OPT®
Machine Vision

L1 Series 10 Gigabit Ethernet Industrial Linear Scan Camera Manual

V2.1.0

Foreword

Overview

This article provides a brief overview of 10 Gigabit Ethernet line scan industrial cameras, including product introduction, networking, basic parameters, and quick operation of the application software.

Symbol Conventions

The following symbols may appear in this article, and their meanings are as follows:

logo	illustrate
 危险	This indicates a high potential danger that, if not avoided, could lead to casualties or serious injury.
 警告	This indicates a moderate or low potential hazard that, if not avoided, could result in minor or moderate injury.
 注意	This indicates a potential risk; ignoring this text could result in device damage, data loss, reduced device performance, or unpredictable consequences.
 防静电	This refers to equipment that is sensitive to static electricity.
 当心触电	This indicates a high-voltage hazard.
 激光辐射	This indicates strong laser radiation.
 风扇警告	This indicates a dangerous moving part; please keep away from the moving fan blades.
 当心机械伤人	This indicates that a mechanical part of the equipment caused injury.
 窍门	It means that it can help you solve a problem or save you time.
 说明	This indicates additional information to the main text, emphasizing and supplementing it.

Safety Precautions

警告

- During the installation and use of the product, all national and regional electrical safety regulations must be strictly observed.
- Please use a power adapter provided by a reputable manufacturer. For specific requirements of the power adapter, please refer to the product specification sheet.
- To reduce the risk of fire or electric shock, do not expose the product to rain or moisture.
- Easy-to-use power disconnect devices should be incorporated into the building's wiring installation.
- When installing in the usage environment, ensure that the product is securely fixed.
- If the product malfunctions, please contact the nearest service center. Do not disassemble or modify the product in any way.
- (Our company assumes no responsibility for any problems caused by unauthorized modifications or repairs.)

注意

- Avoid installing the product in environments with vibration or shock, and keep it away from locations with electromagnetic interference. (Ignoring this may damage the product.)
- Do not touch the heat dissipation components of the product directly to avoid burns.
- Do not install indoor products in environments where they may come into contact with water or other liquids.
- Do not use the product in extremely hot, extremely cold, dusty, corrosive, or high humidity environments. Please refer to the product's parameter table for specific temperature and humidity requirements.
- Avoid pointing the lens at strong light (such as artificial lighting, sunlight, or laser beams), as this may damage the image sensor.
- Do not touch the image sensor directly. If cleaning is necessary, gently wipe away dust and dirt with a soft, clean cloth slightly dampened with alcohol. When the product is not in use, please put on the dust cover to protect the image sensor.
- Please keep all original packaging materials for the camera. In case of any problems, you can use these materials to properly pack the camera and send it to the authorized dealer or return it to the manufacturer. Our company is not responsible for any accidental damage during transportation caused by materials not in the original packaging.

说明

Requirements for the qualifications of installation and maintenance personnel:

- Possess a qualification certificate or experience in the installation and maintenance of low-voltage systems, and have relevant work experience and qualifications. In addition, you must have the following knowledge and operational skills.
- Possess basic knowledge and operational skills in low-voltage wiring and low-voltage electronic circuit connection.
- Have the ability to understand the contents of this manual.

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Chapter 1 Product Overview

1.1. Product Introduction

The 10 Gigabit Ethernet line scan industrial camera is a highly reliable and cost-effective line scan industrial camera. It uses a high-performance image sensor and transmits uncompressed image data in real time via 10 Gigabit Ethernet, making it compatible with any compliant...Application development tools based on the GigE Vision and GenICam standards, with a maximum transmission rate of 10Gb/s, can meet the transmission rate requirements of most industrial applications and can work stably in various harsh environments.

picture1-1 Product Appearance

1.2. Features

- The maximum transmission distance of a 10 Gigabit Ethernet interface can reach...100m.
- It supports multiple modes such as software triggering, hardware triggering, hybrid software and hardware triggering, and free acquisition.
- Supports gamma correction, lookup table, black level correction, brightness, contrast, etc.ISP functionality.
- The color camera supports interpolation, white balance, color conversion matrix, chroma, saturation, etc.
- Supports output of various image data formats, ROI, mirror, etc.
- conform toGigE Vision 2.0 protocol and GenICam standard.
- supportDC 12V~24V power supply.
- conform toEMC and RoHS certified.

1.3. Typical network topology

The most typical networking method for industrial cameras is point-to-point connection, which means that no other network medium is needed between the host and the industrial camera; a network cable is sufficient.

A single host computer can also connect to multiple industrial cameras through

multiple network ports or switches, as shown in the figure below.

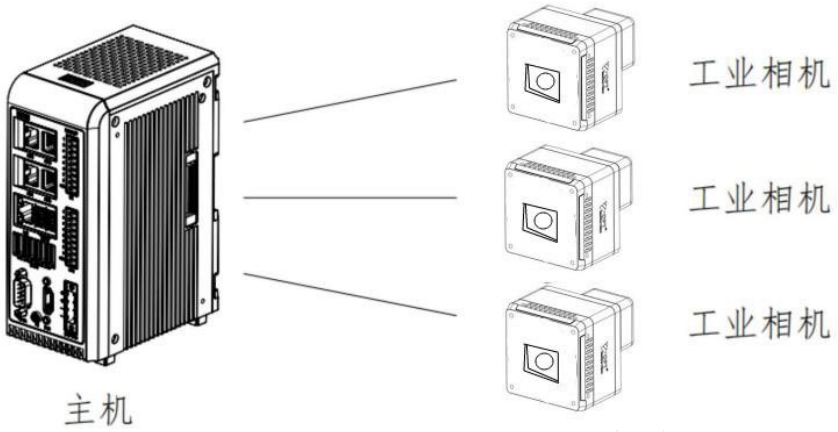


Figure 1-2 Typical networking method

1.4. Environmental requirements

The environmental requirements for 10 Gigabit Ethernet line scan industrial cameras are as follows:

- Temperature and humidity
  The ambient temperature should not exceedIdeally, it should operate at 50℃ in an air-conditioned environment.
  - Operating temperature of the outer casing: 0℃～60℃.
  - Ambient humidity during operation: 20%～80% without condensation.
  - Storage temperature: -30℃～+80℃.
  - Storage humidity: 20%～80% without condensation.
- The equipment is installed indoors in a stable position with sufficient space for heat dissipation in all directions.
- Ensure adequate airflow.

Chapter 2 Interface Description

2.1. Camera structural dimensions

The product's structural dimensions are shown below:

Category 1: IncludesOPT-CL1-M4-XG3-01

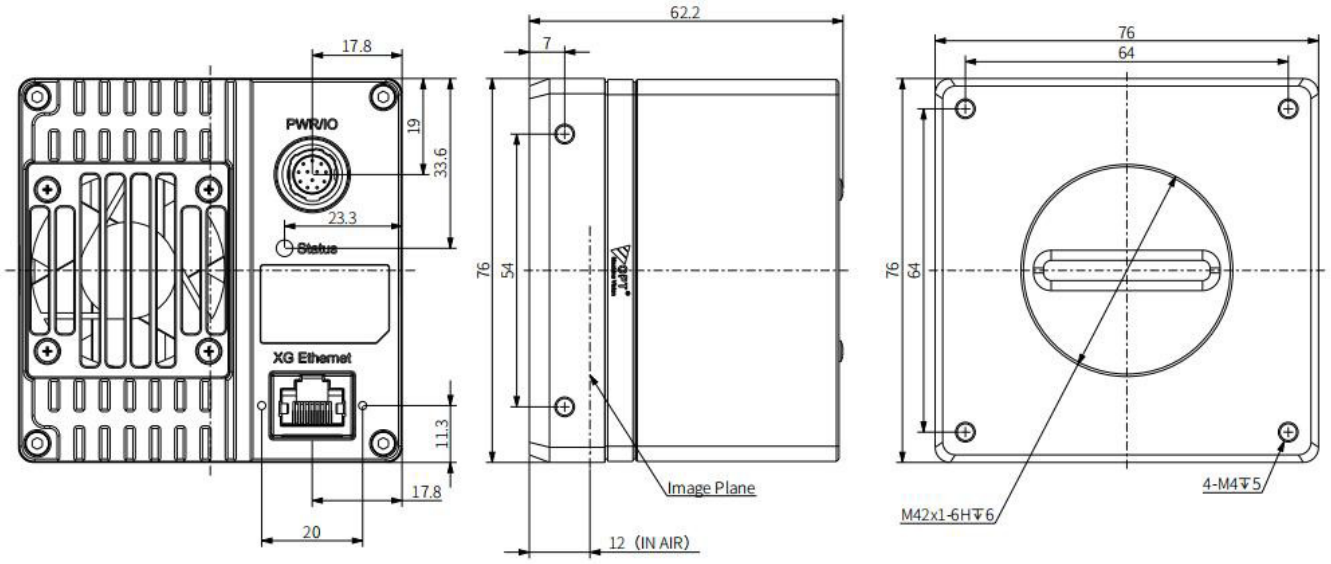


Figure 2-1 Dimensions of a 10 Gigabit Ethernet Linear Array Camera

Category Two: IncludesOPT-CL1-M8-XG3-01, OPT-CL1-M16-XG3-01

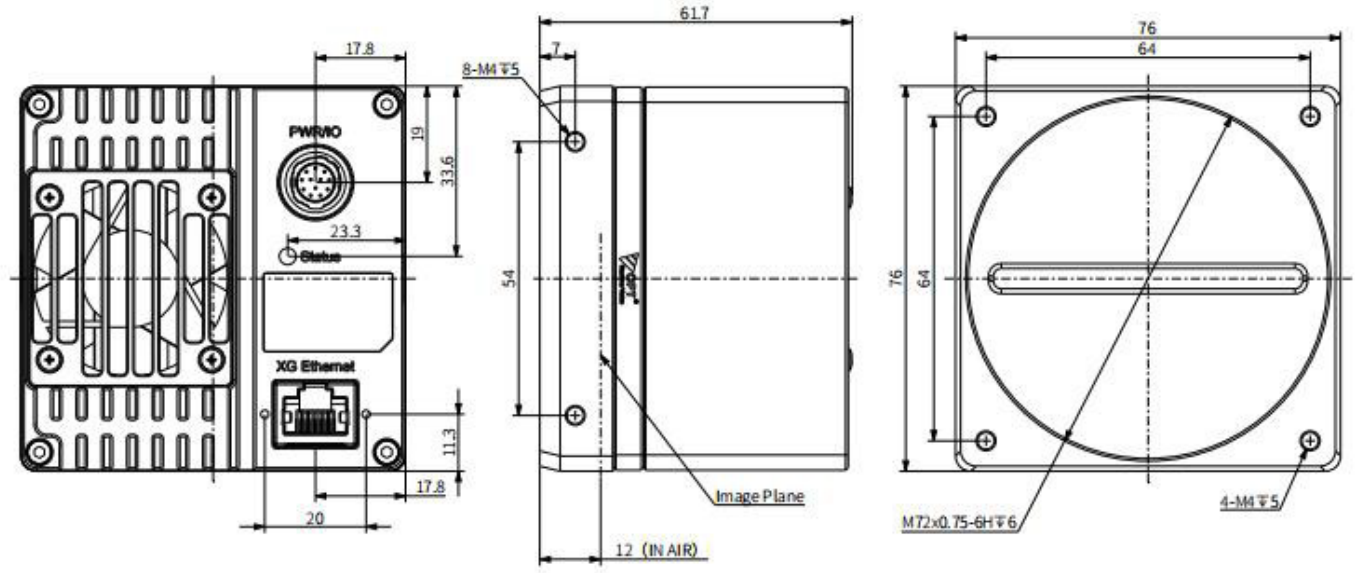


Figure 2-1 Dimensions of a 10 Gigabit Ethernet Linear Array Camera

2.2. Interface Description

The device has two interfaces on the back: a network interface and a...The 12-pin power and I/O interface is shown in the following figure:

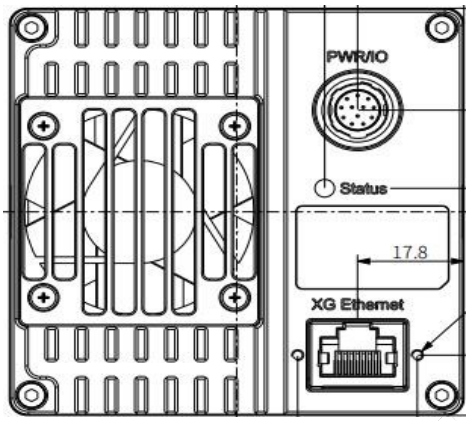


Figure 2-2 External Interface Diagram of a 10 Gigabit Ethernet Linear Array Camera

2.3. Network interface

Network interface, i.e.RJ45 network port, Ethernet 10000Mbps transmission interface, used for camera control and data transmission.

To ensure transmission quality, it is best to use shielded Cat6e twisted-pair cables to prevent excessive data retransmissions and packet loss.

2.4. 12-pin power and I/O interface

The pin signal definitions of the I/O interface are shown in Table 2-1.

Table 2-1 Pin Signal Definitions

pin	Signal	illustrate
1	GND	power ground
2	PWR	DC 12V~24V camera power supply
3	IN Line 1+	Encoder input Encoder A+
4	IN Line 1-	Encoder input Encoder A-
5	IN Line 2+	Encoder input Encoder B+
6	IN Line 2-	Encoder input Encoder B-
7	OUT GND	Optical isolation output ground
8	OUT Line 5	Optocoupler isolated output Line Out1
9	OUT Line 6	Optocoupler isolated output Line Out2
10	IN GND	Optical isolation input ground
11	IN Line 4	Optically isolated input Line2
12	IN Line 3	Optically isolated input Line1

The pin order and wiring definition for the 12-pin female connector (corresponding to the I/O interface) are shown below:

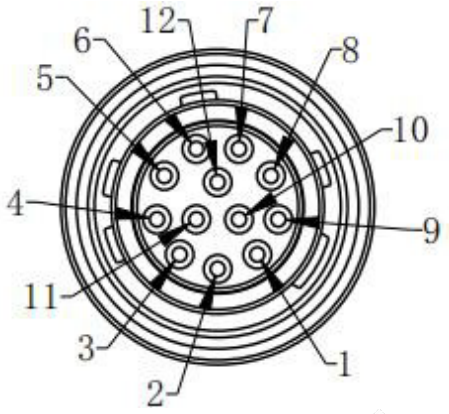


Figure 2-3 12-pin female connector pin order

Table 2-2 12-pin female connector wiring definition

pin	Signal	Line color
1	GND	Black
2	PWR	Red
3	IN Line 1+	white orange
4	IN Line 1-	Orange
5	IN Line 2-	Green
6	IN Line 2+	white green
7	OUT GND	white
8	OUT Line 5	white brown
9	OUT Line 6	Brown
10	IN GND	Grey
11	IN Line 4	Blue
12	IN Line 3	White and blue

2.4. Electrical Specifications

2.4.1. Power supply and network port electrical specifications

Table 2-3 Power Supply and Network Port Electrical Specifications

parameter	illustrate
Camera power specifications	DC +12V～+24V, <1% ripple, powered via the camera's 12-pin Hirose connector; At least26AWG cable.
EMI Standard	Radiation interference QP: 30-230MHz, 40dBuV/m@10m; 230-1000MHz, 47dBuV/m@10m; Conducted interference 0.15-0.5MHz, 79dBuV-QP; 66dBuV-AV; 0.5-30MHz, 73dBuV-QP; 60dBuV-AV;

EMS Standard	Electrostatic Discharge (ESD) Immunity (ESD) Contact Discharge: ±4kV Air discharge: ±8kV Electrically Fast Transmission (EFT) ±2kV Surge immunity ±2kV Conducted Susceptibility: 0.15-80MHz, 10V, 80% AM (1kHz) Radiated Susceptibility: 80-1000MHz, 10V/m; 1.4-2.0GHz, 3V/m; 2.0-2.7GHz, 1V/m;
EMC Standard	Class A

说明

- supportDC +12V～+24V external power supply.
- The power supply must meet the requirements.SELV and LPS specifications.

2.4.2. IO Interface Electrical Specifications

2.4.2.1. Optical isolation input

Table 2-4 Optocoupler Isolated Input

Input voltage	describe
30V	The input voltage must not exceed this limit; otherwise, it will cause the device to malfunction. Prepare for damage
DC 0～24V	I/O Input Safe Operating Voltage Range
DC 0～1.4V	Represents logic 0
DC >1.4V～2.2V	The input state is toggled here; the logic state is indeterminate within this voltage range.
DC >2.2V	Representation Logic 1

注意

isolationThe I/O input port can be filled with a current of 5mA to 15mA.

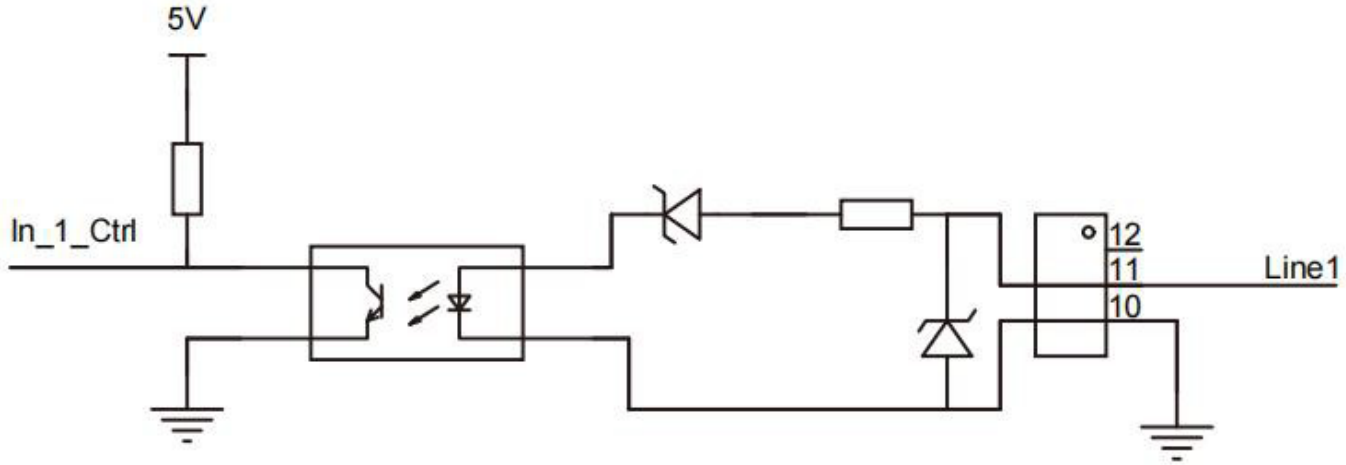


Figure 2-4 Frame Trigger Optical Coupler Isolated Input Circuit Diagram

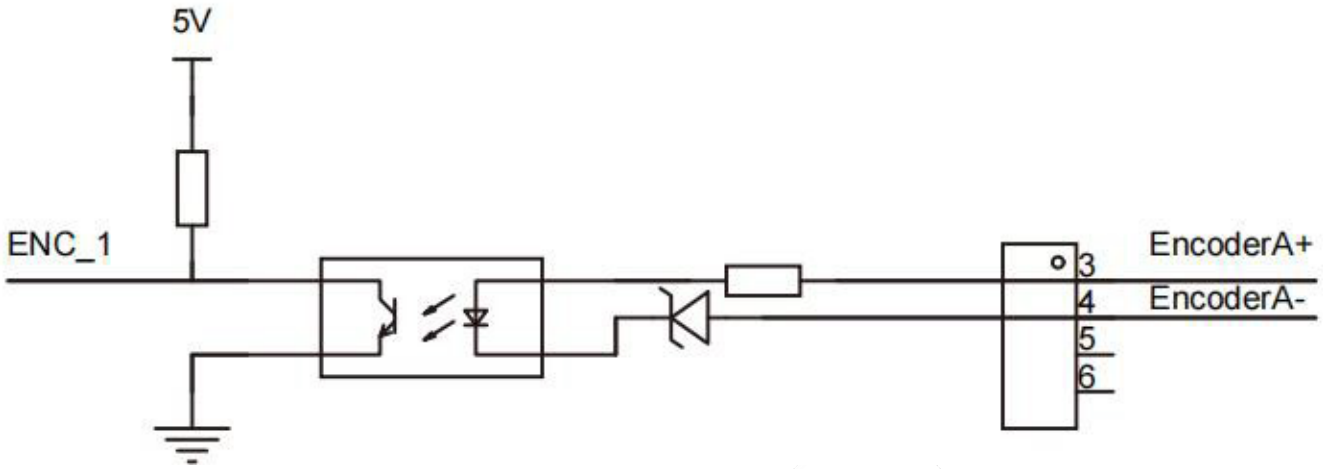


Figure 2-5 Encoder Optical Coupler Isolated Input Circuit Diagram

2.4.2.2. Optocoupler isolated output

Table 2-5 Optocoupler Isolated Output

Voltage	describe
DC 30V	The input voltage must not exceed this limit; otherwise, it will cause the device to malfunction. Prepare for damage
DC < 3.3V	I/O output may be incorrect.
DC 3.3V～+24V	I/O output safe operating range

注意

isolationThe I/O output port can continuously carry a maximum current of 50mA.

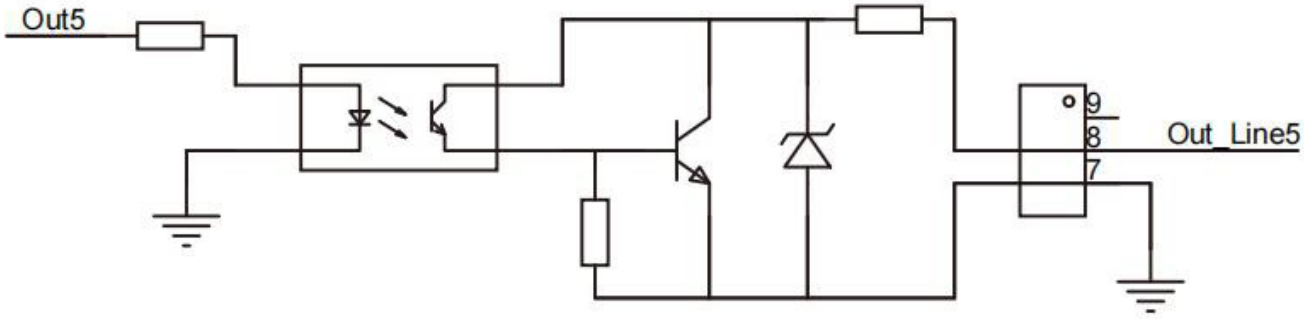


Figure 2-6 Optocoupler isolated output circuit diagram

2.5. Camera wiring diagram

2.5.1. Frame-triggered optocoupler isolated input

The camera's input is connected to the optically isolated output of the load's frame signal.

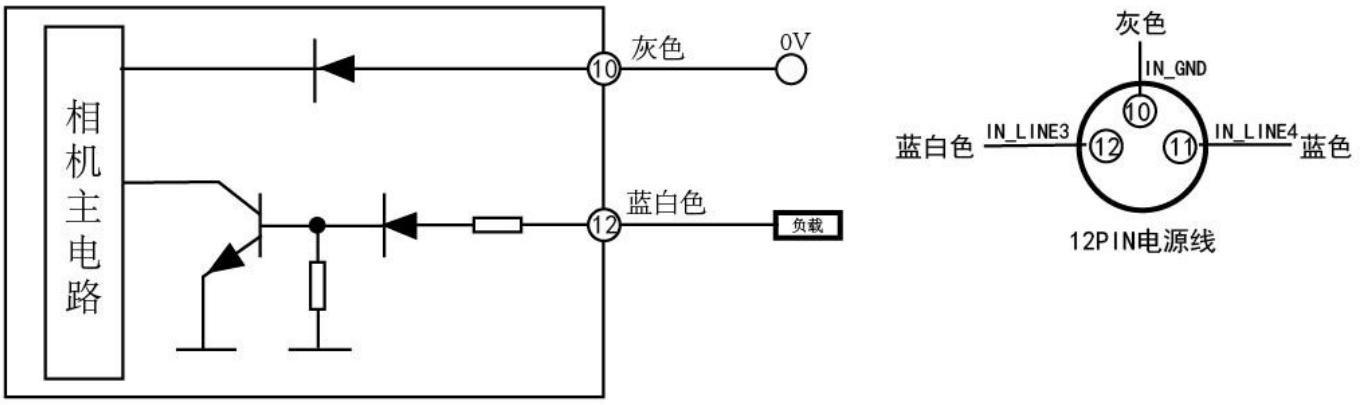


Figure 2-7 Wiring diagram of frame trigger optocoupler isolated input

2.5.2. Encoder trigger optocoupler isolated input

The camera's encoder input is connected to the optocoupler-isolated output of the load's encoder signal.

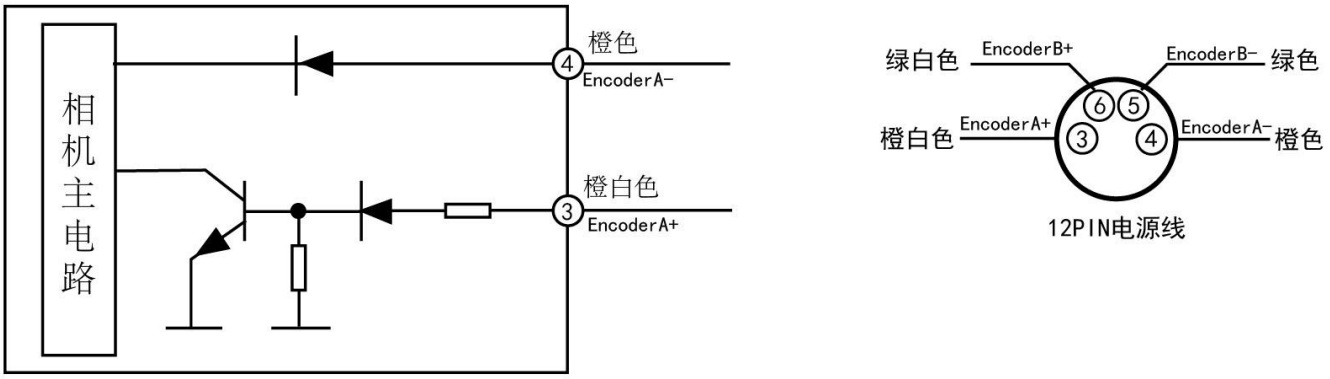


Figure 2-8 Encoder trigger optocoupler isolated input wiring diagram

2.5.3. Optocoupler isolated output

The camera's optically isolated output signal is connected to the load input, and the connection method is divided into:NPN type load and PNP type load.

NPN

输出电路接线图

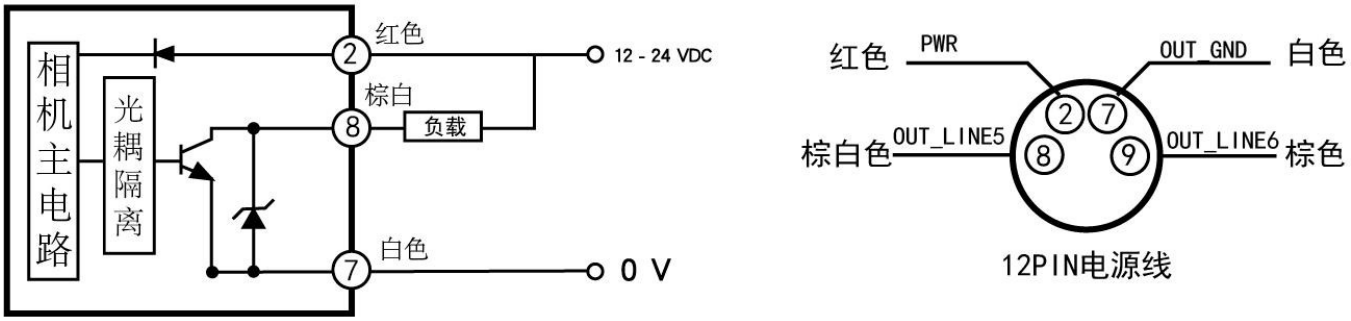


Figure 2-9 Wiring diagram of optocoupler isolated output load NPN

PNP
输出电路接线图

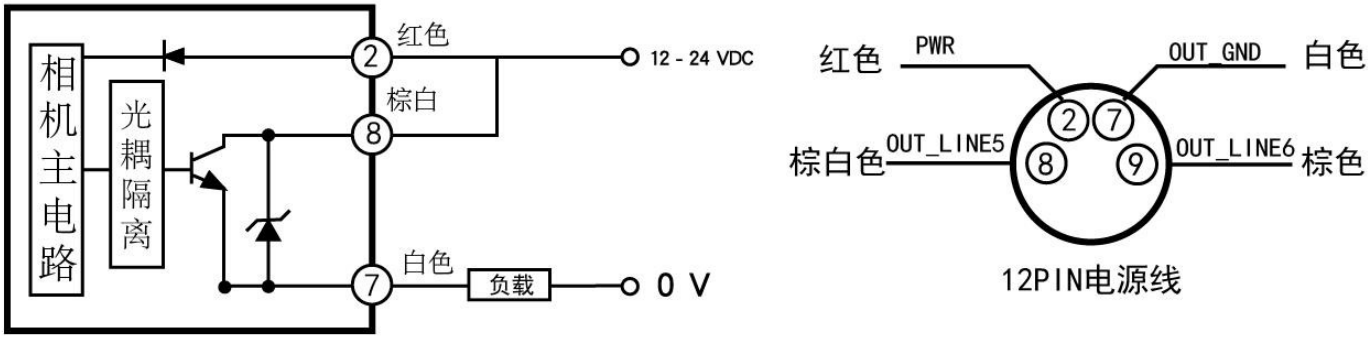


Figure 2-10 Wiring diagram of optocoupler isolated output load PNP

2.6. Status indicator lights

equipmentThe status indicator lights are described in Table 2-8.

surface2-8Indicator light description

● Color and condition	● Schematic diagram	● illustrate
closure		The device is not powered.
Orange light		System startup
Green flash at least1 second		Link detection in progress
Green light flashing slowly		The device and host have established a connection, waiting for the camera to connect or the camera to capture images.
Orange light flashing slowly		The device is in data acquisition trigger mode and is waiting to be triggered.
Orange and green lights flash alternately.		The device is in trigger-based acquisition mode and the camera receives a trigger to acquire images.
Green light always on		The device is in free acquisition mode, acquiring images in...

Chapter 3 Product Installation

Installation is mainly divided into hardware installation and application installation.

3.1. Hardware installation

Before installation, please check the equipment for any obvious damage and confirm that it matches the list of accessories.

1. Fix the camera in the mounting position and select a suitable lens to mount on the camera.
2. Connect the camera and the 10 Gigabit Ethernet card using a 10 Gigabit fiber optic cable (we recommend using the 10 Gigabit Ethernet card recommended by our company).
3. Choose any of the following power supply methods.

Direct power supply: Use a 12-pin power I/O cable and connect it to the appropriate power adapter according to the correct wiring method. See the I/O interface definition.1.4 Power Supply and I/O Interface Definitions.

12V power adapter: Use the 12PIN dedicated power cable provided by our company. This power cable is a 2-pin straight-through power cable. Refer to the adapter datasheet for the wiring sequence.

3.2. Application installation

The steps to install the application on the host are as follows:

说明

Please contact the relevant technical support personnel to obtain the application installation package.

1. Open the software and double-click the desktop shortcut. 

Open the application installation package.
2. If the driver has been installed previously, a pop-up window will appear as shown in the image.In window 3-1, confirm whether to automatically uninstall and reinstall as needed. If you click Yes, the uninstallation will begin.

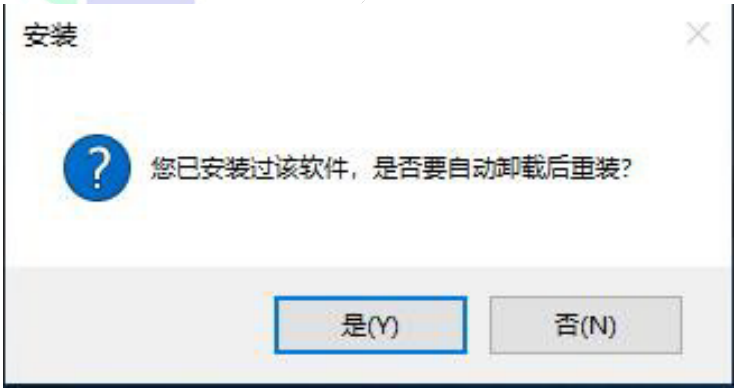


Figure 3-1 Uninstallation Preparation Window

3. The uninstallation/installation window appears as shown in the image.As shown in 3-2,

wait for the uninstallation (if the driver has not been installed before, steps 2 and 3 are unnecessary).

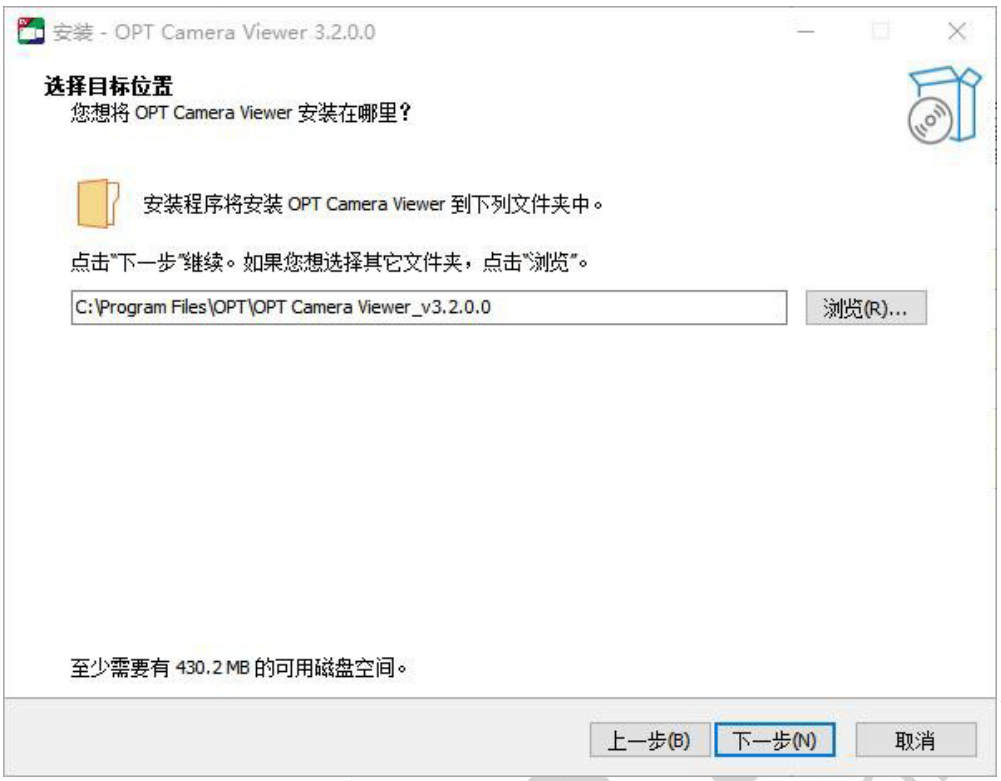
picture3-2 Uninstall Window

4. After uninstallation is complete, proceed directly to the installation process. A license agreement window will pop up as shown in Figure 3-3. After carefully reading the license agreement and confirming your agreement to the license terms, click the Next button to continue the installation process.

picture3-3 Preparing the Installation Window

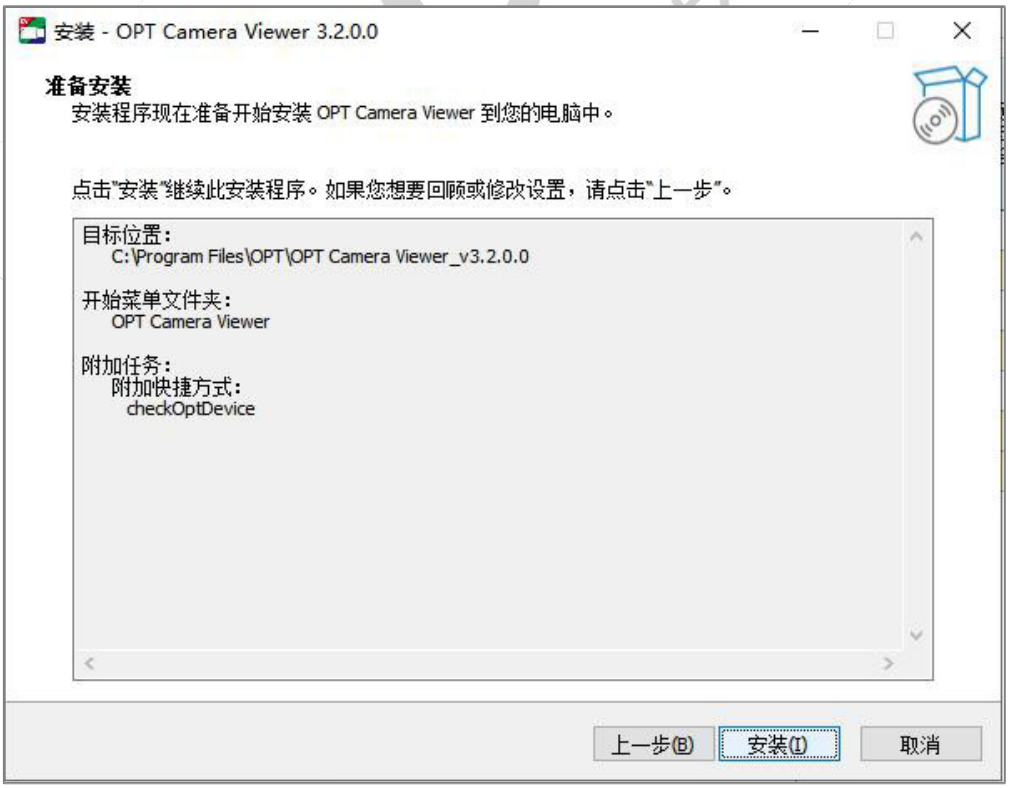
5. The installation folder window will appear as shown in Figure 3-4. Select the

software installation path (the default path is: C:\Program Files).
(Click on \OPT\OPTCameraViewer Demo) and click the Next button to continue the installation process.



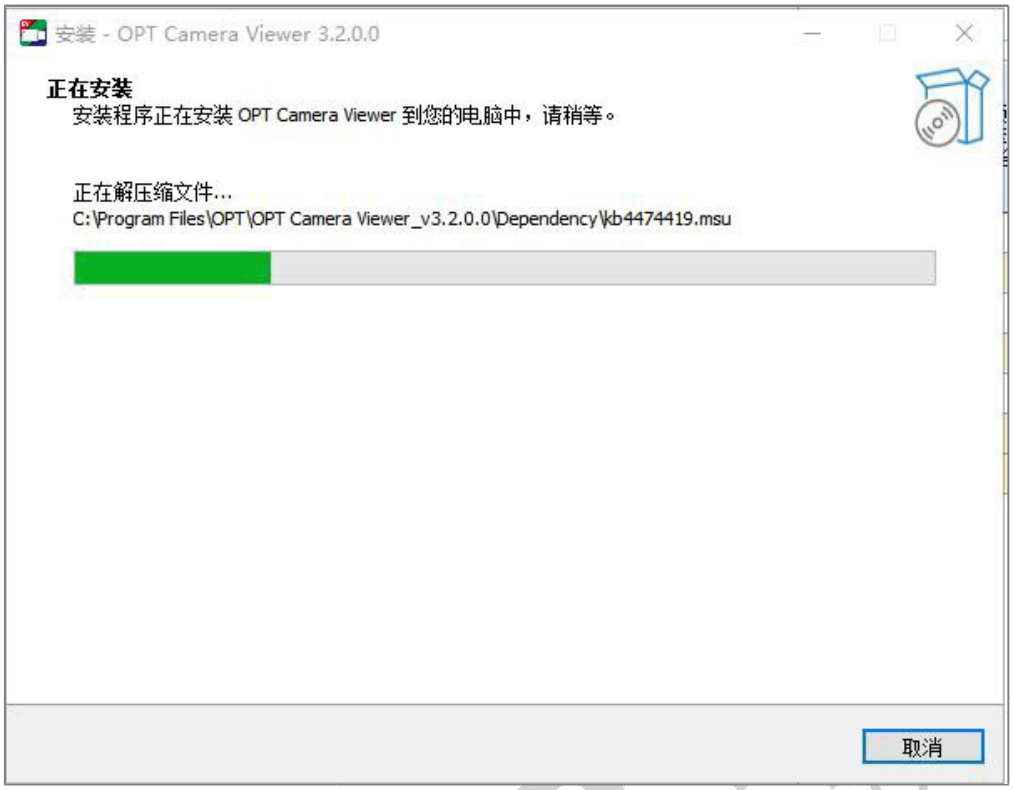
picture3-4 Installation folder window

6. The installation preparation window appears as shown in the image.As shown in 3-5, check the installation summary information and click the Next button to continue the installation process.



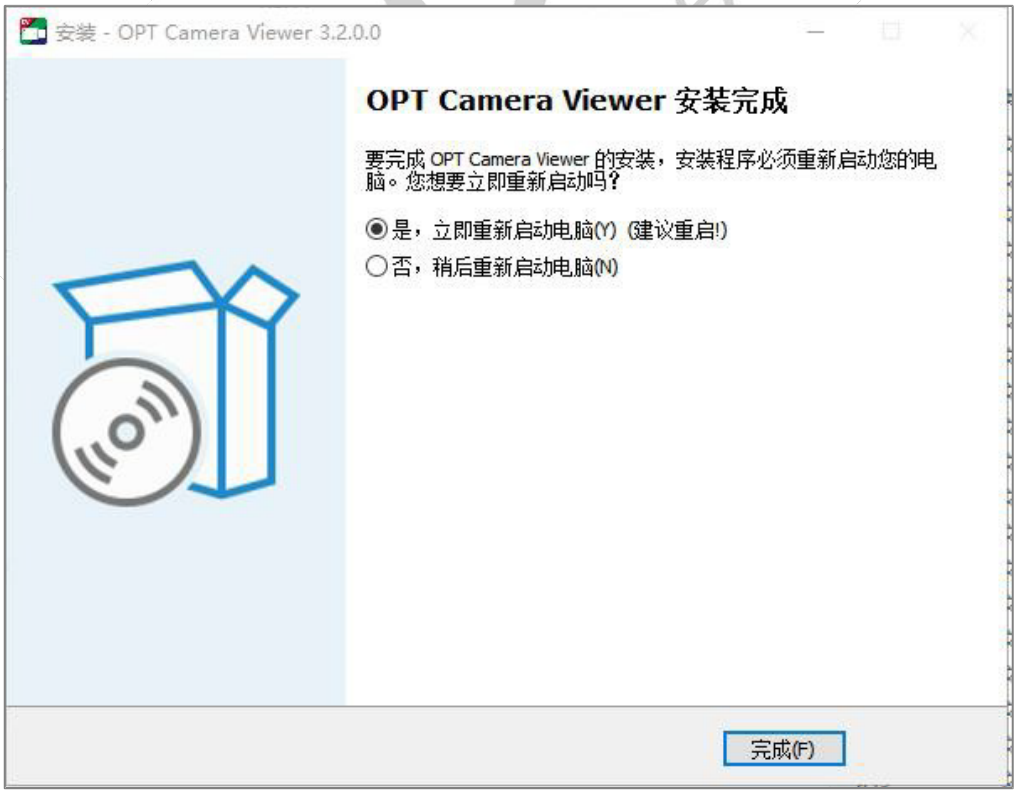
picture3-5 Preparing for Installation Window

7. The installation window appears as shown in the image.As shown in 3-6, wait for installation.



picture3-6 Installation Window

8. A pop-up window showing successful software installation is shown in the image. As shown in 3-7, the OPT Camera Viewer software has been successfully installed. Click the Finish button to end the installation process.



picture3-7 Software installation successful window

Chapter 4 Network Settings

注意

- Please ensure that the 10 Gigabit Ethernet line scan industrial camera is connected to...The PC connection is correct.
- existFor detailed instructions on installing applications on a PC, please refer to "3.2 Application Installation".

After the 10 Gigabit Ethernet line scan industrial camera is connected via cable, the application installed on the host computer can detect the online camera and ensure its functionality. If the IP address and the local computer's IP address are on the same network segment, the camera can operate normally.

The specific steps for setting up the network are as follows:

1. Open the software.

Double-click the desktop shortcut Open the application software. The software will automatically detect all online devices, as shown in Figure 4-1.

Figure 4-1 Software Window

2. cameraIP settings.

Click to select device information, then right-click to proceed.IP configuration, as shown in Figure 4-2.

picture4-2 IP Settings Interface

3. Device connection.

Select target cameraClick Connect the device. After successful connection, click... The Device tab and Properties tab are shown in Figure 4-2.

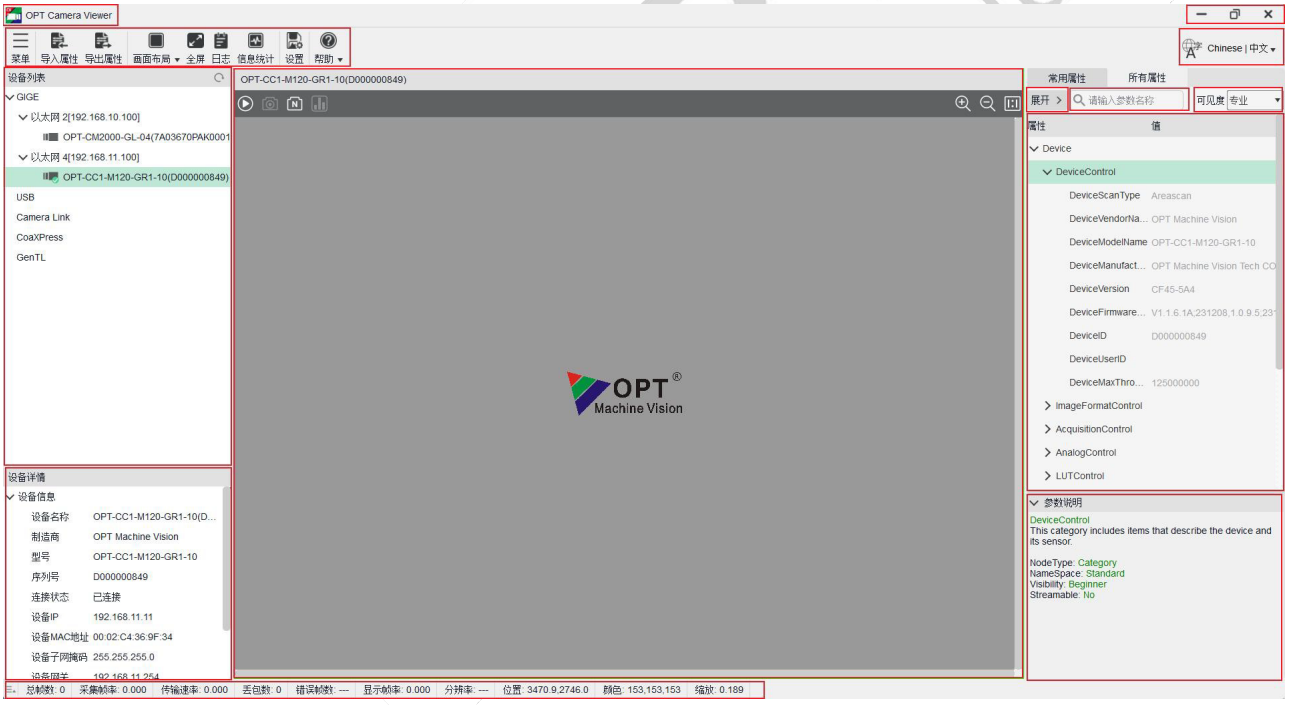


Figure 4-2 Device connection successful (Device tab)

说明

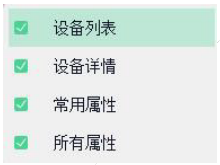
You can click Disconnect the device.

surface 4-1 OPT Camera Viewer Parameter Description

Serial Number	parameter	Parameter Description
1	Menu bar	It provides features for files, views, settings, tools, and help. See Table 4-2 for details.
2	Control Tools Area	Provides quick and convenient operations on camera images, as shown below: ●  Clicking this icon allows you to quickly import configuration parameter properties. (This icon is grayed out when the camera is in streaming mode.) ●  Clicking this icon allows you to quickly export configuration parameter properties. (This icon is grayed out when the camera is in streaming mode.) ●  The screen layout is the display setting for the preview multi-window layout. ●  Click this icon to expand the image preview globally, or press the keyboard.Press ESC to return. (Double-clicking in the image preview window will also allow for a global preview.) ●  Quickly use the log information preview function; the information type can be customized and the output can be saved as a text file for viewing. ●  Click this icon for a quick preview of the statistics. ●  Clicking this icon will take you to the settings window for image saving and caching options. ●  Click this icon to quickly view the software version information, etc. ●  Clicking this icon allows you to select the display language of the software system.
3	Equipment List	Displays a list of devices that are detected online. includeGigE, USB, CameraLink and other common protocol interface devices.  Refresh: Click this icon to manually refresh the online device information.  Click this icon to manually configure the camera IP.
		 This indicates that the device is in a connectable state.
		 This indicates that the device is in a connected state.

4	Equipment Details	Detailed camera information and interface connection information will be displayed here.
5	Image Preview Window	Displays real-time image data from the camera and provides statistics and displays real-time camera information.
6	Functional parameter area	The camera's parameters under different (operational level) roles.  Parameter visibility. You can click as needed. In the drop-down menu, select the beginner, professional, or master role. The parameters for each role are slightly different.
7	Parameter explanation area	Clicking on a parameter property will display an explanation of that parameter.
8	Window operation menu	• Maximize window. • Restore window size downwards. • Minimum window size. • Close the application.
9	Data Stream Area	The frame rate, total number of frames, transmission rate, number of error frames, and display frame rate captured by the camera will be displayed here.

Table 4-2 Menu Bar - Parameter Explanation

Menu bar		illustrate
document	Import Attributes	Import configuration parameter attribute information as a file.
	Export Attributes	Export configuration parameter attribute information as a file
	saveGanicam XML	Save outputXML file information.
view	Equipment List	
	Equipment Details	
	Common properties	You can choose to open or hide the above four windows.
	All attributes	
set up	Image saving	Set the image save path, image format, etc.
	caching options	Configure the cache parameters for the data stream.
tool	Driver Management	Can be loaded or enabled automaticallyThe relevant basic drivers for OPT Camera Viewer.
	Bandwidth management	Monitor network bandwidth and data transmission.
	Network adapter settings	You can switch and configure the computer's network card parameters.
	log	Log information preview (including device parameter updates, event message channels, streaming cache, and other event notifications), information types can be customized and output can be saved as text for viewing.
	Information Statistics	It can statistically analyze the set acquisition frame rate, bandwidth,

		number of received images, frame loss rate, and number of erroneous images.
	Firmware upgrade	The camera firmware can be upgraded.

help	about	View the current software version information (software version number, software owner, and official website).
	Help documentation	The path to place the relevant operation guide documents.

Chapter 5 Main Function Description

This section mainly explains the functional parameters related to industrial cameras. Please refer to the table for specific parameter information.4-1 Search in sequence number 5.

说明

- The industrial camera supports three user levels: Beginner, Expert, and Guru. The parameters in the property window differ slightly for each level. Please refer to the table for instructions on selecting the user level.4-1 Serial number 5.
- Parameters displayed in black indicate that the parameter can be modified or set, while parameters displayed in gray indicate that the parameter cannot be modified or set in the current operating mode.

5.1. Device Control

In the properties, you can view device information and modify the device name, as shown in the figure.As shown in Table 5-1; for detailed parameter settings, please refer to Table 5-1.

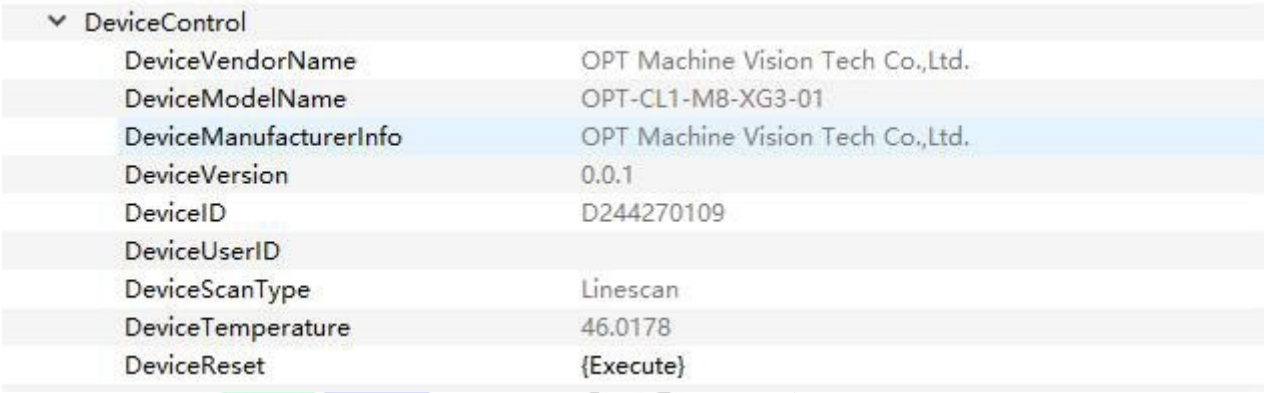


Figure 5-1 Equipment Management

Table 5-1 Equipment Management—Parameter Explanation

parameter	illustrate
DeviceVendorName	Equipment supplier.
DeviceModeName	Equipment model.
DeviceManufacturerInfo	Equipment manufacturer.
DeviceVersion	Device software version.
DeviceID	Device serial number.
DeviceUserID	User-defined device name.
DeviceScanType	The scanning type of the sensor, such as linear array or linear array.

CoreAuthChecksum	based onSHA-1 verification of licensed devices
DeviceTemperature	Actual temperature of motherboard chips (° C).
DeviceReset	The device restart button can be used to call upThe API restarts the camera.

5.2. ImageFormatControl (Image Format Management)

This property allows you to modify the image size, image pixel format, region of interest, and test image mode currently captured by the device, as shown in the figure.As shown in Figure 5-2; please refer to Figure 5-2 for detailed parameter settings.

说明

Please refer to the image output format supported by the industrial camera.

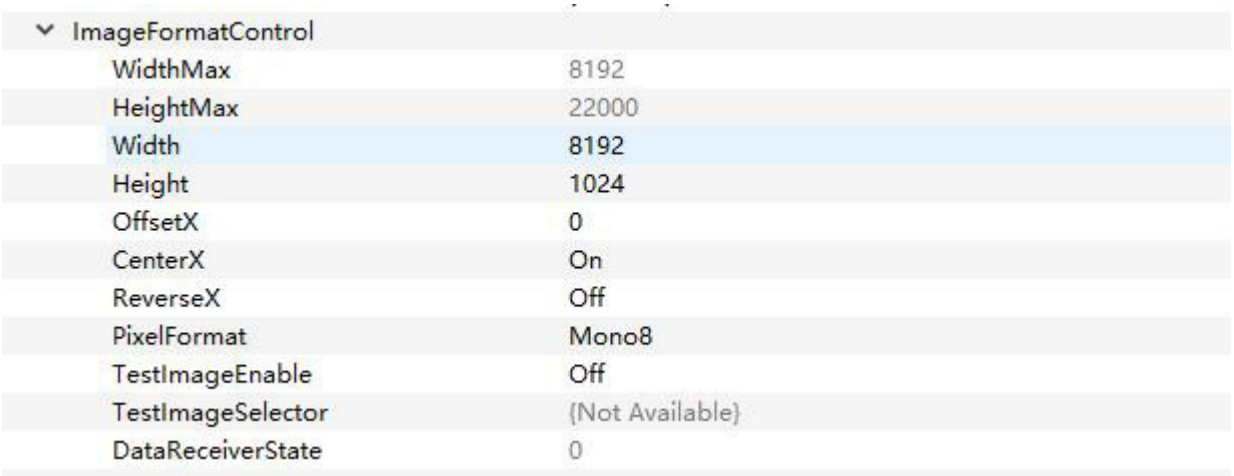


Figure 5-2 Image Format Management

Table 5-2 Image Format Management - Parameter Explanation

parameter	illustrate
WidthMax	The maximum image width (pixels) will be affected byEffects such as decimation.
HeightMax	The maximum image height (in pixels) is affected byEffects such as decimation.
Width	The actual width of the output image (in pixels).
Height	The actual height of the output image (in pixels).
OffsetX	The image horizontal offset starts from the top left corner, with the maximum value being...The value of Width determines this.
CenterX	Center the output image.
ReverseX	Image horizontal flip, the flip is based onThe sensor's original size, not based on the image after the ROI.
ReverseY	The image is flipped vertically. The flipping is based on...The sensor's original size, not based on the image after the ROI.
PixelFormat	Image output format. Different models support different formats.
TestImageEnable	Test image enable control
TestImageSelector	Select the type of test image sent by the device.

DataReceiverState	Device data acquisition status

5.3. AcquisitionControl (Acquisition Management)

This property allows you to set the camera's image acquisition mode, trigger mode, exposure time, etc., as shown in Figure 5-3; please refer to the table for detailed parameter settings.5-3.

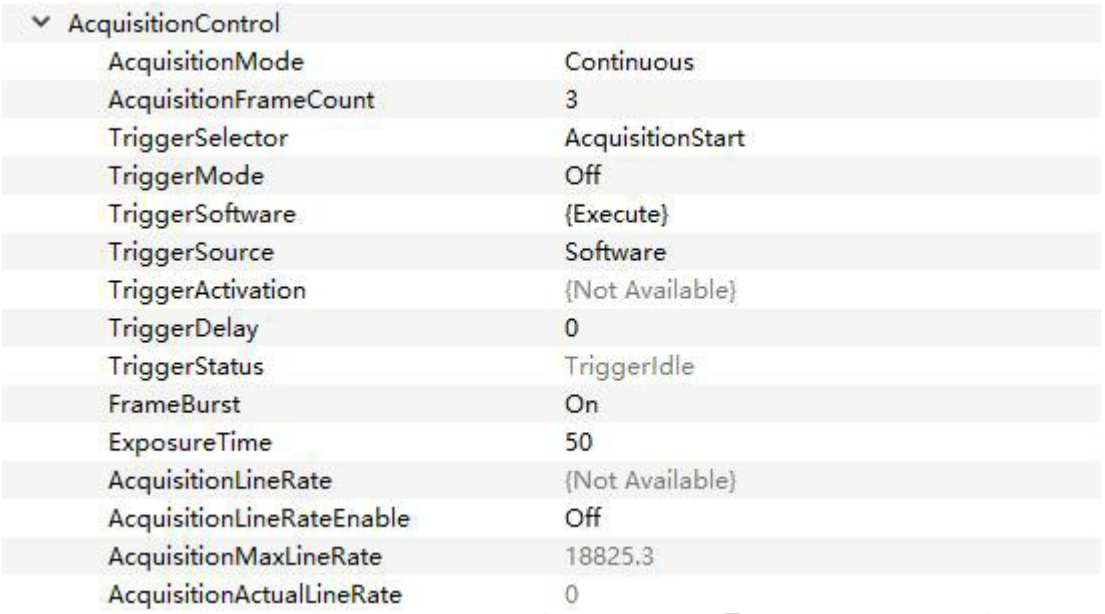


Figure 5-3 Data Acquisition Management

Table 5-3 Data Acquisition Management - Parameter Explanation

parameter	illustrate
AcquisitionMode	Image acquisition mode: • SingleFrame: This refers to capturing one frame at a time, and automatically stopping the streaming after capturing is complete. • MultiFrame: refers to the number of frames acquired at one time (AcquisitionFrameCount value). The streaming stops automatically after acquisition is complete. • Continue: refers to continuously acquiring data until an Acquisition Stop is issued to stop the data acquisition and streaming.
AcquisitionFrameCount	This setting is effective when multi-frame capture is enabled, controlling the number of images captured by the camera in a single trigger.
TriggerSelector	Trigger type selection. existIn the TriggerSelector, select FrameStart (frame trigger) or AcquisitionStart (image acquisition trigger), and then select On/Off in TriggerMode to enable or disable the trigger mode. Only one trigger mode can be enabled for FrameStart (frame trigger) or AcquisitionStart (image acquisition trigger); when one is enabled, the TriggerMode of the other must be set to Off.
TriggerMode	Is the control device trigger mode enabled?
TriggerSoftware	Soft trigger button. A soft trigger can be generated by

	clicking or calling the API.
TriggerSource	Triggering method. TriggerSource supports both SoftwareTrigger and lineN (hardware trigger). ● When choosing a software trigger, you can generate a software trigger by clicking or calling the API in TriggerSoftware. ● When selecting hardware triggering,TriggerActivation sets RisingEdge Hard triggering can be achieved by generating a rising or falling edge signal from an external cable (either a rising or falling edge).

parameter	illustrate
	说明 AcquisitionStart and FrameStart can select the trigger source separately.
TriggerActivation	Triggering methods include five types: rising edge, falling edge, double edge, and high/low level triggering. The method is in the settings.
TriggerDelay	Trigger delay. This refers to the time from when the camera receives the trigger signal to when the trigger takes effect. It will take effect whether the trigger source is a soft trigger or a hard trigger.
TriggerStatus	This displays the current camera trigger status, indicating whether it is waiting to be triggered or is currently triggering.
FrameBurst	Variable length acquisition: When the frame touch level transmission is enabled, this option will be enabled to acquire images. It's like adding a short frame.
ExposureTime	Exposure time.
ExposureAuto	Automatic exposure. • "Off" indicates that automatic exposure is turned off. • Once indicates that the camera can automatically adjust the exposure once based on the ambient brightness. The adjusted value is displayed in gray in ExposureTime. Continue indicates that the camera can continuously adjust ExposureTime based on ambient brightness to adapt to changes in the environment. The adjusted value is displayed in gray in ExposureTime.
AcquisitionLineRate	Image line frequency. whenWhen AcquisitionLineRateEnable is set to True, the AcquisitionLineRate setting only takes effect when limiting the line frequency. 说明 If the set line frequency exceeds the maximum frame rate that the camera can achieve in the current mode, the actual frame rate output by the camera will be AcquisitionActualLineRate, not [the specified value].The value set by AcquisitionLineRate.
AcquisitionLineRateEnable	
AcquisitionMaxLineRate	Configurable maximum line frequency
AcquisitionActualLineRate	The line frequency of the actual image captured by the camera.

5.4. AnalogControl

This property allows adjustments to the analog signal of the image captured by the camera, including lookup table, black level, gamma correction, etc., as shown in the figure.As shown in Table 5-4; for detailed parameter settings, please refer to Table 5-4.

说明

LUT: Short for Lookup Table.

LUTs and Gamma are mutually exclusive. If Gamma is enabled, LUTs will not take effect; for LUTs to take effect, Gamma needs to be set to 1.

Figure 5-4 Analog Control

Table 5-4 Analog Control - Parameter Explanation

parameter		illustrate
Gain		A higher gain value results in a brighter image. The adjustable range varies between different models; the default value is [value missing].1. 说明 Prioritize enabling analog gain.
EnableGamma		Used to set the image gamma value. A non-linear correction used to correct image data caused by the non-linear response of displays, etc.The smaller the Gamma value, the brighter the image. The Gamma value can be set from 1 to 4, with the default value of 1 indicating no Gamma processing. Setting the image gamma value is only effective when EnableGamma is True.
Gamma		
LUT	EnableLUT	This property allows you to stretch and highlight the grayscale range of interest. The operation can be a linear curve or a custom mapped curve. `LUTIndex` sets the value of the target object in all LUTs. `LUTValue` modifies the value of the object dragged by `LUTIndex`. `LUTValueAll` modifies the values of all indices to the same value. whenThe LUTIndex and LUTValue operations are only effective when EnableLUT is set to True.
	LUTIndex	
	LUTValue	
	LUTValueAll	

5.5. DigitalIO (Digital Input/Output)

This attribute can manage differentI/O input or output signals, as shown in Figure 5-5; please refer to Table 5-5 for detailed parameter settings.

Figure 5-5 I/O Input/Output Management

Table 5-5 Digital Input/Output Management - Parameter Explanation

parameter	illustrate
LineSelector	Used to select the external configuration to be performed.IO line
LineSource	When choosingWhen the I/O line is an output, a trigger source can be selected. Currently supported trigger sources include the following: ● Inactive: The signal remains stable. ● ExposureActive: Outputs a signal when exposure begins. ● FlashWindow: Outputs light source control signals. ● AcquisitionTriggerWait: Outputs a signal indicating the acquisition trigger wait status. ● FrameTriggerWait: Outputs a frame trigger wait status signal. ● Timer0Active: Outputs a signal when the counter reaches full count 0. ● Timer1Active: Outputs a signal when counter 1 is full.
LineInverter	This signal is used to control the inversion of the selected physical input or output line. True indicates that the signal is selected. False means the signal is not inverted.
LineDebouncerTime	whenWhen the IO line is an input, the length of the debouncing time can be set. 说明 Pulses smaller than the set value will not be considered a valid trigger input.
LineStatus	Indicates the current logical state of the selected row.
LineStatusAll	Used to return the current status of all available lines.

5.6. Timer Control

In this attribute, device-specific delay units can be set, as shown in the figure. As shown in Table 5-6; for detailed parameter settings, please refer to Table 5-6.

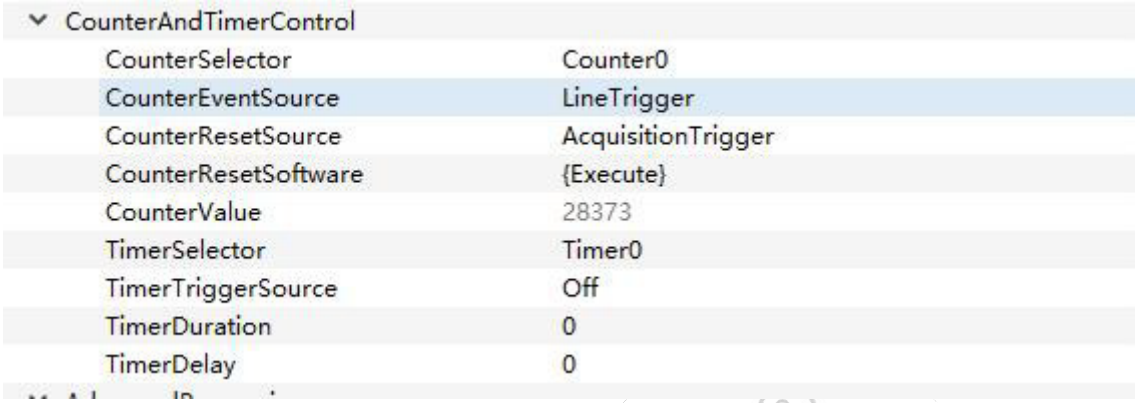


Figure 5-6 Counter and Timer Control

Table 5-6 Timer Management - Parameter Explanation

parameter	illustrate
CounterSelector	Select countercounter0 or counter1.
CounterEventSource	Select the counter trigger time; the trigger count is set according to the configured trigger mode. Counter trigger source.
CounterResetSource	The counter reset control source, once set, will trigger the original signal to clear the current value of the counter.0.
CounterResetSoftware	Reset soft trigger, whenWhen CounterResetSource is set to software, click Execute. Row counter clear0.
CounterValue	Displays the current value of the counter.
TimerSelector	Select the target timer to set.
TimerTriggerSource	Choose the trigger source for the timer.
TimerDelay	Sets the delay time (in microseconds) after the timer receives a trigger.
TimerDuration	Set the hold time for the device timer (in μs).

5.7. UserSetControl (User Settings Management)

This property allows you to save or load user-adjusted parameter schemes and set default parameter configurations when the client opens the application, as shown in the figure. As shown in Table 5-7; for detailed parameter settings, please refer to Table 5-7.

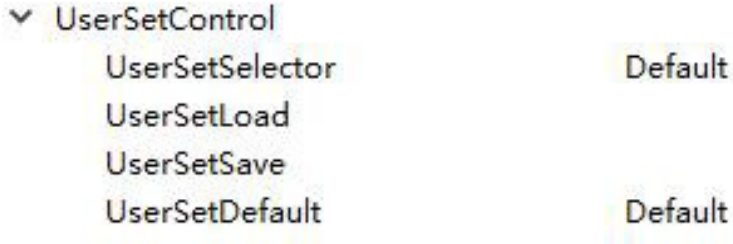


Figure 5-4 User Settings Management

Table 5-4 User Settings Management - Parameter Settings

parameter	illustrate
UserSetSelector	UserSetSelector allows selection of user settings groups. Currently, it supports Default, UserSet1, and UserSet2. Choose which group to use for subsequent steps. The operations of UserSetLoad and UserSetSave.
UserSetLoad	UserSetLoad loads user settings. Restores the camera's configuration to the user-selected settings.
UserSetSave	UserSetSave saves user settings. Saves the current configuration to the selected group, Default. Groups do not support saving.
UserSetDefault	The default user settings upon power-on. UserSet1 and UserSet2 need to have UserSetSave executed first. It can only be displayed here after that.

5.8. Advanced Processing

In this property, you can set the parameters of the automatic function, as shown in the figure. As shown in Table 5-8; for detailed parameter settings, please refer to Table 5-8.

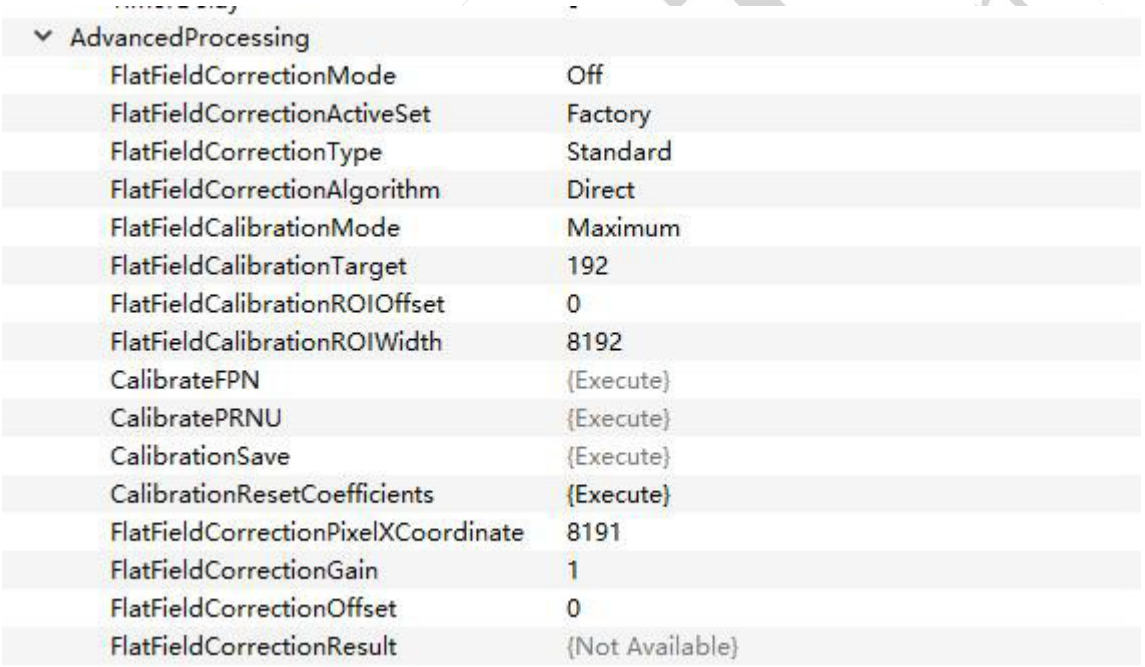


Figure 5-8 Advanced processing parameter settings

Table 5-8 Advanced Processing Parameter Settings - Parameter Explanation

parameter	illustrate
FlatFieldCorrectionMode	Flat field correction mode; OFF to turn off flat field correction, ON to turn on correction mode (using...)(for correction), active flat field correction (used to maintain after correction) (Use this mode)

FlatFieldCorrectionActiveSet	In the active state, you can select different saved correction parameters. factory,userset1,userset2,userset3
FlatFieldCorrectionType	Correction type, defaults to standard.
FlatFieldCorrectionAlgorithm	Flat-field correction algorithms include direct correction and correction after low-pass filtering. just
FlatFieldCalibrationMode	Open field correction, correction mode, optional. Maximum value

parameter	illustrate
	There are three correction modes: Average, Target, and Target.
FlatFieldCalibrationTarget	When settingFlatFieldCalibrationMode is set to Target (target value). After correction, this parameter is effective and can correct the image to the target grayscale range.
FlatFieldCalibrationROIOffset	This parameter controls the effective range of the flat field correction; the two parameters are used in combination.FlatFieldCalibrationROIOffset is the effective area offset.Quantity; FlatFieldCalibrationROIWidth is the width of the effective region. Degree range; the range setting must not exceed the camera's maximum width range.
FlatFieldCalibrationROIWidth	
CalibrateFPN	Dark field correction: Click to execute. Correction will be performed in a completely dark environment. use.
CalibratePRNU	Bright field correction, click to execute, in a half-bright (grayscale) environment.150 and above), Used for correction.
CalibrationSave	Cooperate FlatFieldCorrectionActiveSet is used to save corrections. The parameters listed below can be directly selected for use next time.
CalibrationResetCoefficients	Reset, reset correction parameters, restore the image to its original state before correction.
FlatFieldCorrectionPixelXCoordinate	Flat field correction pixelsThe X-coordinate sets the image before pixel flattening correction. beneficial.
FlatFieldCorrectionGain	Flat field correction gain,
FlatFieldCorrectionOffset	Correct offset
FlatFieldCorrectionResult	Planar field correction results

5.9. ISPControl (ISP Management)

In this attribute, you can adjust the image's sharpness, brightness, saturation, contrast, etc., as shown in the figure.As shown in 5-10; for detailed parameter settings, please refer to Table 5-9.

说明

Chroma and saturation are only applicable to color cameras. (Models OPT-CC1-M060-GR1-02, OPT-CC1-M050-GG1-03, and OPT-CC1-M200-GR1-00 do not have this function.) The 10 Gigabit line scan series supports digital shift, brightness, and contrast.

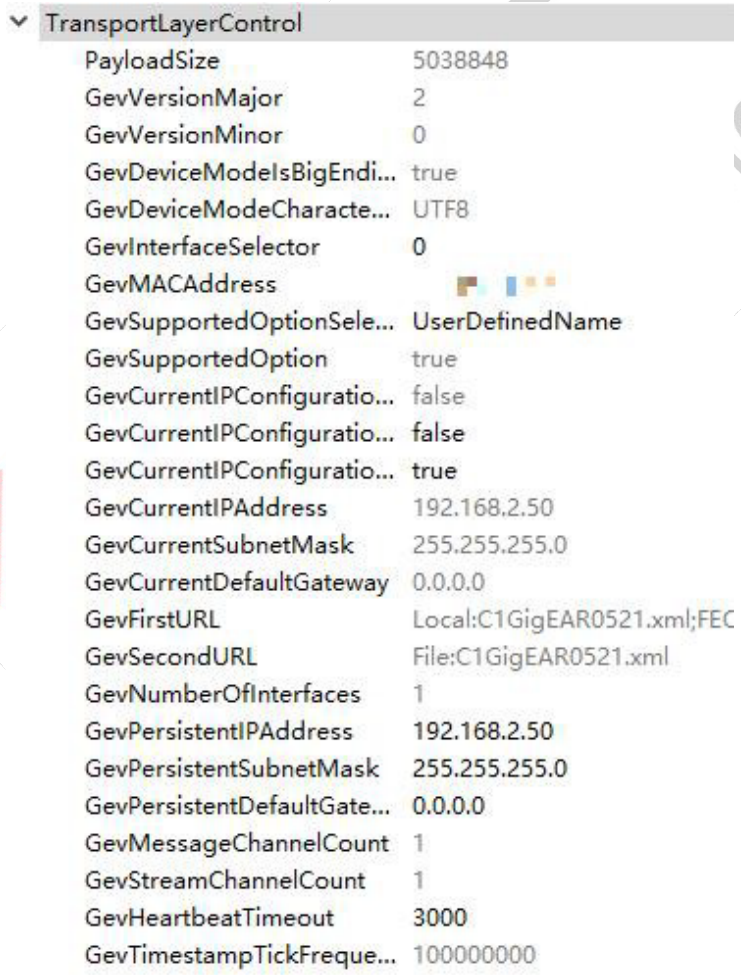
Figure 5-9 ISP Management

Table 5-9 ISP Management - Parameter Explanation

parameter	illustrate
Digital Shift	Adjust (0~4) DigitalShift to shift all data left by the number of bits (default value is 0).
Brightness	brightness. Adjust the exposure target brightness value. The default value is 50. The higher the value, the brighter the image will be. The maximum value can be set to...100, minimum setting is 0.
Contrast	Contrast sets the contrast intensity; the higher the value, the more pronounced the contrast. The maximum value can be set to 100.

5.10. TransportLayerControl (Transport Layer Management)

In this property, you can set the parameters related to the camera's transmission protocol, as shown in Figure 5-11; for detailed parameter settings, please refer to Table 5-11.



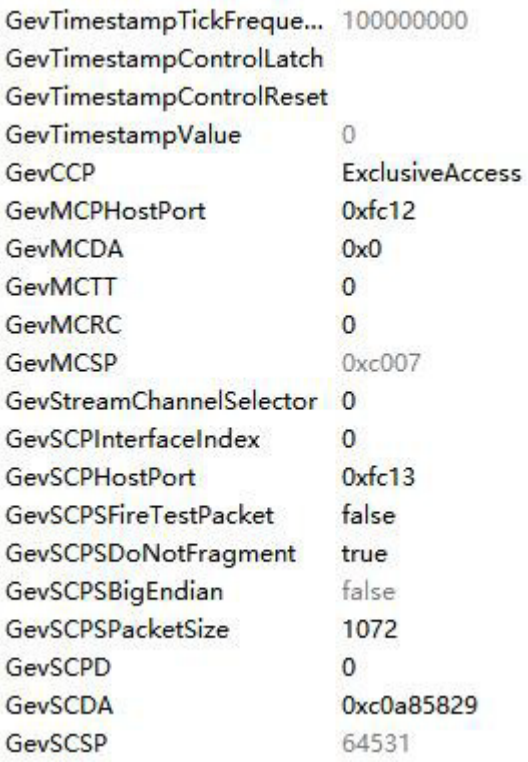


Figure 5-0 Transport Layer Management

Table 5-0 Transport Layer Management

parameter	illustrate
PayloadSize	The length of each message.
GevVersionMajor	The main versions of the protocol specification.
GevVersionMinor	A minor version of the protocol specification.
GevDeviceModelBigEndian	The end value of the device register.
GevDeviceModeCharacterSet	The character set used for all strings in the boot register.
GevInterfaceSelector	The number of network ports on the device, this value starts fromThe timer starts at 0, so the value is 0.
GevMACAddress	network portMAC address.
GevSupportedOptionSelector	GevSupportedOptionSelector Choose one of the existing projects to support.GEV access. GevSupportedOption returns whether the GevSupportedOptionSelector option supports the selected GEV.
GevSupportedOption	
GevCurrentIPConfigurationLLA	OpenLLA function. When True is selected in GevCurrentIPconfigurationLLA, the device will power on.The IP address is in LLA format.

GevCurrentIPConfigurationDHCP	OpenDHCP function. When True is selected in GevCurrentIPconfigurationDHCP, the device will power on.The IP address is set to DHCP, which allows the device to automatically obtain an IP address.

GevCurrentIPConfigurationPersistentIP	staticIP functionality. Select in GevCurrentIPconfigurationPersistentIPWhen True, the device's IP address is static after power-on. 说明 Three typesThe IP configuration priority order is: Static IP > DHCP > LLA.
GevCurrentIPAddress	Current deviceIP address.
GevCurrentSubnetMask	The subnet mask of the current device.
GevCurrentDefaultGateway	The gateway of the current device.
GevFirstURL	GetThe first URL address of GenICam XML
GevSecondURL	GetThe second URL address for GenICam XML
GevNumberOfInterfaces	The number of physical network interfaces supported by the device.
GevPersistentIPAddress	Configure the device's static settingsIP address.
sGevPersistentSubnetMask	Configure the device's static settingsThe subnet mask of the IP address.
GevPersistentDefaultGateway	Configure the device's static settingsIP gateway.
GevMessageChannelCount	This displays the number of message channels supported by this device.
GevStreamChannelCount	This displays the number of stream channels supported by this device.
GevHeartbeatTimeout	Set the heartbeat timeout.
GevTimestampTickFrequency	Define the frequency of timestamps.
GevTimestampControlLatch	Lock the current timestamp toIn GevTimestampValue.
GevTimestampControlReset	Used for resetting internal timestamps.
GevTimestampValue	Used to store the latched timestamp.
GevCCP	Control the app's access permissions to the camera. ● ExclusiveAccess: The application for the connected camera can modify the registers. ● ControlAccess: Applications connected to the camera can only read registers, not modify them.
GevMCPHostPort	Configure the destination port for the camera message channel.
GevMCDA	Set the destination address for the camera message channel.
GevMCTT	Message channel timeout period.
GevMCRC	Maximum number of message channel

	retransmissions.
GevMCSP	Displays the source port number of the message channel.
GevStreamChannelSelector	If the camera supports multiple stream channels, select the stream channel number.
GevSCPinterfaceIndex	The logical channel number corresponding to the display device.
GevSCPHostPort	The port number used by the camera stream channel.
GevSCPSFireTestPacket	Send a test message.
GevSCPSDoNotFragment	If the message is too long, should it be fragmented and sent, and should an additional parameter be added to the IP header? Segmentation Location1.

GevStreamChannelSelector	If the camera supports multiple stream channels, select the stream channel number.
GevSCPinterfaceIndex	The logical channel number corresponding to the display device.
GevSCPHostPort	The port number used by the camera stream channel.
GevSCPSFireTestPacket	Send a test message.
GevSCPSDoNotFragment	If the message is too long, should it be fragmented and sent, and should an additional parameter be added to the IP header? Segmentation Location1.
GevSCPSBigEndian	Sets the end of the pixel data stream for the stream channel.
GevSCPSPacketSize	Set the message length for the flow channel.
GevSCPD	Control the interval between messages. 说明 Modifying this value can reduce the requirements for the network card, but the maximum bandwidth will be affected to some extent, and the acquisition time of a single frame will be longer.
GevSCDA	The destination address of the stream channel.
GevSCSP	Source port of the stream channel

5.11. ActionControl (Action Management)

In this property, you can select and enable the type of event notification, as shown in the figure.As shown in Table 5-8; for detailed parameter settings, please refer to Table 5-8.

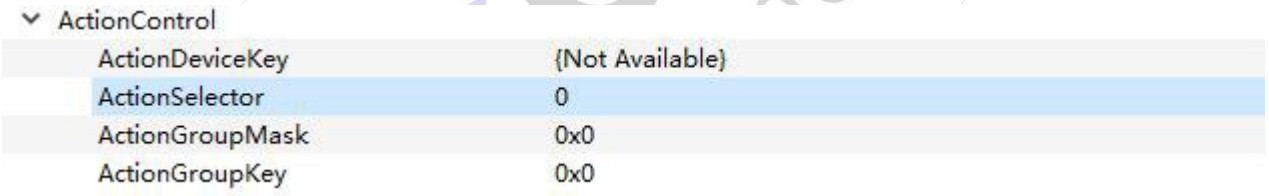


Figure 5-11 Event Notification

Table 5-11 Event Notification Management - Parameter Explanation

parameter	illustrate
ActionDeviceKey	Provide a device key that allows the device to check the validity of action commands.
ActionSelector	Select the action signal to which further action settings are applied.

ActionGroupMask	Provide a mask, which the device will use to verify the operation when it receives an operation protocol message.
ActionGroupKey	Provide a key, which the device will use to verify the operation when it receives an operation protocol message.

5.12. VendorControl (Supplier Management)

This attribute contains the device's firmware update information. Please refer to the table for detailed parameter settings.5-12.

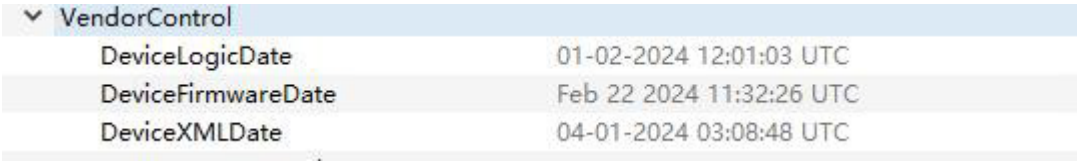


Figure 5-12 Event Notification

Table 5-12 Supplier Management - Parameter Explanation

parameter	illustrate
DeviceLogicDate	Device logic bitstream programming date
DeviceFirmwareDate	Device logic firmware flashing date
DeviceXMLDate	Equipment electronic documentsXML Date

Chapter Six Frequently Asked Questions

You may encounter some problems when using industrial cameras. If the following problems occur, please troubleshoot them yourself according to the solutions. If you cannot solve the problem or encounter other problems, please contact our technical support in time.

Problem Description	Possible reasons	Solution
The client software cannot detect the camera.	Camera fails to start or network cable connection is faulty	Check if the camera power supply and network connection are correct.Normal (you can observe the camera's LED indicator lights and the Ethernet Link light).
The client can enumerate cameras, but the connection fails.	The camera and the client are not on the same local area network. The camera has been connected to another program.	useIP configuration tool to modify IP address Disconnect other programs from controlling the camera and then reconnect.
The preview screen is completely black.	Lens aperture closed Camera malfunction	Open the lens aperture Power off and restart the camera
The preview works normally but cannot be triggered.	Trigger mode not enabled or trigger source selected incorrectly External trigger connection error	Confirm that the camera's trigger mode is enabled, then select...Are the selected trigger source and the I/O interface consistent? Confirm that the trigger signal input and wiring are correct.
The 10 Gigabit Ethernet camera failed to reach	The network used is gigabit.	Check the network transmission environment to ensure that the devices used for connection

10 Gigabit bandwidth.		(switches, network cables, network cards) are all in a 10 Gigabit environment.
External triggering cannot be enabled.	External trigger connection error. External trigger mode was not selected.	Choose the correct trigger mode and ensure that the external connection is correct.
When viewing the image on the client software, it was found to be upside down.	The equipment was installed in the wrong orientation.	You can access this through the client software via "Properties". >ImageFormatControl>ReverseX (horizontal flip) or ReverseY (Vertical Flip) is used to correct the image.

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