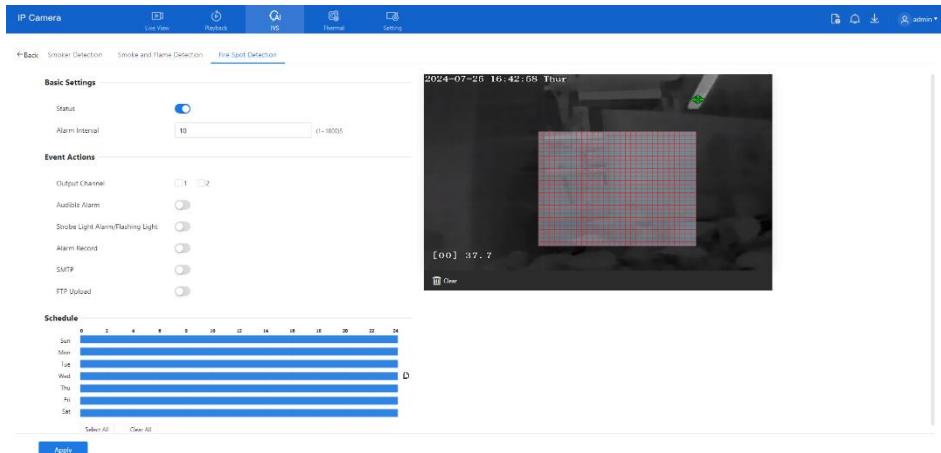
2. Set all parameters of Fire Spot Detection, please see chapter 5.2.1
3. Set a deployment area.

Use the mouse to draw a rectangular area; you can set several areas to deploy, as shown in Figure 5-14.

Figure 5-14 Set deployment area
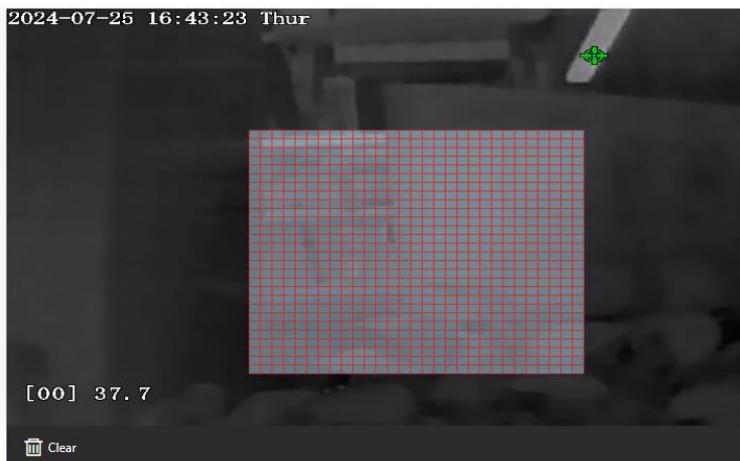
4. For the set deployment time, please refer to Chapter 4.

5. Click **Apply** to save the settings.

---End

5.4 People Counting

Users can draw a line to count the number of people in the special area.

5.4.1 Set

Procedure

1. Navigate to **IVS** > **People Counting > Set** to access the **People Counting** setting interface, as shown in Figure 5-15.

Figure 5-15 People counting

2. Set all parameters of People Counting as per Table 5-3.

Table 5-3 Parameters of people counting

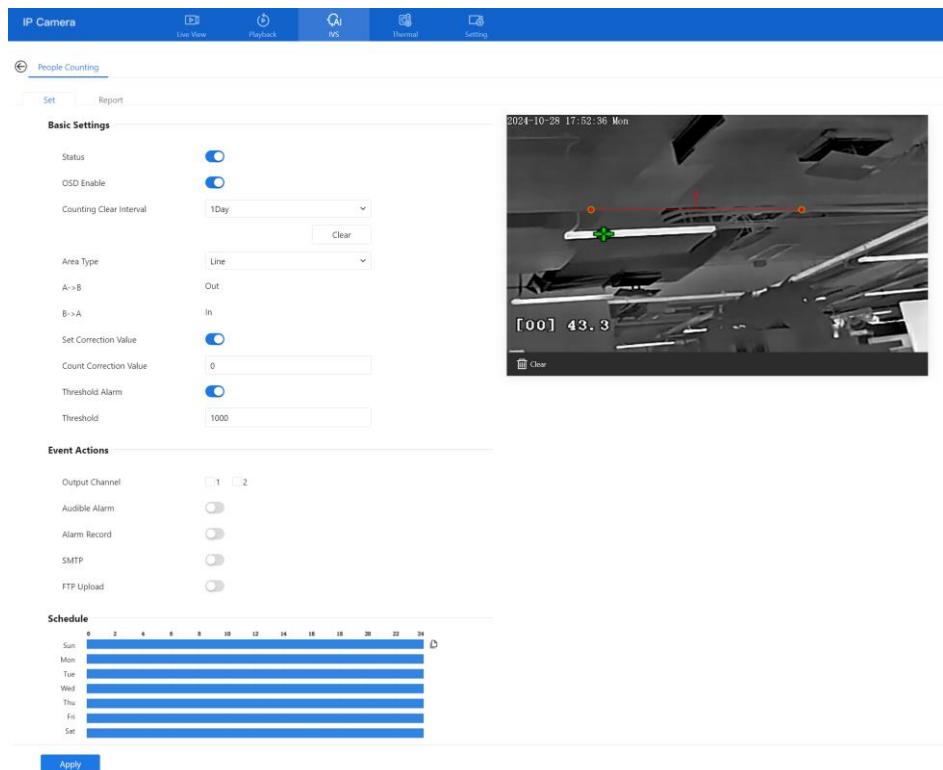| Parameter	Description	Setting
Status	Enable the button to enable the alarm.	[How to set] Click the button to enable. [Default value] **OFF**
OSD Enable	Enable the OSD, and the count data will show on the live video screen.	[How to set] Click Enable to enable. [Default value] **OFF**
Counting Clear Interval	The camera will clear the counting data at the setting interval. Click the "Clear Counting", clearing the data immediately.	[How to set] Choose from the drop-down list. [Default value] **1 Day**
Area Type	Draw a line on the live video screen. The labels A and B indicate out and in.	[How to set] Choose from the drop-down list. [Default value] **Line**
Set Correction Value	Enable and set the count correction value; it can be positive or negative. For example, if 30 people are entering the area before counting, input 30 to correct. If 30 people go out of the area, input -30.	[How to set] Enable /Input a value in the area box. [Default value] **0**
Threshold Alarm	Enable, when the counting number reaches the threshold value, an alarm is triggered.	[How to set] Click Enable to enable. [Default value] **OFF**
Threshold	The threshold for enabling the alarm.	[How to set] Enable /Input a value in the area box. [Default value] **1000**
Output Channel	If you check to set the Output Channel and the device is connected to an external alarm indicator, the alarm indicator signals when an alarm is triggered.	[How to set] Click to select an ID.

Parameter	Description	Setting
Audible alarm	Enable so that when an alarm occurs, it will play audio for the alarm. Choose the audible alarm file (set at the "**Configuration > Alarm > Audible Alarm Output**").	[How to set] Click to enable the Audible alarm [Default value] **OFF**
SMTP	Enable the button to enable the SMTP server. The parameters of SMTP can be set at **Configuration > Network Service > SMTP** interface.	[How to set] Click to enable SMTP. [Default value] **OFF**
FTP Upload	Enable the button to enable File Transfer Protocol. The parameters of FTP can be set at **Configuration > Network Service > FTP** interface.	[How to set] Click to enable FTP Upload. [Default value] **OFF**

3.   Set a deployment area.

Move the cursor to the drawing interface and click to generate a point, move the cursor to draw a line, and then click to generate another point. This is how a line is generated. In this way, continue to draw lines to form any shape, and right-click to finish the drawing.

4.   Set deployment time.

5.   Click **Apply** to save the settings.

----End

5.4.2 Report

At the people counting report interface, you can view the data of people counting by setting the query condition (choose the detailed time in the date's pop-up window). There are three modes to show the data, such as line chart, histogram, and list, as shown in Figure 5-16.

Figure 5-16 Report of people counting
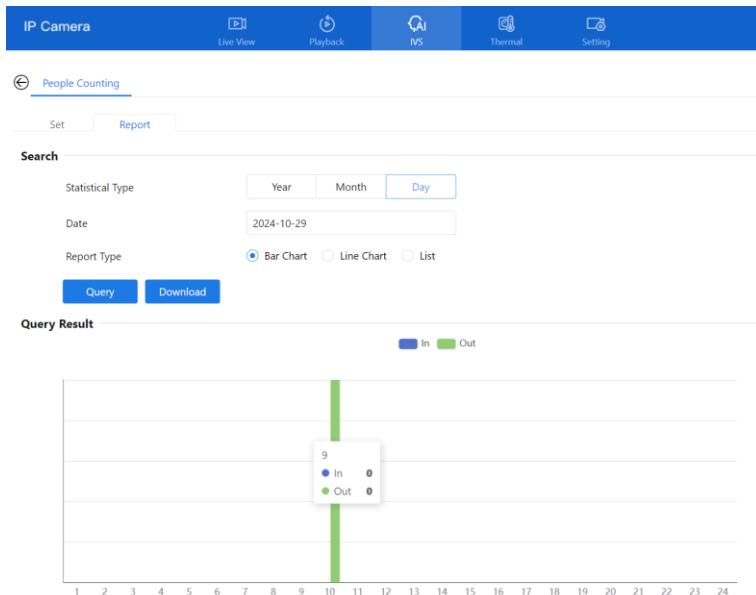
Navigate to **IVS** > **People Counting > Report**

- Click "Download" to download the query result.
- Choose the mode of showing results, such as a line chart, histogram, or list.
- Click "Query" to query the data on people counting.
- The data result can be saved to the local folder.

----End

A Troubleshooting

Common Trouble	Possible Cause	Solution
Unable to access the web	The network is not connected.	• Connect the network cable of the camera to the PC to check whether the network cable is in good contact. • Run the ping command to check the network connection and whether the device works normally.
	The IP address is occupied.	Directly connect the camera to the PC, and reset the IP address of the camera.
	The IP addresses of the PC and the device are in different networks.	Check the IP address, subnet mask, and gateway settings of the camera.
The measured temperature is not accurate.	The device is just powered on, and the temperature of the cavity is unstable.	The temperature of the cavity is stable within 15 to 30 minutes after the device is powered on.
	The FFC mode is incorrect.	The FFC default mode is automatic. If the mode is set to manual, there will be no block calibration, which may lead to fuzzy pictures and inaccurate temperature.
	The target configuration is incorrect.	Check whether the emission rate and distance of the target are configured correctly.
An error occurs in accessing the web of the device after the upgrade.	The data in the cache of browser cache is not updated in time.	Delete the cache of the browser cache. The steps are as follows: 1. Press **Ctrl** + **Shift** + **Delete**, and the pop-up window shows the **Clear browsing data** dialog box. 2. Select all check boxes. 3. Click Clear now. 4. Re-log in to the web page of the camera.
Upgrade failed.	No network cable is connected. The network setting is incorrect.	Ensure the upgrade network is connected. Check whether the network settings are correct.

Common Trouble	Possible Cause	Solution
	The upgrade package is incorrect.	Perform the correct upgrade package again.

B Common Emission Rate

Emission Rate
The emission rate is the capability of an object to emit or absorb energy. An ideal transmitter provides an emission rate of emitting 100% of the intake energy. An object with an emission rate of 0.8 can absorb 80% of the intake energy and reflect the remaining 20%. The emission rate is the ratio of the energy emitted by an object at a specific temperature to that emitted by an ideal radiator at the same temperature. The range of emission rate values is 0.0 to 1.0 generally.

Materials	Temperature (℃/℉)	Emissivity
Gold (High-purity)	227/440	0.02
Aluminum foil	27/81	0.04
Aluminum sheet	27/81	0.18
Aluminum used for families (flat)	23/73	0.01
Aluminum plate (98.3% purity)	227/440	0.04
	577/1070	0.06
Aluminum plate (rough)	26/78	0.06
Aluminum (oxidized @ 599℃)	199/390	0.11
	599/1110	0.19
Polished aluminum	38/100	0.22
Tin (light tinned Iron sheet)	25/77	0.04
Nickel wire	187/368	0.1
Lead (99.9% purity, No oxidized)	127/260	0.06
Copper	199/390	0.18
Cobalt	599/1110	0.19

Steel	199/390	0.52
	599/1110	0.57
Tinned iron sheet (Light)	28/82	0.23
Brass(High-polish)	247/476	0.03
Brass (Tough rolled, polished metal wire)	21/70	0.04
Tinned Iron (Light)	-	0.13
Iron plate (Rust-eaten)	20/68	0.69
Rolled steel sheet	21/71	0.66
Ferric oxide	100/212	0.74
Wrought-iron	21/70	0.94
Fused iron	1299-1399/3270-2550	0.29
Copper (Polished)	21-117/70-242	0.02
Copper(Polished, not reflected)	22/72	0.07
Copper (Heavy oxide Board)	25/77	0.78
Enamel (Fuse on iron)	19/66	0.9
Formica Plate	27/81	0.94
Frozen soil	-	0.93
Brick (Red, rough)	21/70	0.93
Brick (Unglazed, rough)	1000/1832	0.8
Carbon (T - carbon 0.9% ash)	127/260	0.81
Concrete	-	0.94
Glass (Glossy)	22/72	0.94

Granite (Surfaced)	21/70	0.85
Ice	0/32	0.97
Marble (I Polished, grey)	22/72	0.93
Asbestos board	23/74	0.96
Asbestos paper	38/100	0.93
	371/700	0.95
Asphalt (Paving the road)	4/39	0.97
Paper (Black tar)	-	0.93
Paper (White)	-	0.95
Plastic (White)	-	0.91

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