

Hikrobot Co., Ltd.

Machine Vision Software

User Manual

HIKROBOT

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Chapter 1 About this Documentation

The manual guides you to use the Software. To ensure the properness of usage and stability of the Software, refer to the contents below and read the manual carefully before installation and operation.



- Note**
- As GIFs and videos cannot be played in PDF document, you are recommended to read the online document.
 - All screenshots in this manual are for reference only. The actual interface of the Software shall prevail.
-

1.1 Get Support

Contact us for assistance if this manual doesn't resolve your issue.

- Website: Visit <http://www.hikrobotics.com> for documentation or technical services.
- Hotline: Call 400-989-7998 for technical support.
- Email: Send requests to tech_support@hikrobotics.com for prompt responses.
- V-Community: Scan the QR code to access V-Community (www.v-club.com). Register/login to get support.



Figure 1-1 V-Community QR Code

1.2 Symbol Conventions

The symbols that might be found in this document are defined as follows.

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Symbol	Description
 Note	Provides additional information to emphasize important supplementary points of the main text.
 Caution	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
 Danger	Indicates a hazardous situation which, if not avoided, will or could result in death or serious injury.

Chapter 2 Release Notes

This chapter introduces key updates of the Software.

2.1 V4.6.0

V4.6.0 was released in August 2025. This version aligns the features of the Linux version of the Software with the Windows version. Additionally, it introduces U3V reconnection and viewing camera acquisition status during live view to enhance your experience.



Note

Frame Grabber-related features are only available when you run the Software on Linux X86_64 type systems.

New Features

- MVS supports reconnecting U3V camera after loss its connection within a specified time duration. You can go to **Settings** → **General Settings** and enable **U3V camera reconnects after disconnection** and specify the reconnect overtime. For more introduction, see [General Settings](#).
- The Software now supports viewing the line figure of the camera acquisition status parameters during live viewing. You can click the in the live window to view the corresponding status. In [General Settings](#), you can also specify the refresh rate of the figure. For more, see [View Acquisition Status](#).
- This version provides the function to enable/disable **Bayer Interpolation**. By default, this feature is enabled. To view the image without performing Bayer interpolation, disable this setting. See [General Settings](#) for more.
- During the live view, you can draw an ROI to specify the area to zoom in on. The Software zooms the image based on the area drawn.
- The Software supports generating virtual frame grabbers. You can use the **Virtual Device** to simulate and test frame grabbers. To access this feature, go to **Tool** → **Virtual Device** → **Virtual Frame Grabber**. See [Add a Virtual Frame Grabber](#)for details.

Improvements

- You can manipulate the curve in the LUT. For detailed introduction, see [Configure LUT](#).
- The histogram's interaction has been optimized.
 - When drawing an ROI, the histogram display window automatically collapse and hover at the bottom right corner of the preview window.
 - In multiple window division mode, you can set an ROI for each division.

For more information, see [View Histogram](#).

- When the image is enlarged to 64 times or more, you can view each pixel's value and coordinate in the image. For specific details, see [More Functions](#).
- The **Virtual Camera** supports generating Camera Link, CoaXPress Line Scan, and XoFLink Fiber Optic cameras. It also allows you to bind virtual cameras to corresponding frame grabbers. See [Add a Virtual Camera](#) for details.
- This version allows you to batch adding a group of cameras to a divided window. Under the multi-window settings, you can drag and release a group of connected cameras to a window, and the following will be added by order. See [Acquisition and Live View in Multiple-Window Mode](#) for details.
- This version supports exporting partial features by group. You can select groups and specify an export path as required to save only the features you need. See [Import or Export Features of a Single Device](#) for details.
- This version renames the log level to numbers. When set to level 0, the Software does not store any log information. Starting from level 1, The smaller the log number, the more important its corresponding log is. See [Log Viewer Tool](#) for details.
- This version supports rotating images after you enable the crosshair. When you enable the crosshair, you can rotate the image through the right-click menu, and the crosshair will rotate with the image rotation. This helps you to locate the target based on the image acquired.

2.2 V3.0.0

V3.0.0 was released in March 2024.

- On the General page, adds temperature screening configuration and Bayer interpolation configuration.
- Supports enumerating frame grabbers and cameras linked with frame grabbers.
- In the feature configuration area, adds the function of showing temperature window.
- Supports moving modules in the feature tree.
- Supports importing/exporting the features of a single frame grabber.
- Supports importing/exporting the features of multiple frame grabbers.
- Supports moving the cross line of live view page.
- Adds the function of temperature screening configuration and configuration of related parameters.
- The firmware upgrade tool supports automatically enumerating GigE cameras, USB cameras, frame grabbers, and cameras linked with frame grabbers, and supports upgrading the firmware of frame grabbers and cameras linked with frame grabbers in a batch.
- Adds the function of configuring log service.

2.3 V2.1.0

V2.1.0 was released on November 2020.

Combined the user manual for the Linux X86 version and the one for Linux ARM version into one user manual, and updated the newly supported features as follows.

- Updated [Other Features](#) to introduce how to stick a GigE Vision camera to the top of the GigE Vision camera list.
- Updated [Other Features](#) to introduce how to stick a USB3 Vision camera to the top of the USB3 Vision camera list.
- Added [Configure White Balance \(Bayer\)](#) to introduce how to set white balance when the pixel format is set to Bayer.
- Updated [Set Crosshair](#) due to UI updates.
- Added [View Histogram](#) to introduce the newly supported Histogram feature.

Chapter 3 Product Overview

MVS (the Software) is designed by Hikrobot to connect, control, and manage the machine vision devices. With the Software, you can live view and save acquired images, backup camera features, and configure image quality and available device parameters to determine the optimal setting for your vision system.

Product Introduction

The Software supports live viewing of images streamed from the cameras. While connected, you can adjust the acquired image quality, save acquired pictures, record videos, and configure available parameters. You can optimize device features for your vision system.

With the Software, you can batch export and import features of different cameras via multiple methods and configure camera features in various application scenarios.

The Software supports a wide range of devices, including GigE Vision cameras, USB3 Vision cameras, Camera Link cameras, XoFLink Fiber Optic cameras, and CoaXPress cameras. You can also acquire images from cameras connected to the frame grabbers.

Key Features

- Easy to Install: Supports installing drivers along with installing the Software.
- Wide Compatibility: Supports multiple platforms, including Linux X86 and ARM.
- Intuitive Interaction: Highlights 3 key functionalities for controlling cameras, live viewing image acquisition, and configuring camera features.
- Interface for Better User Experience: Provides clear and simple user interfaces.
- Multiple-Camera Live View: Supports setting window division and viewing the live view of multiple cameras simultaneously.

Chapter 4 System Requirements

Make sure the computer on which you install the client software at least meets the minimum requirements.



Note

- This software has integrated all the required drivers. As a result, you can install the software easily without installing driver separately.
 - We recommend adding the software to the allowlist of the antivirus software, in case of being recognized as virus.
-

System Requirements for Linux X86

- Operating System: Ubuntu 12.04/14.04/16.04/18.04 (32-bit and 64-bit), Ubuntu 20.04/22.04/24.04 (64-bit), CentOS 7 (32-bit and 64-bit), Red Hat Enterprise Linux 7 (64-bit)
- CPU: Intel® Pentium IV 2.0 GHz (minimum); Intel Pentium IV 3.0 GHz and above (recommended)
- Memory: 1 GB (minimum); 4 GB and above (recommended)
- Display Resolution: 640 × 480 and above
- Network Adapter: Intel® Pro1000, I210, I350 series
- USB Port: USB 2.0 (minimum); USB 3.0 (recommended)

System Requirements for Linux ARM

Option	Demoboard	Operating System
1	NVIDIA Jetson TX2	Ubuntu 16.04/18.04/20.04
2	Odroid XU4	Ubuntu 16.04/18.04/20.04
3	Raspberry Pi 3 Model B+	Raspbian OS

Chapter 5 Environment Configuration

Before further operations such as camera feature configuration and image data acquisition, you should configure the running environment for the Software to ensure stability and fluency of Software running and data transmission.

5.1 Turn off Firewall

To ensure the stability of Client running and the enumeration of local cameras, disable the PC's firewall before running the Client.

Turn off Firewall in Linux X86 System

- For Ubuntu systems (32-bit and 64-bit), execute the command ***ufw disable*** to turn off the fire wall.
- For CentOS 7 (32-bit and 64-bit) and Red Hat Enterprise Linux 7 (64-bit), execute the command ***sudo systemctl stop firewalld*** to turn off the firewall temporarily. Or execute the command ***sudo systemctl disable firewalld***, and then restart the system to turn off the firewall permanently.

Turn off Firewall in Linux ARM System

- For Ubuntu 16.04/18.04 (32bit or 64bit), execute the command ***ufw disable*** to turn off the fire wall.
- For Raspbian, execute the command ***sudo ufw disable*** to turn off the firewall.

5.2 Configurations before Using GigE Vision Cameras

You should set the IP address of the PC where the Software runs to the same subnet with the camera, or camera connection may fail. You should also enable Jumbo Frame for the Network Interface Controller (NIC), or packet losses may occur during image data acquisition.

Before You Start

Make sure that the cameras are powered on and connected to network.

Steps



Note

As different Linux systems are similar, here we only take configuring local network parameters of Ubuntu system as an example.

1. Configure the local network IP address.

- 1) Click **System Settings** → **Network** → **Wired** in the PC.
- 2) Select a wired network.
- 3) Click **Option** to open following window.

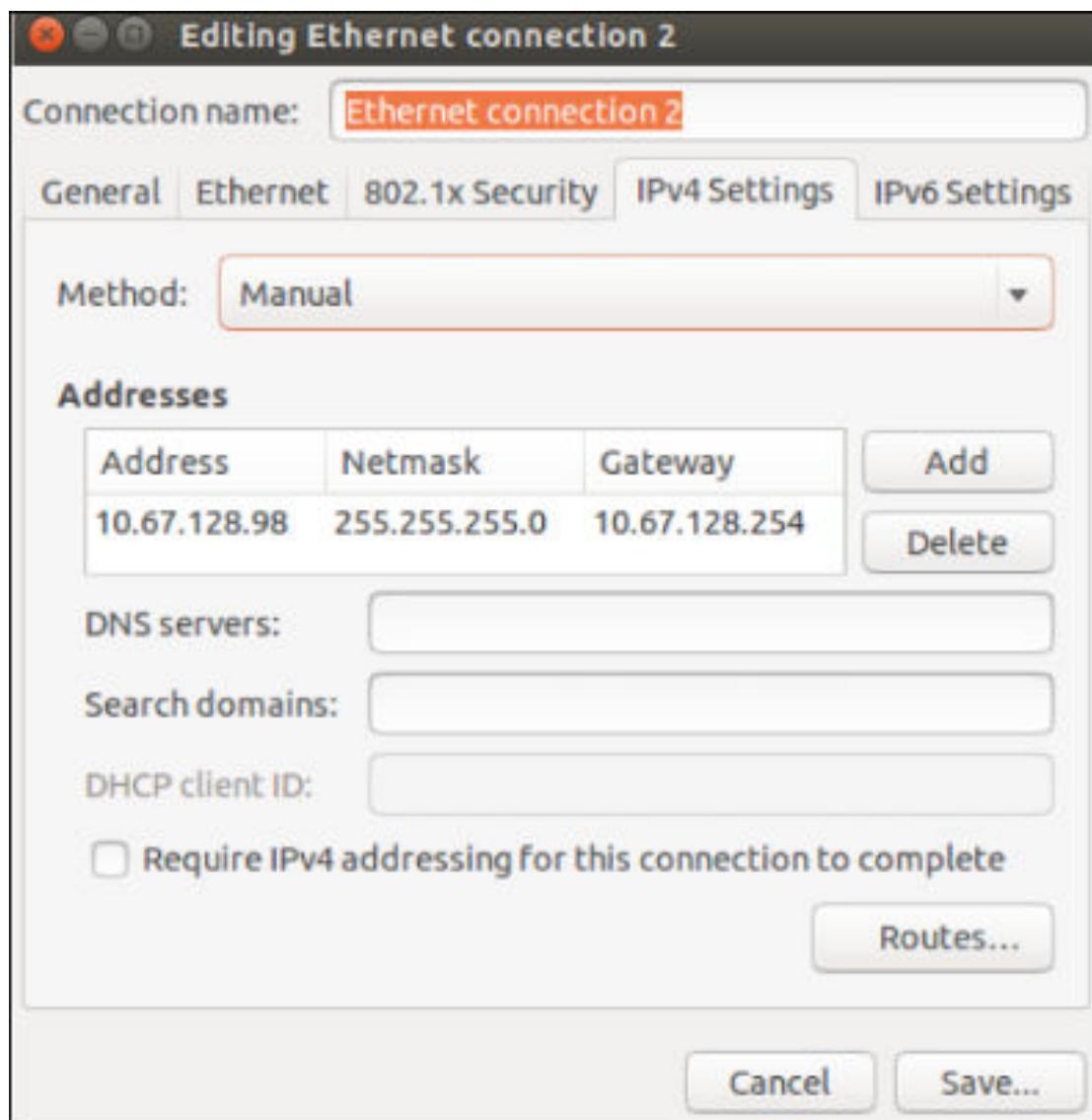


Figure 5-1 Edit Ethernet Connection

- 4) In the **Method** drop-down list, you can select a parameter to set the system to obtain IP address automatically, or set the IP address of the PC to the same subnet with the cameras on the window manually.



It is recommended that you set the IP address as static IP for a stable work of the camera.

- 5) Click **Save** to save the settings.

2. Enable Jumbo Frame.

Jumbo Frame

Jumbo Frame functionality can reduce the CPU usage and improve the data transmission efficiency. After you enable the Jumbo Frame functionality, the Jumbo Frame value will be set to 9 KB or 9014 Bytes automatically.

- 1) Execute the command ***sudo su*** or ***su root*** to get the root permission.
- 2) Execute the command ***ifconfig*** to check the network status.

```
ipconfig: command not found
root@hik-desktop:/home/hik/MVS-1.0.0_x86_64/MVS/bin# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0a:c4:5d:7b:dd
          UP BROADCAST MULTICAST MTU:1500 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
          Memory:d0700000-d0780000

eth1      Link encap:Ethernet HWaddr 00:0a:c4:5d:7b:de
          inet addr:10.67.128.98 Bcast:10.67.128.255 Mask:255.255.255.0
          inet6 addr: fe80::20a:c4ff:fe5d:7bde/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:9000 Metric:1
          RX packets:4359361 errors:0 dropped:0 overruns:0 frame:0
          TX packets:218479 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12113317746 (12.1 GB) TX bytes:11801894 (11.8 MB)
          Memory:d0600000-d0680000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING MTU:65536 Metric:1
```

Figure 5-2 Execute Command

- 3) Enable Jumbo Frame temporarily or permanently.

- **Temporarily:** Execute the command ***ifconfig XXXX mtu 9000*** to enable Jumbo Frame temporarily.
- **Permanently:** Execute the command ***echo "9000">>/sys/class/net/XXXX/mtu*** to enable Jumbo Frame permanently.



Note

- *XXXX*refers to the NIC connected with the camera. For example, you can enter the command `echo "9000">>/sys/class/net/eth0/mtu` or `echo "9000">>/sys/class/net/eth1/mtu`.
- Different NIC may have different parameters. If setting Jumbo frame is unavailable on your PC, you can update the NIC driver or change the NIC with the NIC of Intel Pro 1000 series or above.
- For cameras connected to the network via network switch, static IP address is not required. If the camera is connected to the network directly, you should configure the static IP address, or the camera will not be enumerated.

3. **Optional:** If the camera is not connected to the Software, edit the IP address of the camera. See [Edit Camera IP Address](#) for details.

5.3 Configurations before Using Camera Link Cameras

Before using Camera Link cameras, make sure that the Camera Link frame grabber and the driver for the frame grabber are properly installed on the PC on which the Software runs.

Without the driver, the Software will fail to enumerate the Camera Link cameras; without the frame grabber, the live view and acquisition functionality will not be available for the Camera Link cameras.

If the driver is properly installed, you can use Device Manager of the PC system to view the information of the driver and related serial port. If installation exception occurs, it is recommended to reinstall the driver and related software, or contact the manufacturer of the frame grabber for support.

Chapter 6 Main Window Introduction

This topic introduces the main window of the Software.

The main window of the Software is shown as follows:

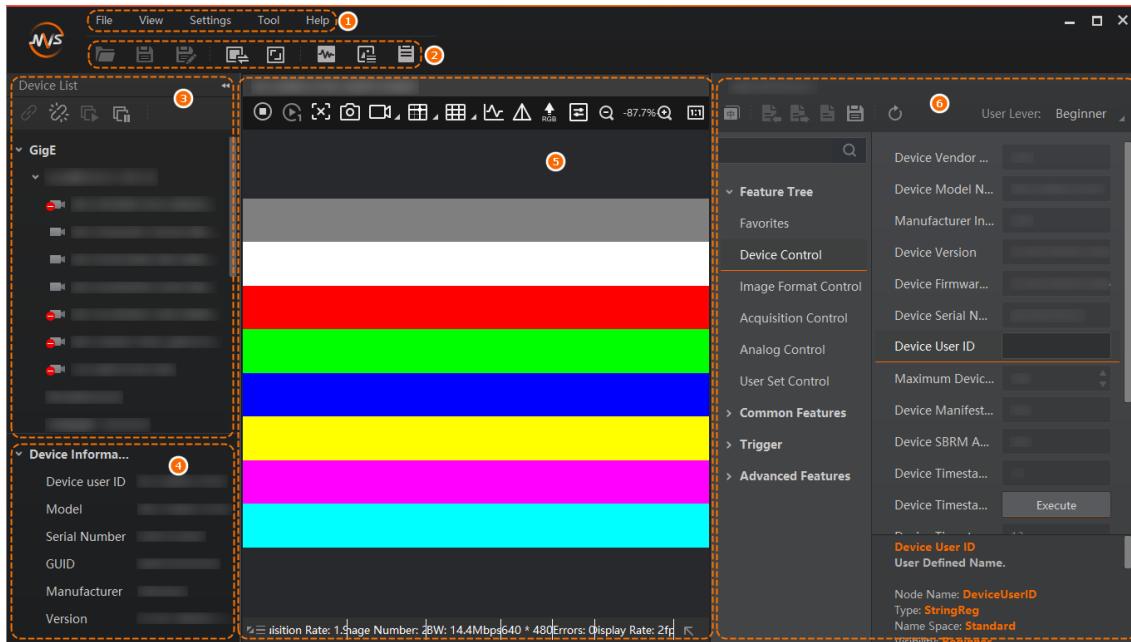


Figure 6-1 Main Window

The following table shows the description of each part of the main window.

Table 6-1 Main Window Description

No.	Area Name	Description
1	Menu Bar	Access functions modules including File, View, Settings, Tool, and Help.
2	Control Toolbar	Perform basic operations including controlling files, setting display window divisions, and viewing acquisition.
3	Device List Panel	<ul style="list-style-type: none"> View all enumerated cameras and frame grabbers, including GigE Vision cameras, USB3 Vision cameras, Serial Port cameras, and cameras connected via GenTL and PCIe. Connect and disconnect cameras to the Software, start and stop acquisition, and refresh enumerated devices.

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No.	Area Name	Description
4	Interface and Device Information Panel	View the information of selected frame grabber or camera from here.
5	Display Window	View the live view of selected camera, or view the image and video from local.
6	Feature Panel	View and configure features of selected camera, and perform other operations, including importing and exporting feature settings, and controlling User Set.

Chapter 7 Menu Bar

The menu bar provides functionality such as saving and opening project file, setting display mode, software settings, tools (e.g., IP configurator and firmware updater), language settings, as well information of the Software and the user manual.

7.1 File

The File sub-menu provides functionality related to project file, functionality for opening images, as well as the functionality for exiting from the Software. Project file is useful if you need to switch global camera settings in different scenarios. You can save the current settings of all the connected cameras as a project file (format: mcfg) to the local PC, after which you can fast restore the settings of the same connected cameras by opening the saved project file.



Note

- When you save cameras' settings as a project file, the serial No. of the cameras are saved as well.
 - Network exception, GenICam error, or failure of exporting features will cause saving failure.
 - Only the feature settings of the CONNECTED cameras can be saved.
-

Save Project File for the First Time

For the first time saving, you need to select a saving path as the default saving path for project file, so next time you can skip the step for selecting saving path and save the project file in the default path directly.

Click on the control toolbar or click **File** → **Save** to open the Save Project File window, and then select a saving path as the default saving path for project files, and finally click **Save**.



Note

You can click **View** on the prompt popped up when saving completes to go to the saving path of the project file.

Save Project File in Custom Saving Path

After the first project file being saved in the default saving path, the function of saving in custom path will be available.

Click on the control toolbar or click **File** → **Save as** to open the Save Project File window, and then select a custom saving path, and finally click **Save**.



Note
You can click **View** on the prompt popped up when saving completes to go to the saving path of the project file.

Open Project File

You can open a project file to restore the saved feature settings to the cameras with matched serial numbers. Two scenarios are involved in the opening of a project file.

Scenario 1: The Software Has been Running

When the Software has been running, you can perform one of the operations in the following list to open a project file.

- Click **File** → **Open Recent** and then select a recently saved project file to open it.
- Click on the control toolbar or click **File** → **Open** to open the **Selected Project File** window, and then select a project file from the PC, and finally click **Open**.

Scenario 2: The Software is Not Running

Double-click the project file, and then the Software will run and the cameras with the matched serial numbers will be connected automatically, and the feature settings information contained in the file will be imported to the cameras as well.

Open Images

You can open local images and video files to view them on the display window of the Software.

7.2 View

You can adjust the image quality of the live video by setting the display mode.

Set Display Mode

You can click **View** → **Display Mode** and then select **30 fps** or **60 fps** to set the image frame rate to 30 frames per second or 60 frames per second respectively.



The larger the image frame rate, the smoother the viewing effect.

7.3 Settings

You can configure settings for the Software, including general parameters, recording and capture parameters, buffer size, and packet resending parameters via the **Settings** sub-menu.

7.3.1 General Settings

You can set the general settings, including user level, auto-refresh settings of the device list, character encoding type, Bayer interpolation, and other related configurations.

Go to **Settings** → **General** to configure the following parameters.

User Level

You can select **Beginner** or **Guru**. When set to the **Beginner** mode, the feature tree only displays some fundamental features, while the **Guru** mode displays all available features.

Application Options

Camera List Auto-Refresh

You can turn on **Camera List Auto-Refresh** to refresh the camera list (device list) automatically.



Note

Devices in Serial Port and GenTL interface require manually refreshing.

Minimalist Mode

When enabled, the Software stops automatically refreshing to save system resources. You should manually refresh its camera list, feature tree, log, and other information to obtain updated status. You can enable this feature when using the Software to render high-resolution acquired images.



When enabled, you cannot enable **Camera List Auto-Refresh**.

ACK mode of devices Discovery

The communication mode between the Software and the detected IP addresses on the same network segment with the IPC that runs the Software. By default, the ACK mode is in **Broadcast** mode. If the Software fails to enumerate a camera, you can switch it to **Unicast** and try again.

Unicast

The enumerated device sends a response only to the current PC.

Broadcast

The enumerated device sends the response to all PCs on the same subnet.

Character Encoding Type

The encoding type of characters displayed on the Software interface, UTF-8 compatible only.

Bayer Interpolation

The interpolating modes for transferring an image of bayer format to RGB format.

Bayer Interpolation Display

When enabled, image data in Bayer format will be interpolated and converted to RGB format for display. If disabled, Bayer-format image data will be displayed in Mono format.

Generally, it is recommended to enable this function. If you need to view the effect of Bayer-format image data without interpolation, you may disable it.



Note

- This function is only effective when the **Rendering Engine** is set to **D3D** or **OpenGL**.
 - This setting can only be adjusted when the client is not connected to a camera or opening a local file.
-

Enumerate Serial Port Devices By Specified Serial

Applicable when connecting serial port devices. Once enabled, specify the **Serial Port Id** to which the Software enumerates connected devices. Then, you need to manually enumerate the connected devices in the device list.

U3V Camera reconnects after disconnection

When the client is connected to a U3V camera, enabling this feature allows you to set a **Reconnection Overtime**.

If the U3V camera disconnects unexpectedly, the system will attempt to automatically reconnect within the **Reconnection Overtime**; If the disconnection duration exceeds the set timeout, auto-reconnection will stop.

Status Curve Sampling Frequency (s/sample)

This setting configures the continuous sampling frequency of the camera's streaming status parameters. After enabling image preview, the system collects these parameters every N seconds. The camera's streaming status parameters include capture frame rate, display frame rate, packet loss count, error count, temperature, and average pixel value.

To view these parameters, click the icon  in the lower-right corner of the preview window. For details, please refer to [Acquisition and Live View in 1-Window Mode](#).

Temperature Screening Settings

Normal Region Color

The color or regions with normal temperature.

Alarm Region Color 1/2

The 2 colors of regions with an alarm triggered by abnormal temperatures.

Note

- If the alarm of screening region is not acknowledged after 200 seconds, the two colors will flash by turns.
 - To display the colors of screening regions, you need to finish the following operations beforehand.
 - Draw a temperature screening region. See [Draw a Region for Temperature Screening](#).
 - Set alarm rules of temperature screening regions. See [Configure Temperature Screening Parameters](#).
 - Select **Region Information Overlap as Client**.
-

Output Logs

When enabled, the Software outputs temperature screening logs.

7.3.2 Capture and Recording Settings

You can set the recording parameters and capture parameters as required.

Go to **Settings → Recording/Capture** to configure the following parameters.

Select Directory

Select Directory for the captured pictures and recorded videos.

Saving Path

Set a saving path for the recorded video files or captured pictures during live view.

Auto Save

When enabled, the recorded video files or the captured pictures during live view will be automatically saved to the saving path you set.

Note

The maximum pictures that can be auto saved depends on the storage space of the saving path you set.

Recording

Set parameters related to recording.

Video Format

Set format (AVI or RAW) for the recorded video files.

Video Quality

If you set AVI as the video format, you can select **Normal**, **Better**, or **Best** from the drop-down list as the video quality, or drag the slider to adjust the compression ratio so as to set video quality.

The compression ratio for **Normal** is from 0 to 40, for **Better** from 41 to 70, for **Best** from 71 to 100.



Note

The higher the compression ratio is, the better the video quality. The better the video quality, the more image details can be displayed.

Playback Speed

If you set AVI as the video format, you can set the playback speed for the recorded video files.

Original Frame Rate

Set the original frame rate of the recorded video file as the playback speed.

Custom

Enter a frame rate as the playback speed.

Video Naming Rule

Customize a prefix and select **Date and Time** or **Increasing No.** as the naming rule.

Date and Time

The video name will be a number which represents the date and time when the video file is saved. For example, if you set *Video* as the prefix of the name, the full name would be *Video_20190424051532390*.

Increasing No.

The video names will be increasing No. For example, if a video file is the second one you saved and you set *Video* as the prefix, the full name of the video would be *Video_02*.

Capturing

Set parameters related to the capturing of pictures.

Picture Format

Set format (**BMP**, **RAW**, **JPG**, **PNG**, **TIFF**) for the captured pictures during live view.



Note

When saving an image over 4GB, the Software only supports saving it in **PNG** or **TIFF** format.

Picture Quality

If you set **JPG** or **PNG** as the picture format, you can select **Normal**, **Better**, or **Best** from the drop-down list as the picture quality, or drag the slider to adjust the compression ratio so as to set picture quality.

The compression ratio for **Normal** is from 0 to 40, for **Better** from 41 to 70, for **Best** from 71 to 100.



Note

The higher the compression ratio is, the better the picture quality.

File Naming Rule

Customize a prefix and select **Date and Time**, **Frame No.**, or **Time Stamp** as the naming rule for the captured pictures.

Date and Time

The picture name will be a number which represents the data and time when the video file is saved. For example, if you set *Image* as the prefix of the name, the full name would be *Image_20190424051532390*.

Frame No.

The picture names will be frame No. For example, if a picture file is the second one you saved and you set *Image* as the prefix, the full name of the video would be *Image_02*.

Time Stamp

The picture name will be a serial number which represents the timestamp. For example, *Image_00000001576677065*.

Continuous Capture

Set the capture mode.

Capture by Frame

The pictures will be captured by frame(s) and the capture will be stopped after the set number of frames. For example, if you set "Capture Every 3 Frame(s)" and "Stop Capturing after 1000 Frame(s)" as the capture mode, a picture will be captured for each 3 frames, and the capture actions end after 1000 frames being acquired.

Capture by Time

The pictures will be captured by time and the capture will be stopped after the time period you set. For example, if you set "Capture Every 2 Second(s)" and "Stop Capturing after 5 Minute(s)" as the capture mode, one picture will be captured each two seconds, and the capture actions will last 5 minutes.

Bayer Color Image

When enabled, Bayer-format images will be automatically converted to RGB format before saving. You can select **RGB8** or **RGB16** as target pixel format after conversion.



Note

- Only available when the image format is set to TIFF.
 - Compatible exclusively with Bayer 8/10/12/16-format images.
 - **RGB16** is only available for Bayer 16, or Bayer 10/12 with **Bit-depth Expansion** enabled.
-

Bit-depth Expansion

When enabled, Bayer 10/12 or Mono 10/12-format images will be expanded to 16-bit depth (saved as Bayer 16 or Mono 16).



Note

- Only available when the image format is set to TIFF.
 - Compatible with Bayer 8/10 and Mono 10/12-format images.
-

7.3.3 Network Settings

You can configure the network settings, including automatic network detection, adaptive dropping frame, and packet loss prompt.

You can enable or disable **Automatic Network Detection** and (or) **Adaptive Drop Frame** to ensure the fluency of the image data acquisition according to the actual network environment.

You can also enable **Packet Loss Prompt** to allow the Software to pop up a prompt if the packet loss occurs.

7.3.4 Buffer Settings

Buffer settings allow you to balance image quality against image fluency.

You can adjust the values of **Buffers for Getting Stream** and (or) **Buffers for Capture and Recording** according to the memory conditions.

Buffers for Getting Stream

The maximum value is 30.

Buffers for Capture and Recording

The maximum value is 10000.

7.3.5 Resend Packet

Packet resending is a mechanism to ensure image quality by resending the lost or damaged packets during image data acquisition. You can set the packet-resending for the

Software, including maximum packet resending percent and the timeout period for packet resending.

You can set the **Resend Packet** switch to on to enable the Software to resending packets, and then configure the following parameters.

Max. Packet Resending Percent (%)

The maximum percent of packets resent within one frame (default value: 10%). With larger packet resending percent, you can get more complete image data. Conversely, you can get more real-time image data.

Timeout Period(ms)

The maximum time period (default value: 50 ms) that the Software can wait between two packets that need to be resent (either for the packet is lost or damaged). If the waiting time exceeds the time you set, the Software will not wait for or resend any packet.



Note

- You can set a relatively long timeout period if there are excessive packet losses.
 - You can set the value of Timeout Period from 0 ms to 1000 ms.
-

7.3.6 Shortcut

The Software provides default keyboard shortcuts for some frequently-used functions such as connecting/disconnecting camera and starting and stopping acquisition. You can customize the shortcuts according to your actual needs.



The Delete key cannot be used as a keyboard shortcut.

Click **Settings → Shortcut** to enter the Shortcut page.

You can do the following operations.

- Customize a Shortcut: Select the text field of a function (such as Start/Stop Live View), and then press one or more keys at the same time to set a shortcut for the function.
- Delete a Shortcut: Select the text field of a function, and then press the Delete key to delete the shortcut.
- Enable **Respond in Priority**: When you turn on **Respond in Priority**, the shortcut of the Software will still be executed even if the Software is minimized or not on the top layer of the PC desktop.
- Restore Defaults: Click **Restore Defaults** to restore the shortcuts for all the listed functions to the default settings.

7.4 Tool

The Software provides multiple tools for camera configuration and management.

The following table shows the brief description of each tool.

Table 7-1 Tool Description

Tool	Description
Toolkit	The toolkit contains tools for configuration, system diagnosis, and image processing. See the user manual of each tool for details.
Firmware Upgrade Tool	Upgrade the firmware of the connected cameras and frame grabbers. See Firmware Upgrade Tool for details.
IP Configurator	Configure the IP address of the GigE Vision cameras. See IP Configurator for details.
Log Viewer	View SDK logs. See Log Viewer Tool for details.
Virtual Device	Virtual Device is a tool designed for scenarios where constructing a real setup of cameras and frame grabbers environment is not feasible. It can simulate these devices, thus simplifying tests during the development stage. See Add a Virtual Device for details.
GigE Vision Action Command	Trigger actions in multiple cameras at the same time. See GigE Vision Action Command for details.

7.5 Help

The Help sub-menu offers access to the language switching functionality, user manual, SDK documents, and the Software information.

Language

Display the Software in the selected language.

User Manual

View the local user manual, which is installed with the Software installation.

User Manual(Online)

View the online user manual.

Development

Click **Help → Development** to view the SDK documents.

Table 7-2 SDK Documents

Folder Name	Description
Bin	The compiled executable programs.
Documentations	SDK documents including <i>SDK Development Guide</i> and <i>Demo User Manual</i> .
DotNet	DLL(s) developed via C#.
Includes	Header files.
Libraries	Static libraries.
Samples	Sample codes in different programming languages.  Note You can also click Start → MVS → Samples in the Windows system to access the Samples folder.
ThirdPartyPlatformAdapter	Third-party plug-ins.

More

Click to go to the official website.

About

Click to view the version of the Software, the SDK, and related drivers.

Chapter 8 Device Management

On the device list, the devices are classified into four types, namely, GigE, USB, Camera Link, and GenTL, according to the camera interface. After connecting cameras to the Software, you can perform operations such as saving GenICam XML, and using Event Monitor to determine issues that may occur on your cameras.

8.1 GigE Vision Camera Management

GigE Vision camera is the camera using GigE Vision interface standard for data transmission. After connecting GigE Vision cameras to the Software, you can perform operations such as Multicast settings, saving GenICam XML, and editing device user ID.



Note
GigE Vision is an interface standard for machine vision cameras. It provides a framework for transmitting high-speed video and related control data over Ethernet networks.

8.1.1 Add GigE Vision Camera

You can connect GigE Vision cameras to the Software in 3 ways, i.e., letting the Client automatically enumerating local cameras, connecting camera by command, and adding remote camera.

- [Automatically Enumerate Local Cameras](#)
- [Connect Camera by Command](#)
- [Add Remote Camera](#)

Automatically Enumerate Local Cameras

All the GigE Vision cameras in the same local subnet with the Software will be automatically enumerated in the device list.

You can hover the cursor over the camera interface and then click  to refresh the enumerated cameras on the same local subnet with the PC on which the Software runs.

Or you can enable the Software to automatically refresh the device list. See [Settings](#) for details.

When the cameras are enumerated, if the camera status is available, you can double-click the camera or click  to connect it to the Software.



For details about status of the GigE Vision cameras, see [Status of GigE Vision Camera](#).

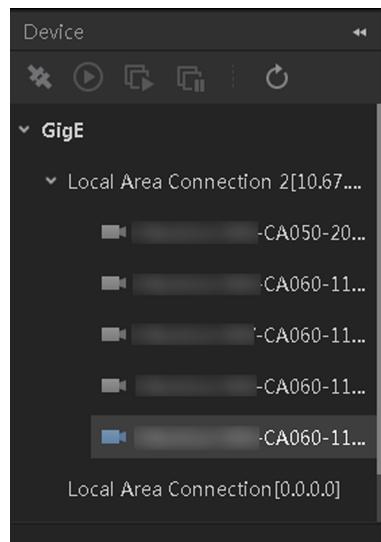


Figure 8-1 Local Camera Enumeration

Connect Camera by Command

You can use CMD commands to run the Software and connect cameras to it.

Steps

1. Open the system terminal.
2. Enter the command "cd /opt/MVS/bin".
3. Press the Enter key to execute the command.
4. Connect the camera to the client software in the following four ways:
 - Connect by Camera IP Address.

```
./MVS.sh /IP xx.xx.xx.xx
```



Connection by IP address is not supported by USB3 Vision camera, Camera Link camera, and CoaXPress camera.

- Connect by Camera Mac Address.

```
./MVS.sh /Mac xx.xx.xx.xx.xx.xx
```



- Connection by Mac address is not supported by USB3 Vision camera and Camera Link camera.
- xx.xx.xx.xx.xx here refers to the camera Mac address.
- Connect by Camera Serial Number.

```
./MVS.sh /SN xxxxxxxx
```



Note
xxxxxxxx here refers to the camera serial number.

- Connect by Opening Project File.

```
./MVS.sh /mcfg/{mcfg file path}/{mcfg file name}.mcfg
```



You should have saved camera features as project file. For details about how to save camera features as project file, see [File](#).

5. Press the Enter key.

Result

The Software will start running and parsing the entered parameters such as camera IP address, and then the camera will be connected automatically.

Add Remote Camera

You can add GigE Vision camera NOT in the same local subnet with the client software to the device list.

Steps

1. Right-click the network interface card (for example, Local Area Connection in the following picture) to open the right-click menu.

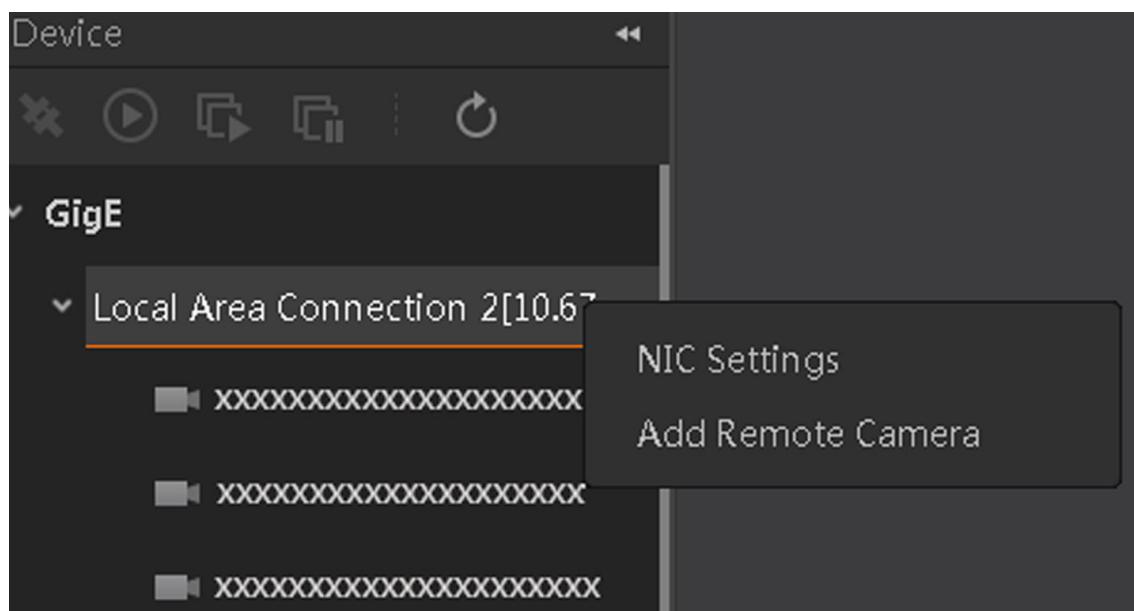


Figure 8-2 Right-click Menu

2. Click **Add Remote Camera** to open the Add Remote Camera window.

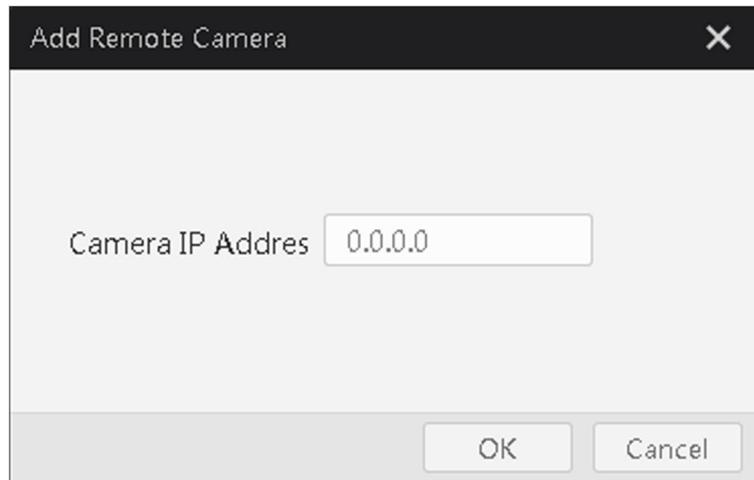


Figure 8-3 Add Remote Camera

3. Enter the camera IP address and then click **OK** to add the camera.

8.1.2 Status of GigE Vision Camera

The Software provides multiple icons to represent different status of GigE Vision cameras.

The following table shows the descriptions of the status of the GigE Vision camera on the device list.

Table 8-1 Status Description

Camera Status	Description
A gray camera icon representing an available and disconnected camera.	Available and disconnected. Note You can double-click the camera or select it and click on the control toolbar to connect it to the Software. Once connected, changes to .
A red camera icon with a red dot, representing a camera that is not available because another software or process is accessing it.	Not available. Another Software or process is accessing the camera.
A yellow camera icon with an exclamation mark, representing a camera that is on the same subnet as the PC but not in the same network segment.	The camera is on the same subnet with the PC on which the Software runs, but NOT in the same network segment. You should configure its IP address to the same network segment before you can connect and use the camera.

Camera Status	Description
	 Note You can double-click the camera or click Tool → IP Configurator to configure the camera's IP address.
	Connected.
	The camera is acquiring streams.  Note See Acquisition and Live View for details about how to start acquisition.
	Multicast of the camera is enabled on another Software. And the camera is connected to the current Software.  Note See Multicast Settings for details about how to enable Multicast.
	Multicast of the camera is enabled on another Software. And the camera is not connected to the current Software.  Note See Multicast Settings for details about how to enable Multicast.

8.1.3 Edit Camera IP Address

If the camera is displayed as  (not reachable for the camera is on the same subnet with the PC on which the Software runs, but not in the same network segment), you can edit the camera's IP address to make it reachable.

Steps

1. Right-click the camera displayed as  to open the right-click menu.
2. Click **Modify IP** on the right-click menu to edit IP address of the camera.



For details about editing camera IP address, see [**Edit Camera IP Address**](#).

8.1.4 Multicast Settings

By enabling Multicast, a GigE Vision camera can be accessed through multiple Softwares. This is especially useful when a camera needs to be accessed by different end users. Before that, you need to configure roles for the Softwares to specify different permission for them to access different cameras.



- Multicast configuration is only available for GigE Vision cameras.
- Multicast configuration should be supported by the GigE Vision camera.

For different cameras, a Software can be configured with different roles to access them. In other words, the end user of a Software can have different permissions to access different cameras. The following roles are available:

Table 8-2 Role Description

Role	Description
Controller and Data Receiver	The camera's features are editable, and the Software can receive camera data to display live image.
Controller	The camera's features are editable, but the Software cannot receive camera data to display live images.
Data Receiver	The camera's features are NOT editable, but the Software can receive camera data to display live images. A small icon of a notepad with an exclamation mark inside, indicating a note or important information. <ul style="list-style-type: none">• You cannot set the role of a Software as Data Receiver manually.• Multiple Softwares can be Data Receiver of the same camera.



- For one camera, only one Software can be the role of "Controller and Data Receiver" or "Controller".
- You can configure Multicast for a camera only when the role is set to "Controller and Data Receiver" or "Controller".
- For the Softwares running on the same PC, one of them can only be configured as "Controller" and the others as "Data Receiver".

Enable Multicast When Camera is Available but Disconnected

If the camera status is available and disconnected, you can set "Controller" or "Controller and Receiver" as the Software's role.

Steps

1. Right-click a camera (available and disconnected) on the device list to open the right-click menu.
2. Click **Multicast Setting** to open the Multicast Setting window.
3. Select **Controller** from the **Role** drop-down list.
4. Click **OK** to save the role settings.

The camera will be connected and Multicast will be enabled automatically.

5. **Optional:** Edit the IP address and port.

IP Address

The IP address of the selected camera.

Port

The port No. of the selected camera.

6. Click **OK** to save the settings.

After enabling Multicast mode of a camera on Software A, if the camera is remotely added to Software B, or the camera is on the same local subnet of the PC on which the Software C runs, the camera will be displayed as  (when disconnected) or  (when connected) on Software B or Software C. And the role of Software B and Software C (relative to the camera) will be "Data Receiver".

Enable Multicast When Camera is Connected

For a connected camera, you can only set the Software's role to "Controller and Receiver".

Steps

1. Right-click the camera and then click **Multicast Setting** to open the Multicast Setting window.

The role for the current Software is set to "Controller and Data Receiver" by default and cannot be edited.

2. Turn on the **Enable** switch to enable Multicast.

The IP Address field and Port field appear.

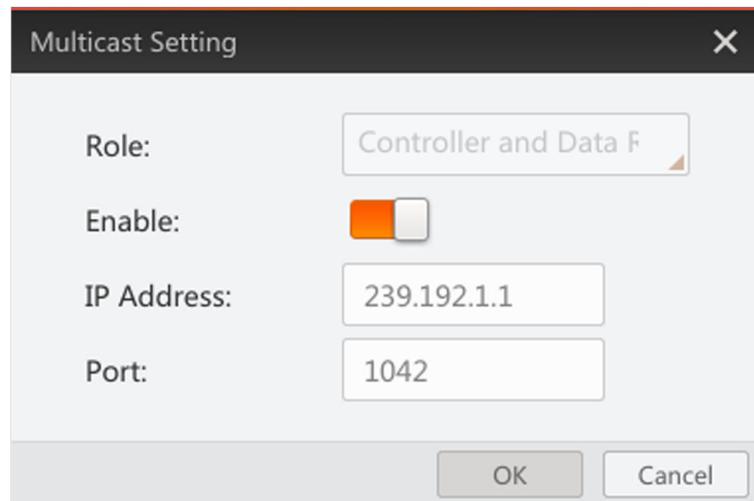


Figure 8-4 Multicast Settings Window

3. Optional: Edit the IP address and port.

IP Address

The IP address of the selected camera.

Port

The port No. of the selected camera.

4. Click OK to save the settings.

After enabling Multicast mode of a camera on Software A, if the camera is remotely added to Software B, or the camera is in the same local subnet of the PC on which the Software C runs, the camera will be displayed as (when disconnected) or (when connected) on Software B or Software C. And the role of Software B and Software C (relative to the camera) will be Data Receiver. In this scenario, the user has the permission to modify the camera's features, as well as view the live video of the camera on Software A; While on Software B and Software C, the user has no permission to modify the camera feature, but can view the live video and features of the camera.

8.1.5 Other Features

Other features are provided for the GigE Vision cameras on the device list, including GVCP Settings, GVSP Settings, GenICam XML settings, device user ID settings, etc.

Configure NIC

Right-click a GigE Vision interface and then click **NIC Settings** to set NIC parameters. For details, see [Configurations before Using GigE Vision Cameras](#).

Rename User ID

Right-click a GigE Vision camera, and then click **Rename User ID** to edit user ID of the camera.



Note
Renaming user ID is only available when the camera is connected or in acquisition.

Stick Camera to Top

Right-click a GigE Vision camera and then click **Stick to Top** to stick the camera to the top of the GigE Vision camera list.

If you want to cancel sticking the camera to the top, right-click the camera and then click **Cancel Sticking to Top**.

GVCP Settings

GVCP (GigE Vision Control Protocol) is a protocol for the communication between the Software and a GigE Vision camera. The protocol allows the Software to configure and control a GigE Vision camera.

In the case of data losses due to slow connection, disruptions and other network issues, you can configure the GVCP settings to allow the Software to resend the command for multiple times within a specified time period.



- GVCP settings is only available when the camera is connected or in acquisition.
 - Cameras connected via frame grabbers does not support this function.
-

Right-click a GigE Vision camera and then click **GVCP Settings** to open the GVCP Setting window and then configure the two parameters below.

Resending Times

Specify the times for resending the command.

The default value is 3, and the value range is from 0 to 100.

Timeout

Specify the time period (ms) for resending the command. In other words, if the time for resending the command reaches the specified time period, command resending will end.

The default value is 500, and the value range is from 0 to 10,000.

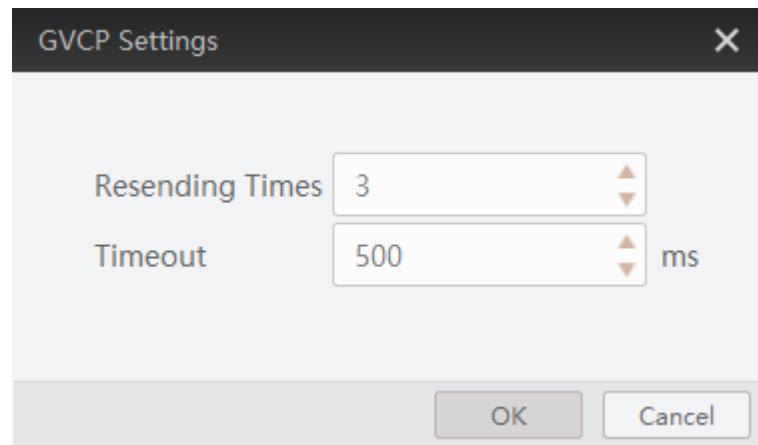


Figure 8-5 GVCP Settings

GVSP Settings

GVSP (GigE Vision Streaming Protocol) provides a protocol for getting non-compressed and compressed data streams. For transmission an image is split into several packages and the packages are recompiled when received. When you set the **Timeout**, you set the waiting duration between each package of an image. If the next package is not received when the waiting duration is longer than the **Timeout** value, the Software will stop receiving the following packages of image and recompile packages received before. When the network condition is not good, setting a short **Timeout** may cause a low resolution of the image; while setting a long **Timeout** may lower the continuity of image acquisition.



- GVSP settings is only available when the camera is connected.
- By default, the **Timeout** is **300**.
- Cameras connected via frame grabbers does not support this function.

Right-click a GigE Vision camera and then click **GVSP Settings** to open the GVSP Setting window and then configure **Timeout**.

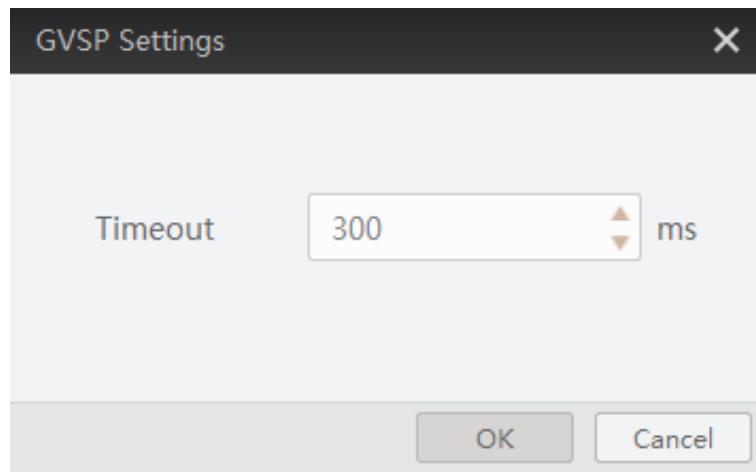


Figure 8-6 GVSP Settings

Save GenICam XML

Right-click a connected GigE Vision camera, and then click **Save GenICam XML** to save the camera information as XML file for purposes such as secondary development of the Software.



Saving GenICam XML is only available when the camera is connected or in acquisition.

8.2 USB3 Vision Camera Management

USB3 Vision camera uses USB3 Vision interface standard for data transmission. You can connect USB3 Vision cameras to the Software for further management, including image acquisition, feature settings, and live view quality adjustment.

8.2.1 Add USB3 Vision Camera

You can add USB3 Vision camera to the Software in two ways, i.e., by automatically enumerating camera, or by command.

- After you connecting a USB3 Vision camera to the PC on which the Software runs, the camera will be automatically enumerated if the USB driver is properly installed. For details about automatically enumerating camera, see [Automatically Enumerate Local Cameras](#).
- You can also connect a USB3 Vision camera to the Software by command. For details, see [Connect Camera by Command](#).

8.2.2 Status of USB3 Vision Camera

The Software provides multiple icons to indicate the status of the USB3 Vision camera. You can do further management according to the status of the cameras.

The following table shows the descriptions of different status.

Table 8-3 Status Description

Camera Status	Description
	Available and disconnected. You can double-click the camera or select it and click on the control toolbar to connect it to the Software. Once connected, the status changes to .
	Connected.
	USB driver exception. You should reinstall the USB driver.
	Not available. Another software or process on the same PC is accessing the camera.
	The camera is acquiring image data.
	USB driver exception (the USB interface of the PC is USB 2.0 interface). You should reinstall the USB driver.
	Connected (the USB interface of the PC is USB 2.0 interface).
	Available and disconnected (the USB interface of the PC is USB2.0 interface).
	Not available (the USB interface of the PC is USB 2.0 interface). Another software or process on the same PC is accessing the camera.
	The camera is acquiring image data (the USB interface of the PC is USB 2.0 interface).

8.2.3 Other Features

Other features are provided for the USB3 Vision cameras on the device list, including U3V Transfer settings, device user ID settings, GenICam XML settings, etc.

U3V Transfer Settings

You can edit the packet size and streaming channels for a USB3 Vision camera. Right-click a USB3 Vision camera and then click **U3V Transfer Setting** to open the U3V Transfer setting window, and then configure **Packet Size** (value range: 64 to 20,480 KB,

default value: 1024 KB) and **Streaming Channel(s)** (value range: 1 to 10, default value: 8) according to the performance of the USB frame grabber. The lower the performance of the USB frame grabber, the smaller the **Packet Size** and the more **Streaming Channel(s)** you should set so as to alleviate data transmission between camera and the Software.



U3V transfer settings is only available when the camera is connected or in acquisition.

Save GenICam XML

Right-click a USB3 Vision camera, and then click **Save GenICam XML** to save the camera information as XML file for secondary development of the Software.



Saving GenICam XML is only available when the camera is connected or in acquisition.

Rename User ID

Right-click a USB3 Vision camera, and then click **Rename User ID** to edit user ID of the camera.



Renaming user ID is only available when the camera is connected or in acquisition.

Stick Camera to Top

Right-click a USB3 Vision camera and then click **Stick to Top** to stick the camera to the top of the USB3 Vision camera list.

If you want to cancel sticking the camera to the top, right-click the camera and then click **Cancel Sticking to Top**.

8.3 PCIe Device Management

The PCIe interface supports frame grabbers developed by our company. Once connected them to the Software, you can perform further operations, including enumerating frame grabbers and cameras that are connected to the frame grabber, and upgrading frame grabber firmware.



PCIe devices are only available when you run the Software on Linux x86_64 type system.

8.3.1 Add PCIe Device

The software automatically enumerates all PCIe devices on the same local subnet and displays them in the device list.

You can enumerate the device in the following ways:

- In the device list, hover the cursor over the PCIe interface, and click  to refresh the enumerated cameras on the same local subnet with the current PC.
- In **Settings**, enable the **Camera List Auto-Refresh**. The software automatically refreshes every 30 seconds to enumerate all devices with which it connects. For details, see [General Settings](#).

Once the device is enumerated and the device status is **Available**, in the device list, you can double click the device or click  to connect the device.

8.3.2 Status of PCIe Device

When the device is available, you can connect them to the Software. Once connected, you can configure parameters and enumerate cameras connected to the device.

Table 8-4 Frame Grabber Status

Icon	Status	Description
	Available	The frame grabber can be connected for further operations.
	Connected	The Software has been connected to the frame grabber. You can configure parameters of the frame grabber and enumerate cameras connected to the frame grabber.

8.3.3 Other Features

Frame Grabber

Once connected, you can:

- Configure Frame Grabber Features: Select one connected frame grabber, and configure the features of the frame grabber on the right pane. For details, see user manual of the corresponding frame grabber.
- Open By Virtual Port: Right-click one enumerated PCIe device and select **Open By Virtual Port** to connect it via a virtual port, which ensures stable image acquisition.
- Save GenICam XML: Right click the connected frame grabber and select **Save GenICam XML** to save the GenICam file (.xml) to local.



Note

You can only save the device information when the device is connected.

- Upgrade Firmware: Disconnect the frame grabber, right click and select **Upgrade Firmware** to upgrade its firmware.

Click to select an upgrade package (a dav file), and then click **Upgrade**.



Note

Reboot the frame grabber after upgrade, or the upgrade will not take effect.

Cameras

Once the frame grabber is connected, you can view cameras to which the frame grabber connects. Double click the camera in the device list to connect the camera, and the feature tree displays on the right pane. You can configure features and preview the acquisition.



Ensure the frame grabber status is "connected." Otherwise, the Software cannot enumerate the camera connected through the frame grabber.

You can click to refresh the camera list.

8.4 Serial Port Device Management

The software supports connecting devices that transmit data through a serial port. After connecting serial port devices to the Software, you can perform further operations, such as device parameter configuration.



The Serial Port interface supports Camera Link cameras.

8.4.1 Add Serial Port Device

The Software supports serial port devices. You can connect serial port devices to the Software to perform further operations such as feature configuration.

Before You Start

Ensure you have properly connected a serial port device to the PC on which the Software runs.

Steps



Note

- The Software doesn't support the image acquisition and live view features for the serial port devices. You can only manage features of serial port devices after connecting them to the Software if no third-party frame grabber is installed on the PC.
 - To acquire streams and view real-time acquisition of serial port devices, you need to install third-party frame grabber on the PC.
 - Serial port device doesn't support Bayer settings and ROI/AOI settings.
-

1. Hover the cursor to **Serial Port**, and then click to refresh the serial port device list.

The cameras will be displayed under the serial port interface of the device list.



Note

- The time for refreshing serial port device is longer than that of other types of devices. Please wait patiently.
 - The serial port device may be enumerated for two times via serial port and frame grabber respectively.
-

2. Connect the device to the Software.

3. **Optional:** Right-click the device, and then click **Connection Parameter Settings** to set the baud rate of the device.



The higher the baud rate, the faster the signals can be transmitted.

8.4.2 Status of Serial Port Device

The Software provides two icons to indicate the status of the serial port device. You can perform further management according to the status of the devices.

The following table shows the descriptions of different statuses.

Table 8-5 Status Description

Status Icon	Description
	Available and disconnected. You can double-click the device, or select the device and then click on the control toolbar to connect it to the Software. Once connected, the status icon changes to .
	Connected.

8.5 GenTL Device Management

The GenTL standard allows the Software to enumerate cameras, communicate with the enumerated cameras, and if possible, stream data from these cameras independent from the underlying transport technology, and configuring features of connected frame grabbers. The standard provides a generic way for the Software to control cameras (including third-party cameras) and acquire data.



GenTL devices are only available when you run the Software on Linux x86_64 type system.

Load cti File

Click GenTL → , and then load the cti file.

Once loaded the cti file, you can click to refresh cameras.

- The cti files of GigE interface and USB3 Vision interface are provided by the Software (directory: C:\Program Files (x86)\Common Files\MVS\Runtime\Win32_i86 or C:\Program Files (x86)\Common Files\MVS\Runtime\Win64_x64).
- The Software supports loading the cti files of GigE, CameraLink, CoaXPress frame grabber. The saving path of the file is C:\Program Files (x86)\Common Files\MVS\Runtime\Win32_i86 or C:\Program Files (x86)\Common Files\MVS\Runtime\Win64_x64.

Table 8-6 cti File Description

File Name	Device Type
MvFGProducerCML.cti	Camera Link frame grabber.
MvFGProducerCXP.cti	CoaXPress frame grabber.
MvFGProducerGEV.cti	GigE frame grabber.
MvFGProducerXoF.cti	Frame grabber using XoF protocol.
MvProducerGEV.cti	Camera with GEV interface.
MvProducerU3V.cti	Camera with USB interface.



The Software also supports third-party cti files that conform to the GenTL standard. To get a third-party cti file, you can contact the corresponding third-party camera manufacturer for support.

Device Operation

Through the GenTL list, you can perform the required operations as follows.

- Frame Grabber:

Different icons indicate different statuses of a frame grabber.

Table 8-7 Frame Grabber Status

Icon	Status	Description
	Available	The frame grabber can be connected and operated.
	Connected	The Software has been connected to the frame grabber. You can configure parameters of the frame grabber and enumerate cameras connected to the frame grabber.

- After connecting to the frame grabber, the feature tree of the frame grabber will be displayed on the right. Configure the features if necessary.



When you connect the same frame grabber through the PCIe interface and GenTL interface, the cameras connected with the frame grabber display under the GenTL interface by default.

- After connecting to the frame grabber, right-click it and then select **Save GenICam XML** to save the frame grabber's GenICam file to the PC in XML format.
- After disconnecting to the frame grabber, you can right-click the frame grabber and select **Upgrade Firmware** to upgrade its firmware.
- Upgrade firmware of a single camera connected to frame grabber: Click to connect to a frame grabber and enumerate cameras connected to it. Right-click a camera and select **Upgrade Firmware**. Click to select an upgrade package (a dav file), and then click **Upgrade**.



Reboot the camera after upgrade, otherwise the upgrade will not take effect.

8.6 Event Monitor

The Event Monitor is a tool used to determine causes of issues that may occur when using the device. When enabled, you can view all the time-stamped GigE Vision or USB3 Vision events.

Before You Start

The cameras and frame grabbers are connected and supports event monitor function.

Steps



Note
The Event Control feature should be supported by your device, or the Event Monitor functionality will be unavailable.

1. Connect the camera with the software by one of the following operations.
 - Select a camera from the device list and click  on the control toolbar to connect it with the software.
 - Double-click the camera on the device list to connect it with the software.
 2. Select **Advanced Features** tab on the Feature List Panel on the right of the main page.
 3. In **Event Control Information**, check the event(s) that you want to view.
 4. Right-click the camera on the device list and select **Event Monitor** to open the Event Monitor window.
 5. Check **Messaging Channel Event**.
 6. **Optional:** Click  to select a saving path, and then check **Auto Save** to automatically save the generated events to the PC.
 7. Start acquisition, and then a large number of events will appear on the Event Monitor window.
 - Click  on the display window to start acquisition.
 - Right-click the camera on the device list and click **Start Acquisition**.
-



- Note**
- Up to 10,000 events can be displayed on the Event Monitor window.
 - Events will keep being obtained even if you close the Event Monitor window.
-

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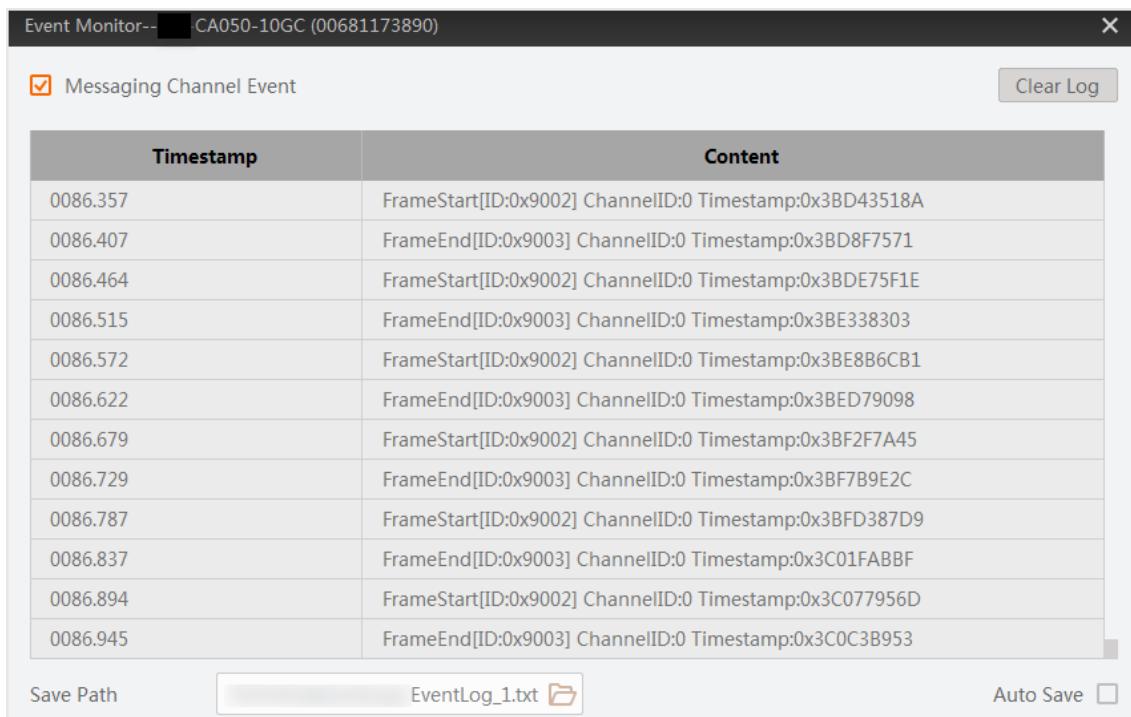


Figure 8-7 Event Monitor

8. Optional: Click **Clear Log** at the upper-right side of the window to clear all the events displayed before.

8.7 Add a Virtual Device

Virtual Device allows you to generate virtual cameras and frame grabbers when a real setup is unavailable. You can use this tool to simplify tests during the development stage.

Virtual camera connecting methods differ by the camera type. Some require a virtual frame grabber before connecting.

Table 8-8 Virtual Camera Connecting Method

Virtual Camera Type	Description
GigE Camera	<ul style="list-style-type: none">Before adding a virtual frame grabber You can connect to the virtual camera under the GigE interface.After binding to a virtual frame grabber You can view the virtual GigE camera under the GigE interface and the corresponding virtual frame grabber under the PCIe interface. However, you can

Virtual Camera Type	Description
	only connect to the virtual camera from one interface.
U3V Camera	You can enumerate and connect to the camera through the USB interface.
Camera Link Camera CoaXPress Camera XoFLink Fiber Optic Camera	You can only connect to the camera after adding a frame grabber with the corresponding interface and binding the camera to the frame grabber. Then, you can enumerate and connect to it from the PCIe interface.

8.7.1 Add a Virtual Frame Grabber

Virtual frame grabber allows you to simulate frame grabbers with different interfaces.



Virtual frame grabbers only support partial features.

- **Camera Type:** available for **Frame Scan** or **Line Scan**.
- Trigger: It supports configuring **Stream Trigger**, **Link Trigger**, and **Timer Trigger**. The trigger source supports **Software Signal** or **QuickSoftwareTrigger**.

Steps

1. Go to **Tool** → **Virtual Device** → **Virtual FrameGrabber**.

2. Select a **Type** and **Model** you want to simulate.



The supported virtual frame grabber models are subject to the displayed options.

3. Click **Add Virtual Frame Grabber**.

You can add 64 virtual frame grabbers at most.

4. In the **Added List** → **Bind Camera**, select virtual cameras as required.



- The maximum number of cameras that can bind to a frame grabber depends on the number of interfaces of the corresponding model. You can view the number of interfaces through the last digit of the **Model**.
- You can only bind created virtual cameras. See [**Add a Virtual Camera**](#) for details.
- Virtual Camera Link, CoaXPress, and XoFLink Fiber Optic cameras can only be displayed in the device list after you have bound them to a virtual frame grabber.

5. Optional: Perform further operations as needed.

Change Online Mode

Right-click the virtual frame grabber and select **Change Online Mode** to switch its mode between online and offline.

Delete Virtual Frame Grabbers

Check the required check boxes of the frame grabber and click **Delete** to delete virtual devices.

You can also right-click a virtual frame grabber and click **Delete** to remove it from the added list.

Reset Virtual Frame Grabbers

Check the required check boxes of the frame grabbers and click **Reset** to initialize the selected virtual devices.

6. Go to the main window of the Software, and the added virtual frame grabbers will be displayed under the PCIe interface.
-



If there is no virtual frame grabber displayed, click to refresh.

7. Double-click to connect the virtual frame grabber to the Software.

What to do next

To have the virtual cameras bound displaying local images, see [Add a Virtual Camera](#).

8.7.2 Add a Virtual Camera

The virtual camera allows you to simulate cameras with different interfaces. After you create a virtual camera, you can connect to it and let it load local images to simulate acquisition.



- For now, virtual cameras only support the following features: **Width**, **Height**, **Pixel Format**, and **Trigger Source**. Other displayed features do not take effect.
 - Virtual cameras only support Mono8, Mono10, Mono12, RGB24 pixel format.
-

Steps

1. Click **Tool** → **Virtual Device** to open the Virtual Camera window.

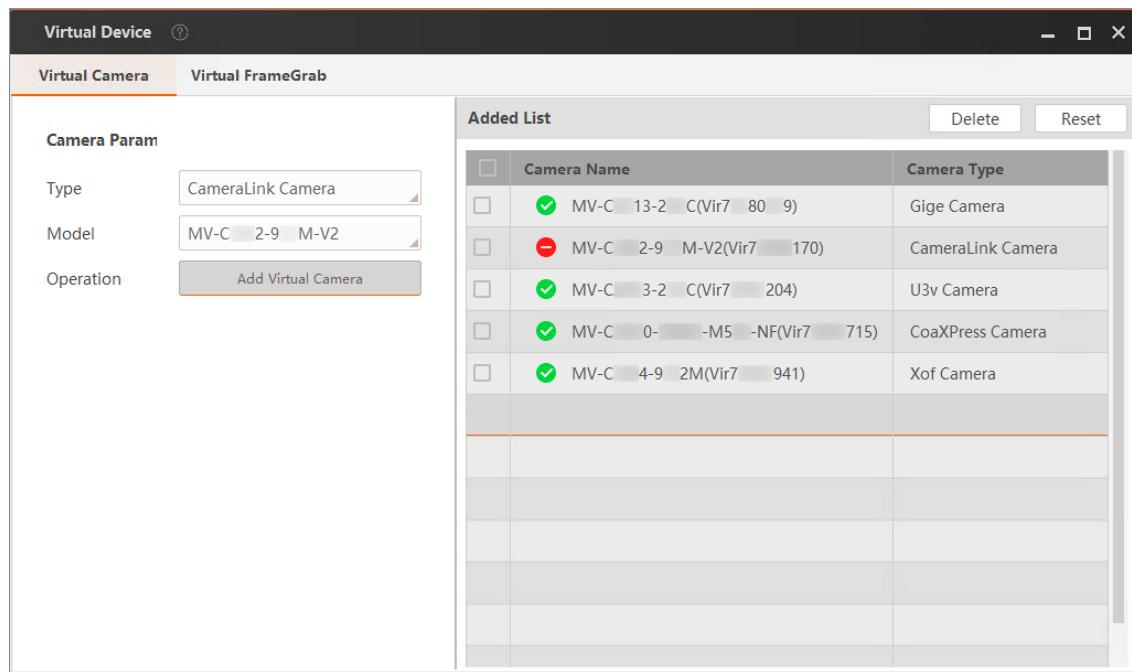


Figure 8-8 Virtual Camera

2. In the **Virtual Camera** tab, select a camera type and model you want to simulate.



The supported virtual camera models are subject to the displayed options.

3. Click **Add Virtual Camera** to allow the Software to generate a specified camera.

You can create 256 virtual cameras for each type at most.

The added virtual cameras will be displayed on the **Added List**.

4. Optional: Perform further operations as needed.

Change Online Mode

Right-click the virtual camera and select **Change Online Mode** to switch its status between online and offline.

Delete Virtual Cameras

Check the required check boxes of the cameras and click **Delete**.

You can also right-click a virtual camera and click **Delete** to delete it.

Reset Virtual Cameras

Check the required check boxes of the cameras and click **Reset**.

5. Go to main window of the Software, and the added virtual cameras will be displayed in the Device List.



Note

- For Camera Link, CoaXPress, and XoFLink Fiber Optic cameras, you need to bind them to a virtual frame grabber to display them in the device list. See [Add a Virtual Frame Grabber](#) for details.
- If there is no virtual camera displayed, click to refresh.

6. Add pictures for simulation.

- 1) Go to C:\Windows\Temp\VirtualCamera\Cameras, and find the file folder named by the virtual camera No.
- 2) Open the file folder, and then put images in the file folder named Mono8 or RGB24.
- 3) Ensure the resolution of imported images is the same as the virtual camera.
If not, you can adjust the image size or adjust the camera resolution via **Height** and **Width** in the **Image Format Control** of the feature tree.

7. In the Feature Tree → Image Format Control → Pixel Format , select a pixel format as required.

You can configure other available parameters as required.

8. Connect the virtual camera to the Software and start acquisition.

8.8 Dead Pixel Correction

You can conduct dead pixel correction on a camera to fix dead pixel.

Before You Start

Make sure that the camera has been connected to the Client.



Note

The feature only support GigE cameras.

Steps

1. Select a camera on the device list.
2. Right-click the camera name and select **Dead Pixel Correction**.
3. **Optional:** Export the dead pixel file and edit the dead pixel information.
4. Select a dead pixel file (MFA format) and click **Import**.

A progress bar will be displayed when importing, and a message box noting "Imported" will pop up when the import is finished.

Chapter 9 Camera Feature Configuration

The Software provides multiple methods to configure the camera features, including configuring manually, configuring via User Set, configuring via project file, configuring via File Access, and batch exporting and importing.

9.1 Feature Tree

Features are capabilities of the cameras and camera modules that can be controlled by setting firmware parameters. The feature tree displays all available features of a connected camera and you can edit the parameters under each feature.



The available features of the camera vary with different camera models.

You can perform the followings:

- Move Feature Tree: Drag the device model on the top of the feature tree to move the feature tree.
- Show or Hide Features: Click to show or hide the camera features under all feature categories.
- Switch User Level: Switch the user level at the top right of the Feature Tree tab.



The higher the user level, the more camera features will be displayed. Guru Level provides the most comprehensive camera features for professional use.

- Add Feature/Parameter to Favorites: Right-click a frequently-used feature/parameter, and then click **Add to Favorites** to add it to the Favorites.
By default, the features/parameters added to Favorites are ranked by time. You can drag the added feature/parameter to adjust its rank.
- View Description of Feature/Parameter: Click the name of a feature or parameter to view its description, node, and related information at the bottom of the tab. You can view the description to learn how to customize the Software.
- Switch Language: Click / to switch the language of this pane to Chinese/English.

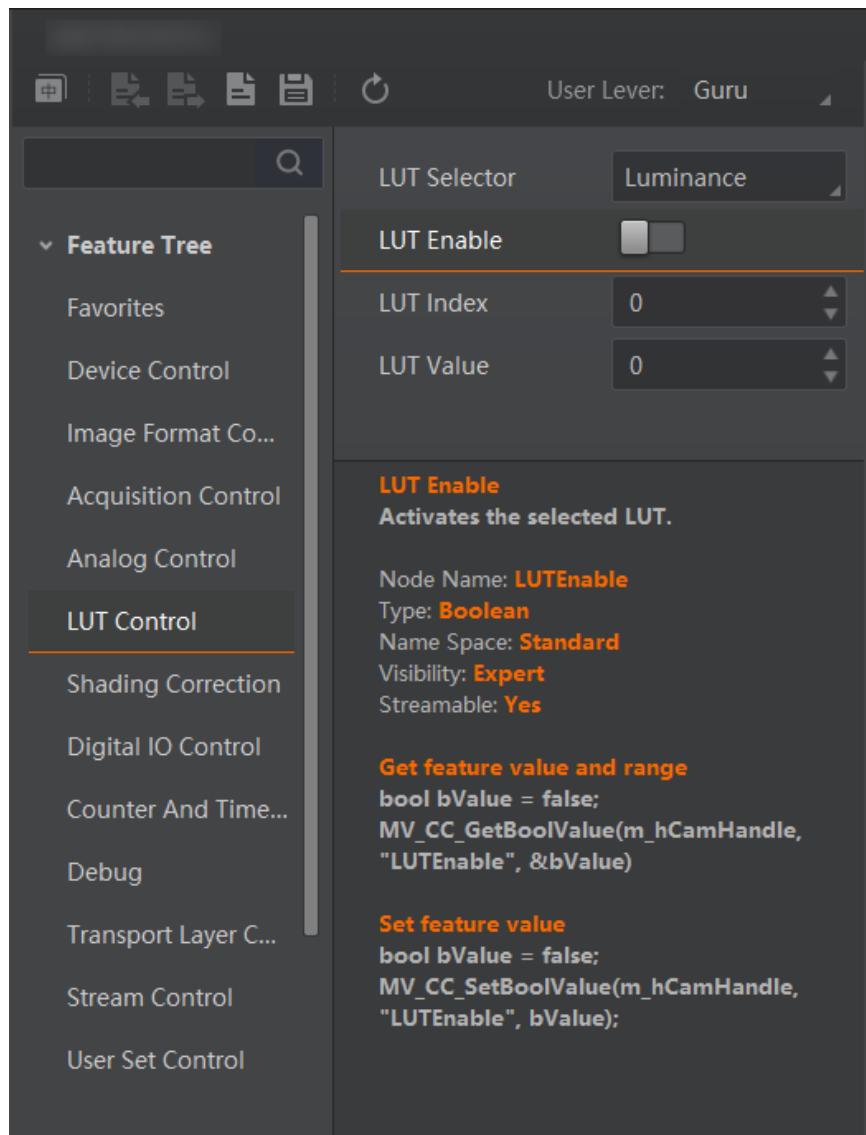


Figure 9-1 The Feature Tree Tab

The following table briefly introduces the description of each feature category.



- The supported features are subjected to the camera's model and firmware.
- For the supported function of a specific camera, see the corresponding user manual.

Table 9-1 Feature Category Description

Feature Category	Description
Device Control	Contains the features related to the control and information of the camera.

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Feature Category	Description
	<p>You can do the followings:</p> <ul style="list-style-type: none"> • View the camera details including device type, version, manufacturer details, device ID, device temperature, etc. • Modify the alias and reset the camera.
Image Format Control	<p>Contains the features related to the format of the transmitted image.</p> <p>You can do the followings:</p> <ul style="list-style-type: none"> • View the live view image width and height, pixel size, etc. • Set ROI, modify pixel format, set image reverse, test pattern, and set the embedded information, etc.
Acquisition Control	<p>Contains the features related to image acquisition, including trigger and exposure control.</p> <p>You can set the trigger mode, trigger source, acquisition mode, etc.</p>
Analog Control	<p>Contains the features related to the video signal conditioning in the analog domain.</p> <p>You can adjust the analog signal including analog gain, black level, brightness, gamma, sharpness, AOI, etc.</p>
Color Transformation Control	<p>Contains the features related to the color of the image.</p> <p>You can adjust your image to make the image more vivid.</p>
Super Palette Control	<p>Contains the features related to hue and saturation.</p> <p>You can change the hue and saturation of different areas of the image.</p>
LUT Control	<p>Contains the features related to the look-up table (LUT) control.</p> <p>You can view the user look-up table and set the LUT index and value.</p>
Encoder Control	<p>Contains the features related to converting outer source signals into acceptable signals.</p>
Frequency Converter Control	<p>Contains the features related to converting outer various frequencies signals into unified and acceptable signals.</p>
Shading Correction	<p>Contains the features related to correcting the grayscale value of different pixels.</p> <p>For some line scan cameras, you can use the Flat-field Correction Tool. See Flat Field Correction Tool for details.</p>

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Feature Category	Description
Digital I/O Control	<p>Contains the features related to the control of the input and output pins of the camera.</p> <p>You can manage the digital input and output.</p>
Action Control	<p>Contains the features related to the control of action command.</p> <p>You can use the features to define the mechanism of the action command.</p>
Counter and Timer Control	<p>Contains the features related to the usage of programmable counters and timers.</p> <p>You can set the counter and timer, which count the triggering signal and control the exposure according to your needs.</p>
File Access Control	<p>Contains the features related to accessing files in the camera.</p> <p>You can use File Access to export and import camera settings.</p>
Sequencer Control	<p>You can set features related to the sequencer.</p>
Event Control	<p>Contains the features related to the generation of event notifications by the camera.</p> <p>You can use Event Monitor to view the messaging channel events to determine causes of issues that may occur during the use of your camera.</p>
Chunk Data Control	<p>Contains the features related to the generation of supplementary image data (i.e., Chunk data) and the appending of that data to every image that you acquire.</p> <p>You can enable chunk data, and set the content of the chunk data.</p>
Transport Layer Control	<p>Contains the features related to the control of transport layer.</p> <p>You can set the parameters of transport layer of the camera.</p>
Transfer Control	<p>You can view the transfer source, transfer mode, and other related information.</p>
User Set Control	<p>Contains the features related to the global control of camera settings.</p> <p>User Set Current</p> <p>The currently loaded user set.</p> <ul style="list-style-type: none">• "0" represents Default, i.e., the factory settings.• "1" represents UserSet1.

Feature Category	Description
	<ul style="list-style-type: none"> • "2" represents UserSet2. • "3" represents UserSet3. <p>User Set Selector</p> <p>Select User Set.</p> <p> Note</p> <p>The number of User Sets vary with different camera models.</p> <p>Default</p> <p>The read-only factory settings. In other words, the default startup settings on the camera.</p> <p>User Set1, User Set2, User Set3</p> <p>The user sets that can be used to load and save your own camera settings.</p> <p>Initially, these user sets contain the same parameter values as the Default user set. You can save one of them to overwrite those values with your own settings to create a user set that is customized for your usage scenario. See the description of User Set Save below for details about saving User Set.</p> <p>User Set Load</p> <p>Load the User Set specified by User Set Selector to the camera and make it active. When a user set is loaded, it overwrites the current camera settings.</p> <p> Note</p> <ul style="list-style-type: none"> • Loading a user set is only possible when the camera is idle, i.e., not acquiring images. • Except for the Default user set, you should have saved a User Set before you can load it. See the description of User Set Save below for details about saving User Set. <p>User Set Save</p> <p>Save your own camera settings as the User Set specified by User Set Selector.</p>

Feature Category	Description
	<p> Note</p> <ul style="list-style-type: none">• Only the UserSet1, UserSet2, and UserSet3 can be saved. The other user sets are read-only.• Saving a user set is only possible when the camera is idle, i.e., not acquiring images. <p>User Set Default</p> <p>Select User Set to automatically load and make it active by default when the camera is reset to its power up state.</p>

9.2 Common Features

On the Common Features tab, you can configure the features which are frequently used in camera configuration, including basic features (Acquisition Frame Rate Control Enable, Exposure Auto, Gain Auto, etc.), ISP, and transport layer control.

9.2.1 Basic Features

The Basic Features allow you to set features like Acquisition Frame Rate, Exposure Time, Gain, etc.



The available features and parameters vary with different camera models. Here we only introduce part of the features and parameters.

Acquisition Frame Rate Control Enable

Controls if the Acquisition Frame Rate feature is adjustable and used to control the acquisition rate. Otherwise, the acquisition rate is implicitly controlled by the combination of other features like Exposure Time, etc.

Acquisition Frame Rate(Fps)

Set an upper limit for the frame rate (fps) at which frames are captured.

This is useful if you want to operate the camera at a constant frame rate in continuous image data acquisition.

Resulting Frame Rate(Fps)

Displays the value of the maximum allowed frame rate (fps) in image data acquisition.

In continuous acquisition, the **Resulting Frame Rate** parameter is useful for optimizing the frame rate for your imaging application. You can adjust **Acquisition Frame Rate** until the **Resulting Frame Rate** reaches the desired value.

Exposure Time

Specify how long the image sensor is exposed to light during image acquisition when **Exposure Mode** is Timed and **Exposure Auto** is Off.



Note

- The **Exposure Mode** parameter should be set to Timed, or the **Exposure Time** parameter is not available.
 - The **Exposure Auto** parameter should be set to Off, or the **Exposure Time** parameter is not available.
-

Gain Auto

Set the Automatic Gain Control (AGC) mode.

Off

Gain is controlled manually using **Gain**.

Once

The camera will automatically adjust gain for only once. After that, the state will automatically return to Off.

Continuous

Gain will be constantly auto-adjusted by the camera.

Gain(dB)

Set an amplification factor applied to the video signal so as to increase the brightness of the image output by the camera.



Note

- **Gain Auto** should be set to Off, or the parameter will not be available.
 - Increasing the gain increases all pixel values of the image.
-

9.2.2 ISP

Follow the instructions below to configure the ISP parameters.



Note

- The available parameters are subject to camera model and pixel format. Refer to the displayed parameters.
 - Here only provides brief introduction to parameters. For details, see the camera's user manual.
-

Gamma Enable

Enable the gamma correction of pixel intensity, which helps optimizing the brightness of acquired images for displaying on a monitor.

Gamma Selector

Specify a gamma correction mode.

User

The gamma correction value can be entered manually for the **Gamma** parameter as desired.

sRGB

The gamma correction value will be automatically set to approximately 0.4. This value is optimized for image display on sRGB monitors.

Gamma

The gamma correction value.

Sharpness Enable

If enabled, the **Sharpness** parameter will be available. The larger the **Sharpness** value, the more distinct the contours of the image objects will be. This is especially useful in applications where cameras must correctly identify numbers, letters or characters.

Hue Enable

Enables/disables hue adjustment.

Hue

Hue of the image in degrees.

Saturation Enable

Enables/disables saturation adjustment.

Saturation

Saturation of the image in percent.

Balance White Auto

Balance White Auto is the 'automatic' counterpart of the manual white balance feature.

Bayer Interpolation Method

If you select **Bayer** as the pixel format, select **Quick**, **Balance**, or **Optimal** as the bayer interpolation method.

Configure White Balance (Bayer)

If the **Pixel Format** parameter of the camera is set to **Bayer**, perform the following steps to configure white balance parameters.

Before You Start

Make sure you have started acquiring image data. For details, see [Acquisition and Live View in 1-Window Mode](#).

Steps

1. Go to the White Balance section of the Common Features tab.

2. Set Balance White Auto.

Balance White Auto

Set the mode for automatic white balancing between the color channels. Once set, the white balancing ratios are automatically adjusted.

Off

Set white balancing manually. See the step 3 below for details.

Once

White balancing is automatically adjusted once by the camera. Once it has converged, it automatically returns to the Off state.



If you select **Once**, skip step 3.

Continuous

White balancing is constantly automatically adjusted by the camera.



If you select **Continuous**, skip step 3.

3. If you select **Off** as the value of Balance White Auto, perform the following sub-steps to configure white balance manually.



- To configure white balance manually, the **Gamma Enable** parameter in the feature tree should be turned off.
 - To configure white balance manually, the **Color Transformation Enable** parameter in the feature tree should be turned off if the camera supports this parameter.
 - To configure white balance manually, the **Hue Enable** parameter and the **Saturation Enable** parameter should be turned off if the camera supports the two parameters.
-

1) Click **Execute of White Balance** to open the White Balance Settings window.

2) Click **Capture** to capture an image.

3) Click draw a Region of Interest (ROI), which is shown as a green rectangle, on the original image to select the white area on the image.

Note

- If there's no white area on the original image, place a white object in front of the camera.
- You can also click  to cancel the ROI settings.

Once you have drawn the ROI, the recommended value for the R (Red) channel, G (Green) channel, and B (Blue) channel will be displayed. You can manually adjust them if required.

4) Optional: Click **Restore** to restore the settings.

5) Click **Optimize** to execute optimization.

- The optimized image will be displayed on the right.
- You can view the optimized value of R (Red) channel, G (Green) channel, and B (Blue) channel at the lower right of optimized image.

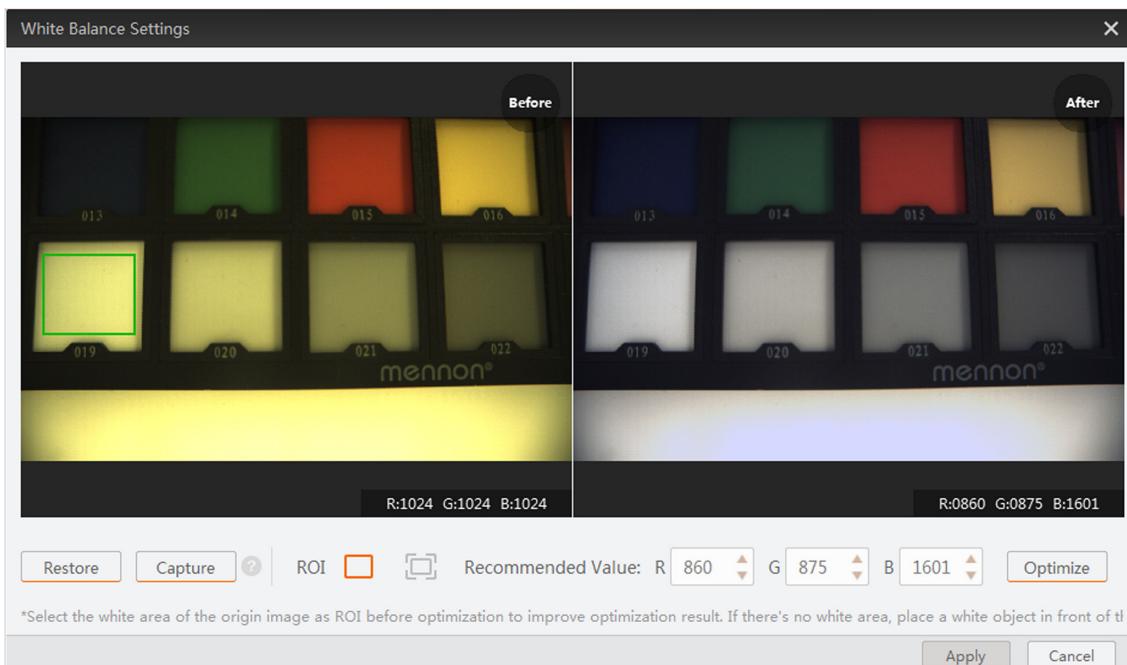


Figure 9-2 Optimization Result

6) Click **Apply** to apply the settings to the camera.

Configure White Balance (YUV/RGB/BGR)

If the **Pixel Format** parameter of the camera is set to YUV, RGB or BGR, you can go to the White Balance section of the Common Features tab to set the white balance parameters.



Note

- White balance parameters are only available for color cameras.
 - The available parameters vary with different camera models.
-

Balance White Auto

Set the mode for automatic white balancing between the color channels. Once set, the white balancing ratios are automatically adjusted.

Off

Set white balancing manually using **Balance Ratio Selector** and **Balance Ratio**.

Once

White balancing is automatically adjusted once by the camera. Once it has converged, it automatically returns to the Off state.

Continuous

White balancing is constantly automatically adjusted by the camera.

Balance Ratio Selector

Selects which Balance ratio to control.

Red

Balance Ratio will be applied to the red channel.

Green

Balance Ratio will be applied to the green channel.

Blue

Balance Ratio will be applied to the blue channel.

Balance Ratio

Set the weight value (0 to 4095) for the channel selected from **Balance Ratio Selector**.

9.2.3 Transport Layer Control

The Transport Layer Control feature allows you to configure parameters related to data packet transmission.



Note

The available features and parameters vary with different camera models. Here we only introduce part of the features and parameters.

GEV SCPS Packet Size

Specify the maximum size (unit: byte) of a data packet transmitted via Ethernet. The larger the packet size, the less the Ethernet overhead load and hence the higher the network efficiency.

The default value (1,500 bytes), which is also the recommended value, is sufficient for most configurations.



Note

If you increase the packet size above 1,500 bytes, make sure that Jumbo Frame of the network adapter is enabled.

Gev SCPD

Specify the delay (in timestamp counter units) to insert between each packet for this stream channel. This can be used as a flow-control mechanism if the application or the network infrastructure cannot keep up with the packets coming from the device.



Note

Increasing the delay may reduce the amount of dropped packets at the expense of slowing the data transmission. As a result, the camera's frame rate may decrease.

GEV PAUSE Frame Reception

Controls whether incoming PAUSE Frames are handled on the given logical link.

GEV Stream Channel Selector

Selects the stream channel to control.

LinkConfiguration

Bootstrap register ConnectionConfig.

LinkConfigurationPreferred

Bootstrap register ConnectionConfigDefault.

CI Configuration

Select a channel mode for the camera. The image outputting way varies according to different channel mode.

9.3 Trigger

On the Trigger tab, you can configure features related to the trigger of IO input and IO output.

9.3.1 IO Input

On the Trigger tab, the IO Input section displays trigger related parameters, which can be used to control the acquisition of images.



Note

The features vary with different camera models.

Trigger Selector

Select the type of trigger for image acquisition.

Frame Burst Start

The trigger for starting the capture of the bursts of frames in an acquisition.

A burst of frame(s) is defined as the capture of a group of one or many frame(s) within an acquisition

Trigger Mode

Controls if the selected trigger is active.

Off

Disable the selected trigger.

On

Enable the selected trigger.

Trigger Source

Specify the internal signal or physical input Line as the trigger source.

Software

Specify that the trigger source will be generated by the software when you execute the

TriggerSoftware

command or set **Enable Auto Trigger** switch to on.

Line 0, Line 1, Line 2 ...

Specify the selected physical line (or pin) and associated I/O control block as the external source for the trigger signal.

Counter 0

Specify the selected Counter signal as the internal source for the trigger.

Action 1

Specify the selected Action Command as the internal source for the trigger.



Note

For details about Action Command, see [*GigE Vision Action Command*](#).

Anyway

All the above-mentioned trigger source types (**Software**, **Line 0**, **Line 1**, **Line 2 ...**, **Counter 0**, and **Action 1**) will be used as the source for the trigger.

Trigger Activation

Specify which signal transition activates the trigger.



Note

Trigger Activation is only available when **Trigger Source** is set to **Line 0, Line 1, Line 2 ..., Counter 0, or Anyway**.

Rising Edge

Specify that the trigger is considered valid on the rising edge of the source signal.

Falling Edge

Specify that the trigger is considered valid on the falling edge of the source signal.

Level High

Specify that the trigger is considered valid if the level of the source signal is high.

Level Low

Specify that the trigger is considered valid if the level of the source signal is low.

Trigger Delay

Specify the delay in microseconds (μs) to apply after the trigger reception before activating it.

Auto Trigger Time

Specify the interval in milliseconds (ms) to generate the trigger signal automatically.



Note

- **Auto Trigger Time** is only available when you set **Software** as the Trigger Source.
 - **Auto Trigger Time** is only effective when the **Enable Auto Trigger** switch is set to on.
-

Enable Auto Trigger

Enable the software to generate the trigger signal automatically.



Note

The parameter is only available when you set **Software** as the Trigger Source.

Trigger Software

Click **Execute** to execute the

TriggerSoftware

command so as to generate the trigger signal.

PostDivider

Sets the PostDivider value for the PostDivider sub-module.

PreDivider

Sets the pre-divider value for the pre-divider sub-module.

Encoder Selector

Selects which Encoder to configure.

Encoder Source A/B

Selects the input line as signal source for the shaft encoder module.

Encoder Trigger Mode

This enumeration value selects the circumstances for the shaft encoder module to output trigger signals.

Encoder Counter Mode

Selects the counting mode of the tick counter of the shaft encoder module.

Encoder Counter

This integer value (read only) indicates the current value of the tick counter of the shaft encoder module.

Encoder Counter Max

This integer value sets the maximum value for the tick counter of the shaft encoder module.

Encoder Counter Reset

This command resets the tick counter count of the shaft encoder module to 0.

Encoder Max Reverse Counter

This integer value sets the maximum value for the reverse counter of the shaft encoder module.

Encoder Reverse Counter Reset

This command resets the reverse counter of the shaft encoder module to 0 and informs the module that the current direction of conveyor movement is forward. Reset must be carried out before the first conveyor movement in the forward direction.

9.3.2 IO Output

On the Trigger tab, the IO Output section provides parameters which allow you to control the general input and output signals of the camera.



The displayed features vary with different camera models. This topic only introduces common IO Output features.

Line Selector

Selects the physical line (or pin) of the external device connector or the virtual line of the Transport Layer to configure its parameters such as line mode.

Line Mode

Control if the selected line is used to input signals, output signals, or control lights.

Input

Use the selected line to input signals.

Line Debouncer Time

Set a debouncer time (range: 0 to 1000000, unit: μs) to filter out invalid short signals (i.e., contact bouncing signals). Once you set a debouncer time, signals that do not last longer than the time will be ignored.

Strobe

Used the selected line to output signals to control light source of the camera.

Line Source

Exposure Start Active

If the exposure starts, the output signals for controlling the light will be triggered.

Acquisition Start Active

If acquisition starts, the output signal for controlling the light will be triggered.

Acquisition Stop Active

If acquisition stops, the output signal for controlling the light will be triggered.

Frame Burst Start Active

If the burst of a frame starts, the output signal for controlling the light will be triggered.

Frame Burst Stop Active

If the burst of a frame stops, the output signal for controlling the light will be triggered.

Soft Trigger Active

Trigger the output signal for controlling the light via the Software.

Hard Trigger Active

Trigger the output signal for controlling the light via the camera.

Counter Active

Trigger the output signal for controlling the light by the counter.

Timer Active

Trigger the output signal for controlling the light by the timer.

Strobe Enable

Enable the strobe mode.

Strobe Line Duration

Set the time duration (unit: μs) of the output signal for controlling the light.

Strobe Line Delay

Set the delay time (unit: μs) for triggering the output signal for controlling the light if the events defined in **Line Source** occur.

Strobe Line Pre Delay

Set the pre delay time (unit: μs) for triggering the output signal for controlling the light if the events defined in **Line Source** occur.

9.3.3 Encoder Control

For line scan cameras, if the trigger mode is set to line trigger, you can configure the encoder signal sources for triggering.

Encoder Selector

Select an encoder.

Encoder Source A/B

Set the signal source A and B respectively for the encoder.



It is recommended that you select different sources for A and B. If they are set to the same source, the shaft encoder will not output signal.

Encoder Trigger Mode

Select the triggering direction of the signal sources from **Any Direction**, **Forward Only**, and **Backward Only**.

Encoder Counter Mode

Select a counting mode for the counter of the encoder from **Ignore Direction**, **Follow Direction**, and **Backward Direction**.

Encoder Counter

(Read Only) Displays the number of triggered signals counted by the encoder counter in real time.

Encoder Counter Max

Set the maximum value allowed for the encoder counter.

When the value displayed by **Encoder Counter** reaches the set maximum value during counting, **Encoder Counter** will be automatically cleared when the next valid signal is received, and the counting will start again. **Encoder Counter** can also be cleared manually via **Encoder Counter Reset**.

Encoder Counter Reset

Click **Execute** to reset **Encoder Counter** to 0.

Encoder Max Reverse Counter

Set the maximum value allowed for the reverse counter of the encoder to allow the camera to not output images until the object returns to the starting position in the forward direction.

Encoder Reverse Counter Reset

Click **Execute** to reset the count of the reverse counter to 0.

9.3.4 Frequency Converter Control

For line scan cameras, if the trigger mode is set to frame trigger or line trigger, you can configure the parameters for converting the frequencies of hard triggering signals or shaft encoder signals to the frame trigger or line trigger frequencies required by the camera.

Input Source

Select an input source for the frequency conversion.



N/A indicates no signal source is selected.

PreDivider

Set a positive integer for the PreDivider.

Signal of the input source is first processed by the PreDivider, which divides the signal frequency by the set integer and then sends the processed signal to the Multiplier.



Signals with frequencies above 100 kHz must be processed by the PreDivider, because the Multiplier can only accept signals within the range of 10 to 100 kHz. Periodic jitter of the encoder signal is accepted.

Multiplier

Set a positive integer for the Multiplier.

The Multiplier multiplies the frequency of the signal received from the PreDivider by the set integer, and then sends the processed signal to the PostDivider.

PostDivider

Set a positive integer for the PostDivider.

The PostDivider divides the frequency of the signal received from the Multiplier by the set integer. The resulting signal will be used by the camera as the trigger signal.

9.4 Advanced Features

On the Advanced Features tab, you can configure features related to ROI feature, AOI feature, embedded information, color correction matrix settings, LUT (Look-up Table) feature, and other features.

9.4.1 Draw ROI

After ROI (Region of Interest) being configured, the system only acquires the image data within the ROI, which improves the acquisition efficiency.

Before You Start

Make sure you have exited the AOI drawing mode.

Steps



You can also go to **Feature Tree** → **Image Format Control** and then configure Width, Height, Offset X, and Offset Y to set ROI. The value of Width plus the value of Offset X should not be larger than the Max. Width, and the value of Height plus the value of Offset Y should not be larger than the Max. Height.

1. Click or double-click the camera to connect it with the Software.
2. Select the connected camera.
3. Click **Advanced Features** on the Feature List panel.
4. Click to display the ROI features.
5. Select an ROI from the ROI Selector drop-down list.
6. Select pixel format from the Pixel Format drop-down list.
7. Draw ROI.
 - Click **ReDraw**, and then drag the cursor on the image to draw ROI (displayed as a blue rectangle).
 - Click **Edit**, and then the ROI (displayed as a blue rectangle) will cover the whole image. You can move the cursor to the edge of the rectangle, and then drag the two-way arrow to adjust the ROI.
8. Perform one of the following operations.
 - Manually adjust the OffsetX, OffsetY, width of ROI, and height of ROI.
 - Move the cursor to the edge of the blue rectangle, and then drag the two-way arrow to adjust the size of the ROI.

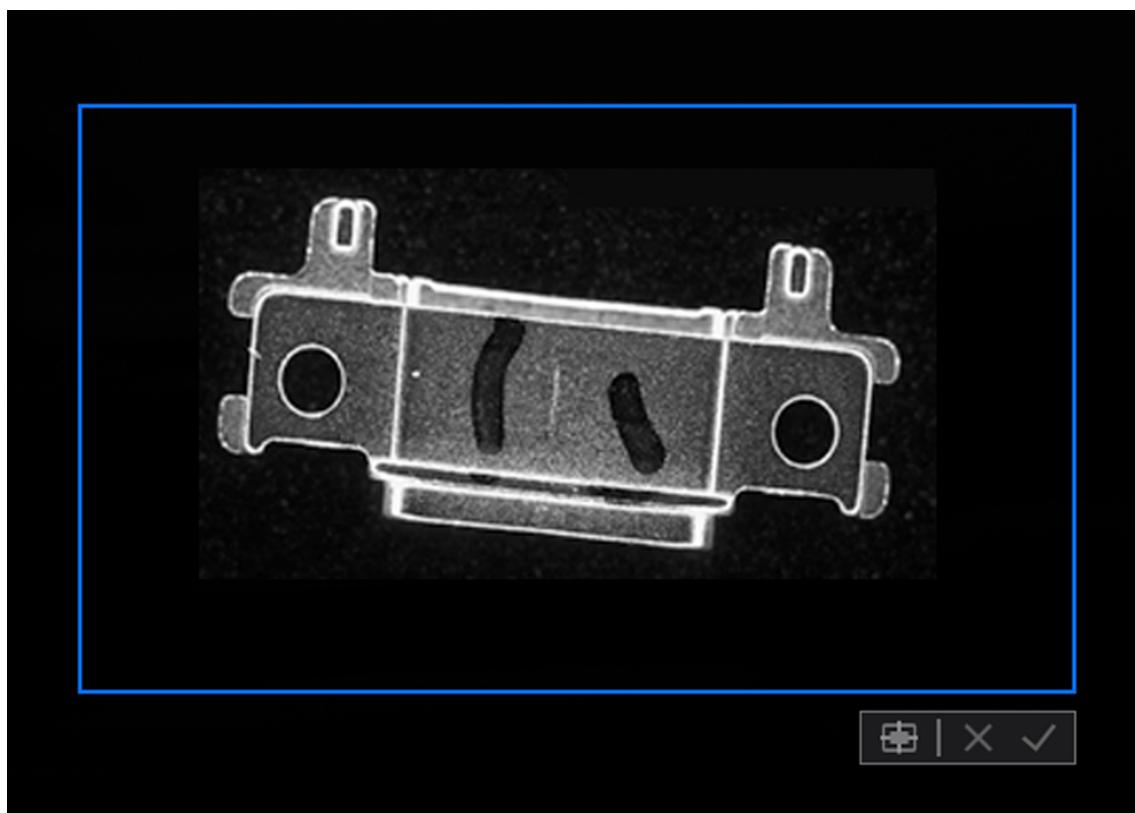


Figure 9-3 ROI

9. Optional: Adjust the position of the ROI.

- Click  to move the ROI to the center of the Live View window.
- Hover the cursor onto the ROI until the cursor turns into a hand icon and then drag the ROI to adjust its position.

10. Finnish drawing.

- Right-click the image and then click **Finish**.
- Click .



The image resolution will be lower after setting ROI.

Only the selected ROI will be displayed.

11. Optional: Click **Restore Max. ROI** to restore the image to the original size.



The image resolution will also be restored to the original state.

9.4.2 Configure AOI

AOI, which is short for Auto Function ROI, is the ROI that provides certain automatic functions.

Perform the following steps to configure AOI.

Steps

1. Draw an AOI.



Note

Drawing the AOI is similar to drawing ROI. You can refer to [Draw ROI](#) for details.

2. Select the AOI type.

- Select **AOI1** from **AOI Selector**, and then enable **AOI Usage Intensity** to set the exposure of the whole image to the same as the AOI exposure.
- Select **AOI2** from **AOI Selector**, and then enable **AOI Usage White Balance** to set the white balance of the whole image to the same as the AOI white balance.



Note

AOI2 is only available for color camera.

9.4.3 Embedded Information

The Embedded Information feature allows you to embed data into the acquired images. You can select data to embed them into the acquired images. The selected ones will be displayed on the Embedded Information window, you can view the data details on it.



The types of data that can be embedded into the acquired images include Timastamp, Gain, Exposure, Brightness, White Balance, Frame Number, Triggering Number, Line Input/Output, and ROI.

White Balance data is only available for color camera.

Embedding data into acquired images is realized in two ways, i.e., through the Hikrobot private protocol, or through the Chunk Data Control feature. If the camera supports the Chunk Data Control feature, the way through the Chunk Data Control feature shall prevail; If the camera doesn't support the Chunk Data Control feature, embedding data is realized through the Hikrobot private protocol.

- If the camera supports the Chunk Data Control feature, you should check **Chunk Mode Active** first, and then select data.
- If the camera doesn't support the Chunk Data Control feature, select data directly (see the picture below).

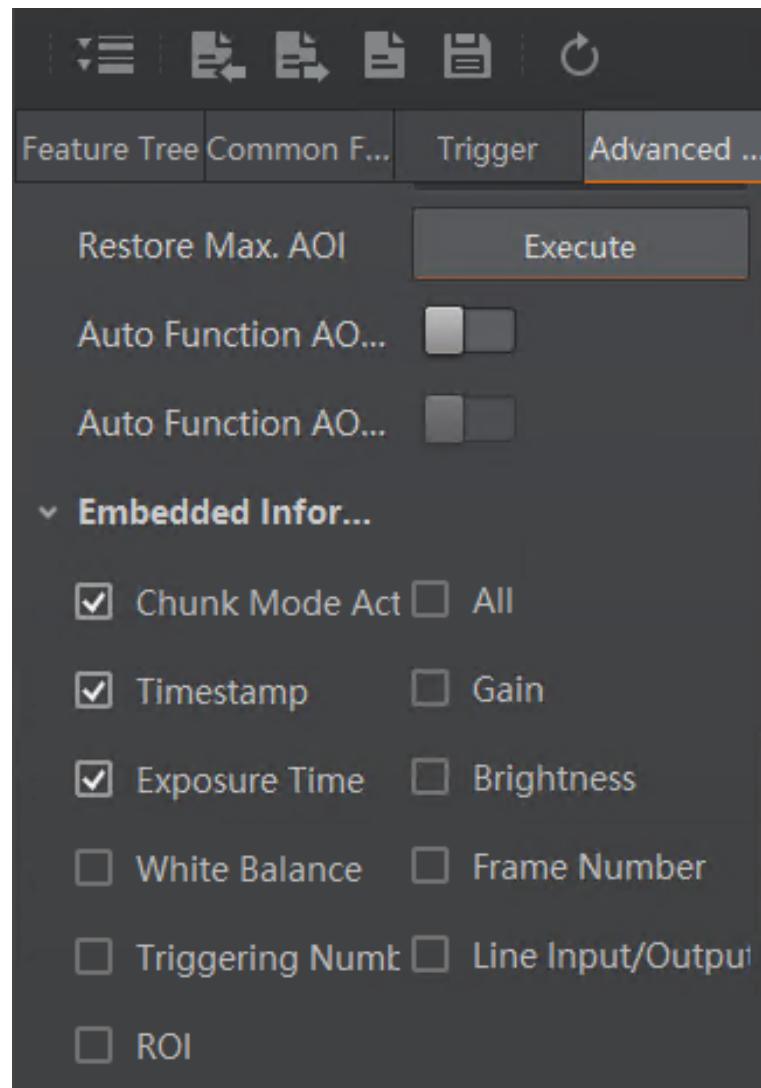


Figure 9-4 Embedded Information

9.4.4 Color Correction Matrix Settings

You can define multiplicative factors in Color Correction Matrix (CCM) to transform color contributions (e.g., R, G, B or B, G, R) of each incoming color pixel to corrected values, so as to enhance color fidelity of the images output by your camera. This is useful in areas where high color fidelity is required, such as microscopy.

Before You Start

Make sure the camera supports Color Transformation Control or Bayer format. Otherwise CCM settings will be unavailable.



Note

For camera that support the Color Transformation Control, you can view this feature when you set the pixel format to RGB or YUV.

Steps

1. Connect the camera to the Software, and then select it.
 2. Go to the feature tree panel, and then select the **Advanced Features** tab.
 3. In the CCM settings area, turn on **CCM Enable**.
 4. Set multiplicative factors in the 9 fields below, which represent a 3×3 color correction matrix.
-



Note

Valid value range of the multiplicative factor is from - 4 to 4.

Example

Take RGB to RGB transformation for an example. In this case, multiplicative factors (from **a11** to **a33**) marked in the figure represent the following meanings.

a11

Red contribution to the red pixel.

a12

Green contribution to the red pixel.

a13

Blue contribution to the red pixel.

a21

Red contribution to the green pixel.

a22

Green contribution to the green pixel.

a23

Blue contribution to the green pixel.

a31

Red contribution to the blue pixel.

a32

Green contribution to the blue pixel.

a33

Blue contribution to the blue pixel.

$$\begin{bmatrix} r_{out} \\ g_{out} \\ b_{out} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} * \begin{bmatrix} r_{in} \\ g_{in} \\ b_{in} \end{bmatrix}$$

Figure 9-5 Color Transformation Matrix in RGB to RGB Transformation

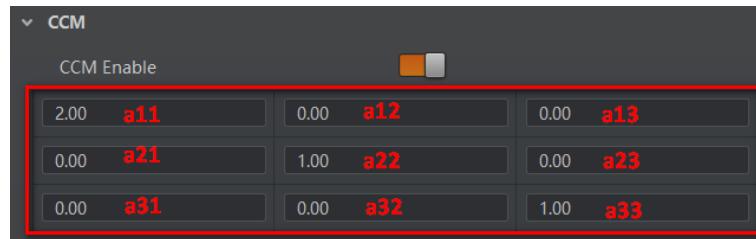


Figure 9-6 CCM Settings

9.4.5 Other Features

Configure the following parameters according to your need.

Binning Selector

Selects which binning engine is controlled by the BinningHorizontal and BinningVertical features.

Binning Horizontal/Vertical

Number of horizontal/vertical pixels to combine together.

Decimation Horizontal/Vertical

Horizontal/vertical sub-sampling of the image.

Shading Selector

Selects the mode of shading correction.

Activate Shading

Activates the selected shading set.

NUC Enable

Enable the FPNC and PRNUC Control

PRNUC User Enable

Enable PRNUC user table

Event Selector

Selects which Event to signal at the host application.

Event Notification

This enumeration sets the type of a notification that will be sent to the host application for the selected event.

9.4.6 Configure LUT

LUT is short for Look-up Table, which is basically an array. It provides a mathematically precise and fast way to replace the pixel values in the image by values defined by you. For example, you can create a "luminance look-up table" to replace the luminance value (or gray value) in the images to optimize the luminance of the images. The Software sorts out the frequently-used LUT parameters in the LUT section on the Image Processing tab.

Before You Start

Make sure you have set **LUT Index** and **LUT Value** in the feature tree.

LUT Index

Set a pixel value that you want to replace with a new value.

LUT Value

Set a new pixel value to replace the value you set in **LUT Index**.

Steps

1. Connect the camera to the Software and select the camera.
2. Go to the **Advanced Features** tab on the Feature List panel.
3. Click  to display the LUT parameters.
4. Select a value (e.g., Luminance, Red, Green, or Blue) from **LUT Selector** to set the LUT type.

Luminance

Luminance LUT, i.e., the look-up table for optimizing luminance of the images.

Red

Red LUT, i.e., the look-up table for optimizing red value of the images.

Green

Green LUT, i.e., the look-up table for optimizing the green value of the images.

Blue

Blue LUT, i.e., the look-up table for optimizing the blue value of the images.



The available LUT types vary with different camera models.

5. Turn on **LUT Enable** to enable LUT.
6. Select the type of line (Fold Line, Curve, Free Line, and Adaptive) to be displayed on the LUT graph.



Note

- Each point on the line defines the Output value in corresponding to an Input value. The Input values represent the pixel values that need to be replaced, while the Output values represent the new pixel values that will replace the old ones.
- By default, the maximum Input value for the line is the value you set for **LUT Index**, and the maximum Output value for the line is the value you set for **LUT Value**.

7. Optional: Adjust the line on the LUT graph.

- For Fold Line, drag each node to edit the line.
- For Curve, drag each node to edit the curve.
Right-click any point on the curve to toggle the segment between concave/convex, and left-click any point to set it as the midpoint of the curve.
- For Free Line, click or drag the cursor on the graph to edit the line.



You can zoom in the LUT graph for higher precision by scrolling up the mouse wheel on the graph.

8. Click **Execute** or **Apply to Camera** to apply the LUT settings to the camera.

9. Optional: Perform the following operations.

Load LUT Settings from Camera	Click Execute or Load from Camera to load LUT settings from the camera to the chart.
Export LUT Settings from File	Click Execute or Export to File to export the LUT settings to the local PC as a TXT file.
Import LUT Settings from File	Click Execute or Import from File to import the LUT settings from a TXT file.
Clear Line Settings	Click Execute or Clear to clear the line settings of the chart.

9.5 Temperature Window

The Temperature Window allows you to view temperature values and variation curves of temperature screening regions.



This feature is only available when you connect a temperature measurement camera to the Software.

When configuring the temperature screening parameters, you can choose whether to display on the Temperature Window the temperature values and curves of the temperature screening regions you have drawn. The value shows the real-time statistics of the corresponding region; the curve shows the temperature variation of the corresponding region over the last 12 hours.

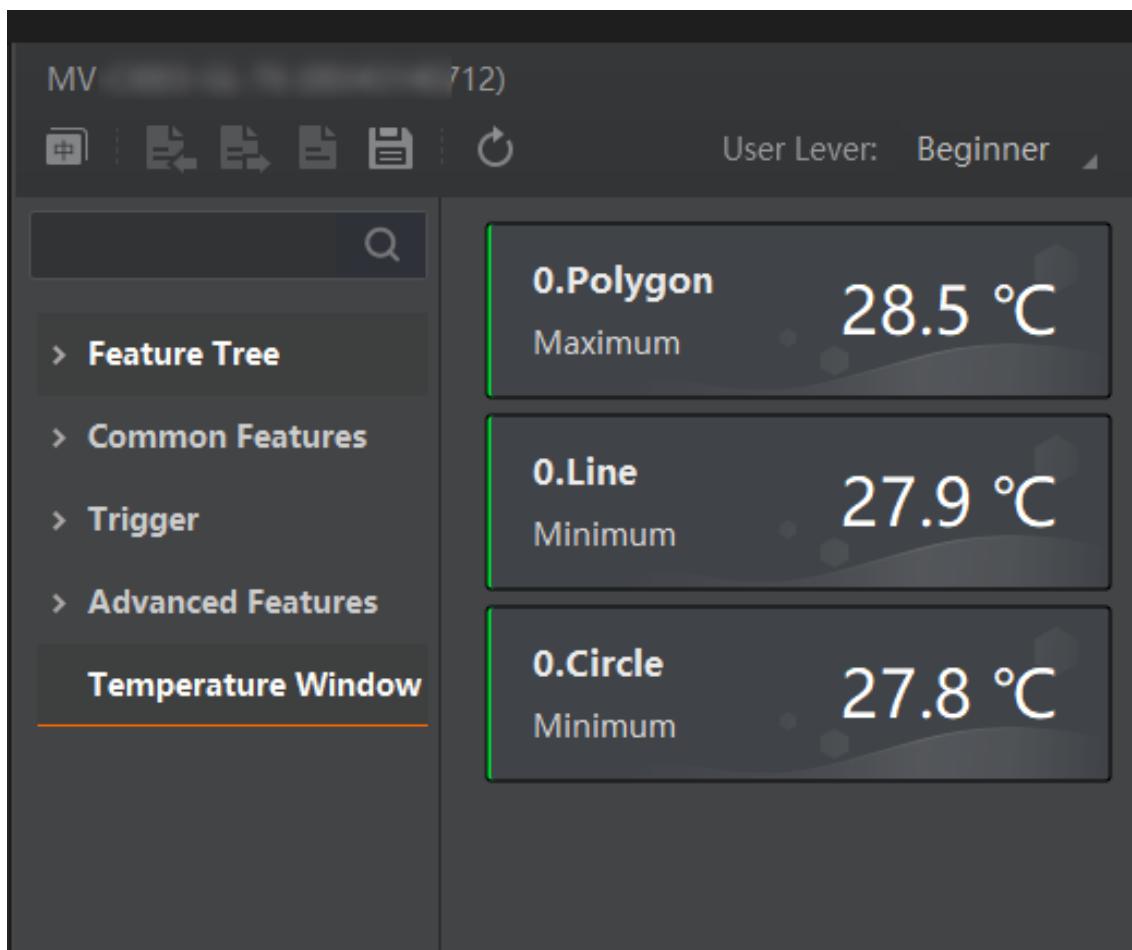


Figure 9-7 Temperature Window



The number of windows displayed on this tab depends on the display parameter configurations. Up to 4 temperature value windows and 1 temperature curve window are allowed to be displayed here.

Refer to [Draw a Region for Temperature Screening](#) for details about how to draw regions for temperature screening and how to configure the relevant parameters.

9.6 Import or Export Features of a Single Device

You can export the feature configurations of the selected device as an MFS or HCF file to the local PC, and import the file from the local PC to the selected devices to configure all its features without the inconvenience of configuring its features one by one.



Note
Connect the camera or frame grabber to the Software and ensure its image data acquisition has been stopped.

Import Features

Export features from one camera or frame grabber.

1. Select the device to which you want to export its features.
 2. Click .
 3. In the **Feature Tree**, select the feature categories that you want to export.
 4. In the **Export Features** window, click and select the path you want to save the feature file.
 5. Click **OK** to export the selected features.
-



For cameras, the exported feature file is an MFS file; for frame grabbers, the feature file is an HCF file.

After exporting features, you can connect another device to which you want to import the saved features.

Export Features

Import features to the device.

1. Select the device.
 2. Click and then select a file from the local PC.
-



- For cameras, select an MFS file; for frame grabbers, select an HCF file.
 - Only when the model of the source camera or frame grabber is the same with that of the target camera or frame grabber can the file be imported.
-

3. Click **Import** to import the feature configurations.

9.7 File Access

The File Access feature allows you to export the User Set or DPC (Defective Pixel Correction) file of a connected device to the local PC as a binary file, or import a binary file from the local PC to a connected device.



Note

- The feature should be supported by the camera.
 - The File Access feature is available to use only when the camera is idle, i.e., not acquiring images.
 - For details about User Set, see [*User Set Control*](#).
-

9.7.1 Import User Set

You can import a binary file from the local PC to the User Set of the camera.

Steps

1. Connect the camera to the Software.
 2. Click to open the File Access window.
 3. Select a User Set (User Set1, User Set2, or User Set3) or DPC from the drop-down list.
 4. Click **Import** to select the corresponding binary file and import it.
-



Note

- DPC can only be imported to the same camera, while User Set can only be imported to the cameras of the same model.
 - The DPC will be imported and be effective directly. While for User Set, you should load the User Set to make it effective (see Step 5).
-
5. If you select a User Set in step 3, load the User Set to make it effective.
 - 1) Click **Feature Tree**.
 - 2) Click to display the features under **User Set Control**.
 - 3) Select a User Set from **User Set Selector**.
 - 4) Click **Execute** to execute the **User Set Load** command to load the selected User Set.

9.7.2 Export User Set

Perform the following task to export User Set to the local PC.

Before You Start

Save the current camera settings to a specific User Set. See [*User Set Control*](#) for details.

Steps

1. Connect the camera to the Software.
2. Click to open the File Access window.

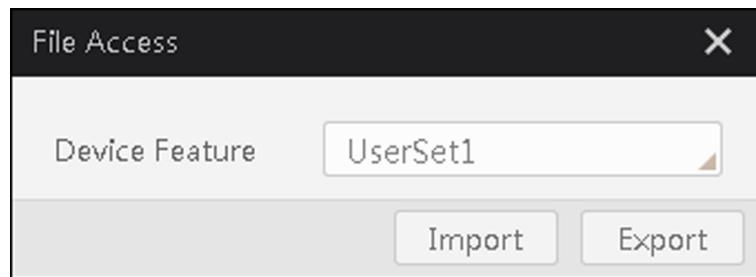


Figure 9-8 File Access Window

3. Select a User Set or DPC from the drop-down list.
 4. Click **Export** to export the User Set to the PC as a binary file.
-

 **Note**

- The file format is mfa by default.
 - The name of the exported file is "Camera Model_Camera Serial Number_User Set Name" by default. Example: MV-CA023-10GC_00682345470_UserSet2.mfa
-

A prompt will appear when the Use Set is exported.

5. **Optional:** Click **View** to go to the directory of the exported file.

9.8 User Set Control

A User Set is a group of parameter values with all the settings needed to control the camera and the frame grabber. In other words, each User Set includes the values of almost all camera parameters. You can globally control the camera settings by saving and loading User Set. If you have configured the parameters as required, you can save them as a User Set. You can load your own User Set to restore the camera to the saved group of parameter values with a minimum of configuration effort.

User Set Description

Click  or double-click a device (camera or frame grabber) to connect it to the Software, and then click  to open the User Set Control window.

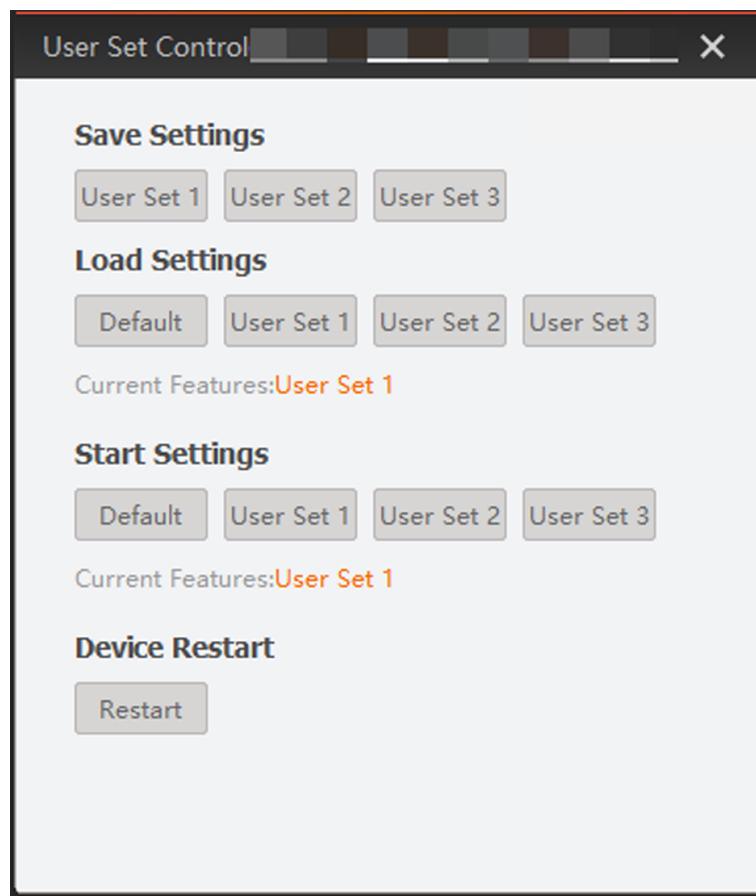


Figure 9-9 User Set Control Window

Table 9-2 Difference between Default User Set and Customizable User Set

Default	Read-only factory settings. In other words, the default startup settings on the camera.
User Set 1, 2, 3...	User sets that can save your own camera settings. Initially, customizable user sets contain the same parameter values as the Default user set. You can save your own camera settings to these user sets to suit your applications.  Note Number of user sets vary with different camera models.

User Set Operations

Do the following to save, load, and activate user sets.

Save Settings

Click a user set to save the current camera parameters to the user set.

Load Settings

Click a user set to load the settings in the user set to the camera. When a user set is loaded, it overwrites the current camera settings but does not take effect immediately. You need to activate the settings in **Start Settings** and then restart the camera.



Note

Loading user sets is only available when the camera is idle, i.e., not in acquisition.

Start Settings

Click a user set to activate the camera settings in the user set. You need to restart the camera afterward.

Device Restart

Click **Restart** to reboot the camera in order to apply the new camera settings.



Note

You need to reconnect to the camera after rebooting. You might need to refresh the camera list to show the camera after a reboot.

9.9 Flat Field Correction Tool

The flat field correction tool can get the images before and after the FPN/PRNU calibration, and display the grayscale line of the image before and after the calibration.

Before You Start

Connect the camera and start acquisition.

Steps

1. Get prepared by following the instruction below **Preparation for FPN Calibration**.
2. Click **Acquire Dark Image** to get the image before starting the FPN calibration.

The grayscale graph of the image is displayed on the left side of the tool, and the execution result and time are displayed under the graph.

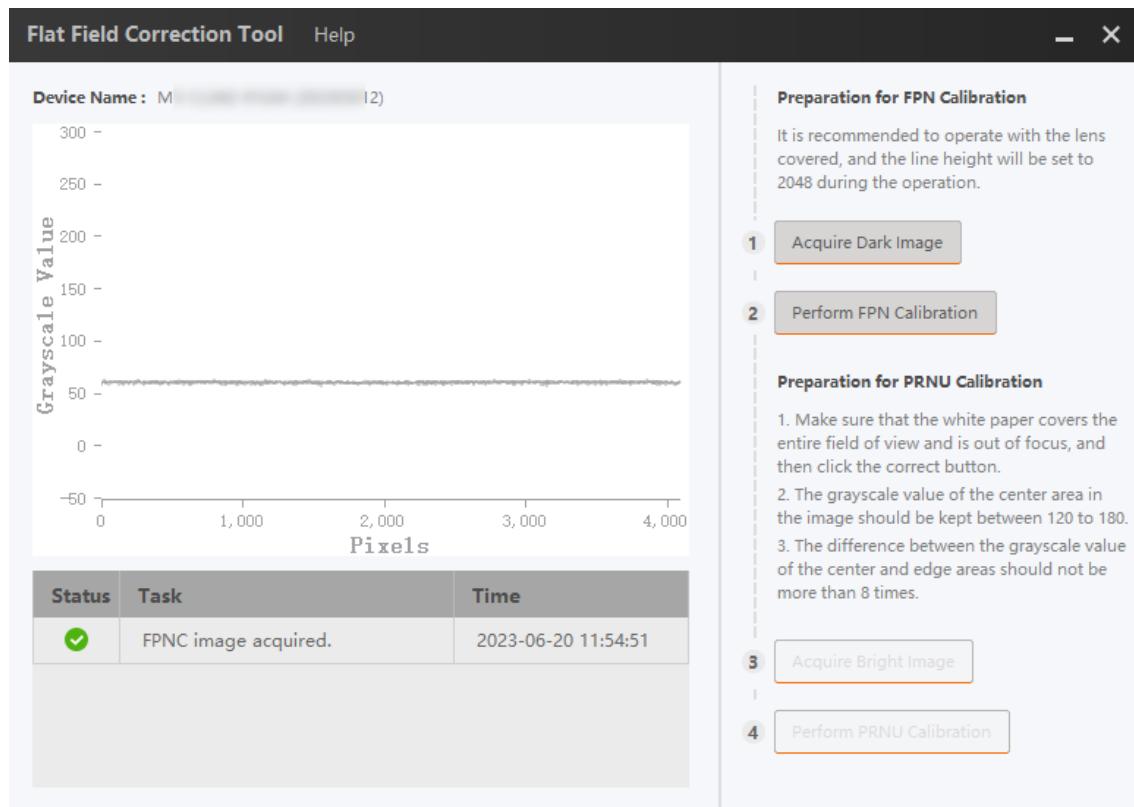


Figure 9-10 Acquire Dark Image

3. Go back to the MVS and configure parameters of FPN Calibration.

4. Click **Perform FPN Calibration** to get an image.

The grayscale graph of the image is displayed on the left side of the tool, and the execution result and time are displayed under the graph.

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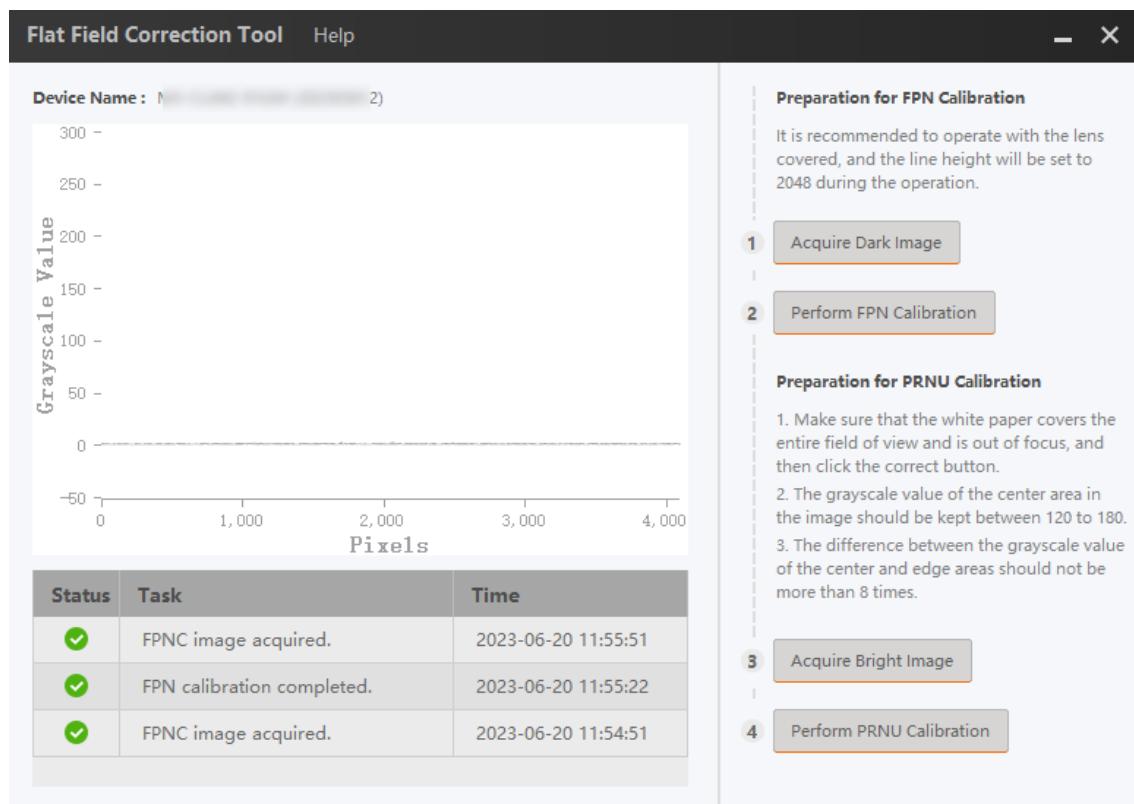


Figure 9-11 Perform FPN Calibration

5. Get prepared by following the instruction below **Preparation for PRNU Calibration**.
6. Click **Acquire Bright Image** to get the image before starting the PRNU calibration.

The grayscale graph of the image is displayed on the left side of the tool, and the execution result and time are displayed under the graph.

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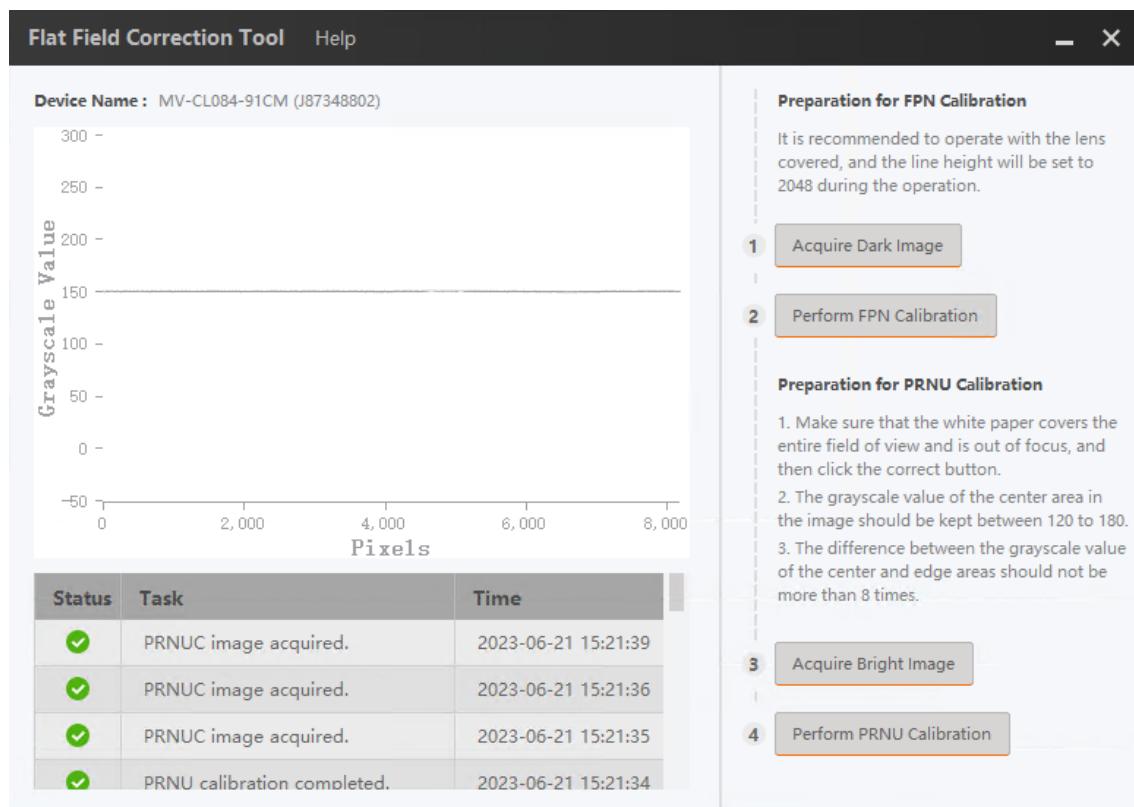


Figure 9-12 Acquire Bright Image

7. Go back to the MVS and configure parameters of PRNU Calibration.

8. Click **Perform PRNU Calibration** to get an image.

The grayscale graph of the image is displayed on the left side of the tool, and the execution result and time are displayed under the graph.

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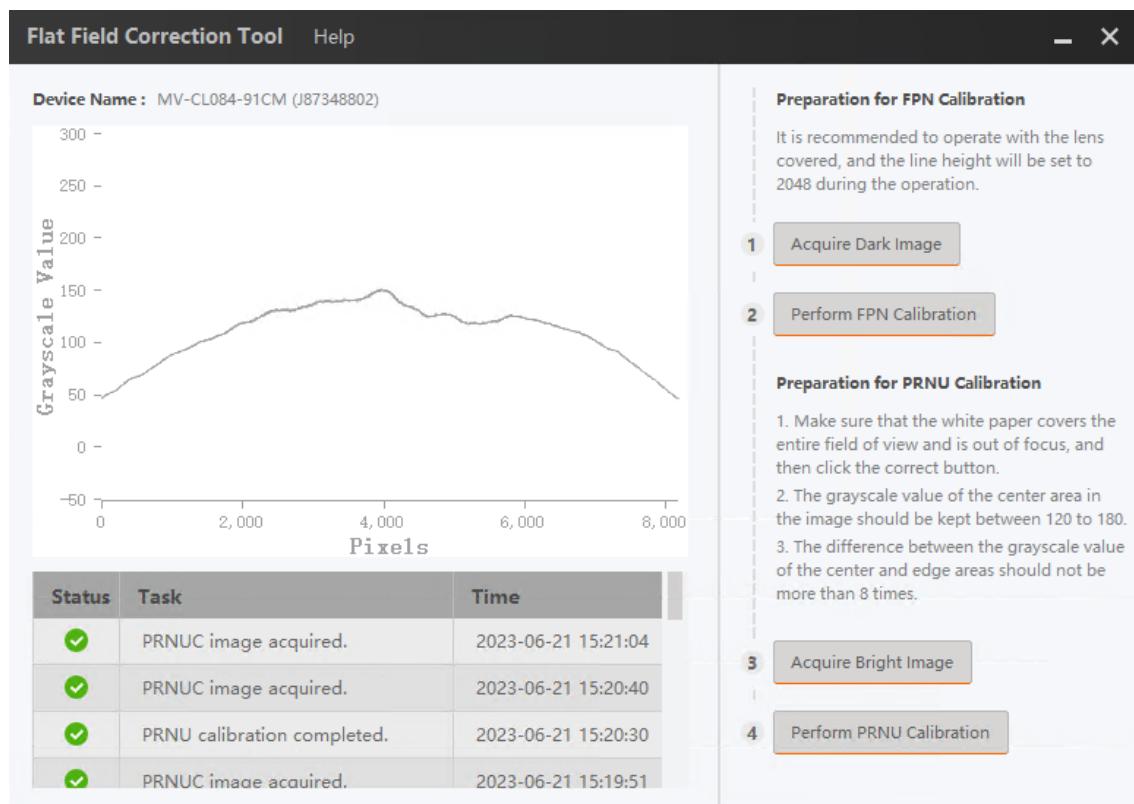


Figure 9-13 Perform PRNU Calibration

Chapter 10 Acquisition and Live View

You can start image data acquisition and view the live video of a single machine vision camera or the live video of multiple machine vision cameras simultaneously. And during the live view, you can determine the optimal image quality and perform operations such as recording video, capturing pictures, and zooming in or out.

Acquisition and live view are two different concepts:

Acquisition

The process in which the camera acquires image data.

Live View (or Live Video)

The display of live images by rendering the image data acquired by the camera.

10.1 Acquisition and Live View in 1-Window Mode

You can view the live video of a specific camera or multiple cameras in 1-window mode. When viewing live videos of multiple cameras, you can switch camera to view live video.

Steps

1. Connect camera(s) to the Client.

2. Start acquiring image data.

- Click  to start a continuous acquisition.
- Click  to start a single acquisition.

If you are acquiring image data from a single camera, the live view of the camera will be displayed; If multiple cameras, the live view of the currently selected camera will be displayed.

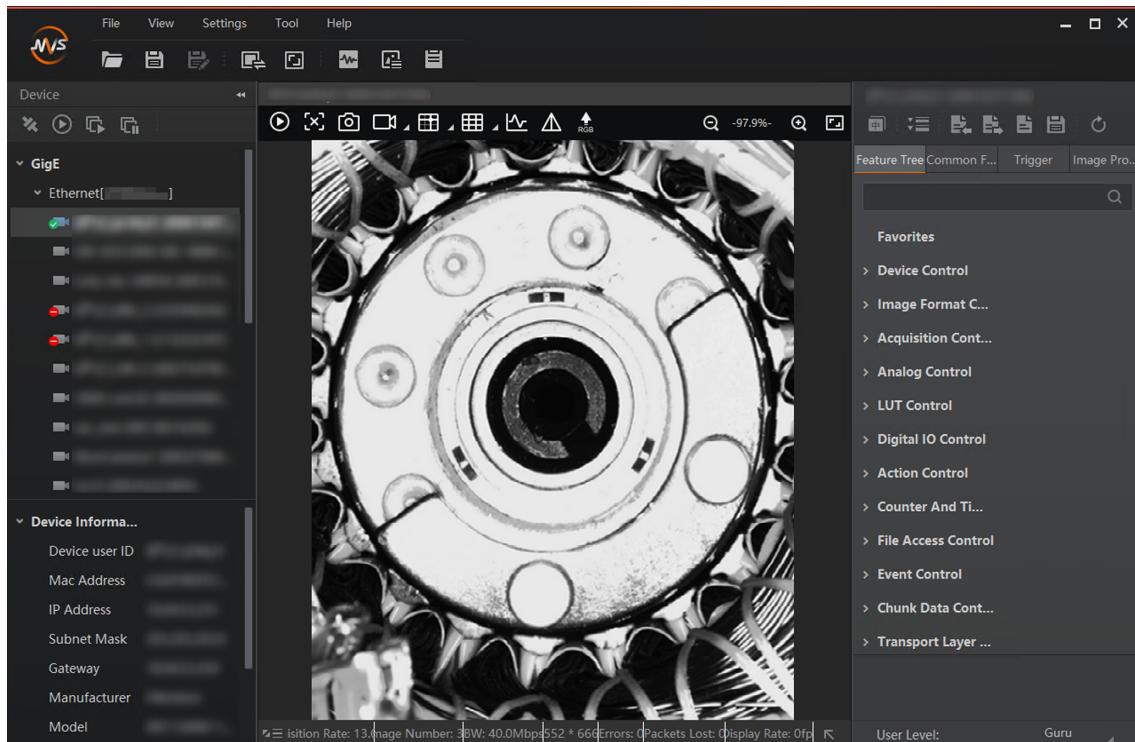


Figure 10-1 1-Window Mode Live View

3. Optional: Perform the following operations if required.

Stop/Resume Live View

Click to stop live view, and click to resume live view



After live view being stopped, acquisition still goes on.

Switch Camera for Live View

If you are acquiring image data from multiple cameras, you can double-click the connected camera on the device list to switch camera for live view.

Display Thumbnail View

Click at the lower-right of the image to display the thumbnail view.

When you zoom in the live view image, an orange rectangle, which represents the zoomed-in part of the original image, will display on the thumbnail view. You can drag the rectangle to view details of different parts of the original image.



See [More Functions](#) for details about image zoom.

4. Stop acquisition.

- Click to stop acquiring image data from the currently selected camera.

- Click  to batch stop acquiring image data from the connected cameras.

10.2 Acquisition and Live View in Multiple-Window Mode

You can view the live view of a specific camera or the live videos of multiple cameras in multiple-window mode. In this mode, you can view the live videos of multiple cameras simultaneously.

Before You Start

Ensure the devices (cameras and frame grabbers) are available.

Steps



You can acquire image data from up to 16 cameras simultaneously.

1. Connect camera(s) or frame grabber(s) to the Software.

You can select one category, and click  to connect all devices in the corresponding category.

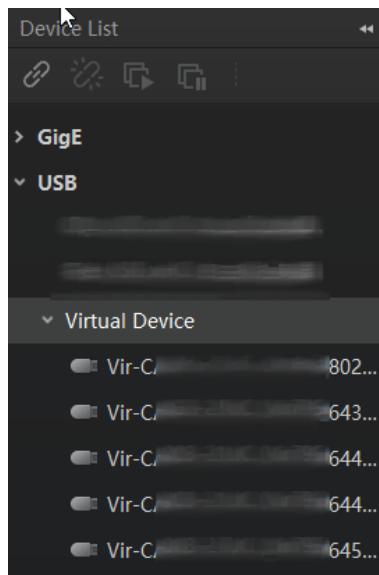


Figure 10-2 Batch Connecting Cameras

2. Click , and then select a multiple-division mode.

You can also customize live window division. For details, see [Customize Window Division](#).

3. Drag the connected camera(s) from the device list to the display window(s) to view the camera's live video.

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You can drag one category of devices to one window division. The cameras under the category will be added to the target and its following window by the order in the device list.

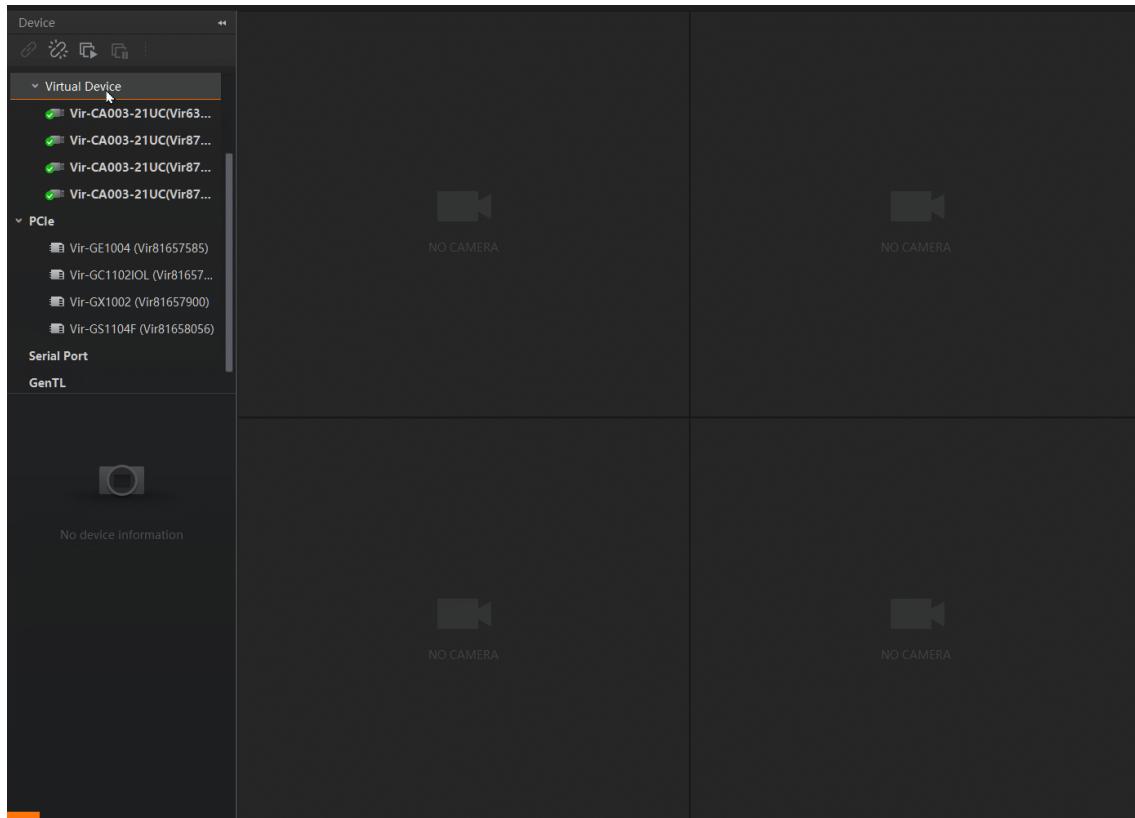


Figure 10-3 Add One Category

4. Start acquiring image data.

- If only one camera is connected, click to start acquiring streams from the camera.
- If multiple cameras are connected, click to start acquiring image data from the connected cameras simultaneously.

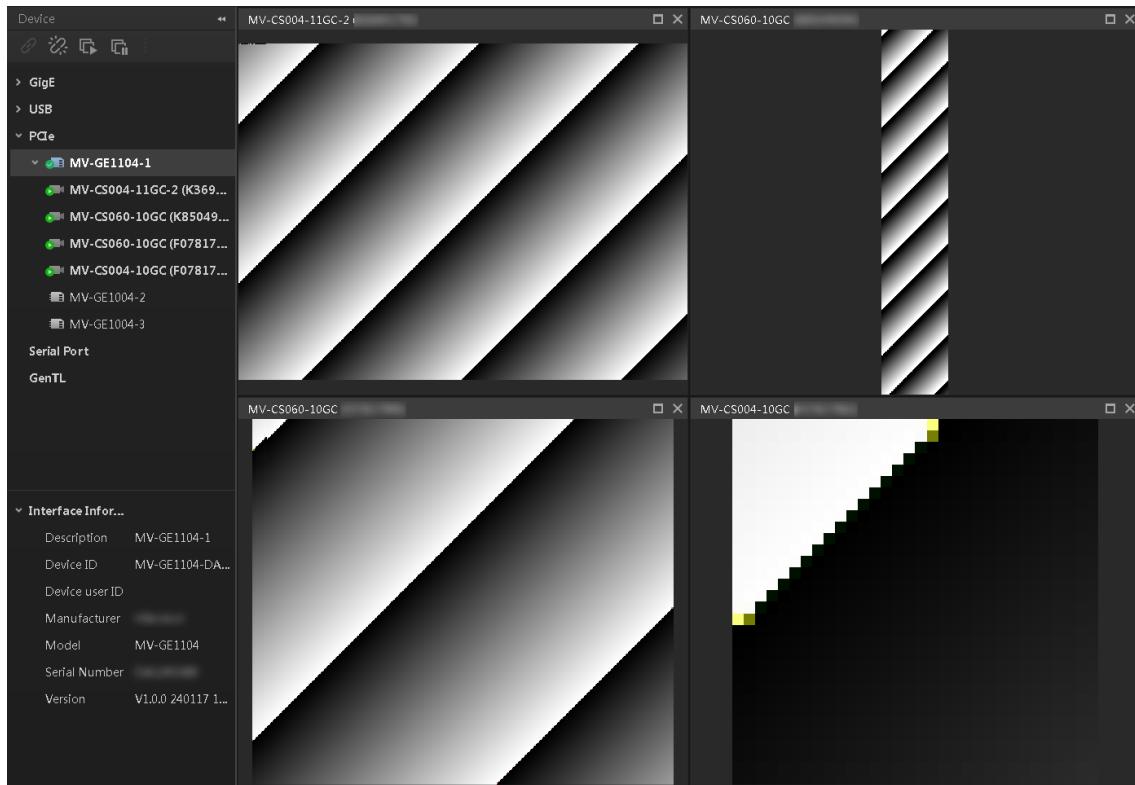


Figure 10-4 4-Window Live View

5. Optional: Perform the following operations after starting the acquisition.

Adjust Window Position Drag the title bar of a display window under live view to adjust its position.

Stop/Resume Live View Move the cursor to the lower part of the live video image, and then click on the appeared toolbar to stop the live view of the selected camera.
Click to resume live view.



After the live view is stopped, the acquisition still goes on.

Switch to 1-Window Mode Double-click one live video image or click the Maximize button to switch to 1-window mode.

Note

- You can double-click the live video image again or click the Minimize button to restore the window division mode to multiple-window mode.
 - When switching from multiple-window mode to 1-window mode, the live video of the first live-viewed camera in multiple-window mode will be displayed. You can drag the camera from the device list to the display window or double-click on the camera to switch the camera for live view.
-

6. Optional: Stop acquiring image data.

- Move the cursor to the lower part of the live video image, and then click  on the appearing toolbar to stop the acquisition of the selected camera.
- Click  to batch-stop acquisition.

7. Optional: Click to disconnect the corresponding camera.

You can select one category, and click  to batch disconnect all devices in the corresponding category.

10.3 View Local Image and Video

You can view local images and videos on the Software. The supported image formats include BMP, JPG, PNG, TIFF, and RAW. For videos, only the videos of RAW format can be played on the Software.

Before You Start

Make sure that no camera is connected to the Software.

Steps

1. Open local image or video file.

- Click **File → Open Image** to select an image or video file from the local PC.
-

Note

If the display window is in multi-window mode, you should have selected a window before clicking **File → Open Image**.

- Right-click the display window and then click **Open Image** to select an image or video file from the local PC.
- If the opened local image is in BMP, JPG, PNG, or TIFF format, the image will be displayed.
- Images in Bayer10/12, Bayer 10/12 packed format are not supported.
- If the opened local image or video is in RAW format, and its file name doesn't conform to the required naming rules, the following window will be displayed.



Note

If the image or video is in RAW format, its name should conform to the following rules:

- For image: XXX_w frame width value_h frame height value_p pixel format.raw (e.g., image_w1280_h728_pMono8.raw).
 - For video: XXX_w frame width value_h frame height value_p pixel format_f frame rate value.raw for video (e.g., video_w1280_h728_pMono8_f30.raw).
-

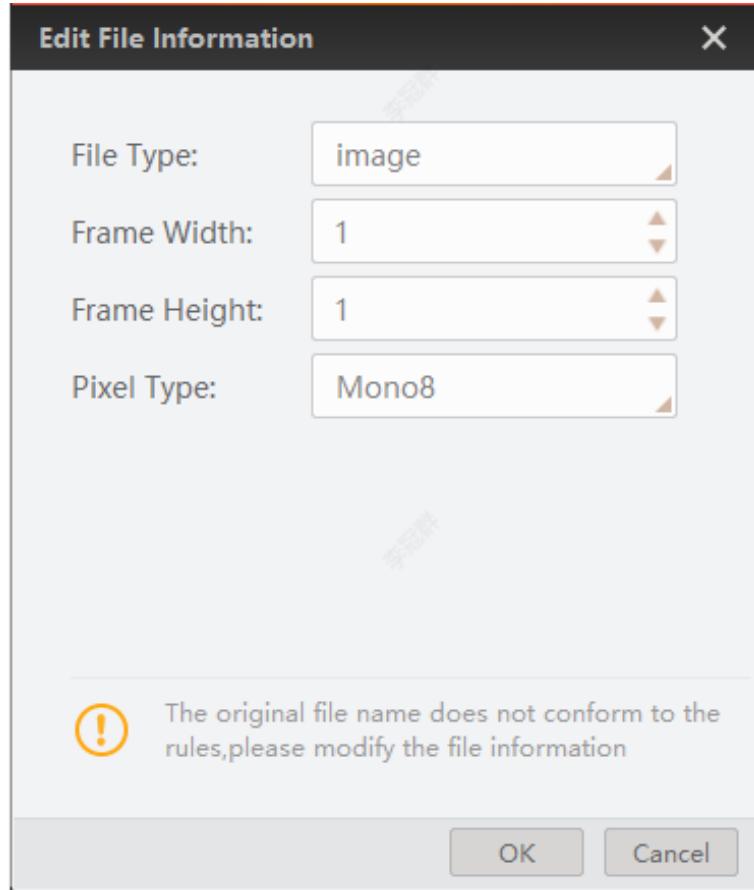


Figure 10-5 Edit File Information

2. Edit the file information, including file type, frame width, frame height, and pixel type.
3. Click **OK**.
The image or video will be displayed as you edited.
4. Right-click the image and then click **Clear Local File** to clear the local file from the Software.

10.4 Live View in Full Screen

You can view live view in full screen in both 1-window mode or multiple-window mode.

In multi-window mode, you can click  or **Full Screen** on the right-click menu to enter the full screen mode. And right-click the image and then click **Exit Full Screen** to exit full screen mode.

In 1-window mode, you can double-click the image to enter or exit the full-screen mode.

10.5 Customize Window Division

Three default window division modes are provided in the Custom Division module, i.e., 2 X 2 (4-Window), 3 X 3 (9-Window), and 4 X 4 (16-Window). You can add the three modes to the Window Division panel, or merge (or split) windows based on the three modes.

Steps

1. Click  to display the window division panel.

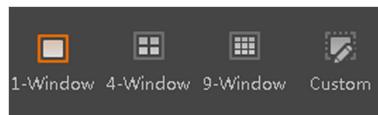


Figure 10-6 Window Division

2. Click **Custom** to open the Custom Division window.

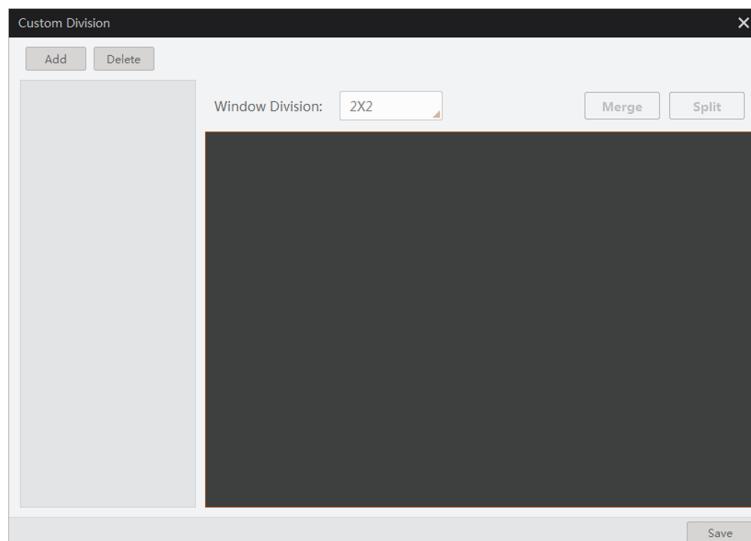


Figure 10-7 Custom Division

3. Click **Add** to open the **Custom Division** window.
4. Name the division mode and then click **OK**.
5. Select a window division mode in the Window Division drop-down list.
6. **Optional:** Merge or split windows.
 - 1) Select windows.

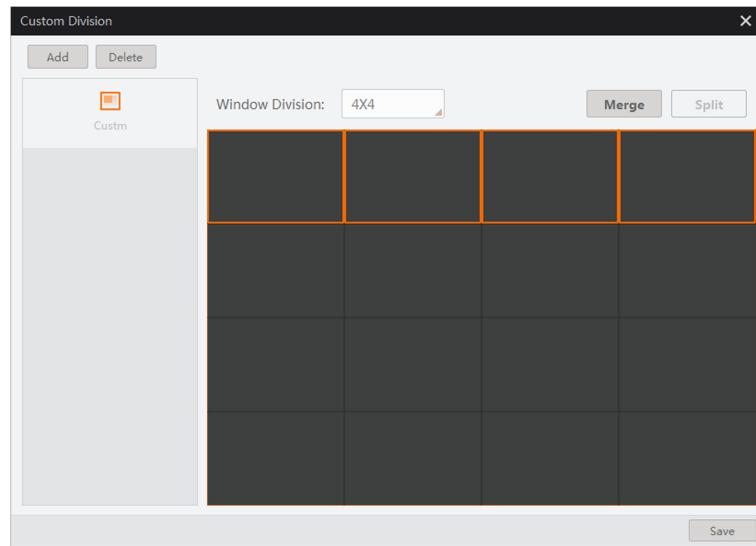


Figure 10-8 Select Windows

- 2) Click **Merge** to merge the selected windows into a larger one.
-



Note

You can merge the selected windows only when the combination of the selected windows is in rectangle shape.

- 3) **Optional:** Select the merged window and then click **Split** to split it into the original windows.

7. Click **Save**.

The customized window division mode will be displayed on the window division panel.

10.6 Capture and Recording

During live view, you can capture pictures and record video files.

Steps

1. Start live view. See [Acquisition and Live View in 1-Window Mode](#) for details.

2. Perform the following operations.

Capture and Save Picture Click  to capture a picture and save the picture to the local PC.

Start or Stop Recording Click  to start recording, and click again to stop recording.



During recording, the recording time will be displayed, and you can click  at the upper-right of the display window to view the buffer usage, number of frame processed and frame dropped.

Continuously Start and Stop Capturing Pictures

Click  (beside ) and then click  to continuously capture pictures of the live view, and click the icon again to stop capturing.



During recording, the number of the captured pictures will be displayed in real time, and you can click  at the upper-right side of the display window to view the buffer usage, number of frame processed and frame dropped.

A prompt will pop up once you finish capturing picture(s) or recording.

3. **Optional:** Click **View** on the prompt to view the picture(s) or video file(s) in the saving path.
-



You can set the saving path of the captured picture(s) and recorded video file(s). You can also set other parameters for recording or continuous capture.

10.7 Set Crosshair

During live view, you can display a crosshair on the live view image to adjust the object position in the view.

Before You Start

The window division is linked to a connected camera and the camera is in live view.



See [Acquisition and Live View in 1-Window Mode](#) and [Acquisition and Live View in Multiple-Window Mode](#) for details about how to start live view.

Steps

1. Click  to display the crosshair on the live view image.
-



After you enable the crosshair, the crosshair will rotate as you rotate the image in the right-click menu.

2. Click  (beside ) to open the following window.
-



In multiple-window mode, you can set the crosshair for each window.

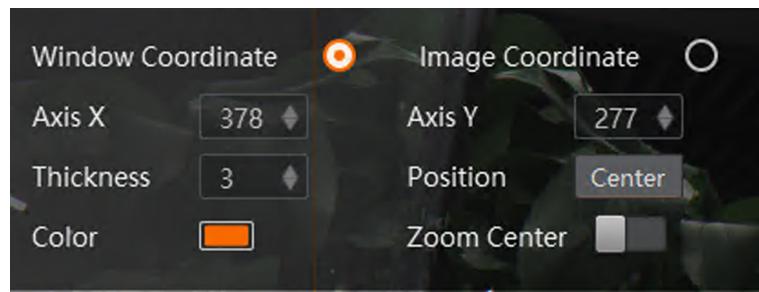


Figure 10-9 Crosshair Settings

3. Set crosshair display parameters.

The crosshair will change accordingly in real-time as you change the display parameters.

Select Base Coordinates	Select Window Coordinates or Image Coordinates . The selected will be used as the base coordinate for the following settings.
Adjust Center Coordinates	Enter a desired value in Axis X and Axis Y to adjust the center position.
Align Crosshair to Image Center	Click Center in Position to align the crosshair to the center.
Adjust Display Effect	Set Thickness and Color to adjust the display effect of the crosshair.

 **Note**

The thickness setting only takes effect for the small crosshair located at the center.

Zoom Based on Crosshair Center	When Zoom Center is enabled, you can zoom in or zoom out the image based on the crosshair center.
---------------------------------------	--

 **Note**

For details about image zoom (or digital zoom), see [More Functions](#).

4. Optional: Select the crosshair and adjust it as required.

Drag to Adjust the Crosshair	Hover the cursor over  until the cursor turns into  , and then drag  to adjust the center of the crosshair.
Adjust the X- or Y-Axis of the Crosshair	<ul style="list-style-type: none">Click the X-axis of the crosshair until the cursor turns into , and then drag  to adjust the X-axis.Click the Y-axis of the crosshair until the cursor turns into , and then drag  to adjust the Y-axis.
Hide Crosshair	Click  to hide the crosshair.

Or right-click , and then click **Hide Crosshair** to hide the crosshair.

Lock Crosshair Right-click , and then click **Lock Crosshair** to lock the crosshair.

Locate Crosshair to the Image/Window Center Right-click , and then click **Central** to locate the crosshair to the center of the image or display window.

10.8 Configure Grid

You can configure grids on the image when acquiring image data in 1-window mode. This is especially helpful when you need to align objects on the image.

Steps

1. Connect a camera and then start acquisition in 1-window mode.



For details about image acquisition in 1-window mode, see [Acquisition and Live View in 1-Window Mode](#).

2. Click  to display grids on the image.

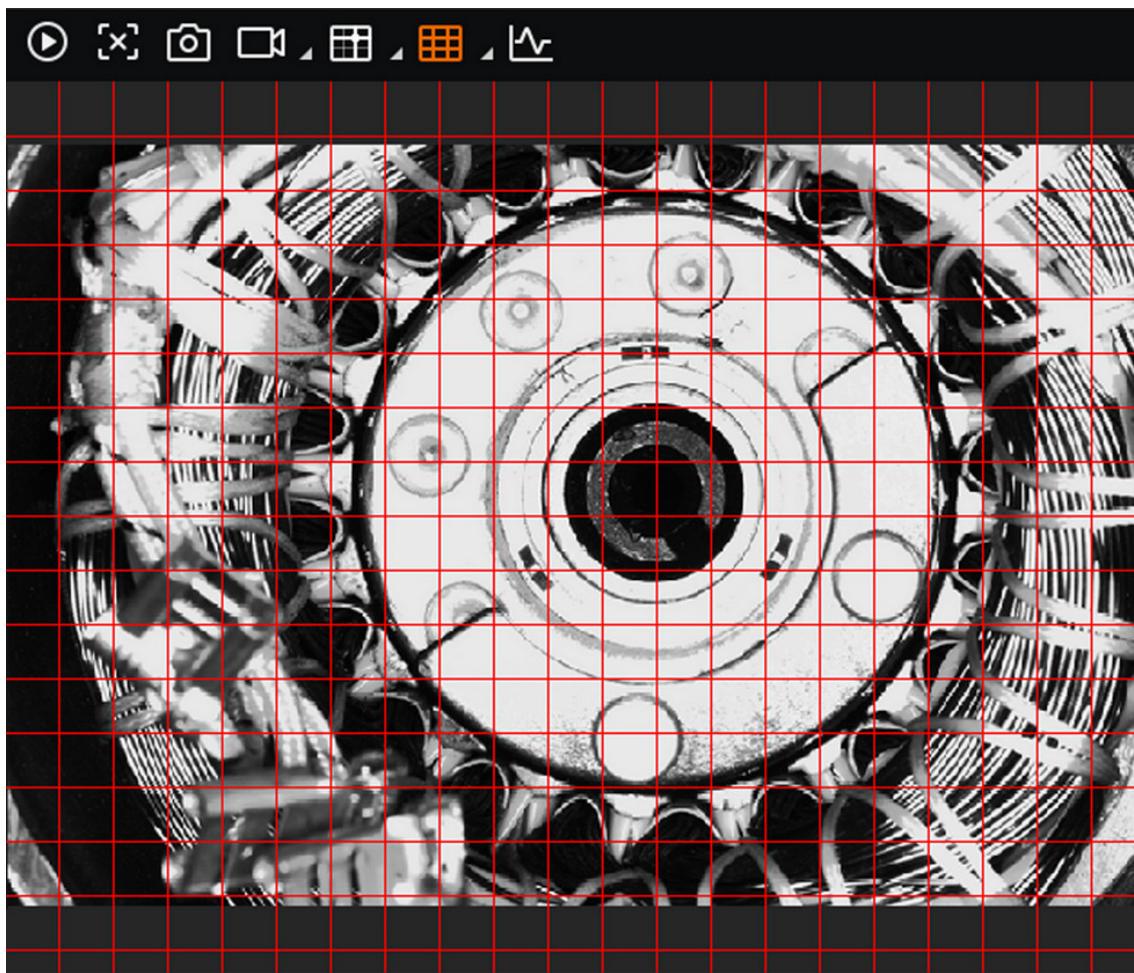


Figure 10-10 Grids Displayed on Image

3. Optional: Click  (beside ) to configure grid parameters, including grid spacing and color.

Grid Spacing

Set the grid spacing value. You can set the value to 30, 60, or 90. You can also customize a value as required. The larger the value, the more scattered the grids will be.

10.9 View Acquisition Status

During acquisition or live view, you can view the acquisition status of the camera(s), including the acquisition rate, image number, bandwidth, resolution, errors, packets lost and display rate, etc.

View Acquisition Status in 1-Window Mode

During acquisition or live view (in 1-Window mode), a status bar appears at the bottom of the display window to display in real time the acquisition status of the selected camera. You can click  in the lower-left corner to select status parameters (the selected ones will be displayed on the status bar).

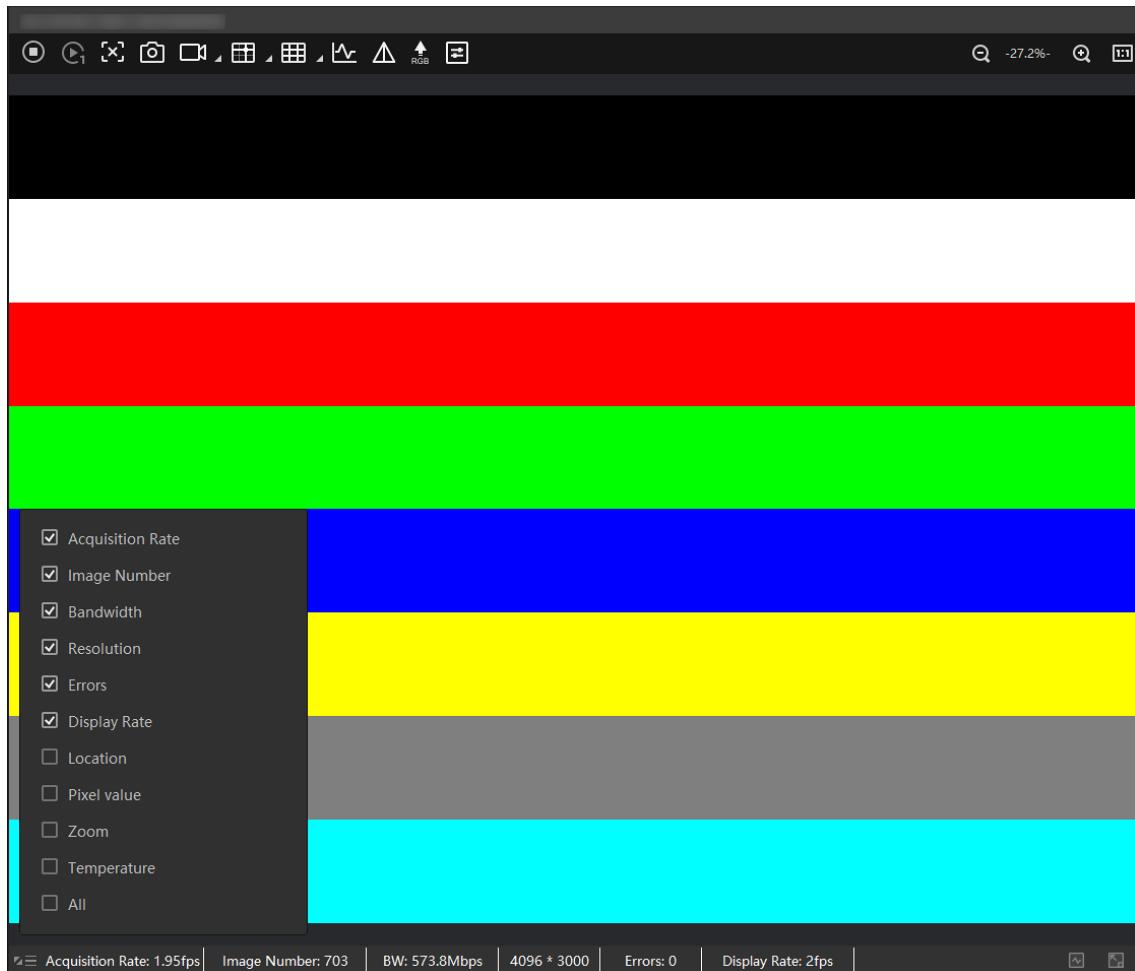


Figure 10-11 View 1-Window Status

You can view live status parameters, including: acquisition rate, image number, bandwidth, resolution, errors, display rate, location, pixel value, zoom, temperature, etc.

The default display parameters are subject to camera types.

- Area Scan Camera: acquisition rate, image number, bandwidth, resolution, display rate.
- Line Scan Camera: acquisition rate, line frequency, image number, bandwidth, resolution, display rate.

When you select **Pixel value**, you can hover the cursor on the image to view the pixel value of the corresponding point. The displayed value depends on the acquired image format.

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You can also view these parameters in the corresponding plots via clicking  in the lower-right corner of the preview window.

To configure the sampling frequency of these parameters, navigate to **Settings → General → Status Parameter Sampling Frequency**.



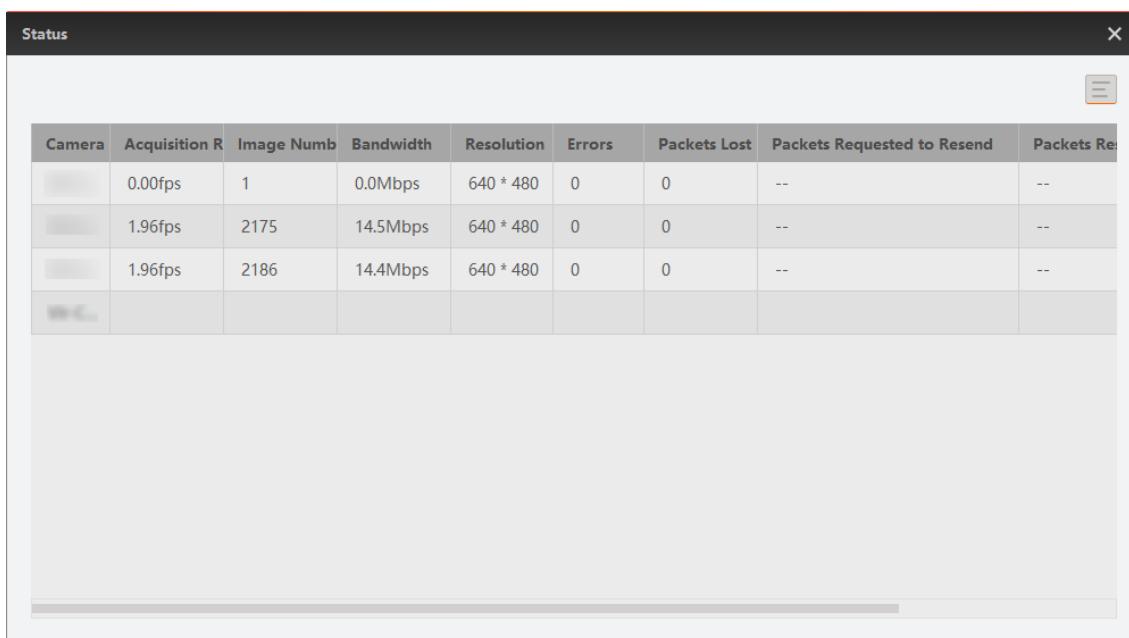
- The Software starts recording the parameters only after you enable the plot viewing window. After that, you can hover and view the corresponding time and value at the position you hover.
 - The figure uses 10 seconds as the default section, and it can store up to 24 hours of data.
 - The available plots are subject to the parameters you enabled from the above configurations.
-

View Acquisition Status of Multiple Cameras Simultaneously

When acquiring images from multiple cameras, you can click  to open the Status window to view the acquisition status of these cameras. Then, you can click  to open the parameter panel, and select parameters to be displayed on the Status window or status bar.



For cameras connected but not in acquisition, you can view the camera model.



Camera	Acquisition R	Image Numb	Bandwidth	Resolution	Errors	Packets Lost	Packets Requested to Resend	Packets Re
	0.00fps	1	0.0Mbps	640 * 480	0	0	--	--
	1.96fps	2175	14.5Mbps	640 * 480	0	0	--	--
	1.96fps	2186	14.4Mbps	640 * 480	0	0	--	--

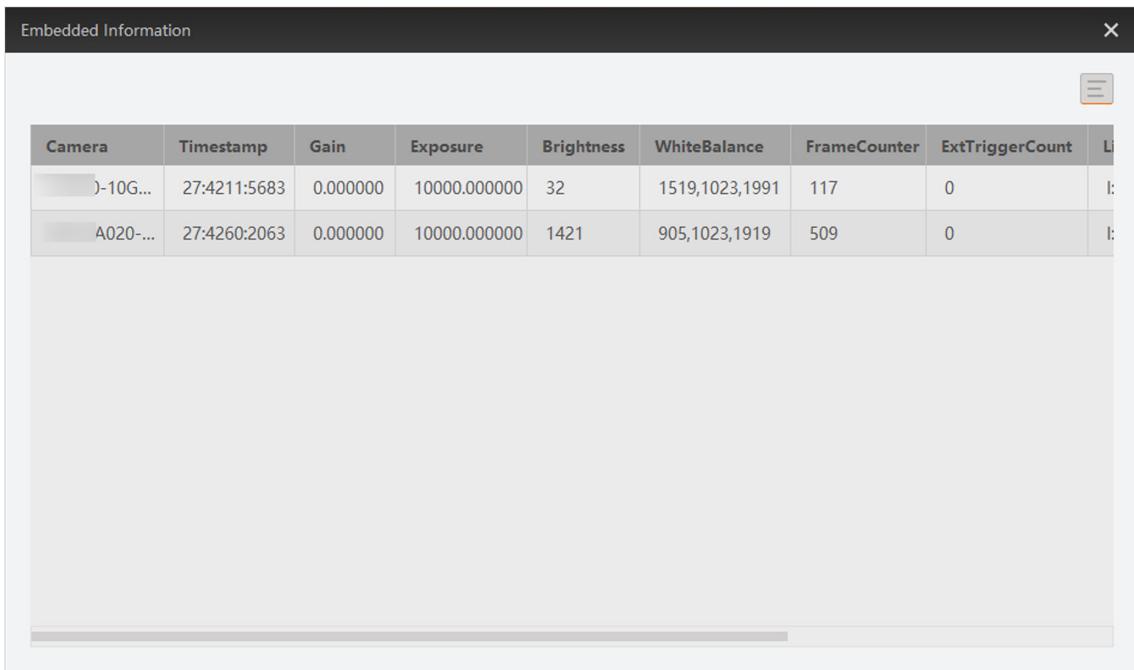
Figure 10-12 Device Status Window

10.10 View Embedded Information

During live view, you can view the information embedded into the image data, including timestamp, gain, exposure, external trigger number, etc.

After starting live view, you can click  to open the Embedded Information window to view the embedded information.

You can click  to select the information (timestamp, gain, exposure, etc.) which needs to be displayed on the window.



Camera	Timestamp	Gain	Exposure	Brightness	WhiteBalance	FrameCounter	ExtTriggerCount	Li
J-10G...	27:4211:5683	0.000000	10000.000000	32	1519,1023,1991	117	0	l:
A020-...	27:4260:2063	0.000000	10000.000000	1421	905,1023,1919	509	0	l:

Figure 10-13 Embedded Information Window

10.11 View Histogram

The Histogram functionality allows you to quickly evaluate the image quality by viewing the real-time distribution of different color channels (for color camera) or the real-time distribution of gray values in the images (for mono camera).



The following text only takes viewing the histogram data of color camera for an example.

Start acquisition and then click  to open the Histogram window.

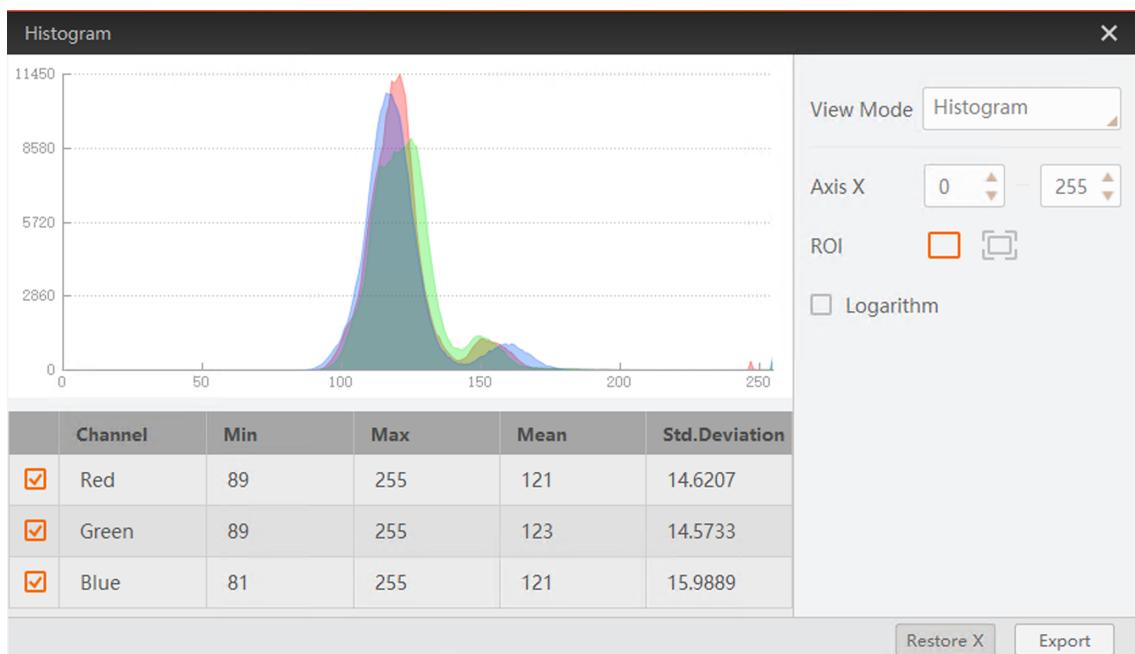


Figure 10-14 The Histogram Window

View Mode

Set the view modes, including Histogram, Line Profile and Column Profile.

Histogram

Axis X

Set the value range of the axis X of the histogram.

Line Profile

Location

Display the coordinates value of your cursor when you moving your cursor on the images.

Line Axis

Set the value range (0 to the horizontal resolution of the image) of the selected line which is parallel with the X axis.

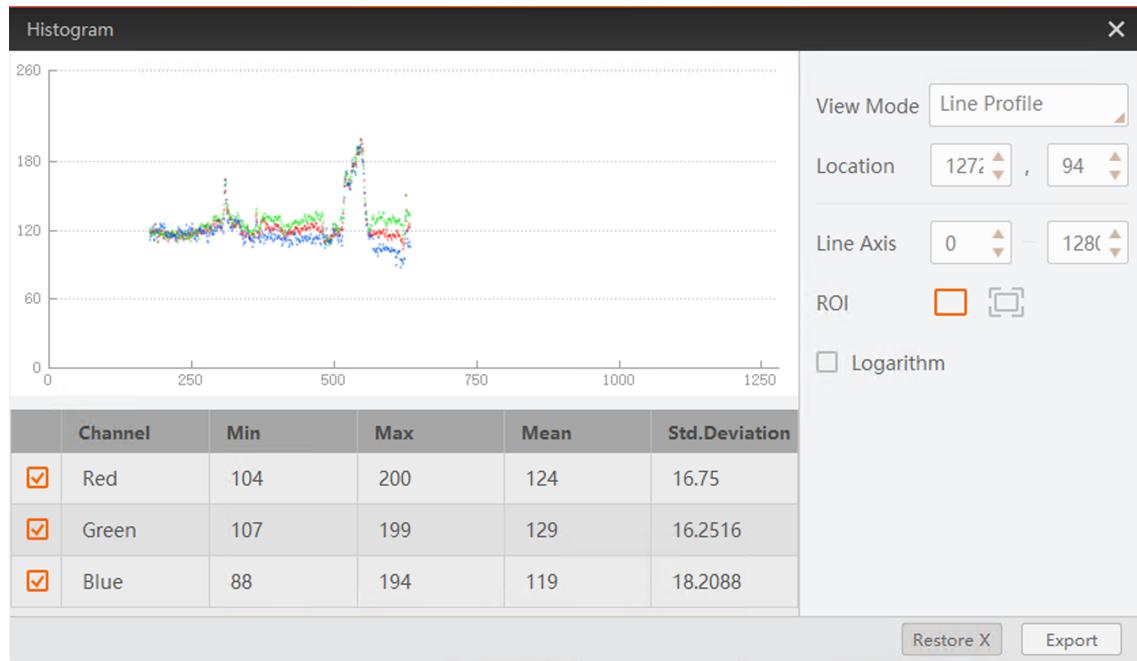


Figure 10-15 Line Profile Mode

Column Profile

Location

Display the coordinates value of your cursor when you moving your cursor on the images.

Column Axis

Set the value range (0 to the vertical resolution of the image) of the selected line which is parallel with the X axis.

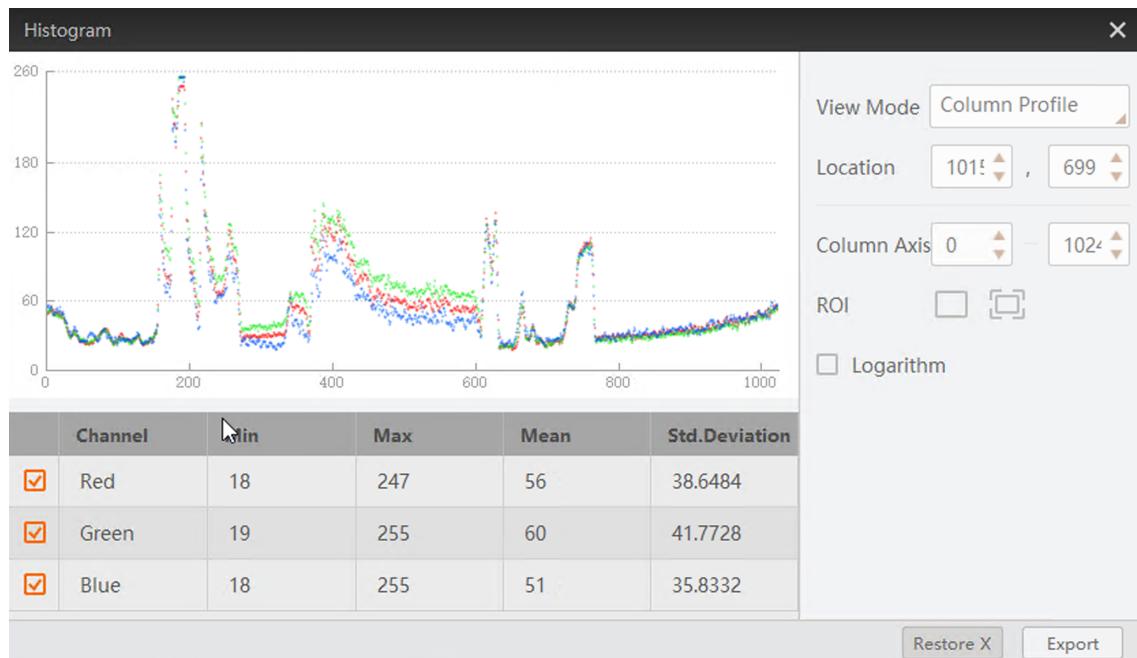


Figure 10-16 Column Profile Mode

ROI

Click and then drag the cursor on the image to draw an ROI. After that, the histogram only displays the color channel distribution or gray value distribution within the ROI.

You can click to cancel the ROI settings.

1. Click in the histogram window to shrink it to the lower-right corner of the image preview window.
2. Drag your cursor in the preview window to draw an ROI and adjust the ROI as needed (refer to the example below).



In multi-view preview mode, you can draw separate ROIs for each view.

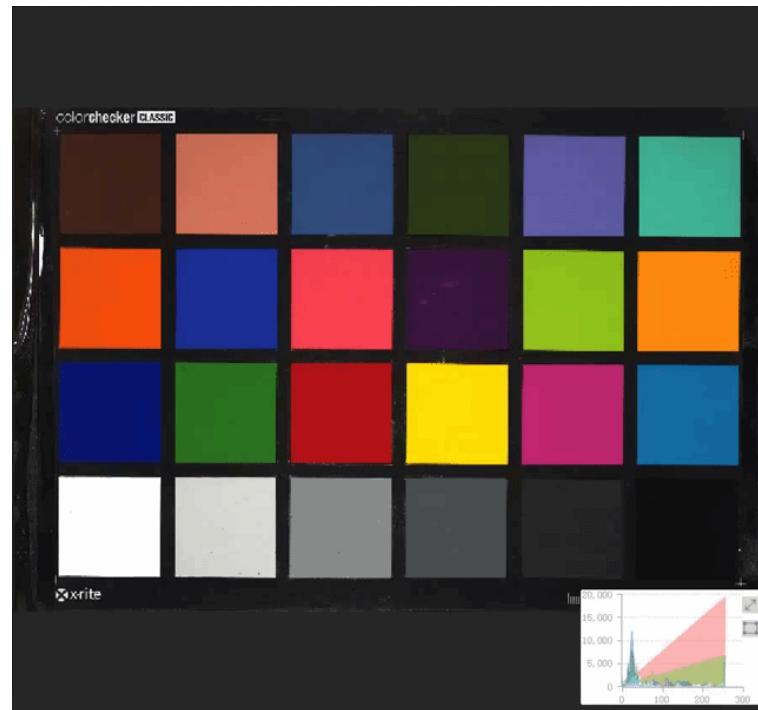


Figure 10-17 Draw an ROI

3. To redraw, click (lower-right corner), then repeat Step 2.
4. Click to restore the full histogram view.

Logarithmic Scale

Switches between a linear and a logarithmic view of the data.

You can do the following operations if required.

Table 10-1 Available Operations

Operation	Description
Panning and Zooming	<p>Panning and zooming allows you to look at specific areas of the histogram in more detail.</p> <ul style="list-style-type: none"> • Panning: Drag the cursor on the histogram to pan the histogram. • Zooming: Move the cursor to the histogram and then scroll the mouse wheel to zoom in or zoom out.
Select Color Channel for Display	If the camera is a color camera, you can check the checkbox(es) in the table, the selected color channel's real-time distribution will be displayed on the histogram.

Operation	Description
Export Histogram Data	Click Export to export the histogram data to the local PC.
Restore X	Click Restore X to restore the coordinates if you have zoomed the histogram.

10.12 Temperature Screening Configuration

For infrared cameras, you can perform temperature screening configurations, such as drawing different types of temperature screening regions and configuring the relevant parameters, including those related to screening, alarm, and display.

10.12.1 Draw a Region for Temperature Screening

To perform temperature screening configurations, you need to first draw regions for temperature screening.

Before You Start

Make sure you have connected an infrared camera to the Software.

Steps

1. Start the live view of the camera.



Note

Refer to [Acquisition and Live View in 1-Window Mode](#) and [Acquisition and Live View in Multiple-Window Mode](#) for details.

2. Click above the live view window.

For Screening configuration details, see [Configure Temperature Screening Parameters](#).

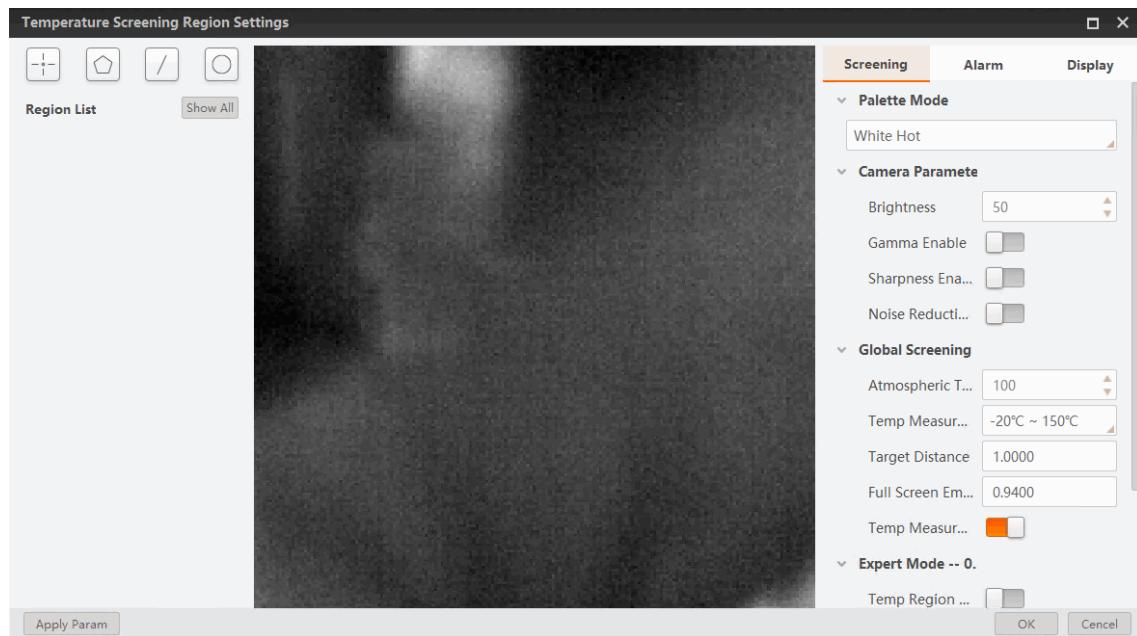


Figure 10-18 Temperature Screening Region Settings Window

3. On the top left of the configuration window, select a type of temperature screening region according to the table below.

Table 10-2 Temperature Screening Region Type

Icon	Region Type	Maximum No. Allowed
	Point	10
	Polygon	10
	Line	1
	Circle	1

The corresponding type of region will be added to **Region List** in the format "index.Type" (e.g., 0.Point). For each region type, the index starts with 0 and increases by one each time.

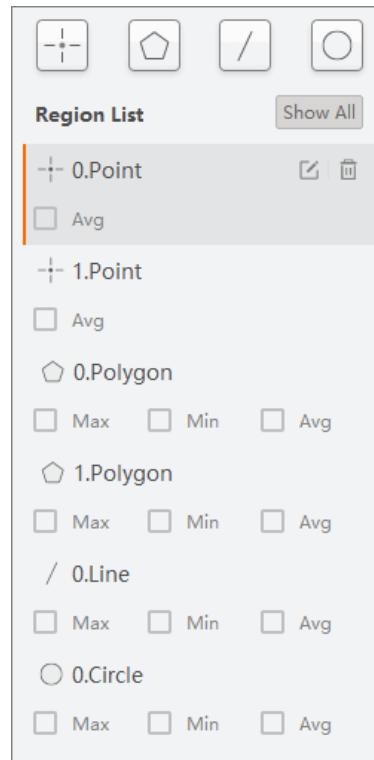


Figure 10-19 Example of Region List

- From the list, select a region to be drawn, click , and draw on the live view window following the instructions below.

Region Type	Drawing Instruction
Point	Click to draw a point.
Polygon	Click to draw the first vertex of the polygon, move your cursor and click again to draw more vertices as needed, and double-click to finish drawing.
Line	Click to draw one end of the line, move your cursor, and click to draw the other one.
Circle	Click, hold, and drag to draw a circle.



If needed, after a region is drawn, you can click to draw again.

- For each region, select **Max**, **Min**, or **Avg** as needed to display the maximum value, minimum value, and mean value respectively for the regions drawn.



For points, only **Avg** (mean value) is available.

6. **Optional:** Select a region from the list and click to delete it if needed.
7. On the bottom left of the configuration window, click **Apply Param** to save your settings.
The regions you have drawn and their corresponding real-time statistics will be displayed on the live view window.

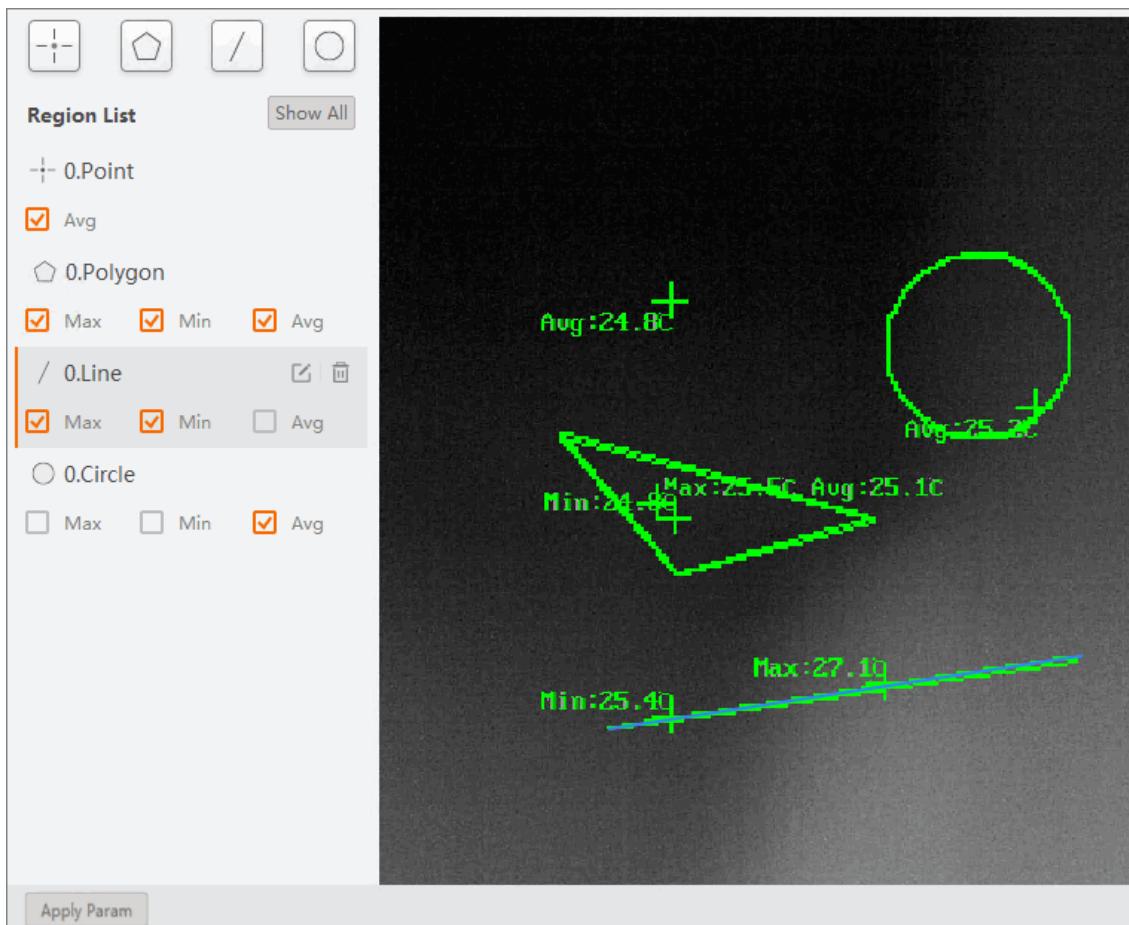


Figure 10-20 Temperature Screening Regions and Statistics

8. **Optional:** Click **Show All** to display all the regions you have drawn on the live view window.

10.12.2 Configure Temperature Screening Parameters

Besides drawing temperature screening regions, you can also set parameters related to screening, alarm, and display on the Temperature Screening Region Settings window.



Note

For the configurations to take effect, you can either click **OK** on the bottom right corner of the window or click **Apply Param** on the bottom left. Clicking **OK** will close the configuration window, whereas clicking **Apply Param** will not and you can continue with the configurations.

Screening

Under **Screening**, you can configure parameters related to the palette mode, camera basics, global screening, and expert mode.

Palette Mode

Select a palette mode for the camera from White Hot, Black Hot, etc.

Camera Parameter

Brightness

Adjust the brightness level of the live view image correspondingly. The larger the value, the brighter the image.

Gamma Enable

When enabled, you can set the gamma value correspondingly. The larger the value, the stronger the contrast.

Sharpness Enable

When enabled, you can set the sharpness level for the edges of the live view image.

Noise Reduction Enable

When enabled, the signal-to-noise ratio of the image will be boosted, so as to improve the quality of the image.

Global Screening

Set the global temperature screening parameters for the temperature screening regions.

Atmospheric Transmissivity

If a germanium glass needs to be added in front of the lens of the infrared camera, the transmittance of the germanium glass can be set by this parameter.



If no germanium glass is needed, you can keep this parameter as 100.

Temp Measurement Range

Select a temperature measurement range as needed from -20°C ~ 150°C and 0°C ~ 550°C.

Target Distance

Set the linear distance from the target object to be measured to the device (unit: m).

Full Screen Emissivity

Set the emissivity of the target object. The emissivity value varies for different objects. Refer to the user manual of the corresponding camera model for details.

Temp Measurement Expert Mode

When enabled, you can set the corresponding parameters for each temperature screening region respectively.

Expert Mode

Temp Region Reflect Enable

Set whether to enable reflection for the temperature screening region when there is a high-temperature object at the scene, and a measured object with low emissivity reflects the high-temperature object.

Temp Region Reflectance

Set the reflectance value of the temperature screening region, which needs to be consistent with the temperature value of the high-temperature object.

Temp Region Target Distance (m)

Set the linear distance from the target object to be measured to the device (unit: m).

Temp Region Emissivity

Set the emissivity value of the target object (unit: %). The emissivity value varies for different objects. Refer to the user manual of the corresponding camera model for details.

Alarm

Under **Alarm**, you can configure parameters related to the temperature triggered alarms for a single region or of comparing two regions.

Single Region Alarm

Set the alarm rule for a single temperature screening region you have drawn.

Point

For point ROIs, you can set the following parameters for conditions to trigger or restore alarms.

Point Temp

Select > or < from the drop-down list, and enter a temperature value correspondingly to set the alarm rule.

E.g., If you select > and enter 50 in the box, an alarm will be triggered when the screened temperature exceeds 50°C.

Tolerance Temp

Set the threshold for restoring alarms of the region.

E.g., If the tolerance temperature is set to 5°C while the rule for triggering alarms is set to > 50°C, alarms will be canceled when the screened temperature is less than or equal to 45°C.

Polygon/Line/Circle

For polygon, line, and circle ROIs, you can select a specific type of temperature statistics (Maximum, Minimum, Average, and Variation) and set the corresponding alarm triggering and restoring rules. The configuration process is similar to those of setting **Point Temp** and **Tolerance Temp** for point ROIs.

E.g., If you select **Maximum**, **>**, and enter 50 in the box, an alarm will be triggered when the maximum temperature value of the region exceeds 50°C.

Multi-Region Alarm

Set up to four multi-region alarm rules which compare the chosen type of statistics of two temperature screening regions. Follow the steps below to configure a rule.

1. Select a region from the drop-down list for **Region Index 1**, which will be set as the reference region (i.e., the region being compared to).
2. Select another region from the drop-down list for **Region Index 2**, which will be set as the target region.
3. Choose a specific type of temperature statistics to be compared between the regions from **Maximum**, **Minimum**, **Average**, and **Variation**.
4. Select **>** or **<** from the second drop-down list, and enter a temperature value correspondingly to set the alarm rule.

E.g., If you select **Maximum**, **>**, and enter 10 in the box, an alarm will be triggered when the maximum temperature value of the target region is 10°C greater than that of the reference region.

Display

Under **Display**, you can configure parameters related to the display settings of the live view window and the temperature window.

Basic Display

Temperature Bar

When enabled, a temperature bar will be displayed on the right side of the live view window.

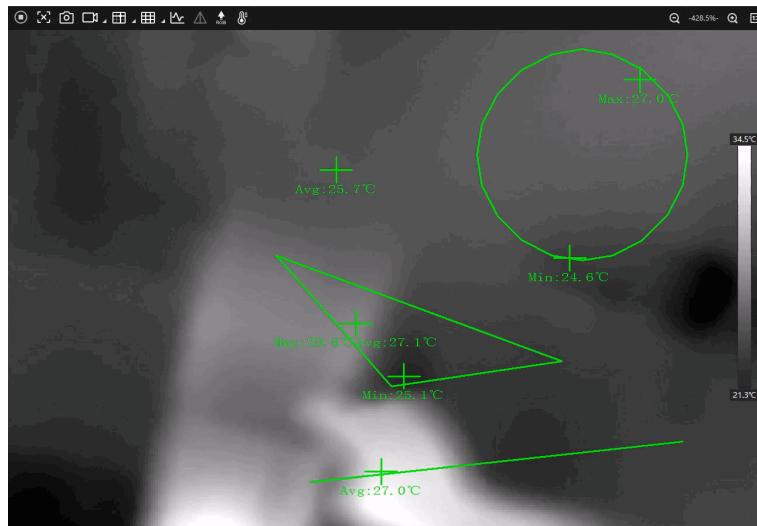


Figure 10-21 Temperature Bar

Region Information Overlay

Select a overlay mode for the region information from the followings.

- **None:** Disable region information overlay. No information is displayed when the camera acquires images or when the images are saved.
- **Camera:** Overlay information of the temperature screening regions to the camera, so that the information will be displayed when the camera acquires images and when the images are saved.
- **Client:** Overlay information of the temperature screening regions to the Client, so that the information will be displayed when the camera acquires images, but not when the images are saved.

Temperature Window

You can set up to 4 displays of temperature values and 1 display of the temperature curve to be displayed on the Temperature Window. For each display, you can select a temperature screening region and a type of statistics as shown below.

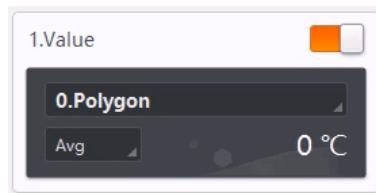


Figure 10-22 Temperature Window Settings

Refer to [Temperature Window](#) for how the display outcome looks like.

10.13 More Functions

The Software provides additional functions for live view, such as digital zoom and image rotation.

Image Zooming

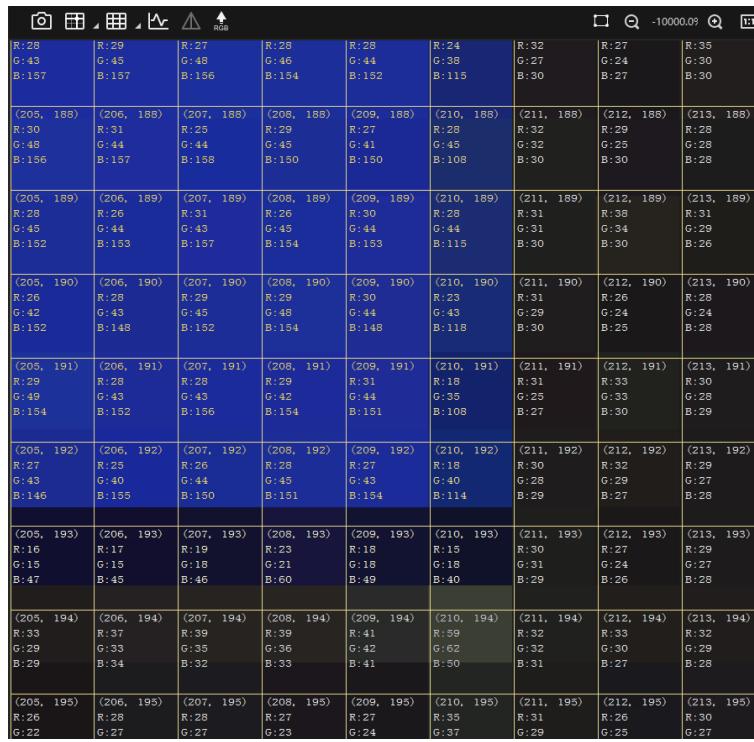
To zoom the current preview image, use the following methods:

- Right-click the image to open the right-click menu and then click **Zoom in/Zoom out**.
- Click  to zoom in, or click  to zoom out.
- Click  and drag to select an area in the preview window to zoom the image to the selected region.
- Move the cursor to the image and scroll the mouse wheel to zoom in or zoom out the image.



Note

- Except when using Box Zoom, after zooming in the live view image, you can drag the image to view more details. For details about how to set window division, see [Customize Window Division](#).
 - This operation is not available for local images and local videos.
 - When zooming reaches 64x or higher magnification, the preview will display the pixel values and coordinates for each pixel, as shown in the example image below.
-



The screenshot shows a software interface with a toolbar at the top containing icons for file operations, zoom, and orientation. Below the toolbar is a grid of 10x10 cells, each representing a pixel. Each cell contains a coordinate pair (x, y) and a triplets of RGB values (R, G, B). The grid is labeled with row and column indices from 0 to 9.

	R:28 G:43 B:157	R:29 G:45 B:157	R:27 G:48 B:157	R:28 G:46 B:156	R:28 G:44 B:154	R:24 G:38 B:152	R:32 G:27 B:115	R:27 G:24 B:30	R:35 G:30 B:30
(205, 188)	(206, 188)	(207, 188)	(208, 188)	(209, 188)	(210, 188)	(211, 188)	(212, 188)	(213, 188)	
R:30 G:48 B:156	R:31 G:44 B:157	R:25 G:44 B:158	R:29 G:45 B:150	R:27 G:41 B:150	R:28 G:45 B:108	R:32 G:32 B:30	R:29 G:25 B:30	R:28 G:28 B:28	
(205, 189)	(206, 189)	(207, 189)	(208, 189)	(209, 189)	(210, 189)	(211, 189)	(212, 189)	(213, 189)	
R:28 G:45 B:152	R:26 G:44 B:153	R:31 G:43 B:157	R:26 G:45 B:154	R:30 G:44 B:153	R:28 G:44 B:115	R:31 G:31 B:30	R:38 G:34 B:30	R:31 G:29 B:26	
(205, 190)	(206, 190)	(207, 190)	(208, 190)	(209, 190)	(210, 190)	(211, 190)	(212, 190)	(213, 190)	
R:26 G:42 B:152	R:28 G:43 B:148	R:29 G:45 B:152	R:29 G:48 B:154	R:30 G:44 B:148	R:23 G:43 B:118	R:31 G:29 B:30	R:26 G:24 B:25	R:28 G:24 B:28	
(205, 191)	(206, 191)	(207, 191)	(208, 191)	(209, 191)	(210, 191)	(211, 191)	(212, 191)	(213, 191)	
R:29 G:49 B:154	R:28 G:43 B:152	R:28 G:43 B:156	R:29 G:42 B:154	R:31 G:44 B:151	R:18 G:35 B:108	R:31 G:25 B:27	R:33 G:33 B:30	R:30 G:28 B:29	
(205, 192)	(206, 192)	(207, 192)	(208, 192)	(209, 192)	(210, 192)	(211, 192)	(212, 192)	(213, 192)	
R:27 G:43 B:146	R:25 G:40 B:155	R:26 G:44 B:150	R:28 G:45 B:151	R:27 G:43 B:154	R:18 G:40 B:114	R:30 G:28 B:29	R:32 G:29 B:27	R:29 G:27 B:28	
(205, 193)	(206, 193)	(207, 193)	(208, 193)	(209, 193)	(210, 193)	(211, 193)	(212, 193)	(213, 193)	
R:16 G:15 B:47	R:17 G:15 B:45	R:19 G:18 B:46	R:23 G:21 B:46	R:18 G:18 B:60	R:15 G:18 B:49	R:30 G:31 B:40	R:27 G:24 B:29	R:30 G:27 B:26	R:29 G:27 B:28
(205, 194)	(206, 194)	(207, 194)	(208, 194)	(209, 194)	(210, 194)	(211, 194)	(212, 194)	(213, 194)	
R:33 G:29 B:29	R:37 G:33 B:34	R:39 G:35 B:32	R:39 G:36 B:33	R:41 G:42 B:41	R:59 G:62 B:50	R:30 G:32 B:31	R:33 G:32 B:27	R:32 G:30 B:27	R:29 G:29 B:28
(205, 195)	(206, 195)	(207, 195)	(208, 195)	(209, 195)	(210, 195)	(211, 195)	(212, 195)	(213, 195)	
R:26 G:22	R:28 G:27	R:28 G:27	R:27 G:23	R:27 G:24	R:35 G:37	R:31 G:29	R:26 G:25	R:30 G:27	

Figure 10-23 Display the Pixel Values and Coordinates

Fit to Window/Actual Size

Right-click the image, and then click **Fit to Window** to fit the size of the image to that of the display window.

Right-click the image, and then click **Actual Size** to restore the image to its original size (original resolution).



- You can set keyboard shortcuts for the two operations. See [Shortcut](#) for details.
- The two operations are not supported by local images and local videos.

Image Rotation

Right-click the image and then click **Rotate Left** or **Rotate Right** to rotate the image to the left or to the right respectively.



Image rotation is not supported by local images and local videos.

View Settings

Adjust the image quality of the live video by setting the display mode, filtering mode, vertical synchronization mode, and rendering engine. See [View](#) for details.

Adjust Bandwidth

During image data acquisition, if excessive packet losses occurs, a prompt will pop up to remind you to adjust bandwidth. In this case, you can tap **Adjust** to adjust the bandwidth so as to alleviate packet losses.

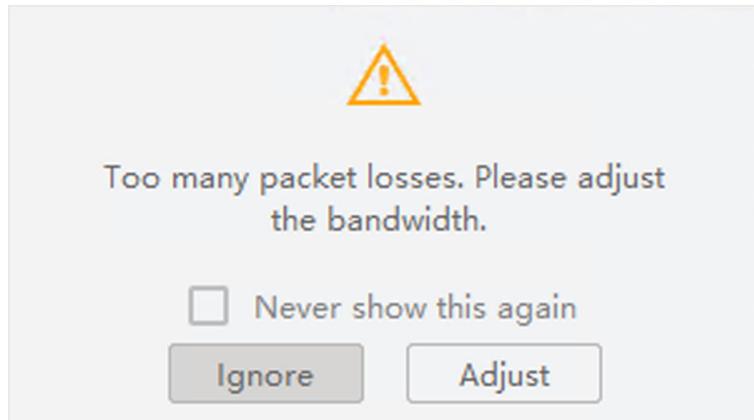


Figure 10-24 Excessive Packet Losses Prompt

Export Pixel RGB Values

Click  to save the each pixel value into one file.



Only available in 1-Window division mode.

Adjust Image Quality Automatically

Click  to allow the Software automatically adjust image acquisition quality based on the image acquired.

Chapter 11 Tool Management

The Software provides multiples tools for the management, configuration, and maintenance of cameras, such as IP Configurator (for editing camera IP addresses), Log Collection Tool (for collecting camera logs), Virtual Code Reader (for testing reading results), etc.

11.1 Firmware Upgrade Tool

You can use the Tool to upgrade the firmware of GigE cameras, USB cameras, PCIe cameras, CoaXPress cameras, and frame grabbers.



Frame Grabber related features are only available when you run the Software on Linux X86_64 type systems.

Main Window Introduction

The main window is as below and the descriptions are in the table.

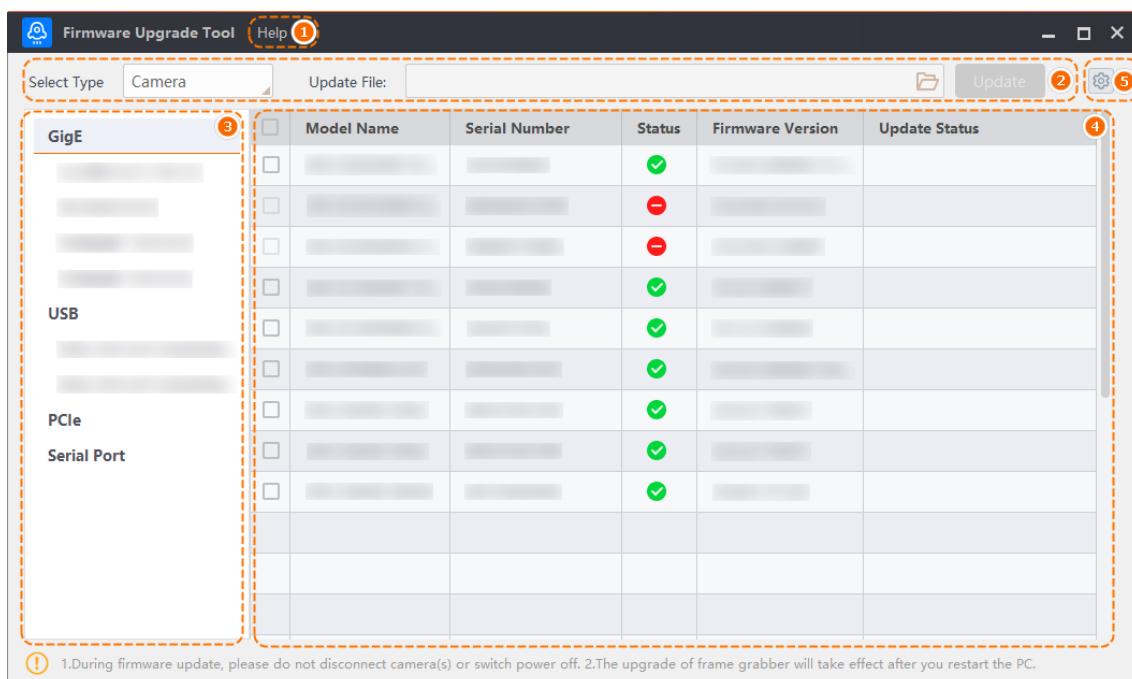


Figure 11-1 Firmware Upgrade Tool

Table 11-1 Main Window Description

Number	Area	Description
1	Help	You can select a language (English or Chinese) and view the version information.
2	Upgrading Configuration	<ul style="list-style-type: none"> • You can select a camera or frame grabber as the to-be-upgraded device type. • You can select an upgrade package for cameras and perform the upgrade here.  Note To upgrade a frame grabber, select the upgrade package in Area 4.
3	Interface Information	You can view the interface information of your computer. The available operations may vary according to devices with different interfaces. See <u>Upgrade a Camera</u> .
4	Device Information	You can view devices and related information of different interfaces.
5	Device List Configuration	You can set information categories to display in area 3. The available information may vary according to interfaces.

11.1.1 Upgrade a Camera

The camera firmware upgrading process mainly contains three parts, and they are Search for Device, Start to Upgrade, and View Upgrading Status.

Search for Devices

After you open the Tool, you can select a camera in the **Select Type** area, and you can see the computer interface information displayed on the left. The available operations may vary according to devices with different interfaces.

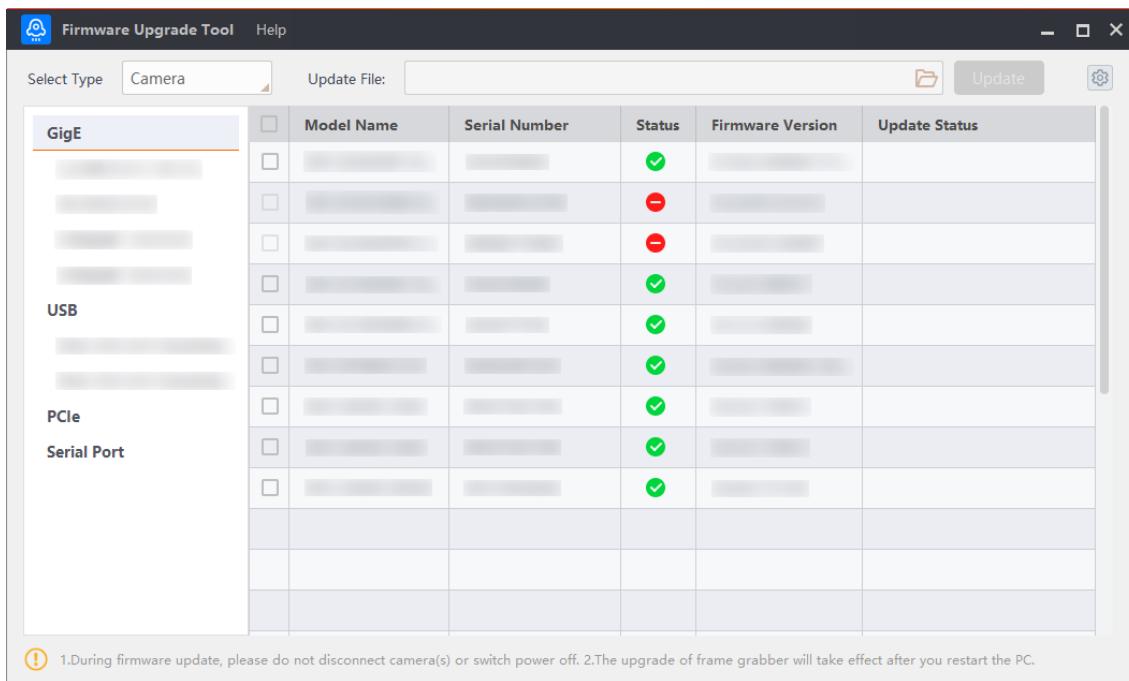


Figure 11-2 Upgrade a Camera

Upgrade Camera Firmware

- GigE and USB Interfaces:
 - Select **GigE** or **USB**, and the devices that can be found will be displayed on the right pane.
 - Select an interface under GigE or USB, and the devices that can be found will be displayed on the right pane.
 - The Tool can automatically refresh the devices under the enumeration of GigE and USB, or click to manually refresh the enumeration.
- PCIe Interface:
 - Select **PCIe**, and the devices that can be found will be displayed on the right pane.
 - Select an interface under PCIe, and the devices that can be found will be displayed on the right pane.
 - The Tool can automatically refresh the devices under the enumeration of PCIe, or click to manually refresh the enumeration.
- Serial Port Interface:
 - Select **Serial Port**, and the available devices will be displayed on the right pane.
 - Select an interface from Serial Port, and the available devices of the interface will be displayed on the right pane.
 - By default, the camera information under Serial Port will not be refreshed automatically. You can click on the right side of the Serial Port to refresh the enumeration manually.

Start to Upgrade

Check if the camera to be upgraded is available. Click  to select a firmware upgrade package (dav file) in the upper right side of the Tool.

The Tool can upgrade the firmware of multiple cameras in a batch. Up to 20 cameras can be selected at the same time.

- If the upgrade package is for a specific model, only cameras of the same model can be upgraded in batch. For cameras of other models, the status bar will prompt "Upgrading failed. (Error code: 0x900006500) Firmware mismatch.".
- If the upgrade package is for multiple models, you can upgrade the cameras of multiple models in the upgrade package. For cameras of the other models that are not included in the upgrade package, if you upgrade them, the status bar will prompt "Upgrading Failed. (Error code: 0x900006500) Firmware mismatch.".

After selecting the firmware upgrading package, click **Upgrade**.



- Do not disconnect the camera from the PC during firmware upgrade.
• The camera will reboot automatically after upgrading.

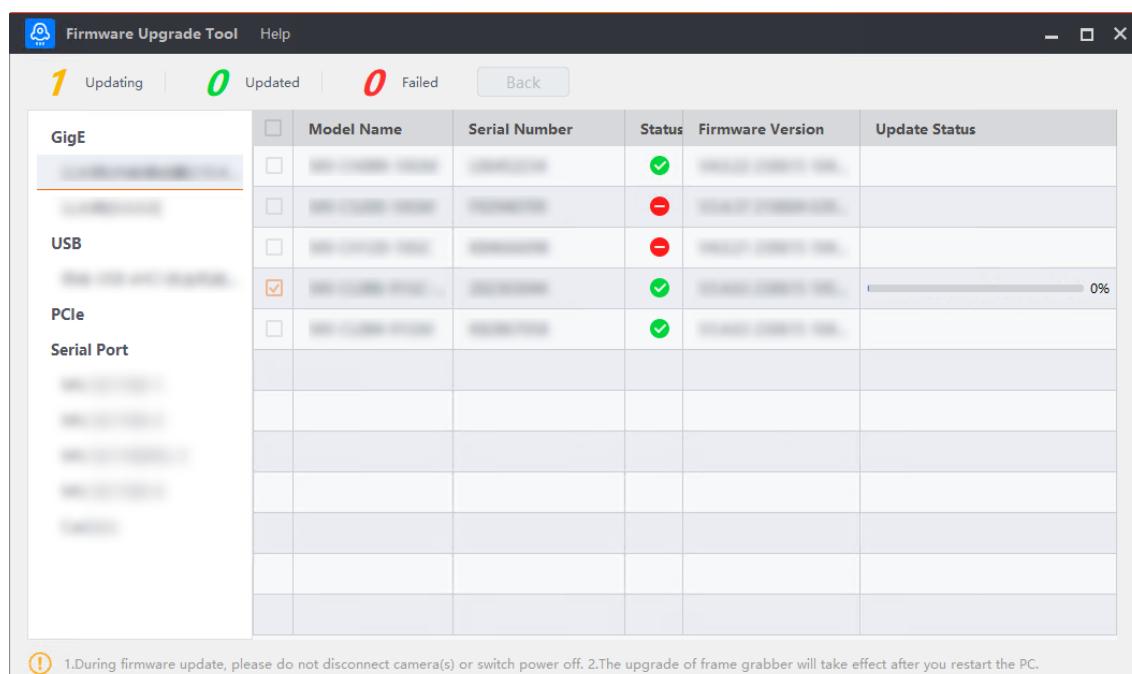


Figure 11-3 Upgrading Process

View Upgrading Status

In the upper-left corner, the upgrading information is displayed as shown below. You can click **Back** on the top of the Tool to go back to the initial interface. Also, on the right of the Tool, the upgrading status information of a selected device is displayed.

11.1.2 Upgrade a Frame Grabber

The frame grabber firmware upgrading process mainly contains three parts, and they are Search for Device, Start to Upgrade, and View Upgrading Status.

Search for Devices

After you open the tool, select **FrameGrabber** in **Select Type**, and all connected PCIe devices displays on the left.



By default, the Tool automatically enumerates connected frame grabbers every 30 seconds. You can also click to re-enumerate.

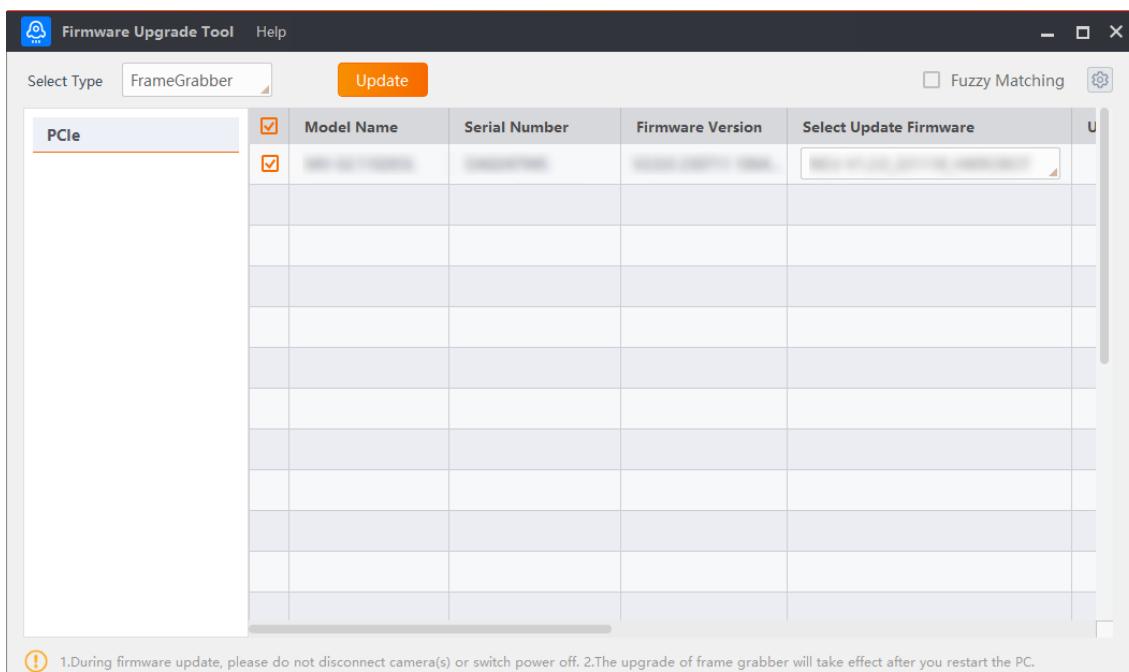


Figure 11-4 Upgrade Frame Grabber Firmware

Start to Upgrade

Please contact technical support to get the firmware driver packages of the to-be-upgraded frame grabbers.

Before upgrading, ensure the frame grabber(s) to be upgraded are available during upgrading process.

1. Install the firmware driver under the directory: C:\Program Files (x86)\Common Files\{Software Name}\FirmWare.

Once installed, the Tool detects and displays available firmware, as shown below.

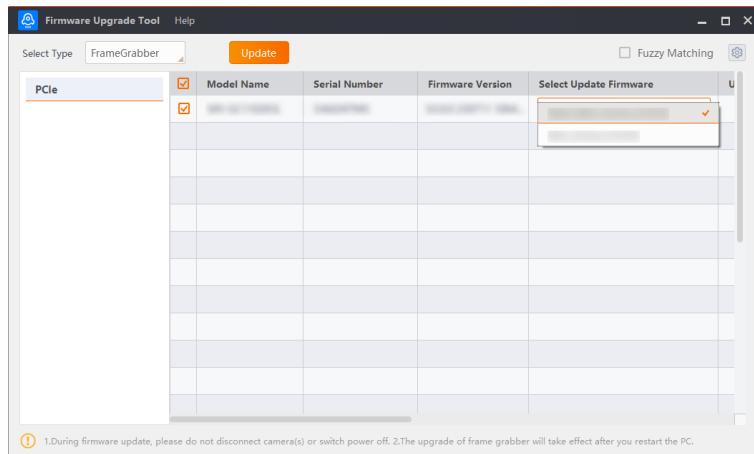


Figure 11-5 Upgrade Frame Grabber

2. Select frame grabber(s) to be upgraded.
 3. Select required firmware in **Select Update Firmware** for each frame grabber.
-

 **Note**

- The Tool supports upgrading up-to-20 frame grabbers in a batch.
- The Tool supports fuzzy searching of firmware files. To enable this functionality, enable **Fuzzy Matching**.

4. Click **Upgrade** to upgrade them.
-

 **Note**

- Keep the device(s) connected when upgrading.
 - The frame grabber(s) will reboot automatically when upgraded.
-

View Upgrading Status

Once the upgrading starts, you can view the status on top, as shown below. The upgrading progress also displays in **Update Status**.

In case of upgrading failure, you can click **Back** to return to the initial window and redo the upgrading.

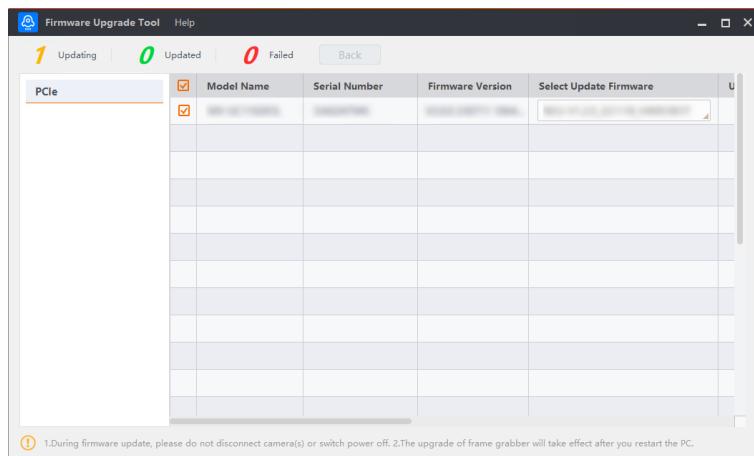


Figure 11-6 Upgrading Frame Grabber

11.2 IP Configurator

The online GigE Vision cameras in the same local subnet with the PC on which the Software runs will be enumerated in the device list. You can configure the IP addresses and other network parameters of these cameras.

Click **Tool → IP Configurator** from the **Menu Bar** to open the tool.

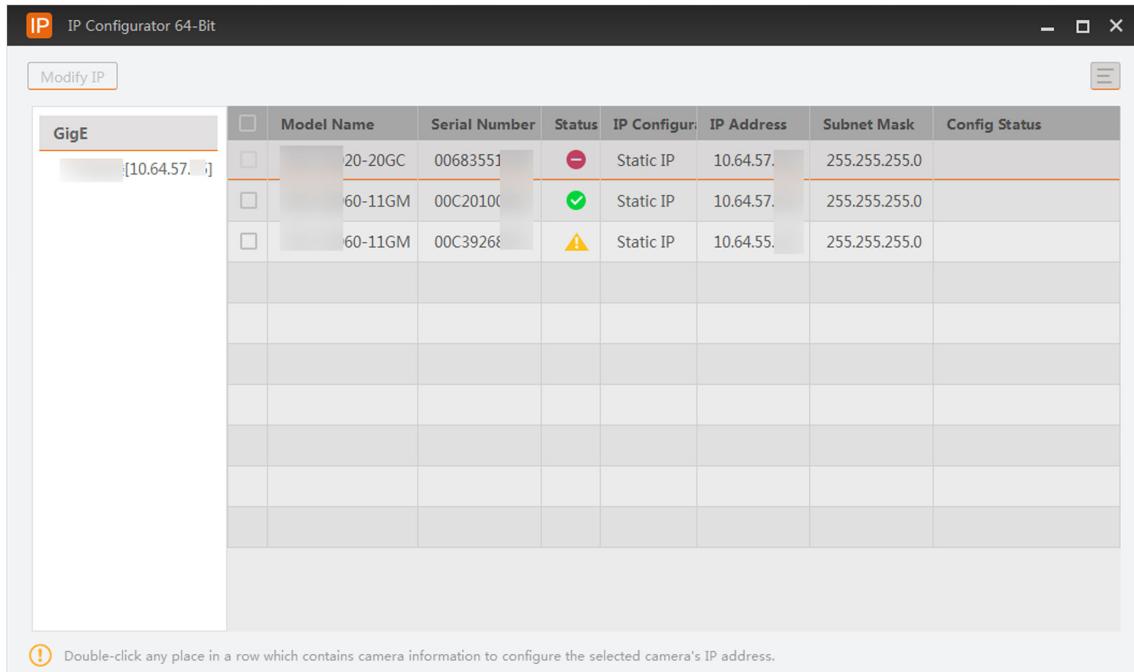


Figure 11-7 IP Configurator

By default, the window displays all enumerated GigE cameras and their information (model name, device user ID, status, etc.).



- Note**
- You can move the cursor to **GigE** and click to refresh the list.
 - You can click to select what camera information to display on the window.
-

To edit camera IP, ensure the status is **Free** or **Unreachable**.

Free

The camera is available and you can edit its IP address.

In Use

The camera is busy. You can check the following:

- Disconnect the camera, if the Software is live viewing it.
- Terminate other processes that are accessing the camera.

Unreachable

The camera is unreachable due to one of the following 2 reasons:

- The network of the camera is abnormal. Check the camera network settings.
- The camera is on the same subnet with the PC on which the Software runs, but NOT in the same network segment. You should modify its IP address to the same network segment with the PC to make the camera available for connection and use.

11.2.1 Edit IP Address of a Single Camera

You can modify the IP address of a single camera if the camera status is Free or Unreachable.

Steps

1. Select a network interface.
 2. Double-click any place in the camera row to open the Modify IP Address window.
 3. Select the **Static IP**, **DHCP**, or **LLA** as the IP type.
-



You can change the IP type only when the camera status is Free. And if you change the IP type, the camera will be reset to its power up state.

Static IP

For setting the IP type as Static IP, you can modify the IP address, subnet mask, and default gateway.

DHCP

The camera is set to automatically obtain an IP address. This means that the IP address will dynamically change (within a range) every time the camera or computer is restarted.



Note

- If the IP addresses of your PC and camera are both static but they are not in the same IP segment, you need to change the camera IP address to a dynamic IP address.
- If you enter restricted IP types including D type (from 224 to 239), E type (from 240 to 254), the IP addresses starting with 127 or 255, or IP addresses with incorrect IP address formats, you will not be able to access the devices.

LLA

The camera uses a default IP address from the link-local address block. Link-local addresses for IPv4 are defined in the address block 169.254.0.0/16 in CIDR notation. In IPv6, they are assigned the address block fe80::/10.

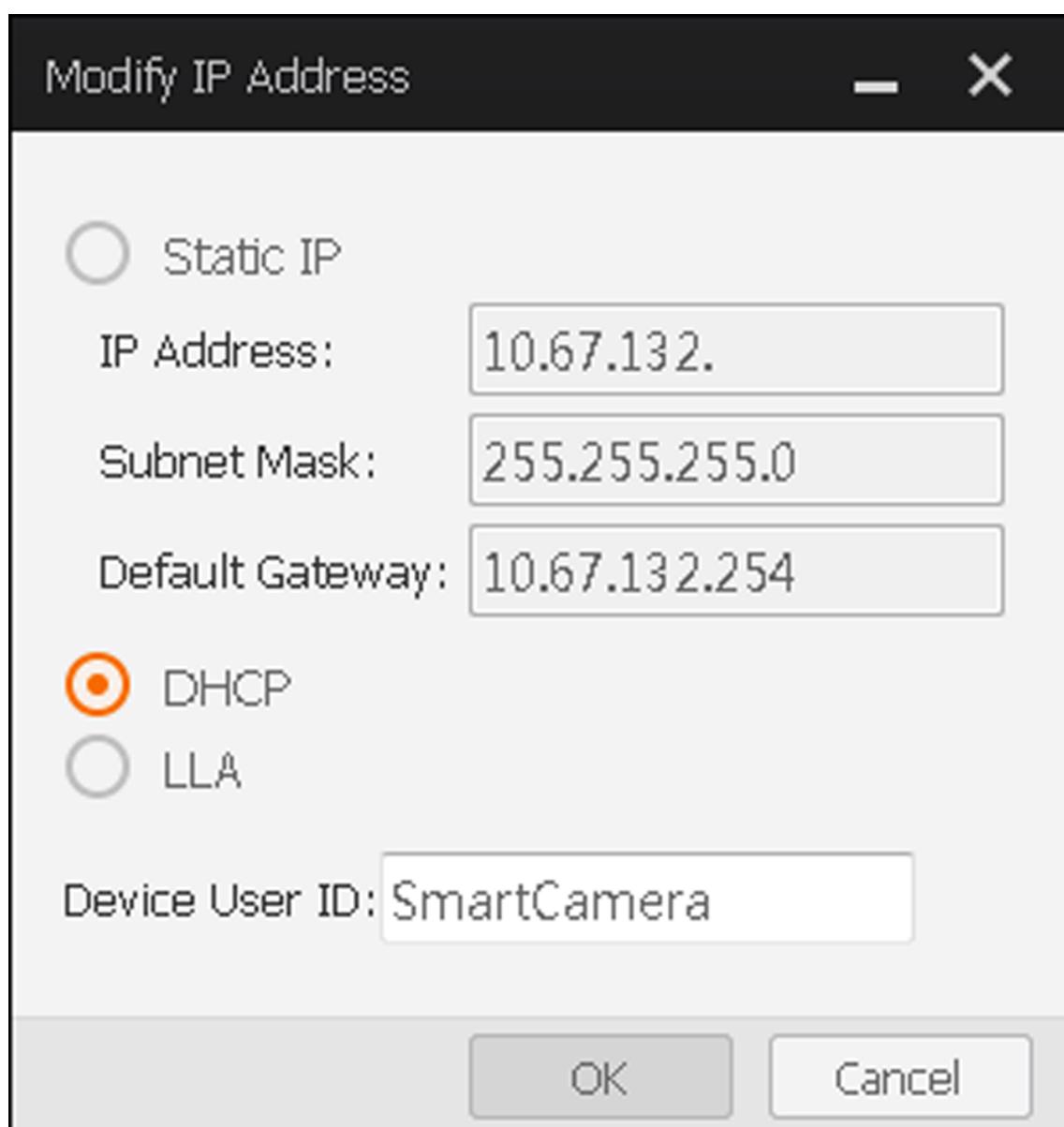


Figure 11-8 Modify IP Address

4. Optional: Edit the camera name in Device User ID field.

5. Click OK to save the settings.

 **Note**

If the modified IP address conflicts with another device's IP address in the same local subnet, a prompt will pop up to remind you that IP conflict occurs. Change the IP address in this situation.

11.2.2 Edit IP Addresses of Multiple Cameras

You can batch modify the IP addresses of multiple cameras under the same interface.

Steps

1. Select a network interface.
 2. Select the cameras to be modified.
-



You can select up to 20 cameras.

3. Click **Modify IP** to open the Batch Modify IP window.



Figure 11-9 Batch Modify IP Addresses

4. Select **Static IP**, **DHCP**, or **LLA** as the IP type.



Note

- For setting the IP type as Static IP, you can set the start IP address, subnet mask, and default gateway.
- For batch modifying static IP, you only need to configure the start IP address. The last decimal of the next IP address will be plus 1, and so forth (example: 192.168.1.1, 192.168.1.2, 192.168.1.3...).

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



If the modified IP address conflicts with another device's IP address in the same local subnet, a prompt will pop up to remind you that IP conflict occurs. Change the IP address in this situation.

11.3 GigE Vision Action Command

The Action Command is used to trigger actions in multiple cameras in a network simultaneously. When Action Command is configured, the Software can send commands across the network and have devices in a predefined group respond based on how they have been configured to respond to certain commands. In this way, a single command can trigger actions such as Frame Start in multiple cameras with a minimum of latency and configuration effort. The Action Command can be used in various scenarios where image fusion is required.

Before You Start

Search for the following three parameters in the feature tree and configure them for each camera that needs to receive commands.



- The camera should support the Action Control feature, or configuring Action Command will be unavailable.
- ActionDeviceKey, ActionGroupKey, and ActionGroupMask are all displayed in hexadecimal notation.

Table 11-2 Parameter Description

Parameter	Description
ActionDeviceKey	A kind of password which enables the camera to check the validity of the commands.
ActionGroupKey	Used to specify a group of cameras to perform actions.
ActionGroupMask	Used to filter out some cameras from the specified group.

Steps

1. Go to Tool → GigE Vision Action Command .

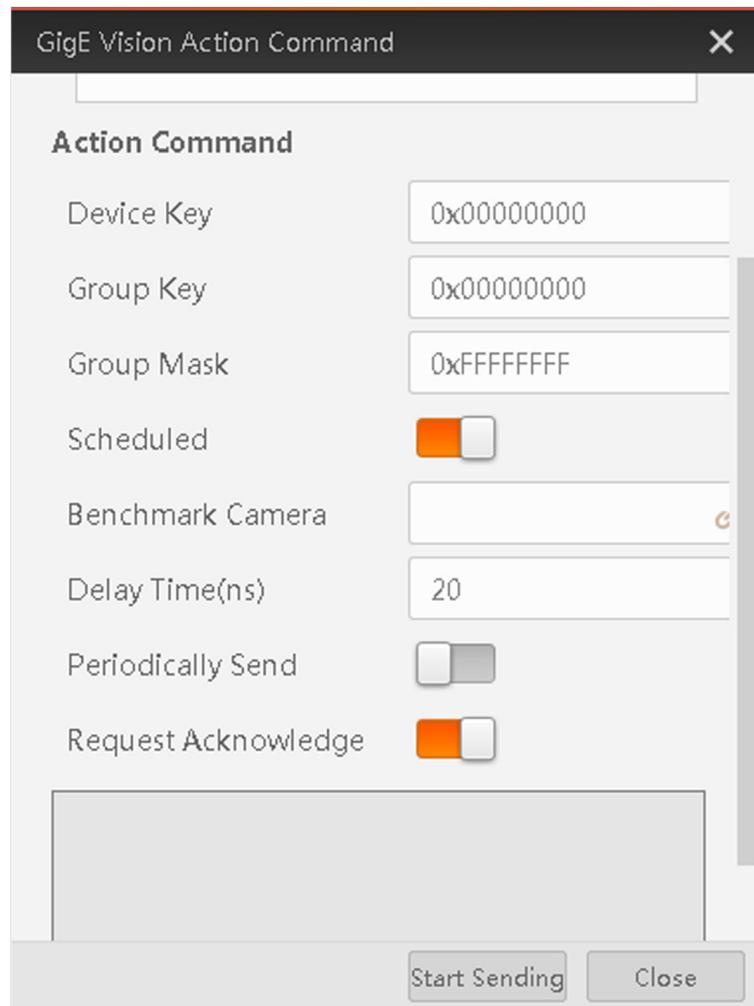


Figure 11-10 GigE Vision Action Command Window

2. Select network interface(s) to set the subnet(s) that the command to be sent to.
3. Enter the device key, group key, and group mask.

Parameter Requirement

Device Key Its value should be the same with the value of the ActionDeviceKey feature.

Group Key Its value should be the same with the ActionGroupKey feature.

Group Mask The bitwise AND operation of the Group Mask against the ActionGroupMask feature should results in non-zero.

4. Optional: Set in Scheduled field to to enable scheduled action command.

Benchmark Camera

The value of the GevTimestampValue feature of the selected camera will be automatically acquired and be used as the start time point for the delay.

Delay Time

The delay time should NOT be shorter than the maximum time required to transmit the command across the network.

When the benchmark camera receives the command, all the cameras will trigger certain actions simultaneously after the specified delay time.

5. Optional: Enable the Software system to send commands periodically.

- 1) Enable Periodically Send.
 - 2) Enter the interval for sending the command.
-



Note

- If you enable Periodically Send, Request Acknowledge will be disabled, or vice versa.
 - The default value is 1000ms, and valid value range is from 1ms to 3600000ms.
-

6. Optional: Enable Request Acknowledge to display the acknowledgment messages.



Note

- If you enable Request Acknowledge, Periodically Send will be disabled, or vice versa.
 - Up to 50 messages can be displayed. Once the message number exceeds 50, the earliest message will be automatically deleted.
-

7. Click Start Sending.

Example

Sample Use Case

To generate slow-motion playback in stadiums for the purpose of viewing and analyzing the athlete's movement details, a group of camera is installed parallel to a race track (see picture below).

When the athlete passes, four cameras (subgroup 1) synchronously execute an action (capture images in this example).

As the athlete advances, the next four cameras (subgroup 2) synchronously capture images. One after the other, the subgroups continue in this way until the athlete has reached the end of the race track. The resulting images can be combined and processed to generate the slow-motion playback in subsequent steps using other technology and programs.

In this sample use case, the followings should be defined.

- Use the **ActionDeviceKey** parameter to authorize the execution of the synchronous image acquisition. The device key should be configured on each camera and it should be same with the device key for the action command protocol message.
- Use the **ActionGroupKey** parameter to define the group of cameras in a network segment that is addressed by the action command (in this use case: group 1).
- Use the **ActionGroupMask** parameter to define the subgroups in the group of cameras that capture images synchronously (in this use case: subgroups 1, 2, and 3).

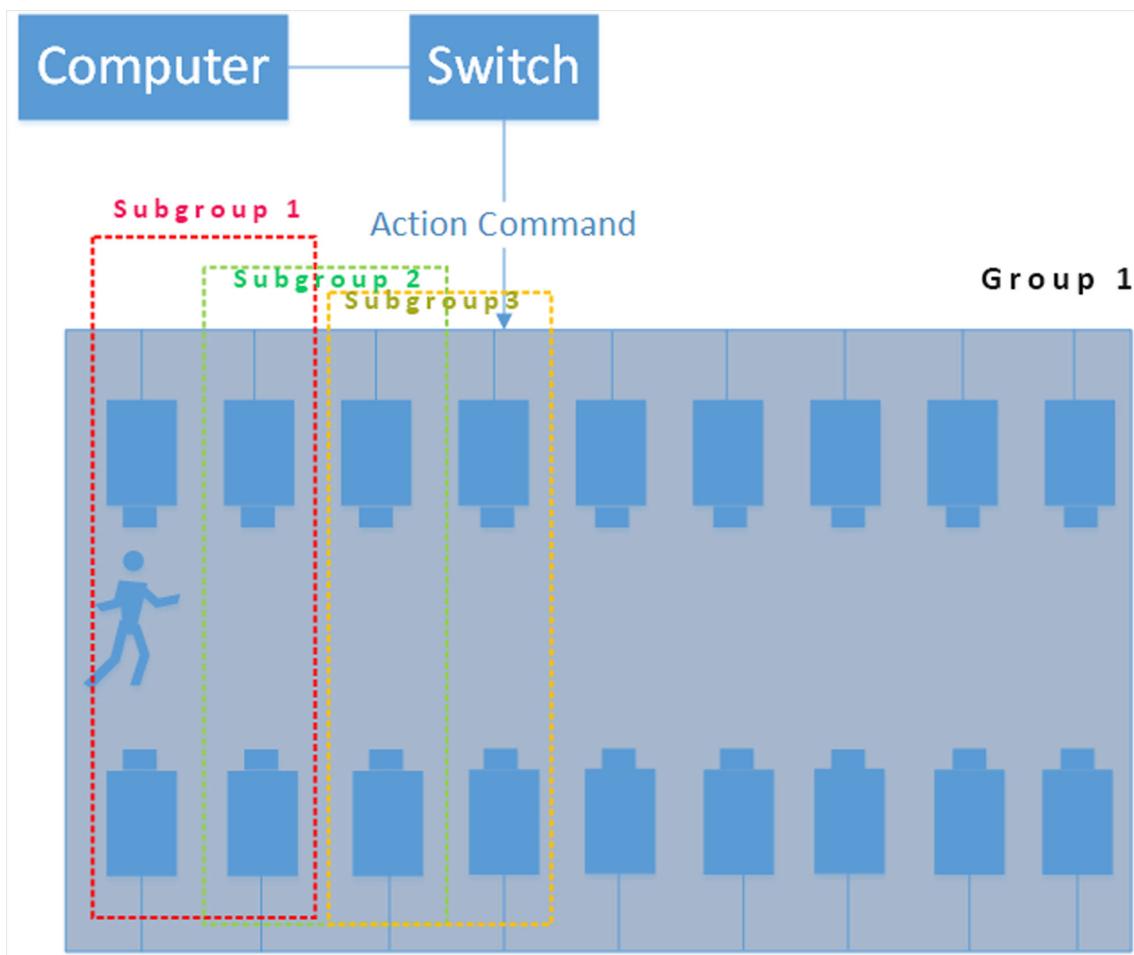


Figure 11-11 Sample Use Case In Stadium

Chapter 12 Logs

You view both logs about progresses and operations on the Client, and the SDK (Software Development Kit) logs.

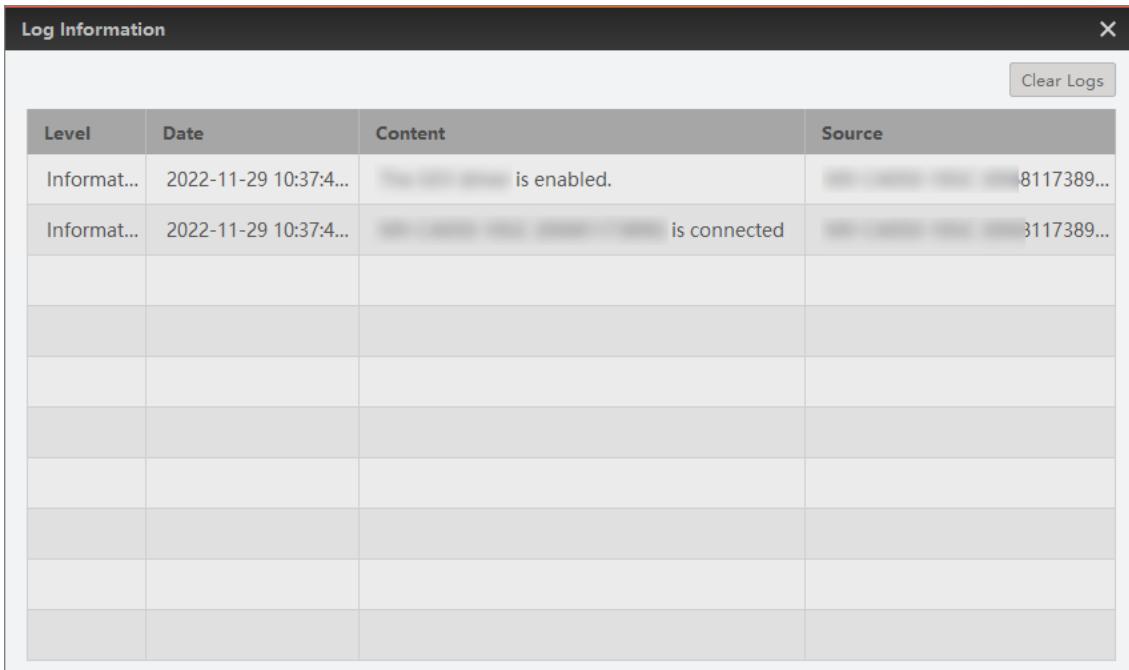
12.1 Software Logs

You can view the logs about operations and progresses on the Software.

Click  to open the Log Information window.

You can view the information such as importance level, date, content, and source.

You can click **Clear Logs** to clear all the displayed logs.



Log Information			
Level	Date	Content	Source
Informat...	2022-11-29 10:37:4...	is enabled.	8117389...
Informat...	2022-11-29 10:37:4...	is connected	3117389...

Figure 12-1 Log Information Window

12.2 Log Viewer Tool

You can view the logs of SDK and frame grabbers via the log viewer tool.

12.2.1 View Logs

Logs store events, processes, and messages from the Software and devices, with which you can monitor the status and effectively locate configuration issues. With the Log Viewer, you can view log type, time, content, and other related information.

Click Tool → Log Viewer in the menu bar to open the Log Viewer window.

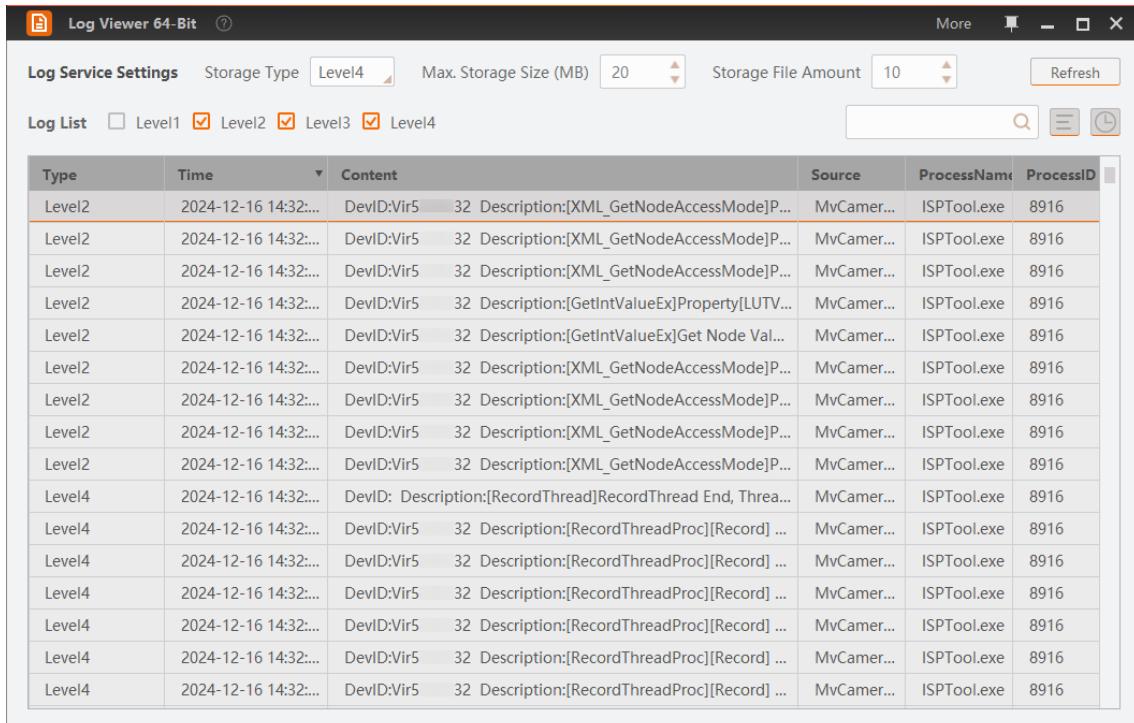


Figure 12-2 Log Viewer

The following table describes SDK log types.

Table 12-1 Type of SDK Logs

Log Type	Description
Level 1	Fatal level. One key functionality is not working.
Level 2	Error level. Errors occurred on the Client.
Level 3	Warning Level. The warning information sent by the Client when precondition error occurs.
Level 4	Info Level. The information about operations.

You can perform the following operations.

Set Log Service Settings

In **Log Service Settings**, you can configure the following:

Storage Type

Select the minimal log level to store in the log file.

The greater the level number, the more logs would be displayed. Suppose the **Storage Type** is set to **Level 3**, all logs equal or under the level 3 would be stored.

From Level 0 to Level 6, the corresponding meanings of each level are: Off, Fatal, Error, Warning, Info, Debug, Trace.

Max. Storage Size (MB)

Set the maximum log file size (by default 10).



It is recommended that you set the size to a value smaller than 100 MB.

Storage File Amount

Set available log file amount.

Refresh and Customize Displayed Logs and Information

Refresh Logs

Click **Refresh** to refresh logs.

Select Display Log Types

In the **Log List**, select displayed log types.

Search Logs

Enter keywords in to search logs.



You can only search the keywords from the log **Content**.

Select Displayed Information

Click to select the to-be-displayed information (time, type, content, source, etc.).

Select Time Range

Click to set the time range of the displayed logs.

Sort Logs by Time in Descending or Ascending Order

Click the **Time** table header to sort the logs by time.

Export, Copy, and Clear Logs

Export All Logs

Right-click the list and click **Export All Logs**.

Export Selected Logs

Press and hold **Shift** or **Ctrl**, select multiple logs, right-click the log list, and click **Export Selected Logs**.

Copy All Logs

Right-click the log list and then click **Copy All Logs**.

Copy Selected Logs

Press and hold **Shift** or **Ctrl**, select multiple logs, right-click the log list, and click **Copy Selected Logs**.

Clear All Logs

Right-click the log list and then click **Clear Logs**

Other

More

See [**Configure Logs**](#) for details.

You can also customize log storage type for each driver type.

Always on Top

Click  to pin the log viewer window above all other windows. Click  to unpin.

12.2.2 Configure Logs

Configure log view settings and driver log service settings.

Click **More → Settings** to configure displayed logs amount and automatic log refresh interval.

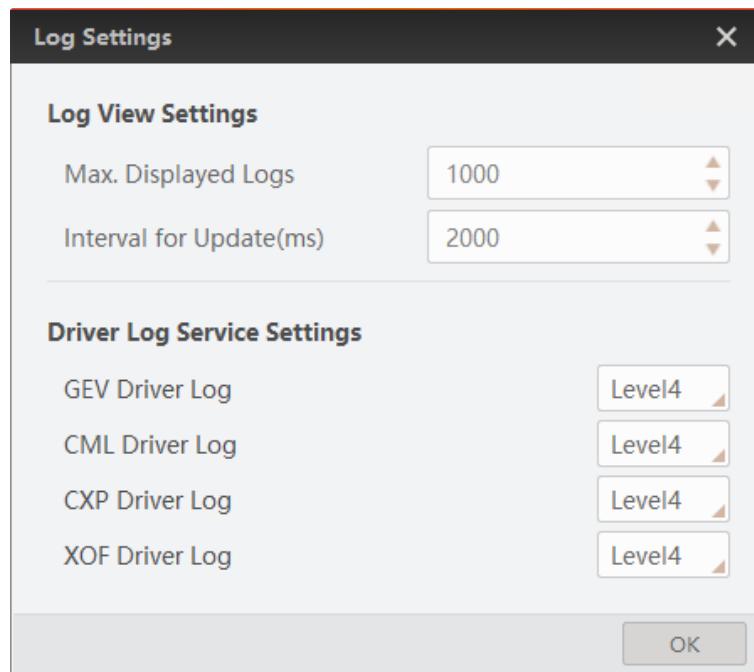


Figure 12-3 More Log Settings

Log View Settings

Max. Displayed Logs

Set the maximum number of displayed logs.



The range of maximum displayed logs is from 1 to 100,000 (default value: 1000).

Interval for Update

Set the time interval (unit: ms) for upgrading the log list.



The range of the time interval is from 100 to 1000,000 (default value: 1000).

Driver Log Service Settings

Select the minimal log level to note for each type of drivers.

The greater the level number, the more logs would be displayed. Suppose the log level is set to **Level 3**, all logs equal or under the level 3 would be displayed in the **Log Viewer**.

From Level 0 to Level 6, the corresponding meanings of each level are: Off, Fatal, Error, Warning, Info, Debug, Trace.

Chapter 13 Error Code List

The error codes of the Software and machine vision camera SDK are as the following.

Software Error Code	Machine Vision Camera SDK Error Code	Description
Normal Code Description		
0x00000000	0x00000000	Succeeded. No error.
General error codes.		
0x90006100	0x80000000	Incorrect or invalid handle.
0x90006101	0x80000001	The function is not supported.
0x90006102	0x80000002	No more cache can be stored.
0x90006103	0x80000003	Function calling order error.
0x90006104	0x80000004	Incorrect parameter.
0x90006105	0x80000006	Applying for resource failed.
0x90006106	0x80000007	No data.
0x90006107	0x80000008	Not prepared, or the running environment has changed.
0x90006108	0x80000009	Versions mismatch.
0x90006109	0x8000000A	No enough storage.
0x9000610A	0x8000000B	Abnormal image. Package missing may cause the abnormality.
0x9000610B	0x8000000C	Importing DLL dynamically failed.
0x9000610C	0x8000000D	No cache can be output.
0x9000610D	0x8000000E	Incorrect file path.
0x900061FF	0x800000FF	Unknown error.
Error codes of Genl cameras.		
0x90006200	0x80000100	General error.
0x90006201	0x80000101	Invalid parameters.
0x90006202	0x80000102	The value exceeds the range.
0x90006203	0x80000103	Incorrect node property.

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Software Error Code	Machine Vision Camera SDK Error Code	Description
0x90006204	0x80000104	Running environment error.
0x90006205	0x80000105	Logic error.
0x90006206	0x80000106	Incorrect accessing condition of node.
0x90006207	0x80000107	Timeout.
0x90006208	0x80000108	Conversion exception.
0x900062FF	0x800001FF	Unknown error of GenICam.
Error codes of GigE_STATUS.		
0x90006300	0x80000200	Command not supported by device.
0x90006301	0x80000201	The address to be accessed does not exist.
0x90006302	0x80000202	No data can be written.
0x90006303	0x80000203	No right to access device.
0x90006304	0x80000204	Device is busy, or disconnected from the Software.
0x90006305	0x80000205	Network Package data error.
0x90006306	0x80000206	Network error.
0x90006307	0x80000221	Duplicated device IP.
Error codes of USB_STATUS.		
0x90006400	0x80000300	Reading USB error.
0x90006401	0x80000301	Error occurred when writing the USB.
0x90006402	0x80000302	Device exception.
0x90006403	0x80000303	GenICam error.
0x90006404	0x80000304	Insufficient bandwidth.
0x90006405	0x80000305	Drivers mismatch or no driver.
0x900064FF	0x800003FF	Unknown USB error.
Error codes of upgrade.		
0x90006500	0x80000400	Firmware versions mismatch.
0x90006501	0x80000401	Firmware languages mismatch.

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Software Error Code	Machine Vision Camera SDK Error Code	Description
0x90006502	0x80000402	Device upgrade conflict. (The device is already being upgraded.)
0x90006503	0x80000403	Internal error occurred in the camera during upgrade.
0x900065FF	0x800004FF	Unknown error during upgrade.

Chapter 14 FAQ

You can refer to the following information if you encounter the problems described in the following Frequently Asked Questions (FAQ).

Before checking the details of the FAQ, please check the running environment if the software cannot detect the camera, or the camera live view fails. You should make sure:

- The Client is running on a PC or industrial PC with gigabit network interface card.
- The network between the camera and the PC or industrial personal computer is gigabit network.
- The jumbo frame of the PC's network adapter is enabled. If not, please enable the Jumbo Frame function of the network adapter.
- The USB interface of the PC running the client software should be USB3 interface.
- The USB cable which connects the PC and the USB3 Vision camera should meet the USB3 specifications.

If the solutions provided in the FAQ cannot solve your problem, please contact us for support. See [Get Support](#) for details.

14.1 No GigE Vision camera is enumerated after running the Software.

Question

What can I do if no GigE Vision camera is enumerated after running the Software?

Possible Cause

The camera is not properly started or the network cable not properly connected.

Solution

Check the power supply of the camera (by checking PWR indicator) and network connection (by checking Link light in LAN interface).

14.2 No USB3 Vision camera is enumerated after running the Software.

Question

What should I do if no USB3 Vision camera is enumerated after running the Software?

Possible Cause

The camera is not properly started or USB line wiring exception.

Solution

Check if the LED indicator of the camera is in normal status.

14.3 The Software enumerates a GigE Vision camera, but fails to connect it.

Question

What should I do if the Software enumerates a GigE Vision camera, but fails to connect it?

Possible Causes

- Cause 1: The camera is not on the same LAN with the Software.
- Cause 2: The camera has been connected to other programs.

Solutions

- For Cause 1: Edit the camera IP address.
- For Cause 2: Disconnect the camera from other programs, and then connect it to the Software.

14.4 The Software enumerates a USB3 Vision camera, but fails to connect it.

Question

What should I do if the Software enumerates a USB3 Vision camera, but fails to connect it?

Possible Causes

- Cause 1: USB3 driver exception.
- Cause 2: The USB3 Vision camera has been connected to another program.

Solution

- For Cause 1: Re-plug the USB3 Vision camera, or reinstall the USB3 driver.
- For Cause 2: Disconnect the camera from other programs and then connect it to the Software.

14.5 Live view shows black image.

Question

What should I do if live view shows black image?

Possible Causes

- Cause 1: Iris of the camera lens is closed.
- Cause 2: Camera exception.

Solutions

- For Cause 1, open the aperture of the lens.
- For Cause 2, power off and reboot the camera.

14.6 Acquisition works fine. But when the trigger signals are provided by external device, no image is triggered.

Question

What should I do if no image is triggered (although acquisition works fine) when the trigger signals are provided by external device?

Possible Causes

- Cause 1: Certain trigger mode is not activated, or the trigger source is incorrectly selected.
- Cause 2: External device wiring error.

Solutions

For Cause 1, check if the camera trigger mode of the current application scenario and the related line input is normal.

For Cause 2, make sure that the wiring of the external device is normal.

Chapter 15 Legal Information

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About this Manual

The Manual includes instructions for using and managing the Product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version of this Manual at the Hikrobot website (<https://en.hikrobotics.com>).

Please use this Manual with the guidance and assistance of professionals trained in supporting the Product.

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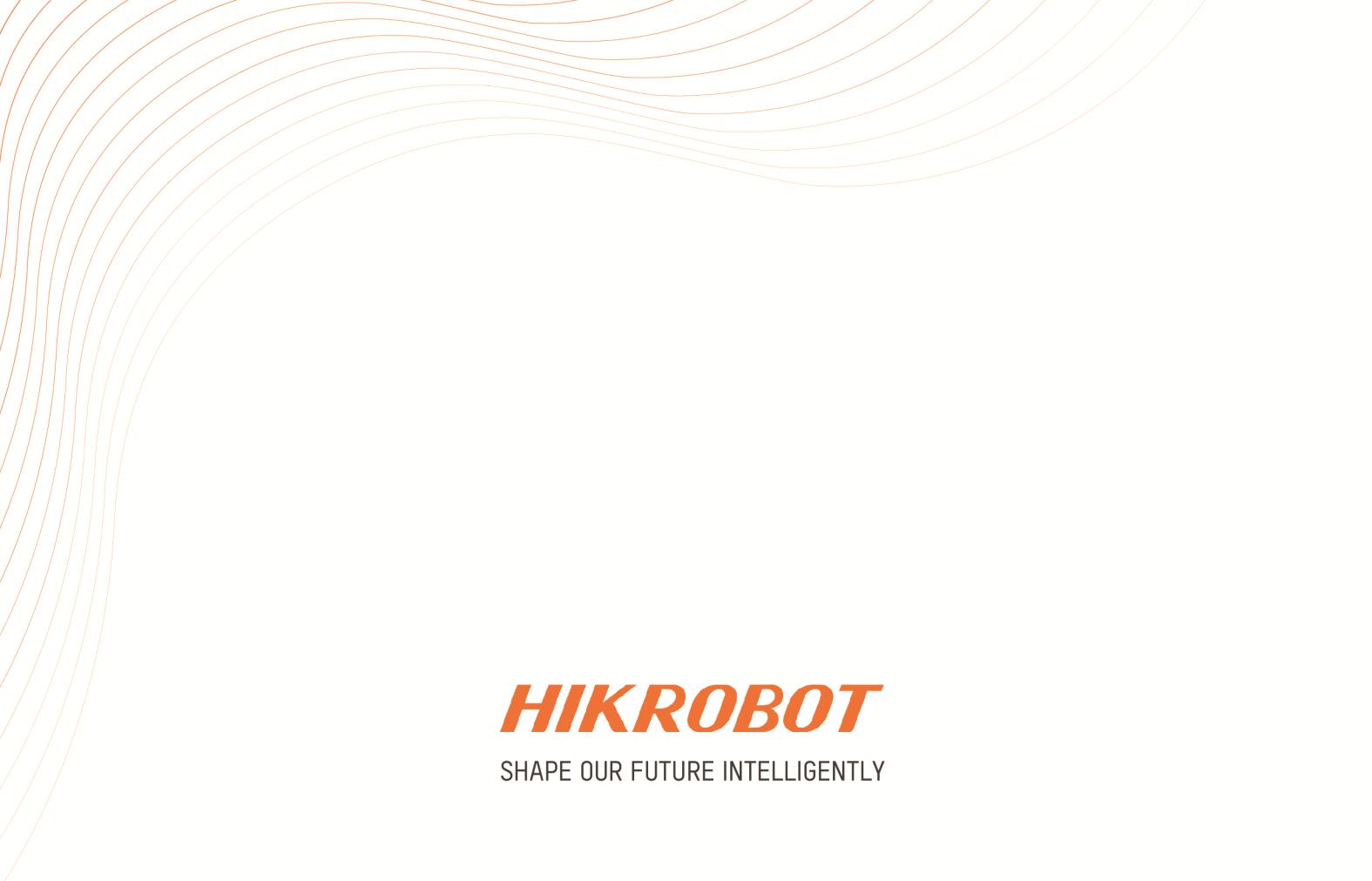
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