Software Manual

Baumer Camera Explorer

Digital Cameras Industry

EN-US

List of Contents

1   About this document

1.1   General Information

The Baumer *Camera Explorer* is the perfect evaluation and configuration tool for GenICam cameras with GigE, Dual-GigE and USB interfaces and allows you to get to know the extensive functionality of our innovative cameras.

The tool provides you with an easy to use graphical user interface to test your specific camera features and allows different camera models to be used simultaneously.

1.2   Warnings in this manual

Warnings draw attention to potential personal injury or material damage. The warnings in this manual indicate different hazard levels:

Symbol	Warning term	Explanation
	DANGER	Indicates an imminent potential danger with high risk of death or serious personal injury if not being avoided.
	WARNING	Indicates potential danger with medium risk of death or (serious) personal injury if not being avoided.
	CAUTION	Indicates a danger with low risk, which could lead to light or medium injury if not avoided.
	NOTE	Indicates a warning of material damage.
	INFO	Indicates practical information and tips that enable optimal use of the devices.

1.3   Liability limitation

All information and notes in this manual have been compiled in accordance with the applicable standards and regulations, the state of the art, and our many years of knowledge and experience.

The manufacturer accepts no liability for damage due to the following reasons:

- Non-observance of the manual
- Improper use
- Use of unqualified personnel
- Unauthorized conversions

The obligations agreed in the delivery contract, the general terms and conditions and the delivery conditions of the manufacturer and its suppliers, as well as the legal regulations valid at the time of conclusion of the contract apply.

1.4   Copyright

Any duplication or reprinting of this documentation, in whole or in part, and the reproduction of the illustrations even in modified form is permitted only with the written approval of Baumer. The information in this document is subject to change without notice.

2   Support

In case of any questions please contact our Technical & Application Support Center.

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3   System Requirements

The Baumer Camera Explorer can run on any current x86, x86_64, ARMhf and aarch64 plat-form. It is available for Windows® 7, Windows® 10 and Linux®.

To run the Camera Explorer on Linux please make sure that at least libstdc++.so.6.0.21 is avail-able on the system, because it is build with gcc v5.5.0.

If you plan to work with multiple cameras or very high frame-rates simultaneously the required performance will rise. We recommend an Intel® Core i7 or similar performance class system.

Download latest software for your system: www.baumer.com/camera-explorer

4   Installation

4.1   Windows

There are separate downloads available depending on your installed Operating System.

Please use the download named x86_64 for 64-bit versions of Windows® and the download marked with x86 for 32-bit versions of Windows®

4.1.1   Installation using the Installer

The msi-installer provides an simple way to install the Baumer *Camera Explorer*.

INFO

Please be aware that you will need Windows® administrator privileges to use the installer.

INFO

All C++ application require the *Microsoft Universal CRT* package to be installed on your system. If your Windows® system is not updated as recommended by Microsoft you might not be able to start the Baumer *Camera Explorer*. A error message will appear.

For your convenience, we provide the *Windows® Universal CRT* package with the installer.

Interactive Installation

1.   Start the msi-file for your system.
(e.g. *Baumer_Camera_Explorer_x.x.x_win_x86_64.msi)*

→ Baumer *Camera Explorer* Setup appears.

INFO: Start the Setup with the command-line parameter "-h" to get an overview about the options.

2.   Follow the installation process and select the components to install.

INFO: The *Filter Driver* helps to reduce system load when using GigE cameras and can be installed optionally.

4.1.2   Installation using the zip-file

We also provide the Baumer Camera Explorer as a zip-file to download. This download can just be copied to a location of your choice and unpacked. It will run from this location, even from a USB-Stick. Other than the Baumer Camera Explorer you will also find additional files in the unpacked folder.

- Baumer USB-driver (required for all Baumer USB cameras) see the folder `\drivers\USB\` (administrator privileges are required to install the driver).
- Baumer Filter Driver (optional for all Baumer GigE cameras, better performance with multi-camera and 10GigE) see the folder `\drivers\GigE\` (administrator privileges are required to install the driver).
- Windows® Universal CRT (only required if your Windows® system is not updated regularly) see the file `\ucrtredist_x64.zip` (unpack the content of the file directly into the folder where you unpacked the Baumer Camera Explorer).

4.2   Linux

4.2.1   Installation using the package manager

The Baumer *Camera Explorer* is provided as a deb-file for download. This download can be in-
stalled using the Debian package manager. While installing the package a new rule will be
added to the USB-system required to work with USB cameras. No special drivers are required
for GigE cameras.

Install the downloaded packet

```
apt-get install xxx.deb
```

4.2.2   Installation using the tar.gz-file

We also provide the Baumer Camera Explorer as a tar.gz-file to download. This download can
just be copied to a location of your choice and unpacked. It will run from this location, even from
a USB-Stick.

Inside the package you will find a USB-rules file this needs to be installed into the right location
if USB cameras will be used.

Only for USB-Cameras, the provided udev file needs to be copied into the udev rules folder
(e.g. `/etc/udev/rules.d/`)

5   Program Start

Windows (if installed via Installer)

Open the Baumer *Camera Explorer* via *Start → All Programs → Camera Explorer*

Linux (if installed via the Packet Manager)

Open the Baumer Camera Explorer via *Show Applications → Input in search field "Camera Explorer" → Camera Explorer*

INFO

There are several command-line parameters. To get an overview, start with -h (`bexplorer.exe -h`).

If zip-file was used, you have to start the *Camera Explorer* in the respective unpacking folder.

6   Connect a camera

Please refer to the technical documentation of your camera for connecting a camera to your system.

NOTICE
Observe the safety instructions in the respective technical documentation of the camera.

7   Start Screen

The *Camera Explorer* can have the following start conditions:

- if no camera is connected, the last snapshot is displayed

- if one camera is connected, a live image is displayed immediately

- if several cameras were connected during the last session, they will be displayed with their availability marked / If the option *Open camera view automatically* in the Camera settings Dialog(⚙ - on camera) is activated, the respective camera(s) view will open automatically

- On the Start Screen, you will find a user interface that is separated into several areas, which are described in greater detail within the following paragraphs.
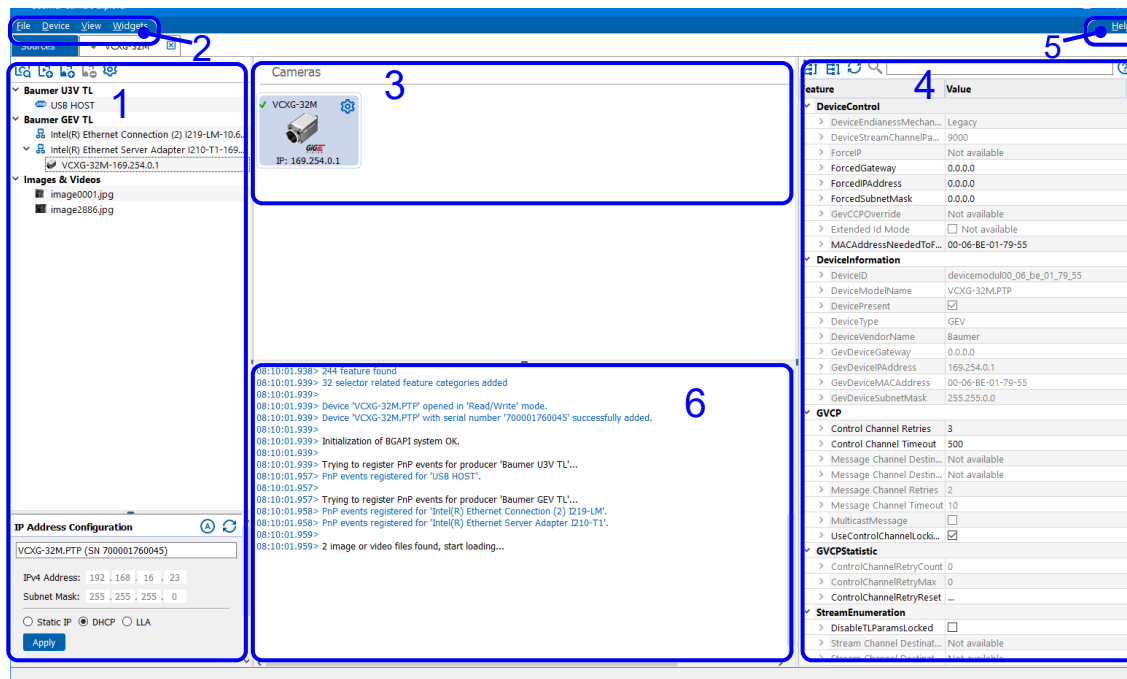
1	Source Tree	2	Main Menu
3	Cameras / Images	4	Features and Properties
5	Help	6	Log View

7.1   Source Tree

In this area, all existing sources, cameras and images are displayed in a tree list.

The cameras are displayed in a tree structure starting with the GenTL producer followed by the available hardware adapter(s) and the connected camera(s).

You can open the selected camera or image by double clicking. This area can be expanded and collapsed by pushing and pulling the little blue marker. After selecting a camera from the list by double clicking, a new camera tab with the *Camera View* will be opened.
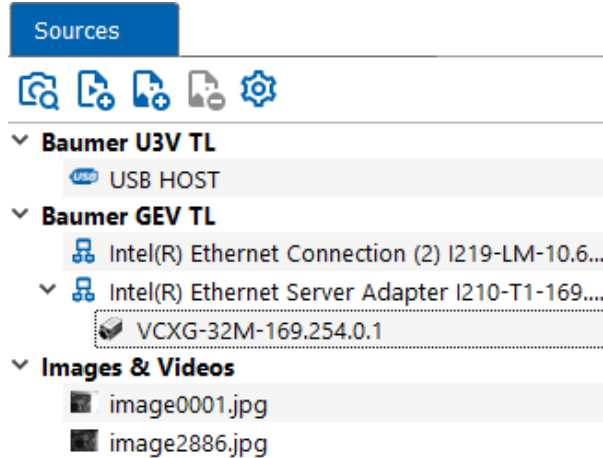
This area shows the following icons with functions as described below:

Icon	Description
	Start search for available cameras or update list. All available cameras recognized are listened under the respective interface.
	Load video (*.brv) from a folder.
	Load image(s) from a folder.
	Remove image. Selected images are removed only from the GUI and remain in their storage location.
	Open program settings dialog.
	Expanded and collapsed the area. At a certain point, the area closes completely.

7.1.1   **IP Address Configuration**

The *IP Address Configuration* is used to configure the network settings of GigE cameras.

> 💡 **INFO**
> Enable function: *File → IP Address Configuration*

> 💡 **INFO**
> On Linux®, root rights are required for configuration. When you start *Camera Explorer*, the list of cameras is empty. The list must be refreshed initially with Refresh button.
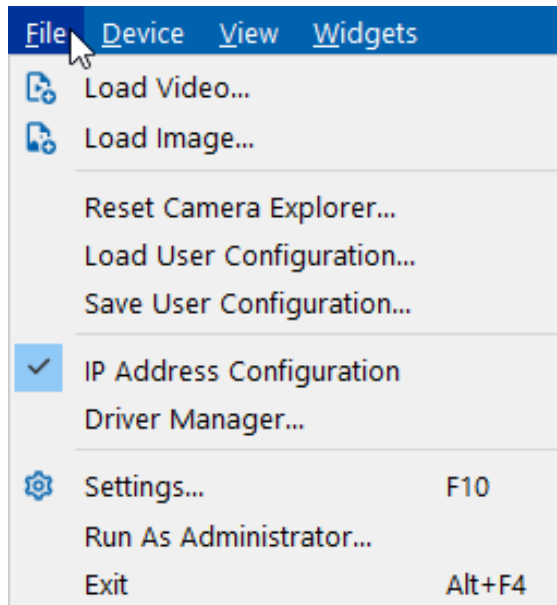

This area shows the following functions as described below:

Function	Description
Ⓐ	Add static ARP entry to avoid packet loss.
	This setting results in a static entry in the ARP table of the operating system to avoid packet loss when sending data to the camera.
	INFO: Function is available for Windows only. Administrator rights are required.
↻	Refresh the settings of the selected camera.
IPv4 Address	Manually set an IP address for the selected camera.
Subnet Mask	Manual setting of the subnet mask.
Static IP	The static IP mechanism sets a specific IP Address and Subnetmask to the camera. Please specify the IP settings manually.
	These settings are sent without verification and are immediately adopted. They remain valid until an other IP configuration mode is selected.
DHCP	Enable DHCP (*Dynamic Host Configuration Protocol*) mode of device. The DHCP automates the assignment of network parameters such as IP addresses, subnet masks and gateways. Use this option, if a DHCP server is available in your network.
LLA	Get IP address with LLA (*Link-Local-Address*) configuration.
	The IP address is determined by the camera using a pseudo-random number generator from `169.254.0.1` to `169.254.254.`.
Apply	Set selected IP address configuration mode.

7.2 Main Menu

Several program options can be adjusted here.
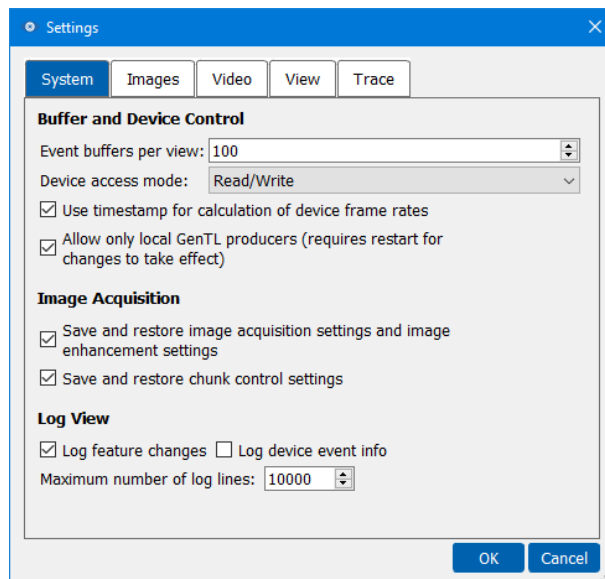
7.2.1 File

Function	Description
Load Video...	Load and show a video file.
Load Image...	Load images from folder.
Reset Camera Explorer...	Reset the *Camera Explorer* to default. **INFO: All changes to the user interface and customized settings will be lost.**
Load User Configuration...	Load a previously saved user configuration. The user configuration contains all settings of the *Camera Explorer*. The current layout is also saved.
Save User Configuration...	Save user configuration. The user configuration contains all settings of the *Camera Explorer*. The current layout is also saved.
IP Address Configuration	Show or hide the IP address configuration *Widget*. **INFO: The function is only visible in the *Source View*.**
Driver Manager…	Start the *Baumer Driver Manager*. This is a tool to install the Baumer filter driver. **INFO: Administrator rights are required to start the tool.**
Settings... [F10]	With this function or [F10] you open the dialog window for program configurations. Several program options can be adjusted here.
Run As Administrator…	Restarts the *Camera Explorer* with administrator rights.
Exit [Alt + F4]	Close the *Camera Explorer*.

7.2.1.1   **Settings**
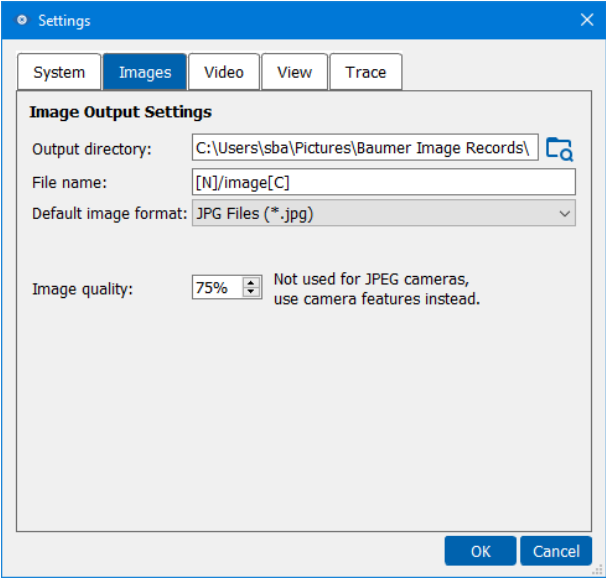
All global settings of the *Camera Explorer* are adjusted here.

System

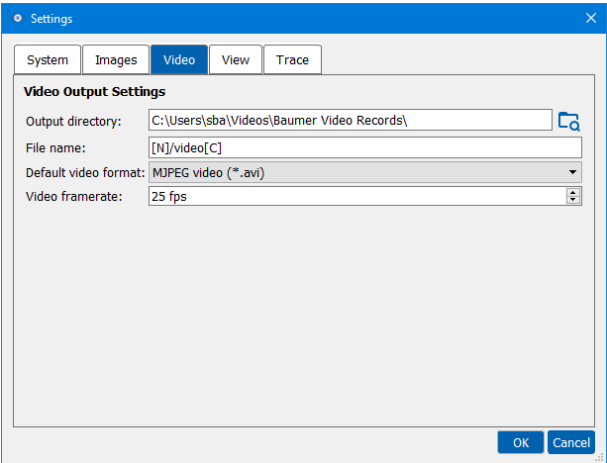| Function	Description
Buffer and Device Control	
Event buffers per view	Set the number of event buffer.
	INFO: Advanced Option, change only when specifically required!
Device access mode	Set the access mode used to connected cameras.
	Read/Write: full access
	Read Only: access to read the features only
	Exclusive: camera locked for other applications
Use timestamp for calculation of device frame rates	Uses the image time stamps provided by the camera to calculate the frame rate. This is more accurate than timing via the PC.
	Whether this feature is supported depends on the connected camera.
Allow only local GenTL producers (requires restart for changes to take effect)	Enable this option to allow the *Camera Explorer* to use only local GenTL producers found on the system.
	Disable this option to allow the *Camera Explorer* to use local GenTL producers and other not local GenTL producers (3rd party) found on the system.
	The not local GenTL producers are accessible via the environment variable `GENICAM_GENTL_{64|32}_PATH`. This is normally set during installation.
Image Acquisition	
Save and restore image acquisition settings and image enhancement settings	If this option is activated, the *Camera Explorer* will save and restore the camera related feature settings of the dock *Widgets* for all connected camera devices.

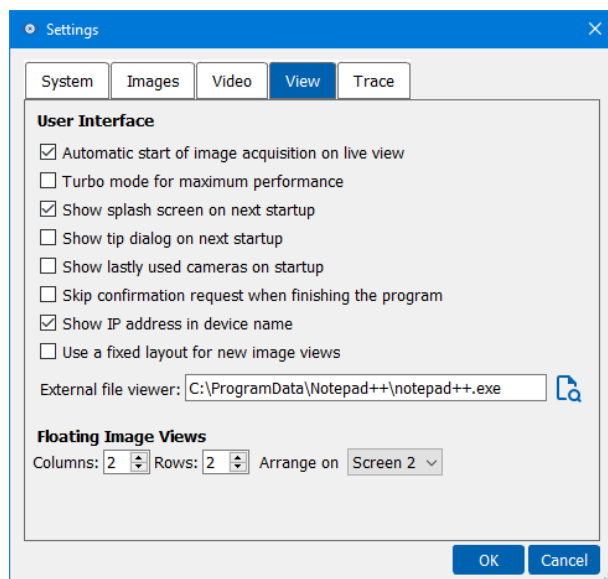| Function	Description
Save and restore chunk control settings	If this option is activated, the *Camera Explorer* will save the Chunk Control Settings of the camera.
	Activating this option may lead to issues if the camera is used with some 3rd Party Software products.
Log view	
Log feature changes	Write a log message for each feature modification.
Log device event info	When you activate this feature, all events activated by the respective camera as part of the Event Control feature are logged.
Maximum number of log lines:	Here, you can set the maximum number of log lines. If the maximum is reached, the older log lines will be deleted.
	0 = unlimited log lines

Images

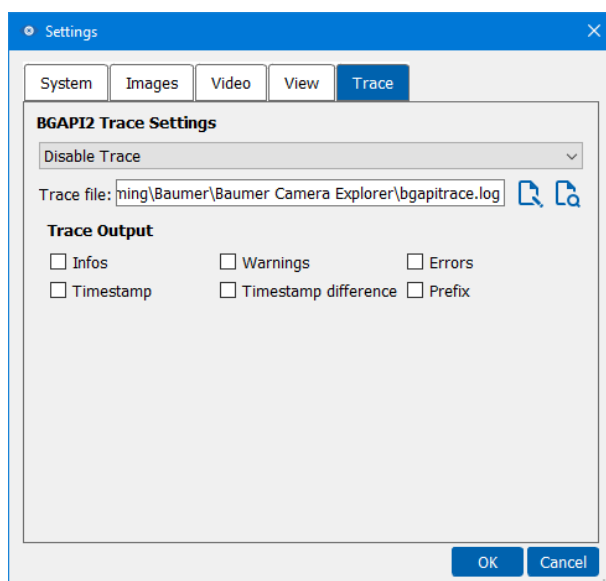| Function	Description
Image Output Settings	
Output directory	Change the directory where image files are stored.
File name	File name template for saving of image files.
	Additional subdirectories can be added by using of "/" or "\". Entering an empty string will restore the default template. Invalid characters will be replaced by "_".
	Possible placeholders
	[C] – image counter of the current device
	[N] – name of the current device
	[U] – user device name of the current device
	[Y][M][D] – Year, Month, Day
	[h][m][s][z] – Hour, Minute, Second, Millisecond
Default image format	Select image format for all image saving functions.
Image quality	Set the image quality from 1 to 100 %.
	INFO: Do not use for JPEG cameras. Use camera features instead.

Video

Function	Description
Video Output Settings	
Output directory	Set the directory for saving of video files.
File name	File name template for saving of video files
	Additional subdirectories can be added by using of "/" or "\". Entering an empty string will restore the default template. Invalid characters will be replaced by "_".
	Possible placeholders
	[C] – image counter of the current device
	[N] – name of the current device
	[U] – user name of the current device
	[Y][M][D] – Year, Month, Day
	[h][m][s][z] – Hour, Minute, Second, Millisecond
Default video format	Select video format for all video saving functions.
Split Size	Select a suitable split size for the video output file.
	INFO: Splitting is only working if the camera has JPEG output.

View

Function	Description
User Interface	
Automatic start of image acquisition on live view	Enable automatic start of image acquisition on program start.
Turbo mode for maximum performance	Maximum performance in receiving and processing image data. **INFO: This mode can cause a high processor load.**
Show splash screen on next startup	Select when to start the software and whether the splash screen is enabled. If you turn off the view of the splash screen, you will see the initialization in the System Status window instead.
Show tip dialog on next startup	If you activate this, the *Tip of the day...* is shown on the next startup [Shift]+[F1].
Skip confirmation request when finishing the program	Disable the query when closing the *Camera Explorer*.
Show IP address in device name	Shows the IP address of the camera at the end of the name.
Use a fixed layout for new image views	If activated the internal standard layout or a user defined layout will be set for new image views. A user defined layout can be created via menu *View → Save Layout*.
External file viewer	Set a viewer for the camera's XML file or the trace file.
Floating Image Views	
Columns	Set the number of columns for arranging the floating image views.
Rows	Try to use this number of rows for arranging the floating image views.
Arrange on	Select the destination screen for arranging the image views.

Trace

The Trace function allows you to monitor program execution. The following options are available.

Function	Description
BGAPI2 Trace Settings	
Disable Trace	No trace storing.
Trace to Debugger	Trace will be transferred to external debugger.
Trace to File	Trace is stored in the specified file.
	Show the trace file with the currently selected file viewer.
	Select the trace file.
Trace Output	
Infos	Logging of general information.
	This selection creates a high volume of data. Activate only when necessary.
Warnings	Logging of warnings.
Errors	Logging of errors.
Timestamp	Logs the timestamp of every event.
Timestamp difference	Logs the interval from the last traced event to the current one.
Prefix	Shows the source (.dll) of the log entry.

7.2.2   Device

File   Device   View   Widgets
         User Sets   ▶
         Image Storage   ▶

NOTICE

Functionality is available only in *Camera View*.

Function	Description
User Sets	Reset...: Reset all camera settings to the default user set.
	Load...: Load a a previously saved user set from the PC.
	Save...: Saves the current camera settings to a user set on the PC.
Image Storage	Save to camera...: Save current image permanently to camera.
	Load from camera...: Show permanently stored image from camera.

7.2.3   **View**
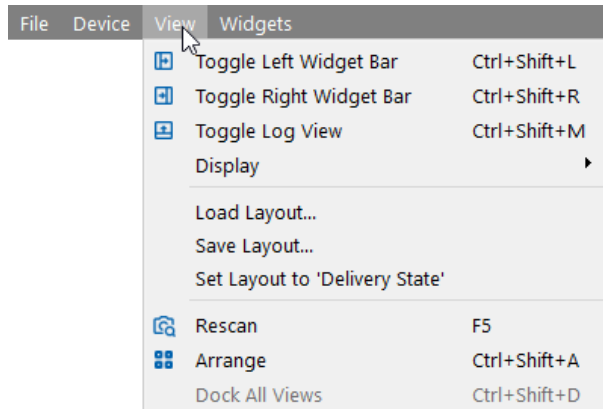
Function	Description
Toggle Left Widget Bar [Ctrl]+[Shift]+[L]	Open / Closes the left Widget Bar.
Toggle Right Widget Bar [Ctrl] + [Shift] + [R]	Open / Closes the right Widget Bar.
Toggle Log View [Ctrl] + [Shift] + [M]	Open / Closes the Message View.
Display	Rotate 90 ° Clockwise
	Rotate 90 ° Counter Clockwise
	Flip Horizontal
	Flip Vertical
Load Layout...	Load a previously saved layout from a file.
Save Layout…	Saves the current layout to a file.
Set Layout to 'Delivery State'	Reset the layout to the delivery default.
Rescan [F5]	Search / Update for available cameras. The available cameras are listened under the respective interface.
Arrange [Ctrl+Shift+A]	Open all cameras and tabs (images) in separate windows.
	This button is only available if the Open camera view automatically function is activated for at least one camera, or if tabs are opened.
	Settings for Arrange windows: Program settings → View / Floating Image Views
Dock All Views	Docks all cameras and tabs (images) in the Camera Explorer. This feature is only available if the Arrange function was used previously.

7.2.4   **Widgets**

The Baumer *Camera Explorer* has a flexible, customizable user interface. The user can decide which of the functional modules (*Widgets*) should be displayed. *Widgets* are arranged via a simple drag and drop into the left and right panes. *Widgets* can be closed (hidden from the interface) and reopened if required again via the menu.

INFO

The available *Widgets* differ depending on the view (*Camera View* / *Image View*) and the features of the connected camera.

Widgets - Camera View (example)	Widgets - Image View
File Device View **Widgets**	File Device View **Widgets**
✓ Histogram & Profile	✓ Histogram & Profile
✓ Temperature	✓ Crosshairs
✓ Recorder	✓ View Settings
✓ Camera Features	
✓ Crosshairs	
✓ View Settings	
✓ Image Format	
✓ Brightness	
✓ Image Acquisition Info	
✓ Serial Interface	

Function	Description
Histogram & Profile	The histogram and profile diagrams is an essential tool for everybody working with images.
Temperature (*Camera view* only)	This *Widget* offers you the possibility to comfortably monitor the temperature of the camera.
Recorder (*Camera view* only)	This *Widget* allows to record image-series and videos.
Camera Features (*Camera View* only)	With this *Widget* you can view and change camera features and can be used to configure and store the camera features as required by your application.
Crosshairs	Show the options for a crosshairs in the image.
View Settings	*Widget* for view settings like rotate, image format and rendering options.
Image Format (*Camera View* only)	Change the cameras pixel format and region of interest easily.
Brightness (*Camera View* only)	Here is the central point to configure all related settings of your camera. Use it to understand how different settings relate to each other and influence the image quality.
White Balance & Color (*Camera view* only)	The white balance and color settings combines all settings which influence the color accuracy of your camera.
Image Acquisition Info (*Camera View* only)	On the widget, you can access additional information about the image and data transfer.

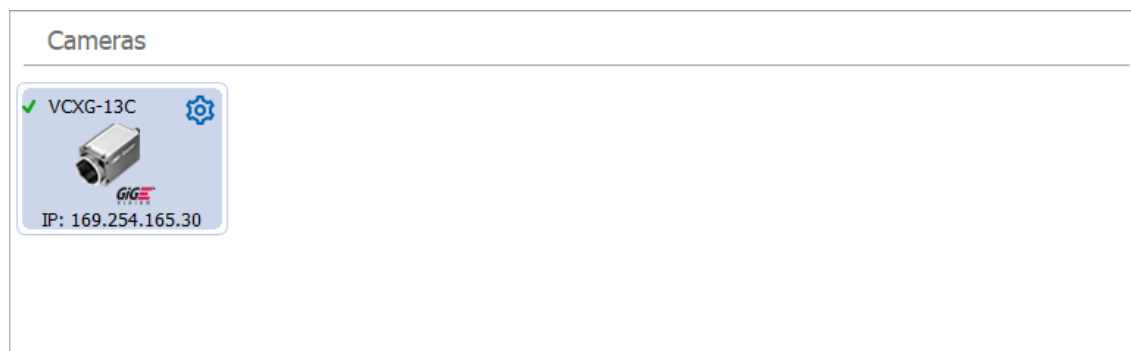| Function	Description
Serial Interface (*Camera View* only)	With this widget it is possible to control a device (e.g. lens, lighting) connected to UART1 port or UART0 port (depending on camera model) of the camera from the PC using separate software.
Data Stream Features (*Camera View* only)	Containing the features to control the stream channel shared between the remote device and the GenTL Producers data stream module of GigE cameras.

7.3 Cameras / Images

The recognized cameras or open images are displayed here.

Cameras

In this area, the connected cameras are displayed with their model name, a status icon and the serial number. Start the *Camera View* by double clicking on the icon.

Meanings of the status icons shown as part of the camera icon.

Icon	Description
	Full access to the camera is available.
	Camera accessibility is limited. Features are shown but cannot be changed.
	Camera is not accessible.
	Device disabled. Other programs can use the camera instead.
	Camera is in the wrong subnet. **INFO: On Linux®, root rights are required for configuration.** Press **(+)** to assign a temporary valid IP address (forcing). **INFO: The assigned IP address is only valid temporarily. As soon as the power supply to the camera is interrupted, it is deleted.**

Icon	Description
	After assigning a temporary IP address you can use *IP Address Configuration [▶ 13]* to assign a fixed IP address.

INFO

You can display the IP address instead of the serial number of the cameras.
File → Settings → View → Show IP address in device name

Camera settings Dialog

To the right of the available cameras, there is the option button.

Icon	Description
⚙️	Click this button to open the options for the respective camera.

☐ Open camera view automatically   ☒
☑ Save and restore image acquisition settings and image enhancement settings
☐ Disable device

Function	Description
Open camera view automatically	If this function activated, the respective Camera View(s) will be opened automatically when the *Camera Explorer* is next started.
	If only one camera is connected, a live image is displayed immediately, regardless of this option.
Save and restore image acquisition settings and image enhancement settings	If this option is activated, the *Camera Explorer* will save the previous settings for the Image Acquisition Tab and the Image Enhancement Tab.
	You can activate this function in the Program Settings. File → Settings → System (Save and restore image acquisition settings and image enhancement settings)
Disable device	Disable this device for further use. This ensures other programs can use the camera without interference from the *Camera Explorer*.

Images

The captured snapshots and the loaded images are displayed here. Their storage location will be shown as a tooltip. You can open an image in the Image View by double clicking it.

Remove the selected image with [Del].

INFO

Selected images are removed only from the GUI and remain in their storage location.

Images

_00002.bmp   _00005.bmp   Stifte.bmp
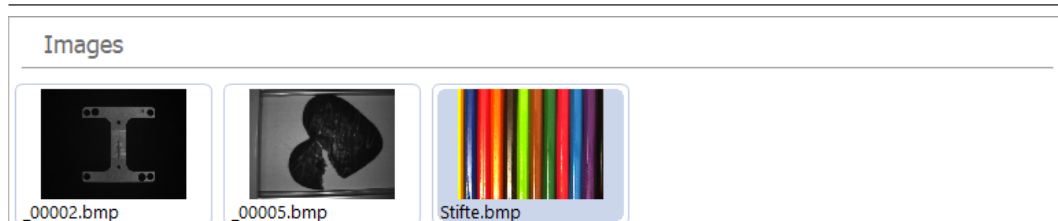
7.4   Features and Properties

Depending on the selected object (systems, interfaces or cameras) in the source tree, the available properties are shown here. You can view and in some cases change values as required.
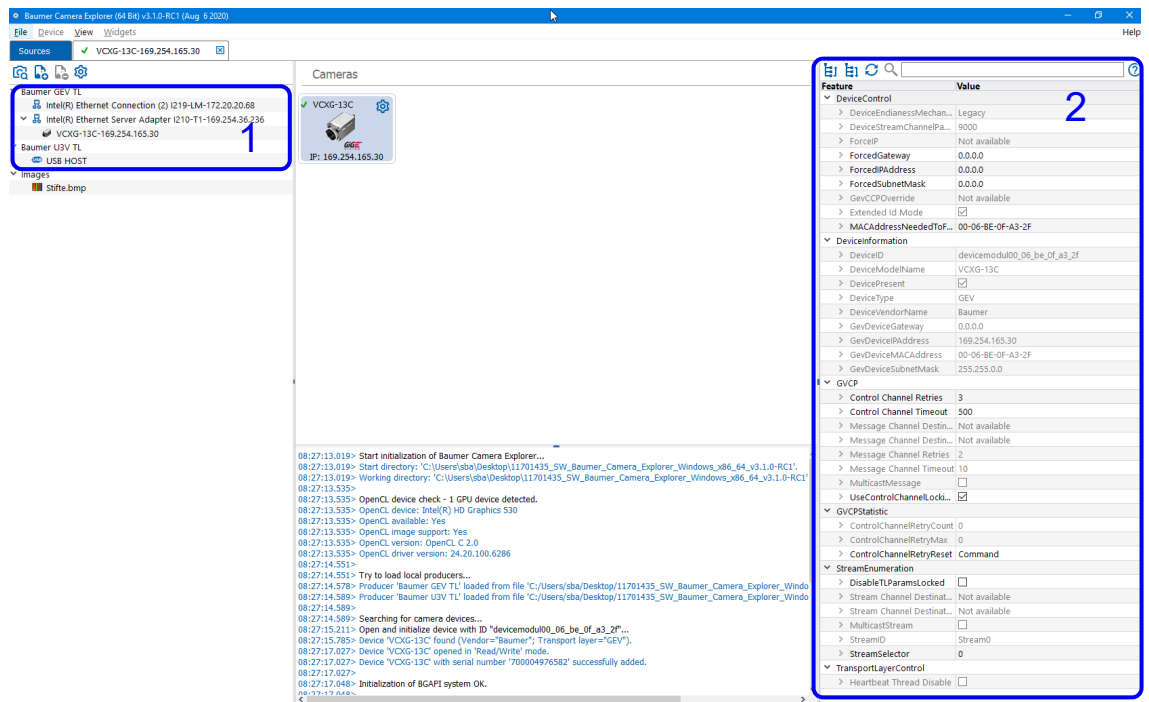
| 1 | Source Tree | 2 | Features and Properties |

(1) Source Tree

The Source Tree lists the available cameras in relation to their respective interfaces (e.g. network adapters) and the GenTL producers (e.g. Baumer GEV TL).

(2) Features and Properties

The features are displayed within their respective category.

This area shows the following icons with functions as described below:

Icon	Description
	Collapse all feature control categories.
	Expand all feature control categories.
	Refresh all feature values [F5]. Toggle the feature names with pressed [CTRL]-Key.
	Filtering features by name, value or category. Filtering is not case sensitive. Several OR linked search strings can be entered separated by spaces. Searching is done in feature name or display names by default. A prefix can be used to search in feature values or in feature categories. Possible prefixes are: : - search in feature values (e.g. ":Off")

Icon	Description
	# - search in feature category names (e.g. "#User")
⑦	Display Help for selected feature.

7.5   Help

You can open the help file within the program.

Help

⑦	Help	F1
	Tip of the Day...	Shift+F1
	Command Line Parameter...	
	Show Changelog...	
	Baumer Industrial Cameras...	
	Homepage...	
	Check for Updates...	
	About Camera Explorer...	
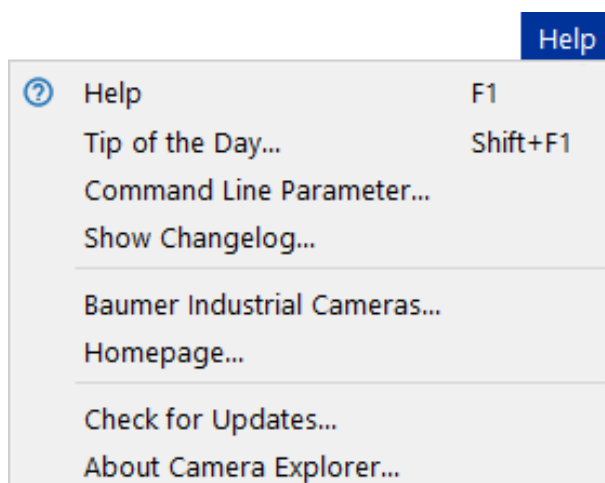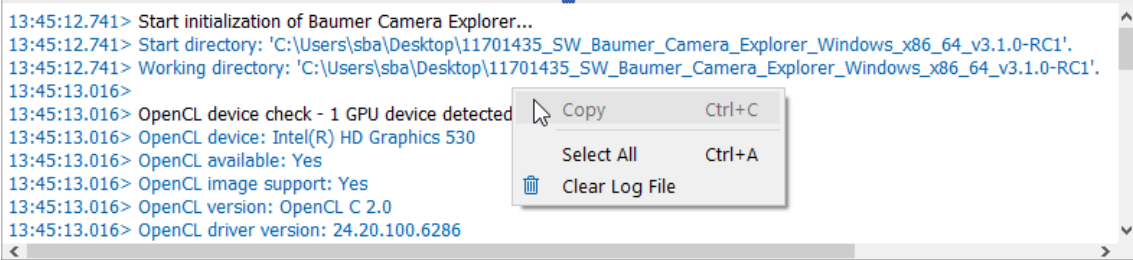
Function	Description
Help	Open the help file [F1].
Tip of the Day…	Open the Tip of the day [Shift]+[F1].
Command Line Parameter…	Here you get an overview of the available command line parameters when starting the Camera Explorer.
Show Changelog…	Opens the version history of *Camera Explorer* in an .md file.
Baumer Industrial Cameras…	Open the homepage about the innovative Baumer products
Homepage…	Open the *Baumer Camera Explorer* homepage.
Check for Updates…	Check if a new update is available.
About Camera Explorer…	Shows the program version and further information.

7.6   Log View

In this area, the program activities are shown in chronological order.

Right-click in this area to display different options.

For example, you can access information about:

- starting procedure
- recognized cameras
- occurred errors
- used GenTL producers

INFO

Settings for the *Log View* can be adjusted in *File → Settings → System*

8   Camera View

Each opened camera will be shown in a separate tab (*Camera Views*). Each Camera View is separated into into different areas.
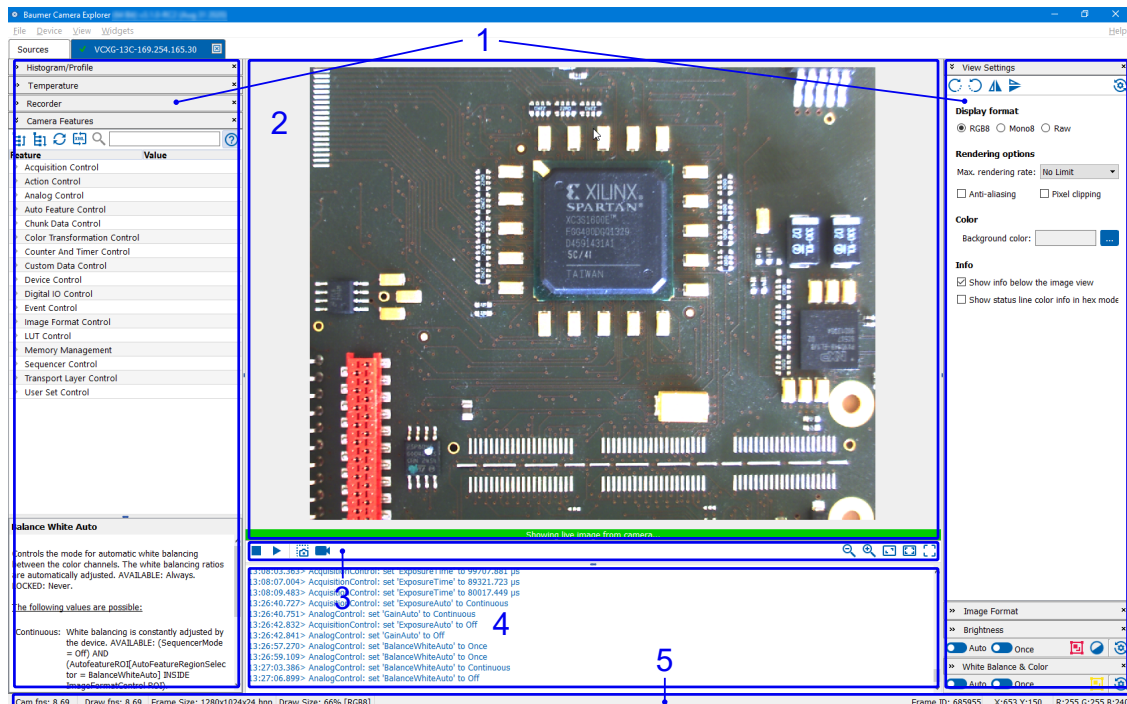
1	Widgets	2	Live Image (with status bar)
3	Play / Record Bar	4	Message View
5	Status Line		

(1) Widgets

Widgets can be:

- arranged per drag and drop into the left and right panes
- collapsed and expanded by using the double arrow button in the top left corner
- hidden by using the cross button in the top right corner or via the view menu
- reopened again via the view menu

The arrangements as well as the settings in a *Widget* are saved and restored if the same camera is reconnected or opened again.

INFO

The available *Widgets* differ depending on the features of the connected camera.

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(2) Live Image View

This view shows live images from the camera. The status bar below informs about the current mode of the camera / image view.

green:	live image from camera
gray:	camera stopped, last available image shown OR displaying images from recording OR display image from file
red:	currently recording from camera

(3) Play / Record Bar

The following functions are available in this Tool Bar.

Icon	Description
■	Stop image acquisition [F11].
▶	Start image acquisition [F12].
📷	Take a snapshot of the current image [F9].
🎥	Start image recording. **INFO: The settings are controlled in the *Recorder widget*.**
🔍	Zoom out [Ctrl] + [mouse wheel].
🔍	Zoom in [Ctrl] + [mouse wheel].
⌟⌞	Toogle Fit in view mode [F2].
⛶	Toogle maximized mode [F3].
⌜⌝	Activates full screen mode [F8]. **INFO: In full screen mode, you can zoom into/out of the image with [Ctrl] + [mouse wheel].**

The following functions are available after / during recording.

Icon	Description
	Restart image recording.
	Stop image recording.
	Show previous recorded image.
	Start replay.
	Show next recorded image.
	Save current images to file.
	Save captured images.
	Save captured images to video file.

(4) Log View

In this area, the program activities are shown in chronological order.

Log View [▶ 29]

(5) Status Line

The Status Line at the bottom of the *Camera View* tab gives information about the currently displayed image.

Cam fps: 12.49 Draw fps: 12.49 Frame Size: 1280x1024x24 bpp Draw Size: 66% [RGB8]   Frame ID: 661444   X:372 Y:571   R: 57 G: 76 B:170

      1   **2**   **3**   **4**   **5**   **6**   **7**
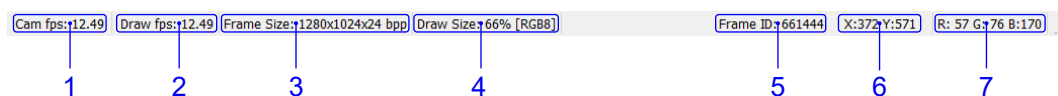
1	Camera Frame Rate	2	Camera Explorer Frame Rate
3	Frame Size	4	Draw Size [View Mode]
5	Frame ID	6	Coordinates
7	RGB values		

No.	Description
1	<u>Camera Frame Rate</u> Current frame rate of the camera (frames per second [fps]).
2	<u>Rendering Rate</u> Current display / recording frame rate of the *Camera Explorer* (frames per second [fps]).
3	<u>Frame Size</u> Current resolution (Region of Interest) of the image.
4	<u>Draw Size [View Mode]</u> Current zoom level of the displayed image and image format. Image format switchable with [F6].
5	<u>Frame ID</u> Number of images transferred from the camera since *AcquisitionStart*. The mouse pointer must be over the image.
6	<u>Coordinates</u> Position of mouse pointer within the image.
7	<u>RGB values</u> The **R**ed **G**reen **B**lue values for the current mouse position. **INFO: The display format can be changed. Widget** *View Settings* → ⚙ → **Show status line color info in hex mode.**

9 Image View

Each image will open in a separate tab. The image view are separated into different areas. The content of the areas is described below.
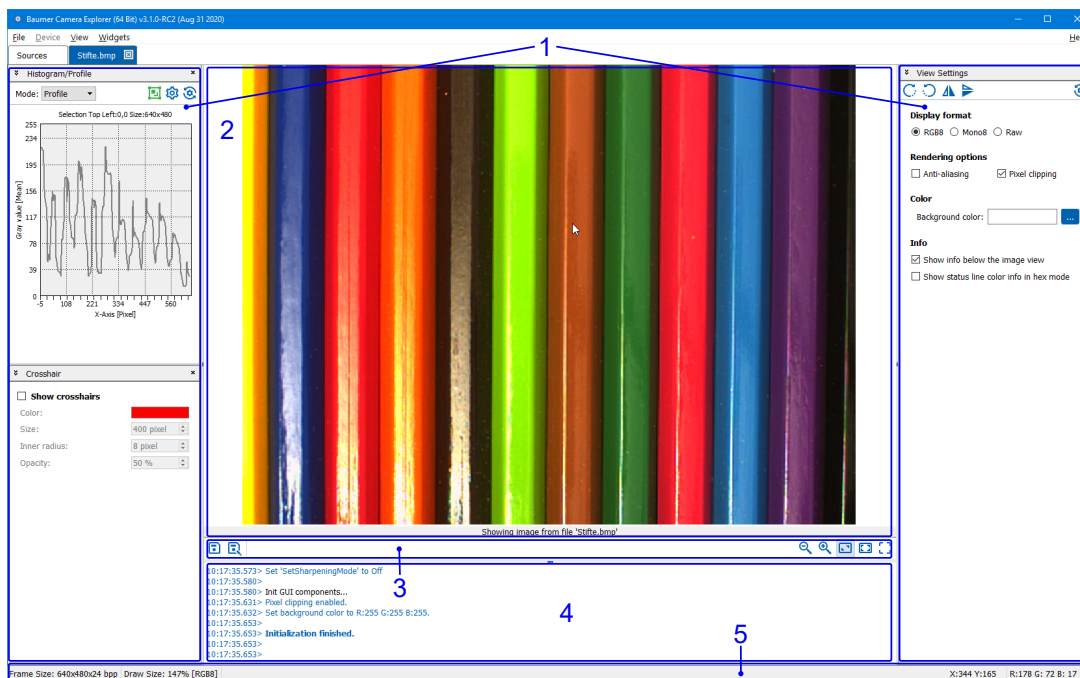
1	Widgets	2	Image View
3	Tool Bar	4	Message View
5	Status Line		

(1) Widgets

Widgets can be:
- arranged per drag and drop into the left and right panes
- collapsed and expanded by using the double arrow button in the top left corner
- hidden by using the cross button in the top right corner or via the view menu
- reopened again via the view menu

The arrangements as well as the settings in a *Widget* are saved and restored if the same image is reconnected or opened again.

Widgets [▶ 37]

(2) Image View

Displays the selected image.

(3) Tool Bar

The following functions are available in the Tool Bar.

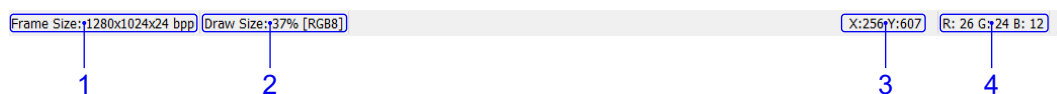| Icon	Description
💾	Save current image to file.
🔍	Save current image to new file.
🔍	Zoom out.
🔍	Zoom in.
⊡	Toogle Fit in view mode [F2].
⊡	Toogle maximized mode [F3].
⌜ ⌝ ⌞ ⌟	Activates full screen mode [F8]. **INFO: In full screen mode, you can zoom into/out of the image with [Ctrl] + [mouse wheel].**

(4) Log View

In this area, the program activities are shown in chronological order.

Log View [▶ 29]

(5) Status Line

The Status Line at the bottom of the Camera View tab gives information about the currently displayed image.

Frame Size: 1280x1024x24 bpp   Draw Size: 37% [RGB8]   X:256 Y:607   R: 26 G: 24 B: 12

        1   2   3   4

1	Frame Size	2	Draw Size [View Mode]
3	Coordinates	4	RGB values

No.	Description
1	Frame Size
	Current resolution of the image.
2	Draw Size [View Mode]
	Current zoom level of the displayed image.
3	Coordinates
	Position of mouse cursor within the image.
4	RGB values
	The **R**ed **G**reen **B**lue values for the current mouse position.
	INFO: The display format can be changed. Widget *View Settings* → ⚙ → **Show status line color info in hex mode.**

10   Widgets

Widgets can be:

- arranged per drag and drop into the left and right panes
- collapsed and expanded by using the double arrow button in the top left corner
- hidden by using the cross button in the top right corner or via the view menu
- reopened again via the view menu

*Widgets* can be closed (hidden from the interface) and reopened if required again via the *View* menu.

INFO

The available *Widgets* and the adjustable values differ depending on the view view (*Camera View* / *Image View*) and the connected camera type.

10.1   Histogram & Profile

The *Histogram & Profile* Widget is an essential tool for everybody working with images.

You can analyze the histogram and the profile of live and captured images over the whole image or just inside a selected area (ROI).

Main Window
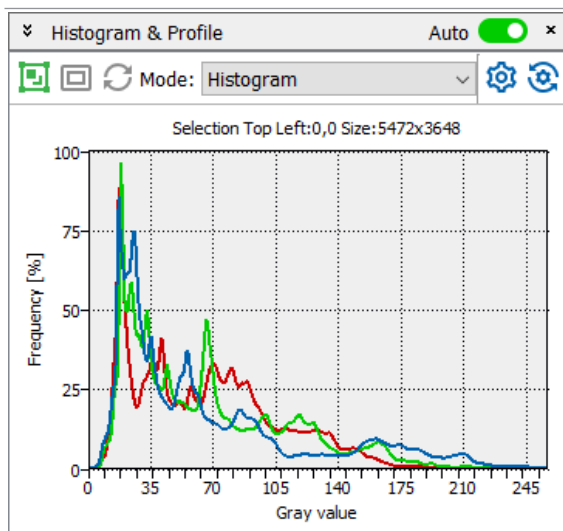
INFO: With a right click in the diagram, further functions are available.

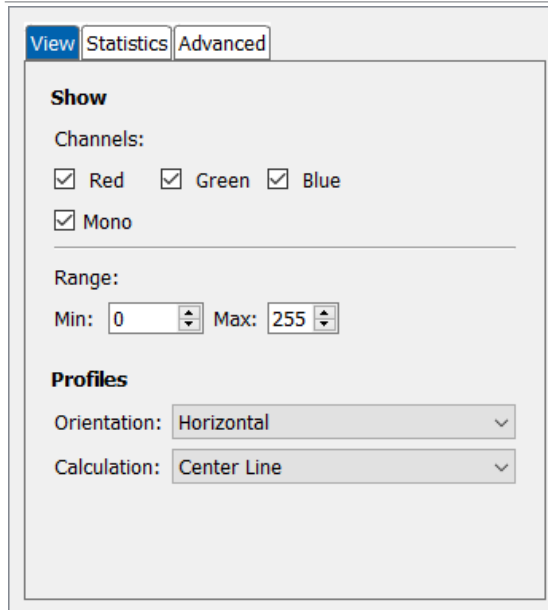|	
Auto	Start or stop live diagram (*Camera View* only)
	Selection of an area in the image to control the *Histogram* / *Profile*. With a right click on the image, further functions are available.
	Center the current selection (selectable if area is marked in the image).
	Refresh with data from current image.
Mode:	Histogram: Frequency distribution for the selected channels.
	Profile: Evaluation of the image profile.
	Open or close the settings.
	Reset diagram settings.

Settings - View

Show

Red: Show the red channel.

Green: Show the green channel.

Blue: Show the blue channel.

Mono: Show the brightness channel.

Range: Use this settings to shrink the value range of the x-axes..

Profiles

INFO: Functionality is only available in Mode Profile (Main Window).

Orientation:

Horizontal: The entire image / marked area is analyzed horizontally.

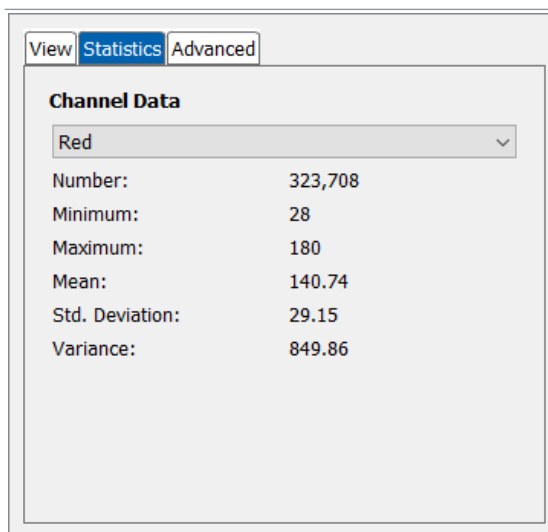Verical: The entire image / marked area is analyzed vertically.

Calculation

Mean Value: The entire image / marked area is analyzed in the selected orientation.

Center Line: The image / marked area is analyzed centrally in the selected orientation.

**INFO: The orientation is marked with a yellow line in the image / marked area, if you selected this under:
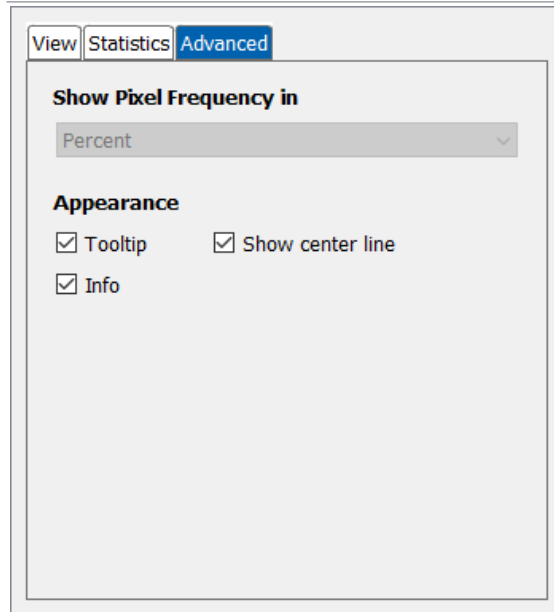Advanced → Show center line.**

Settings - Statistics

Channel Data

Here for each selected channel (Red, Green, Blue, Mono (Brightness) values are displayed.

Settings - Advanced

View | Statistics | **Advanced**

Show Pixel Frequency in

Percent

Appearance

☑ Tooltip ☑ Show center line

☑ Info

Show Pixel Frequency in

Show histogram with absolute frequency values or with percentages values.

INFO: Functionality is only available in Mode *Histogram* (Main Window).

Appearance

Tooltip: Show tooltip info inside the diagram area.

Show Center line: Show center line for profiles when calculated with *Center Line* option.

INFO: Functionality is only available in Mode Profile (Main Window) and when *Calculation: Center Line* is selected in the View Tab.

Info: Show or hide additional info in the diagram area.

10.2   Temperature (Camera View only)

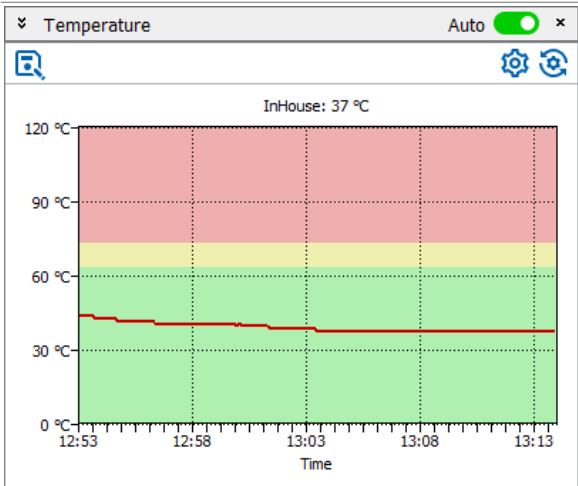This *Widget* offers you the possibility to comfortably monitor the temperature of the camera.

INFO

Emergency shutdown at Overtemperature
To prevent damage on the hardware due to high temperatures, the camera features emergency shutdown.
Observe the technical documentation of the respective camera.

Main Window

|	
	Auto ⬤ Activate or deactivate the automatic temperature recording.
	🔖 Save current temperature data to .csv file.
	⚙ Open or close the temperature settings.
	🔄 Reset temperature diagram and recorded data.

Settings

Warning: Set the temperature warning threshold (*DeviceTemperatureStatus-Transition*). The green area in the diagram is directly adapted to your input.

Unit X-axis: Select the labeling of the x-axis.

Interval: Set the measuring intervals in seconds.

Buffer Size: Number of buffers used internally to store measured values.

Max: Maximum shown temperature value in the diagram.

Min: Minimum shown temperature value in the diagram.

10.3   Recorder (Camera view only)

This widget allows to record image-series and videos.

Main Window
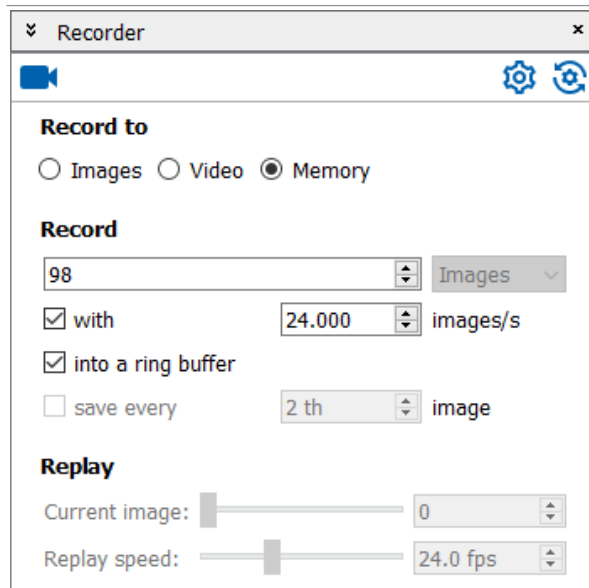
	Start recording [F7].
	Stop recording.
	Restart recording [F7].
	Open or close the recorder settings.
	Reset all recorder settings to default values.

Record to

Images: Record the captured images to disk.

Video: Record the captured images as video to disk.

Memory: Record the user defined number of images to memory.

The image and video format can be selected in *Settings [▶ 15]* - Images

INFO: Images and Videos recorded with the *Recorder* widget are not automatically added into the Images & Video list of the *Source View*.

Record

Set the number of images or the duration in seconds for next recording.

with: Set the camera frame rate for saving. Disable the checkbox to use the current frame rate.

into a ring buffer: Save images continuously in a ring buffer to the PC.

The size of the ring buffer is defined by the number of images or the number of seconds to be recorded.

INFO: This option is only available with Record to *Images* or *Memory*.

save every: Record every n'th captured image.

Replay

INFO: The functions are grayed out as long as no images have been recorded-NOTICE! .

Current image: Select the current image.

Replay speed: Select the current image replay rate.

Settings

Output

Image folder: Current output directory for saving of images

Image counter: Start counter used in file names for saving of images.

To use this counter the place holder **[C]** must be used in the file name setting.

File name settings: *Settings [▶ 15]* – Images/Video

Video folder: Current output directory for saving of videos.

Video counter: Start counter used in file names for saving of videos.

To use this counter the place holder **[C]** must be used in the file name setting.

	Open current output directory
	Opens the global Settings Menu to configure the image/video output settings *Settings [▶ 15]* – Images/Video

Event Actions

Here it is possible to control the image recording via the Digital-IO of the camera.

Select "Off" to disable the respective event action.

INFO: The number of available Digital-IOs depends on the connected camera.

Save image: Select a camera input line with which the image acquisition is triggered.

INFO: This function will not work if image recorder is running.

Save ring buffer Select a camera input line with which will save all captured images to disk.

Start recording: Select a camera input line with which will start the image recorder.

Stop recording: Select a camera input line with which will stop recording.

Overrun: Specify the number of images to be recorded after the "Stop recording" event. The specification is made as a percentage of the size of the ring buffer.

10.4   Camera Features (Camera view only)

This *Widget* shows the GenICam conform features provided by the camera. Use this *Widget* to change camera settings.

Furthermore you can use it to preset the camera as required by your own application, by permanently store the settings on the camera.

Hover your mouse cursor over the feature value to display brief information in the form of a tool tip. On the *Help* you get information about the respective marked feature. To make changes, click on the value and a editable element is show. Changes can also be made via the keyboard. Some features correlate with each other and will be immediately updated. Some features can only be changed if the camera is stopped. (Stop - [F11], Start - [F12]).

INFO
Camera Features

a) The available categories and features depends on the connected camera.

b) Features might be locked depending on other features. The help-window might hold a hint why a feature is locked.

c) Interdependent features are arranged under a selector category (marked green). The corresponding selector (also marked in green) is placed first.

d) Many widgets offer consolidated access to features grouped into logical functionalities (e.g. *Exposure Time* in Widget *Brightness*). Those widgets will change values in the feature tree and visa-versa.

e) Please refer to your camera User´s Guide to learn more about how to work with camera features, learn about specific features of your camera and how to persist feature settings in the camera.

1	Collapse all.	

	Expand all.

	Refresh all feature values. Toggle the feature names with pressed [CTRL]-Key.

	Show the GeniCam XML configuration file for the current device. **INFO: You can set your own external file viewer to show the camera configuration files.** *Settings → View / External file viewer*

	Filtering features by name, value or category. Filtering is case sensitive. Several OR linked search strings can be entered separated by spaces. Searching is done in feature name or display names by default. A prefix can be used to search in feature values or in feature categories.

Possible prefixes are:

: - search in feature values (e.g. ":Off")

- search in feature category names (e.g. "#User")

?	Display help for selected feature (3)
2	This is the Feature control area.
3	Help for selected camera feature.

10.5   Crosshairs

Show the options for a crosshair in the image. The crosshair position in the image can be adjusted.

Show crosshairs	Activate this option if you want to position a crosshair in the image.

Color: Select the color of the crosshairs.

Size: Set the size of the crosshairs.

Inner radius: Set the radius of the circle in the middle of the crosshairs.

Opacity: Set the opacity of the crosshairs.

10.6 View Settings

Widget for view settings like rotate, flip, display format, rendering options and background color.

⟳	Rotate image 90° clockwise.
⟲	Rotate image by 90° counter clockwise.
◢◣	Flip image horizontal.
◤	Flip image vertical.
⚙	Settings
⟳	Reset all view settings to default values.

Rendering

Set the converting of the image data [F6].

View

Rendering rate: Set the rendering rate. This setting only affects the display of images in the camera view. The rendering rate is shown in the status bar as *Draw fps*.

Anti-aliasing: Use anti-aliasing transformation for showing of images.

Pixel clipping: This setting colors black pixels in blue and white pixels in red to highlight areas of the image with unusable content.

Memory Control

Reserved buffers: Set the number of preallocated image buffers used for image acquisition.

More image buffers can prevent image loss but requires a larger memory capacity. Set only the required numer of buffers (1 buffer = 1 image).

INFO: The system does not check whether there is sufficient memory available.

Use optimal buffer size: Enable this option to save system memory or to allocate image buffers as much as possible.

Disable this option to prevent possible display errors when the size of the allocated image buffers will become smaller than the current Payload size.

Settings

Info ☑ Show image view info bar ☐ Show color info in hex mode **Color** Background color: [ ] [...]	**Info** Show info view info bar: Display the current mode under the image. Show color info in hex mode Display of the color information in the Status Line of the current pixel over which the mouse is positioned, in hex mode.
	Color Background color: Here you can select the background color of the image area in the *Camera View*.

10.7 Image Format (Camera view only)

Change the cameras pixel format and region of interest (ROI) easily.

Image Format widget	
Image Format ⊠ ×	⊡ Select an area to change the current image region.
⊡ ⊡	With a right click on the image, further functions are available.
Pixel format	⊡ Center the current selection (selectable if area is marked in the image).
BayerRG8 ⌄	⊡ Reset image format settings to default values.

Pixel format

Select one of the available pixel formats here.

Image Region

X-Offset: Set the horizontal offset from the origin to the region of interest (in pixels).

Y-Offset: Set the vertical offset from the origin to the region of interest in pixels.

Width: Select the width of the image region in pixels.

Height: Select the height of the image region in pixels.

Apply ROI

Set the ROI for the current image (selectable if area is marked in the image).

Binning

INFO: Availability depends on camera model.

Horizontal: Number of horizontal pixels to combine.

Vertical: Number of vertical pixels to combine.

10.8 Brightness (Camera view only)

Various auto features are available to affect the automatic adjustment of image brightness. Here is the central point to configure all related settings of your camera. Use it to understand how different settings relate to each other and influence the image quality.

Main Window
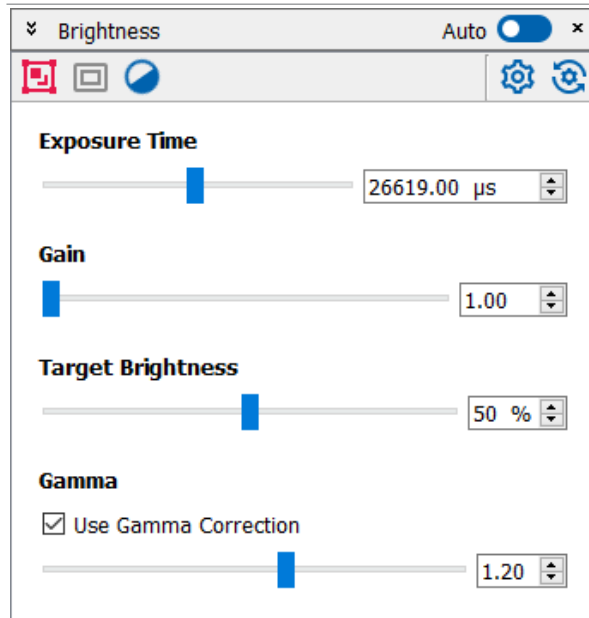
	Auto Toggle automatic brightness control.
	Select an area to control the auto brightness (functionality depending on camera model).
	With a right click on the image, further functions are available.
	Center the current selection (selectable if area is marked in the image).
	This setting colors black pixels in blue and white pixels in red
	Open or close the brightness settings.
	Reset all brightness settings to default values.

Exposure Time

Set the exposure time for the camera.

INFO: If the feature is grayed out, make the following settings in the *Feature Tree*:

```
ExposureMode = Timed
ExposureAuto = Off
```

Gain

Controls global Gain as an absolute physical value.

Target Brightness

Set the nominal value for brightness in percent of full scale. It will be adjust with consider the setting in *BrightnessAutoPriority* (Feature Tree → Category: *AutoFeatureControl*).

Gamma

Use Gamma Correction:

Controls the gamma correction of pixel intensity. This is typically used to compensate for non-linearity of the display system (such as CRT).

Settings

Control Priority

Select the control priority for auto brightness.

- *Exposure Time -> Gain*
- *Gain -> Exposure Time*
- *Exposure Time Only*
- *Gain Only*

Exposure Time Range

This setting defines the working range of the automatic control.

Gain Range

This setting defines the working range of the automatic control.

10.9 White Balance & Color

The white balance and color settings combines all settings which influence the color accuracy of your camera.

Toggle automatic white balance & color control.	
Select an area to control the auto white balance (functionality depending on camera model / firmware). With a right click on the image, further functions are available.	
Center the current selection (selectable if area is marked in the image).	
Reset all white balance and color settings to default values.	

Demosaicing

Demosaicing is used to calculate an RGB image from the received raw data.

Select the current demosaicing method to convert the received image data from the camera sensor.

INFO: If the camera is already sending an RGB image, this setting does not matter.

Sharpening & Noise Reduction

Here you have different options to influence the sharpness and the noise of the images.

INFO: Sharpening is only available if the demosaicing method is set to Baumer 5x5 and if the current pixel format is supported.

Mode: Select the sharpening mode which will be used by the image transformation.

- Off
- Global Sharpening
- Adaptive Sharpening
- Active Noise Reduction

Further options for influencing the selected method, are available in the lower area.

Factor: Here you can adjust the level of sharpening.

Threshold: Here you can adjust the sensitivity threshold for sharpening.

Auto Color Matrix Switching

Activate or deactivate the *Auto Color Matrix Switching*.

After activating this function, one of the existing *ColorTransformationFactoryList* is automatically selected.

Color Correction

INFO: Deactivate *Auto Color Matrix Switching* to make settings here.

Rotation: Set color rotation for merging with current color matrix.

Saturation: Set color saturation rotation for merging with current color matrix.

Load Matrix…: Load color transformation file and gain values from the PC.

Save Matrix…: Save current color matrix and gain values to file on the PC.

10.10 Polarisation (Camera view only)

The *Camera Explorer* can be utilized to view the different formats like AOP and DOLP which are calculated from the image of polarized camera.
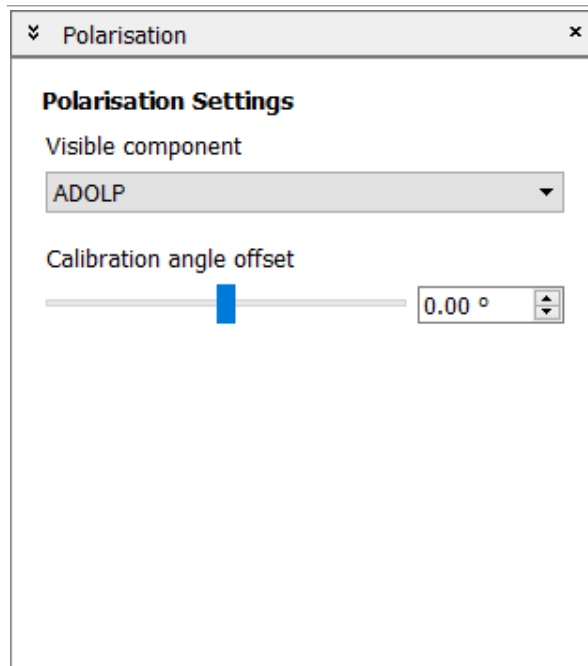
Polarisation Setting

Visible component :Select the polarization part of the image data for showing in image view.

INFO: The calculable data can be found in the respective operating manual of the camera.

Calibration angle offset:

Adds a calibration offset to compensate for an individual "roll" angle of the camera, introduced by mounting tolerances. The offset is added to all type of output data that incorporates an angle, like false color representation and angle of polarization data. The offset is without effect to raw data and to degree of linear polarization data.

10.11   Image/Buffer Info (Camera View only)

On this *Widget*, you can access additional information about the image and data transfer.

(Image/Buffer Info widget screenshot)	Collapse all
	Expand all
	Refresh all feature values. Toggle the feature names with pressed [CTRL]-Key.
	Reset the stream statistics of the current device and some buffer related counters. **INFO: Some counters can only be reseted by restarting the image acquisition.**
	Clear the Info view.
	Filtering features by name, value or category. Filtering is case sensitive. Several OR linked search strings can be entered separated by spaces. Searching is done in feature name or display names by default. A prefix can be used to search in feature values or in feature categories. Possible prefixes are: : - search in feature values (e.g. ":Off") # - search in feature category names (e.g. "#User")
	Show help for selected camera feature.

## 10.12   Serial Interface (Camera View only)

INFO

The *Widget* is only available for Windows® 64bit.

The *com0com* driver must be installed to use the serial camera interface. If the *com0com* driver is not installed, the functionality in this *Widget* is grayed out.

Download driver: https://com0com.sourceforge.net/

With this *Widget* it is possible to control a extra device (e.g. lens, lighting) connected to *UART0* port or *UART1* port of the camera from the PC using the original configuration software from it's manufacturer..

The communication commands with the extra device are fed directly into the camaera data cable. No extra cable is needed. This requires additional software (com0com) to define a COM connection between two virtual COM ports.

This COM connection connects *Camera Explorer* to the configuration software. In the *Widget*, one virtual COM port is used to connect it to the UART of the camera. The second virtual COM port must be set in the configuration software.

Schematic structure
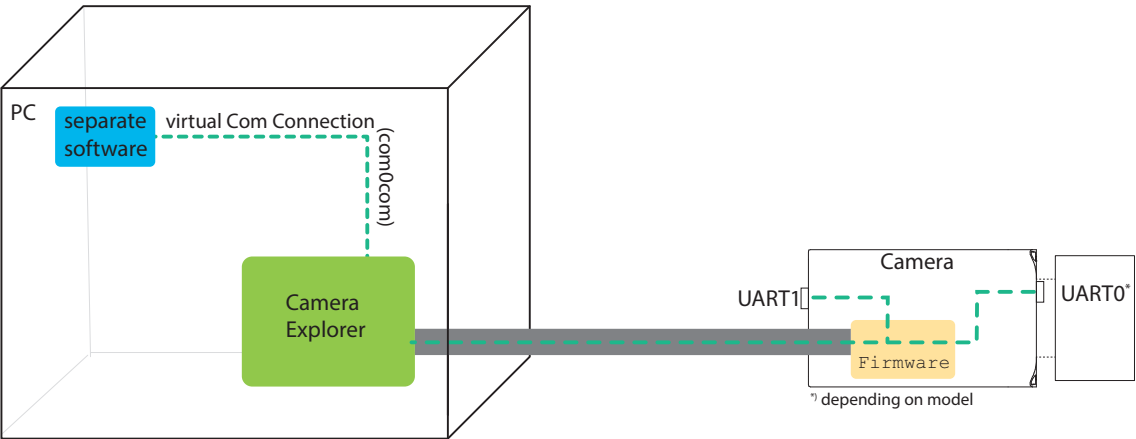
Connections

Connect: Contains the available UART ports of the camera.

to: Contains the available virtual COM port provided by com0com.

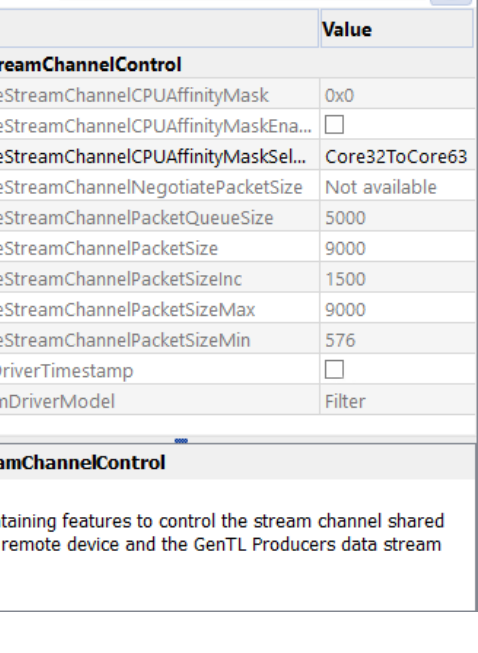|	
⟳	Reset all serial interface settings to default values.
Apply	Connect selected UART with selected com0com Port.

Info

Number of ports detected.

10.13   Data Stream Features (Camera view only)

Containing the features to control the stream channel shared between the remote device and the GenTL Producers data stream module of GigE cameras. These are the features of the data stream. They are independent of the connected camera.

Icon	Description
	Collapse all.
	Expand all.
	Refresh all feature values.
	Filtering features by name, value or category. Filtering is case sensitive. Several OR linked search strings can be entered separated by spaces. Searching is done in feature name or display names by default. A prefix can be used to search in feature values or in feature categories. Possible prefixes are: : - search in feature values (e.g. ":Off") # - search in feature category names (e.g. "#User")
	Display help for selected feature.

11   Shortcuts

Below you can see the shortcuts available in *Camera Explorer*. With them the Camera Explorer can be operated more quickly.

Setting	Shortcut
Help	[F1]
Tip of the day	[Shift] + [F1]
Image view fit to window	[F2]
Toggle maximized mode	[F3]
Exit	[Alt] + [F4]
Search / Update camera devices	[F5]
Disable / Enable the converting of the image data	[F6]
Start image recording	[F7]
Full screen	[F8]
Snapshot of current image	[F9]
Program Settings…	[F10]
Stop image acquisition	[F11]
Start image acquisition	[F12]
Remove selected image	[Del]
Select all images	[Ctrl] + [A]
Manual image enlargement	[Ctrl] + [mouse wheel]
Scroll in zoomed image	[Alt] + [mouse] / [Shift] + [mouse]
Open / Closes Left Widget Bar	[Ctrl] + [Shift] + [L]
Open / Closes Right Widget Bar	[Ctrl] + [Shift] + [R]
Open / Closes Message View	[Ctrl] + [Shift] + [M]
Arrange	[Ctrl] + [Shift] + [A]
Dock All Views	[Ctrl] + [Shift] + [D]

Baumer

Passion for Sensors