AcquireControl

User Guide

V6.0.0

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Contents

This document at a glance

Scope of this document

This user guide describes the usage of the AcquireControl application in combination with Allied Vision cameras:

- Alvium G1/G5
- Bigeye G/P
- Goldeye G/CL/P
- Mako
- Manta
- Pearleye P
- Prosilica GB/GC/GE/GS/GT/GX

Advantages for users:

- Unified user interface for various camera models
- Display of monochrome, color and temperature images
- Various image correction modules available
- Various image analyzing modules available

VimbaX

VimbaX continues **Vimba**, but adds new functions. Contents relating to **VimbaX** apply to previous **Vimba** versions as well, unless otherwise stated.

Vimba download

You can download **VimbaX** from www.alliedvision.com/en/products/software.

Camera and features documentation

Document downloads

For your camera's documentation, including descriptions for software controls or features, see www.alliedvision.com/en/support/technical-documentation.

Installing and using AcquireControl

Installation: See Installing dependent software on page 17 and Installing the AcquireControl application on page 15.

Camera operation: See Operating AcquireControl on page 29 and Graphical user interface (GUI) on page 30.

Getting a first camera image

Step 1:   Connect camera to PC and supply camera with power.

Step 2:   Download AcquireControl application from the Allied Vision website and start setup.

Step 3:   Install frame grabber driver or camera driver if necessary. For GigE cameras, read the following manuals:

- How to install a GigE camera (Bigeye P/Pearleye P/Goldeye P)
- How to install a GigE camera (Manta and Bigeye G)
- Allied Vision GigE Installation Manual (Prosilica GE, GC, GS, GB, GX)

Step 4:   Start AcquireControl application

Step 5:   Select frame grabber type:
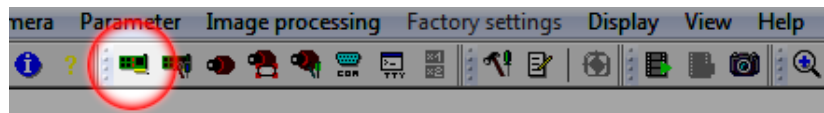
Step 6:   If a Pleora GigE camera is used, set IP address and select camera:
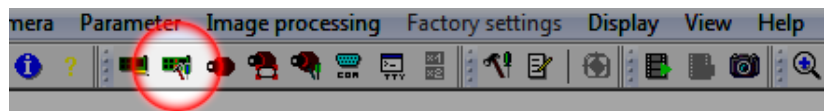
Step 7:   Select camera model:
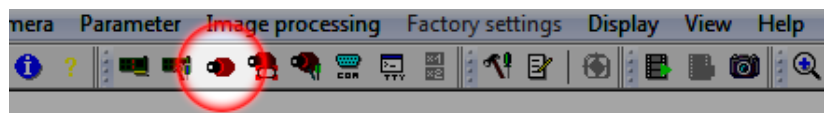
Step 8:   Select camera graphics mode:
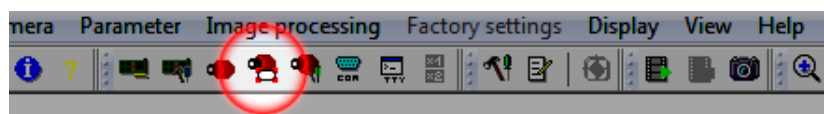
Step 9: Select image processing chain that fits to your camera model:

Step 10: Start image acquisition:
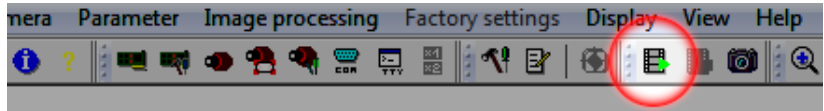
Document history and conventions

This chapter includes:

Document history

Version	Date	Remarks
V6.0.0	2022-Nov-29	• Renamed the document from Technical Manual to User Guide. • Added contents for VimbaX support. • Added ROI to AOI, see Terms on page 12. • Added notes for deprecated products, see Terms on page 12. • Updated screenshots. • Updated Table 16: AcquireControl grabber description on page 38. • Applied editorial changes.
V5.1.0	2016-Dec-15	• Added section: Installing driver for Active Silicon frame grabbers. • Updated multiple screenshots.
V5.0.0	2016-Apr-08	• Applied minor corrections. • Incremented the version to V5.0.0 to coincide with the software version.
V2.5.0	2015-Jan-26	Applied minor corrections.
V2.4.0	2014-Nov-03	Added new brand name and new brand logo.
V2.3.1	2013-Nov-18	Added note about Read/Write access in Installing the AcquireControl application on page 15.
V2.3.0	2012-Aug-03	Adjusted for the new AcquireControl application V4.0.0
V2.1.0	2012-Mar-16	Applied minor corrections
V2.0.0	2011-Mar-03	Created new AcquireControl Technical Manual

Table 1: Document history

Conventions used in this manual

Typographic styles

To give this manual an easily understandable layout and to emphasize important information, the following typographical styles and symbols are used:

Style (example)	Function
Emphasis	Programs, or highlighting important things
`Feature names`	GenICam features names
`Feature options`	Features options and register's options that are selectable by the user
UI Element	Text that is displayed, or output, by the system for the user, like parts of the GUI, dialog boxes, buttons, menus, important information, windows titles.
Reference	Links to webpages and internal cross references

Table 2: Markup conventions used in this manual .

Symbols and notes

NOTICE

Material damage or violation of data security

Precautions are described.

Safety-related instructions to avoid malfunctions

This symbol indicates important or specific instructions or procedures that are related to product safety. You need to follow these instructions to avoid malfunctions.

Practical Tip

Additional information helps to understand or ease handling the camera.

Additional information

Web link or reference to an external source with more information is shown.

Terms

The term **deprecated** is used for products that are not produced or maintained anymore, such as hardware and software running on Windows XP, but without support for Windows 7 or higher. Therefore, deprecated products should not be used to set up new applications.

Frame grabber is partly shortened to **grabber** to ease reading.

Matrix Vision represents Matrix Vision frame grabbers.

ROI stands for region of interest, which is equal to **AOI** (area of interest).

Allied Vision

Installing AcquireControl

This chapter includes:

System requirements

Host PC

- Microsoft Windows XP, Vista or Windows 7, 8, 10, 11 (32-bit and 64-bit)
- Current Intel processor
- 4 GB RAM or more
- Microsoft DirectX 7 compatible graphic card 128 MB (256 MB recommended)
- 200 MB hard disk space for installation

Hard disk space required for images

Hard disk space for image storage depends on the size, format, and number of images.

Camera

The AcquireControl software works with all Allied Vision cameras.

Note

If Goldeye CL cameras are used with AcquireControl and the VimbaCLConfig transport layer, you cannot acquire images, but you can control cameras.

Therefore, we recommend you to use **VimbaX** with the related GenICam compliant transport layer provided by the grabber manufacturer instead. Firebird Camera Link grabbers by ActiveSilicon have been successfully tested with VimbaX.

Image acquisition interfaces

Current

- All devices supported by **VimbaX** or **Vimba**
- Active Silicon Phoenix/Firebird series (RS644/LVDS/Camera Link)

Deprecated

- **PvAPI**
- Former VDS Vosskühler IEEE1394-based cameras
- Matrix Vision pcIMAGE-SDIG (RS644/LVDS)
- Matrix Vision mvTITAN-DIG (RS644/LVDS)
- Matrix Vision mvTITAN-CL (Camera Link)
- Matrix Vision mvGAMMA-CL (Camera Link)

Suitable frame grabbers

Some frame grabber drivers may not be available for all operating systems. For suitable Camera Link frame grabbers, please contact support at
https://www.alliedvision.com/en/support/contact-support-and-repair.html

Installing the AcquireControl application

To install AcquireControl, complete the following outlined below:

Step 1:   Download the **ZIP file** of the AcquireControl application from the Allied Vision website: Unpack it and run the corresponding EXE file.

AcquireControl installer

You can download AcquireControl from https://www.alliedvision.com/en/support/software-downloads.html
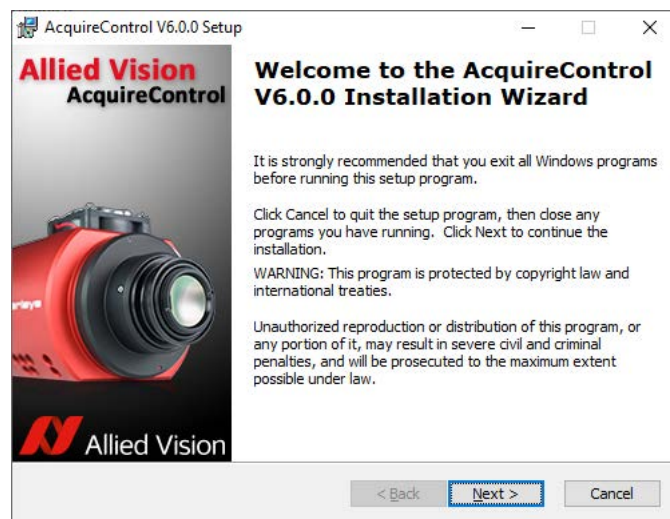
Figure 1: AcquireControl setup: Welcome window

Step 2:   In the Welcome dialog window, klick `Next`.

Step 3:   Select installation options:

- If the application is installed on a 64-bit operating system, you can choose to install the 32-bit version additionally.
- Choose if the startmenu items should be installed for **All users** or for the **Current user** only.
- Click `Next`.
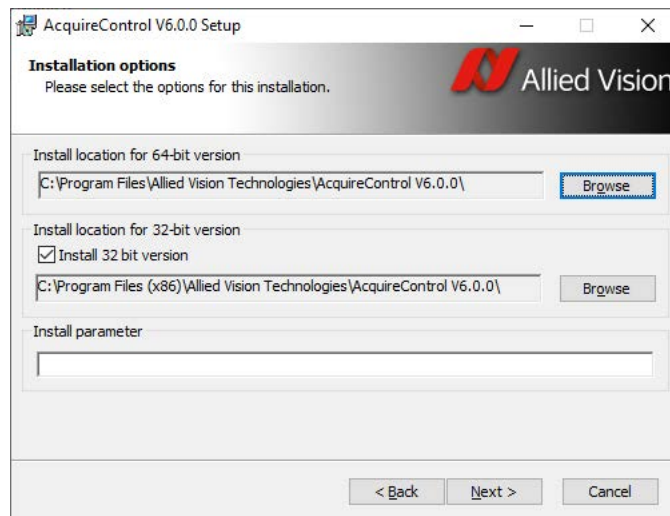
Figure 2: AcquireControl setup - Installation options

Step 4:   In the next window, click `Install` to start the installation.

Always ensure that AcquireControl has Read/Write access to the configuration folder:

`C:\ProgramData\Allied Vision Technologies\AcquireControl Vx.x.x,`

and the included subfolders and files.

Step 5:   In the final dialog you can select to:
- Show the Release Notes
- Start the Pleora Driver Package Installer
- Start AcquireControl
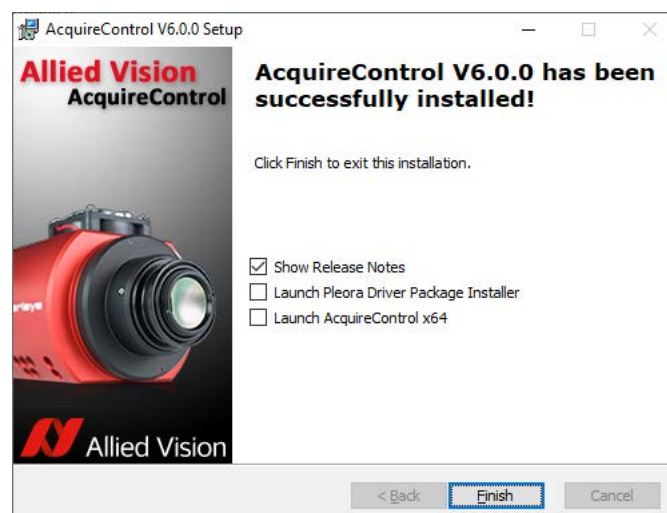
Figure 3: AcquireControl setup - finish

Step 6:   Click `Finish` to exit the installer.

Step 7:   Working with AcquireControl:
For a quick tour go to Getting a first camera image on page 7..
For detailed information go to Operating AcquireControl on page 29.

Installing dependent software

The following pages describe the installation of further software that may be required for AcquireControl to work, depending on your use case (also see Table 16: AcquireControl grabber description on page 38). Note that not necessarily all of the following is required in all situations.

VimbaX

VimbaX SDK must be installed to access cameras via VimbaX grabber in AcquireControl, see www.alliedvision.com/en/products/software.

GigE drivers

The installation of a filter driver may interfere with existing VPN drivers.

We recommend you to use a separate network card for GigE cameras only (without any other interfering drivers).

Ensure that your firewall or antivirus solution is not blocking the camera network traffic.

Installing Allied Vision GigE driver

When operating cameras using **Vimba** or **VimbaX**, you can install the Allied Vision GigE driver for better performance with:

- Alvium G1
- Alvium G5
- Bigeye G
- Goldeye G
- Mako
- Manta
- Prosilica GB, GC, GE, GS, GT, GX
- Prosilica GT

Perform the following steps:

Step 1:   In the start menu choose the `Allied Vision GigE Filter Driver Installer`.

Step 2:   Follow the instructions.

Installing Pleora GigE driver

To get a better performance install the Pleora GigE driver for the following GigE camera families:

- Bigeye P
- Goldeye P
- Pearleye P

It is also possible to access the camera series listed above via the VimbaX (or Vimba) grabber.

See Hardware setup on page 37

Perform the following steps:

Step 1: In the start menu choose `Allied Vision Setup for Pleora Driver Package`.

Or: If the driver package is already installed, start the `Driver Installation Tool` manually in the start menu.
The Pleora Driver Installation Tool starts.
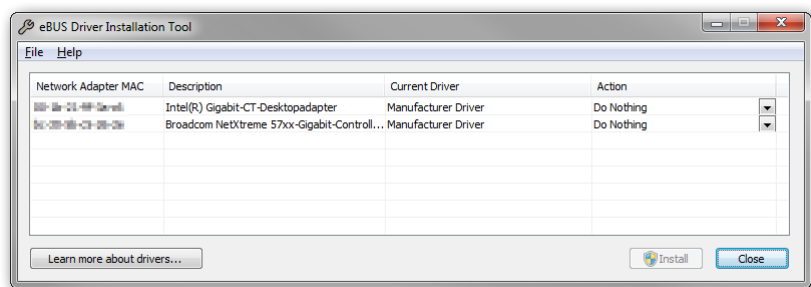
Figure 4: Pleora Driver Installation Tool

All network adapters found in your system are listed.

Step 2: To choose your desired driver, click the `Action` column.

Driver type	Description
Manufacturer driver	Default driver from the manufacturer of your network card: - low performance, especially when high-resolution cameras are used
eBUS Universal Pro driver	**We recommend you to install this driver.** Filter driver from Pleora: + high flexibility and reliability combined with low CPU usage + ideal for most real-time vision applications + runs on almost any vendor's NIC

Table 3: Pleora GigE driver: Pros and cons of driver types (sheet 1 of 2)

Driver type	Description
eBUS Optimal driver	+ maximum performance and the lowest CPU usage + ideal for applications with very high data rates and heavy processing overhead - for Intel PRO/1000 family of network cards only
High-Performance IP Device Driver	High performance driver - for Intel PRO/1000 family of network cards only

Table 3: Pleora GigE driver: Pros and cons of driver types (sheet 2 of 2)

Frame grabber drivers

Installing driver for Matrix Vision Deprecated

The installation package of Matrix Vision frame grabbers contain a corresponding CD ROM for the installation.

Matrix Vision frame grabber drivers are available from the Allied Vision support team.

For the installation, refer to the **frame grabber installation manual from Matrix Vision**. Following a correct installation, the frame grabber should be listed under the device manager of the Windows control panel.

Installing driver for Active Silicon

The installation package of the Active Silicon frame grabber contains the required driver and SDK.

For the installation, refer to the **frame grabber installation manual from Active Silicon**. Following a correct installation, the frame grabber should be listed under the device manager of the Windows control panel.

Legacy drivers Deprecated

Installing IEEE 1394 legacy driver for VDS cameras

To work with legacy VDS Vosskühler IEEE 1394 cameras, you have to install the corresponding driver. The driver files are copied to your local hard disk while installing AcquireControl.

Due to a limitation in the original Microsoft bus driver, it is not possible to grab isochronous data on 64-bit operating systems with a RAM size equal or greater than 4GB. In this case, we can offer you our own bus driver v1394bus. Please contact the Allied Vision support team for further details.

	Platform	Windows 7	Windows XP
Architecture			
vds1394 Device Driver + Microsoft Bus Driver (NOT runtime-based)	x86	Yes	Yes
	x64 (< 4GB RAM)	Yes	Yes
	x64 (≥ 4GB RAM)	No	No
vds1394 Device Driver + v1394bus Bus Driver (runtime-based)	x86	Yes	Yes
	x64	Yes	Yes

Table 4: vds1394 device driver + v1394 BusDriver

Carry out the following steps:

Step 1:   Connect the camera to your IEEE 1394 card.

Step 2:   Open the windows device manager (WINDOWS key + PAUSE). Find the entry labeled `Generic 1394 Desktop Camera`. If you have worked with a different IEEE 1394 driver in the past, Windows might have already connected your old driver with the camera. Find the new entry in the list and right-click.
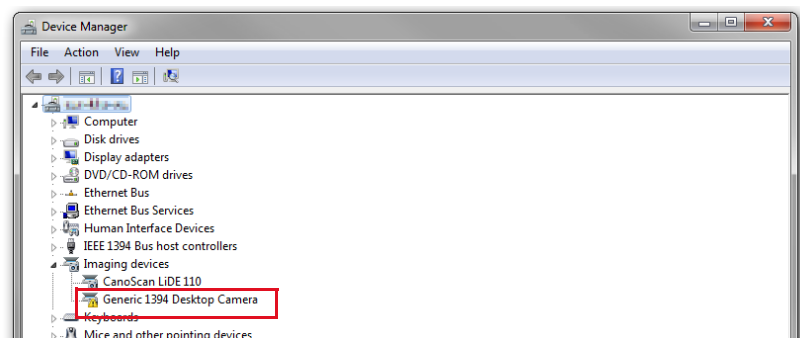
Step 3:

Figure 5: Device Manager: Generic 1394 Desktop Camera entry

Step 4:   Select `Update Driver Software`

Step 5:   Select `Browse my computer for driver software`.

Figure 6: Update Driver Software
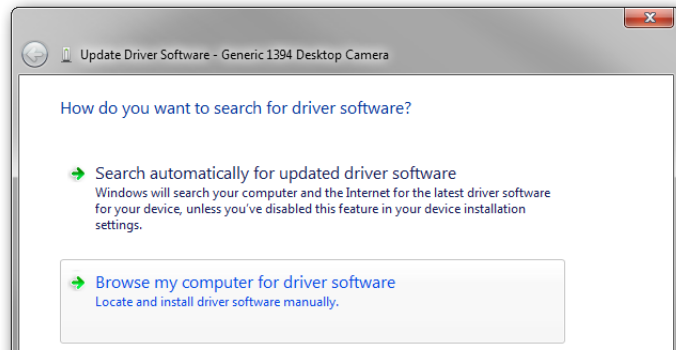
Step 6:   Go to the following path to find the IEEE 1394 driver:

`<Your AcquireControl installation path>\Allied Vision Technologies\AcquireControl Vx.x.x\IEEE1394Driver`
The default installation path for AcquireControl is:
`C:\Program Files\Allied Vision Technologies\ AcquireControl Vx.x.x`

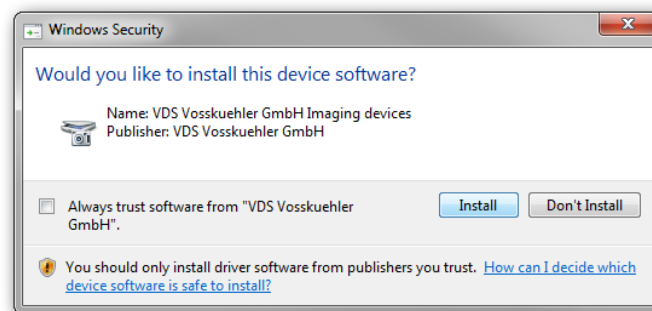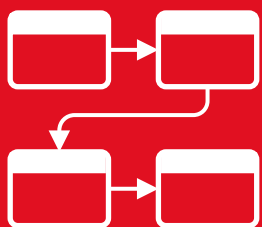Step 7:   Click `Next` to finish the installation.

Figure 7: Windows Security

AcquireControl Concept

This chapter includes:

Functional overview

The AcquireControl application can be used to control Allied Vision cameras, equipped with one of the following interfaces:

- Allied Vision GigE Vision compliant interface module (Camera name G-...)
- Pleora GigE Vision compliant interface module (Camera name P-...)
- IEEE 1394 legacy interface
- Camera Link interface and a compatible frame grabber.

A single instance of the application works with a single camera only.

The application is structured in a chain-like fashion and offers miscellaneous interaction options to the user. The following diagram shows the structure of such an image processing chain. The diagram distinguishes between image processing modules (**Process Module**) and analysis modules (**Analyze Module**).
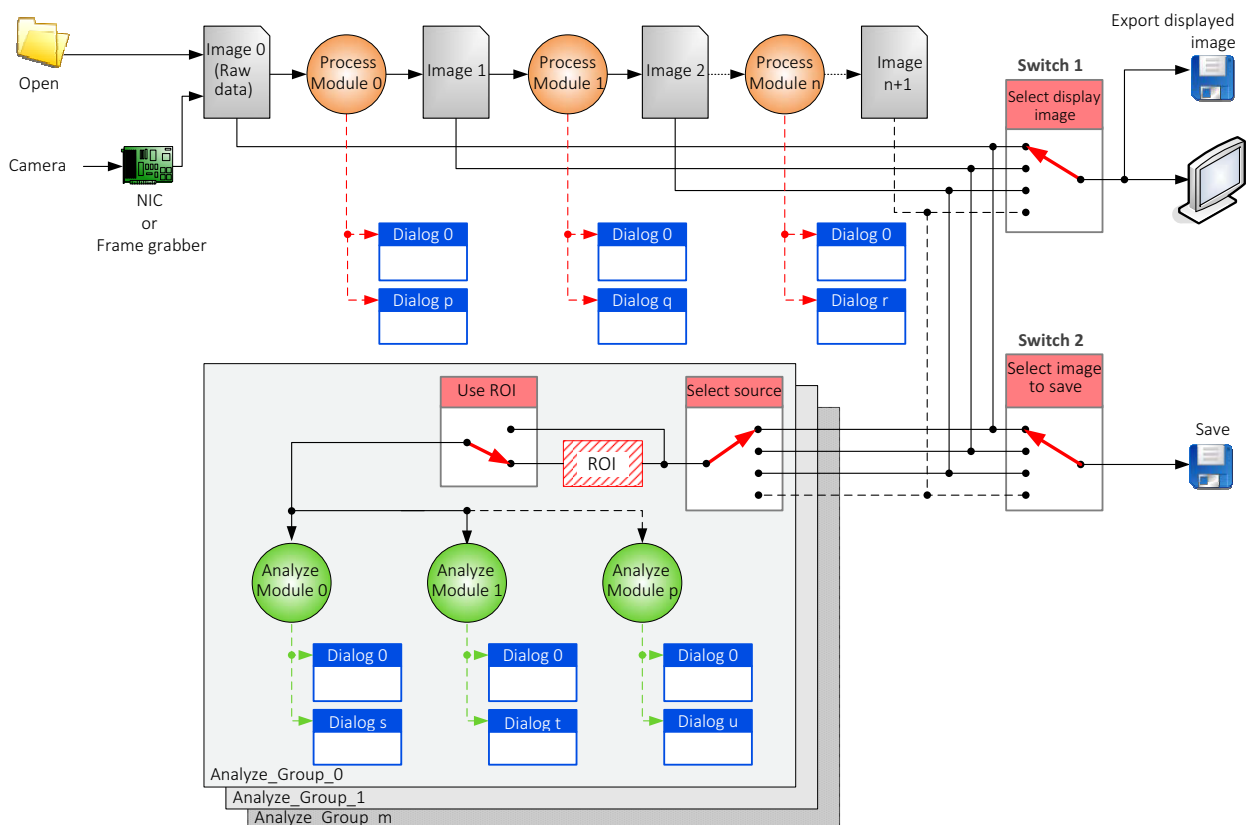
Figure 8: Image processing workflow

Each image processing module requires an input image and outputs a modified image.

Image processing modules

- Color interpolation: Transformation from RGB-CFA data to RGB data.
- BCG LUT: look-up table for adjustment of brightness, contrast, and gamma.
- Background correction
- Recursive filter
- Pseudo color LUT: Conversion of gray-scale data to RGB data (e.g. for visualization of temperature data)
- Image flip: Flip the live image horizontally and/or vertically.
- Image rotation: Rotate the live image.

In contrast to the image processing module, analysis module requires only an input image. The data can be displayed on the monitor or the data can be written to a LOG file.

Analysis modules

- Histogram
- Statistics
- Pixel table
- Temperature display
- Row/column statistics
- Time-based statistics
- Line profile
- Autosave

In the AcquireControl application, 12 different image processing chains are available:

Name of the image processing chain	Description	Processing modules available
Gray-scale Data	This image processing chain is used for gray-scale cameras or loaded gray-scale images.	• BCG LUT
Pseudo Color for Gray-scale Data	This image processing chain is used for gray-scale cameras or loaded gray-scale images. In addition to the *Gray-scale Data* chain, a pseudo color LUT and an image flipping can be applied.	• Pseudo Color LUT • Flip image
Goldeye series	This image processing chain is used for Goldeye cameras.	• Background Correction • Recursive Filter • Flip image • Pseudo Color LUT

Table 5: Image processing chain (sheet 1 of 2)

Name of the image processing chain	Description	Processing modules available
Data from XR cameras	This chain is used for X-Ray cameras.	• Gain/Offset Correction • Background Correction • Recursive Filter • Flip Image • Image Rotation • BCG LUT
Pearleye series/IRC-xxxCL/GE with aperture f/1.7 [-55°C…+506°C] [-50°C…+523.30°C] [-30°C…+92.85°C] [0°C…+204.75°C] [0°C…+327°C] [0°C…+409°C]	This chain is used for LWIR cameras with the given temperature range.	• Background Correction • Recursive Filter • Pseudo Color LUT • Background Correction • Recursive Filter • Pseudo Color LUT
RGB-CFA Data	This chain is used for Bayer Mosaic Filter cameras or corresponding loaded CFA images.	• Bilinear Interpolation • BCG LUT
RGB Data	With this chain, loaded RGB images can be displayed.	• BCG LUT

Table 5: Image processing chain (sheet 2 of 2)

To adjust the image processing chain:

1. In the Image processing toolbar, click on

   or

   In the menu bar, choose `Image processing,` then `Select image processing chain.`

2. Decide which image is displayed, saved and used for analysis.

The adjustment is completed via software buttons, which are described in the following chapters.

Select display image (Switch 1)

This is **Select display image** button in Figure 8 on page 23.

Select the image to be displayed on the screen.

To display images:

1. In the **Display** toolbar, click

   or

   In the **menu bar**, choose `Display,` then `Select display image.`

The corresponding menu will show a list with all available image sources.

For more information see Selecting the displayed image on page 64.

Select image to save (Switch 2)

This is **Select image to save** button in Figure 8 on page 23.

During image storage, the final image (as RGB data) or miscellaneous interim images can be chosen, depending on the used image processing chain.

For more information see Saving images on page 68.

To save the image:

1. In the Main toolbar, click ⬚ or
    In the **menu bar**, choose `File,` then `Select image to save`.

•   If the images are stored before the pseudo color LUT, they can still be changed subsequently after loading.

•   Images which are stored as RGB data can be changed subsequently only in their colors.

Image analysis and postprocessing modules

These are the **Use ROI** (region of interest, or AOI = area of interest) and **Select source** switches in Figure 8 on page 23.

The application provides diverse image analysis methods, which can work on the entire image as well as on ROIs as sections, like rectangles, circles, rings, lines, and cross hairs.

The following modules are implemented:
- Histogram
- Image statistics
- Row & column statistics
- Pixel table
- Temperature display
- Time-based statistics
- Line profile
- Autosave

Histogram

Definition: A histogram is a bar chart indicating a frequency distribution of all occurring pixel values. The X-axis indicates the pixel value and the Y-axis indicates the frequency. The determined area for the **Histogram ROI** is analyzed.

Image statistics

The application offers the possibility to evaluate statistical data for any ROI or for the full image.

For these analysis modules you can select the final image or an interim image result (see also Options for an analyze group on page 70.)

Row & column statistics

In addition to the default statistics dialog, the **Row/Column** statistics calculates the standard deviation within rows and columns only.

Time-based statistics

The time-based statistics dialog offers a calculation of the standard deviation for each pixel in a defined ROI over a defined number of images.

Temperature display

The AcquireControl application handles up to five different temperature measurement windows. In each measurement window, you can adjust the emission factor. The average temperature level within the measurement window is displayed.

The source image for the temperature data is the corrected image before the color conversion. When using an image processing chain with recursive filter, the temperature data before or after the filter can be calculated. It is possible to store the temperature values for every image into a LOG file for later utilization.

Pixel table

For a detailed pixel analysis of an image, the pixel table dialog is available. This dialog displays the values of a group of pixels during live display.

Line profile

The line profile dialog measures pixel values along a line within a source image. For example, this tool is useful to measure shading within an image.

Autosave

The **Autosave** module saves every incoming image as single image or as movie (AVI) sequence.

Image data storage

The recorded image data can be saved in various formats up to 16 bit.

Image acquisition devices

AcquireControl is able to work with miscellaneous frame grabbers. Due to the development of a universal frame grabber interface, an extension to future frame grabbers is possible. Cameras or rather frame grabbers are supported with the following interfaces:

- GigE
- Camera Link
- USB3
- IEEE 1394

The application works with nearly all Allied Vision cameras. The universal frame grabber interface adaptations allow to easily implement new cameras.

Operating AcquireControl
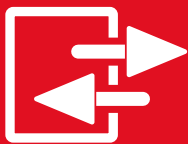
This chapter includes:

Graphical user interface (GUI)
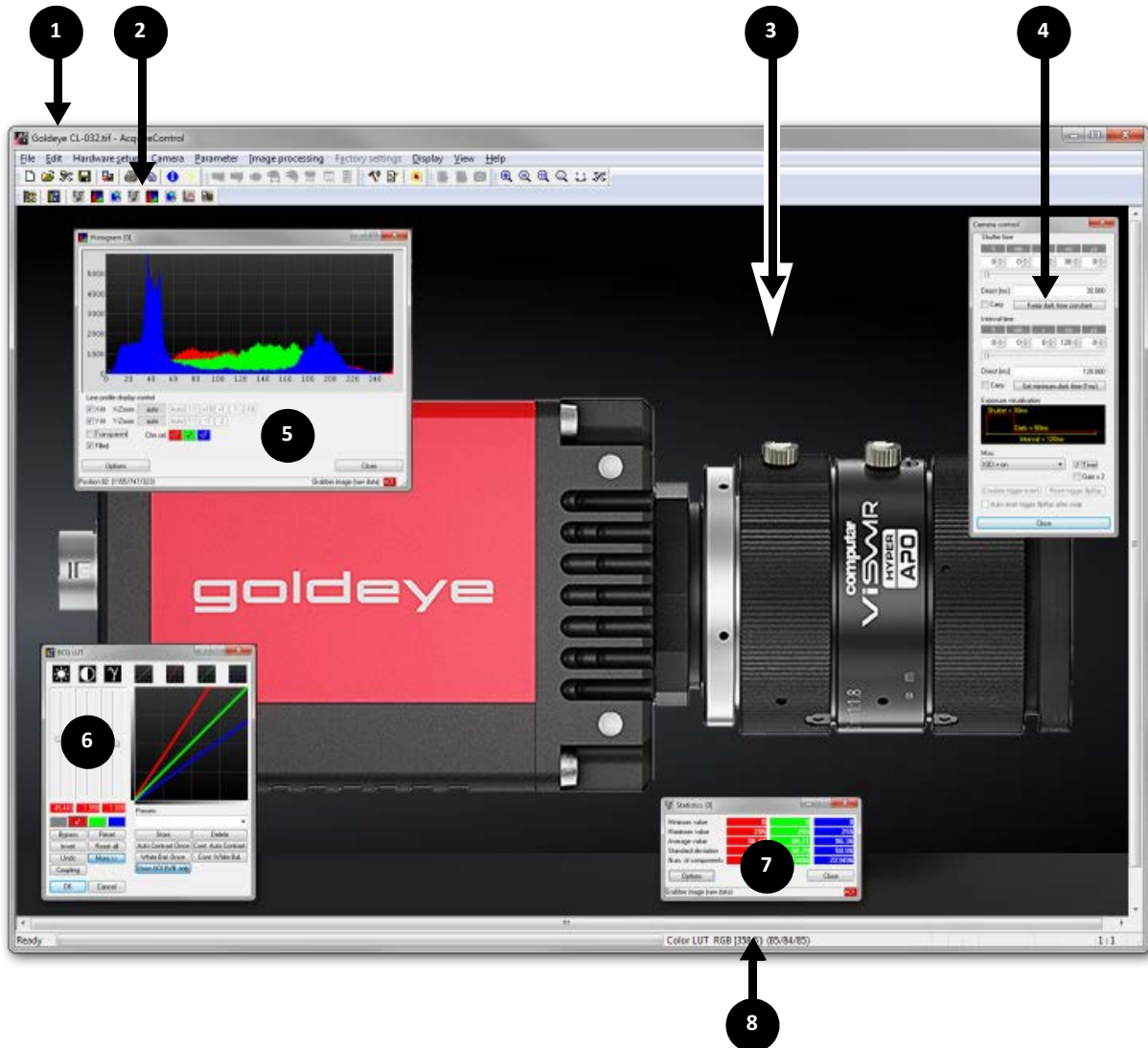
Figure 9: AcquireControl: Graphical User Interface (GUI)

Number	Description
1	Main window
2	Program toolbars
3	Document window
4	Camera control dialog: Controls miscellaneous camera parameters.
5	LUT dialog: Adjusts color balance and white balance.
6	Statistics dialog: Display of statistical image data
7	Histogram Dialog: Display of a histogram
8	Status bar

Table 6: GUI descriptions

Note when creating a new document

If a new document is created, the old document is closed and its camera connection is disconnected.

Main toolbar

Figure 10: Main toolbar

Icon	Description
	Creates new document.
	Opens file.
	Setups source image for save.
	Saves file.
	Saves current display image.
	Prints document.
	Copies to clipboard.
	Displays program information.
	Shows help file.

Table 7: Main toolbar - description

Hardware setup toolbar

Figure 11: Hardware setup toolbar

Icon	Description
	Changes frame grabber.
	Changes frame grabber options.
	Changes camera.
	Changes camera video mode.
	Changes camera timing.
	Selects communication channel.
	Shows camera terminal window.
	Changes camera gain.

Table 8: Hardware setup toolbar - description

Parameter toolbar

Figure 12: Parameter toolbar

Icon	Description
	Changes application parameters.
	Changes logging settings.
	Shows point of gravity.

Table 9: Parameter toolbar - description

Camera control toolbar

Figure 13: Camera control toolbar

Icon	Description
	Starts continuous snap.
	Stops continuous snap.
	Starts single snap.

Table 10: Camera control toolbar - description

Image processing toolbar

Figure 14: Image processing toolbar

Dynamic toolbar

This toolbar adjusts dynamically depending on the selected image process chain.

Icon	Description
	Change image processing chain.
	Modify LUT settings.
	Display statistics (Analyze group 0).
	Display histogram (Analyze group 0).
	Display pixel table (Analyze group 0).
	Display statistics (Analyze group 1).
	Display histogram (Analyze group 1).
	Display pixel table (Analyze group 1).
	Display line profile (Analyze group 0).
	Display line profile (Analyze group 1).
	Display autosave options.

Table 11: Image processing toolbar - description

Display toolbar

Figure 15: Display toolbar

Icon	Description
	Increase zoom
	Decrease zoom
	Set zoom to 1:1
	Set best fit zoom
	Toggle between hard- and soft zoom
	Change display image of the chain

Table 12: Display toolbar - description

Hard and soft zoom

Hard zoom: setting the enlargement of the image is done by simple pixel repetition.

Soft zoom: the enlargement is done by interpolation between pixels. This algorithm generates softer images, but the processing speed is reduced. Soft zoom works only in combination with DirectX.

Status bar
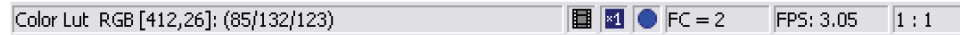
Figure 16: Status bar

Icon	Description
Color Lut RGB	Pixel data source
[412,26]:	Current mouse position
(85/132/123)	RGB or gray value for the current pixel
▦	Current image acquisition mode
×1	Current camera gain
●	Camera cooling state
FC = 2	Image counter
FPS: 3.05	Current frame rate
1 : 1	Current zoom

Table 13: Status bar - description

To show or hide the status bar and the toolbars: Go to View menu and check/ uncheck the corresponding item.
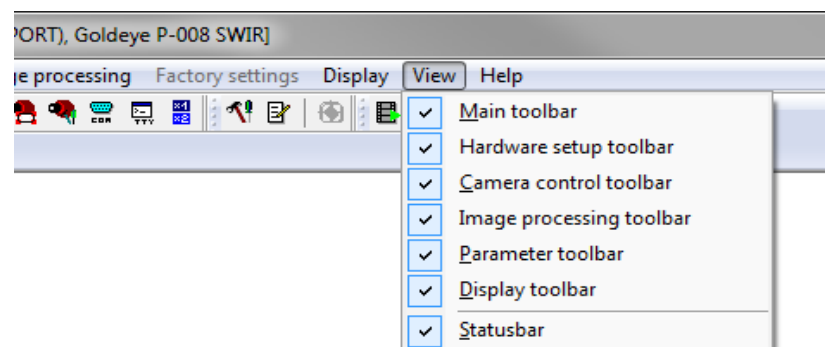
Table 14: Show or hide the status bar and the toolbars

Hardware setup

All hardware relevant parameters like frame grabber type, camera and video mode can be configured within the **Hardware setup toolbar** or the **Hardware setup menu**.
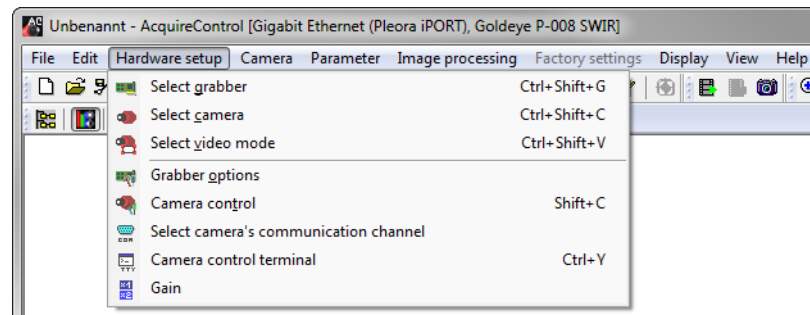
Figure 17: Hardware setup

Selecting a frame grabber

A frame grabber defines the hardware and SDK that AcquireControl uses to access cameras. To select a frame grabber:

1. In the **Grabber Selection** dialog, click the `Select Grabber` button.
2. The following dialog offers all available types of frame grabbers.
3. Click OK.
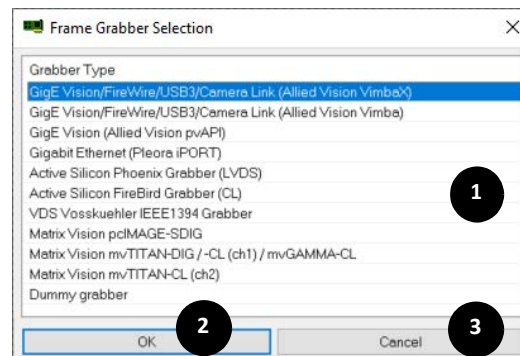
Figure 18: Grabber Selection

Number	Element	Description
1		List of all supported frame grabbers
2	OK	Confirms the adjustments and closes the dialog.
3	Cancel	Rejects the adjustments and closes the dialog.

Table 15: Grabber selection - description

4. The application tries to open the frame grabber. In the case of a failure, an error message is displayed.

Grabber type	Required SDK or software interface	Supported cameras
GigE Vision/FireWire/ USB3/Camera Link (VimbaX)	VimbaX (must be installed separately)	All Allied Vision cameras with: • GigE interface • Goldeye CL cameras • FireWire interface (**excluding** former VDS Vosskühler cameras with IEEE1394 interface) • USB3
GigE Vision/FireWire/ USB3/Camera Link (Vimba)	Vimba (must be installed separately)	All Allied Vision cameras with: • GigE interface • Goldeye CL cameras (camera control **only**) • FireWire interface (**excluding** former VDS Vosskühler cameras with IEEE1394 interface) • USB3
GigE Vision	PvAPI (included in AcquireControl package)	All Allied Vision cameras with GigE interface (**excluding** Bigeye P, Goldeye P, Pearleye P, and all VDS Vosskühler cameras with GIP-1000 module)
Gigabit Ethernet	Pleora iPort (included in AcquireControl package, drivers must be installed separately)	Bigeye P, Goldeye P, Pearleye P, all former VDS Vosskühler cameras with GIP-1000 module
Active Silicon Phoenix Grabber (LVDS)	Active Silicon Phoenix SDK and grabber driver (must be installed separately)	All former VDS Vosskühler cameras with LVDS interface (CCD-xxxx, NIR-xxxx, IRC-xxxx, and related)
Active Silicon Firebird Grabber (CL)	Active Silicon Firebird SDK and grabber driver (must be installed separately)	All former VDS Vosskühler cameras with CLA-1 adapter or CPP-1000 module (CCD-xxxx, NIR-xxxx, IRC-xxxx, and related)
VDS Vosskühler IEEE1394 Grabber	VDS Vosskühler IEEE1394 SDK and driver (must be installed separately)	All former VDS Vosskühler cameras with IEEE1394 interface
Matrix Vision pcIMAGE-SDG	Matrix Vision SDK and driver (must be installed separately)	All former VDS Vosskühler cameras with LVDS interface (CCD-xxxx, NIR-xxxx, IRC-xxxx, and related)
Matrix Vision mvTITAN-DIG/CL (ch1) Matrix Vision mvGAMMA-CL	Matrix Vision SDK and driver (must be installed separately)	All former VDS Vosskühler cameras with LVDS interface, CLA-1 adapter, or CPP-1000 module (CCD-xxxx, NIR-xxxx, IRC-xxxx, and related)

Table 16: AcquireControl grabber description

Grabber type	Required SDK or software interface	Supported cameras
Matrix Vision mvTITAN-CL (ch2)	Matrix Vision SDK and driver (must be installed separately)	All former VDS Vosskühler cameras with CLA-1 adapter or CPP-1000 module (CCD-xxxx, NIR-xxxx, IRC-xxxx, and related)
Dummy Grabber	Not applicable	Virtual frame grabber to enable testing the application without any frame grabber or camera

Table 16: AcquireControl grabber description

Adjustment of frame grabber parameters for Pleora

If you work with a Pleora iPORT GigE camera, you have to assign an IP address to the GigE interface after powering on the camera.

Use the **Grabber Options** dialog.

The following dialog lists all network adaptors of the PC and the cameras connected to them.

Yellow exclamation mark

If a yellow exclamation mark is displayed on the camera icon, right-click the camera entry and choose `Set IP...` .
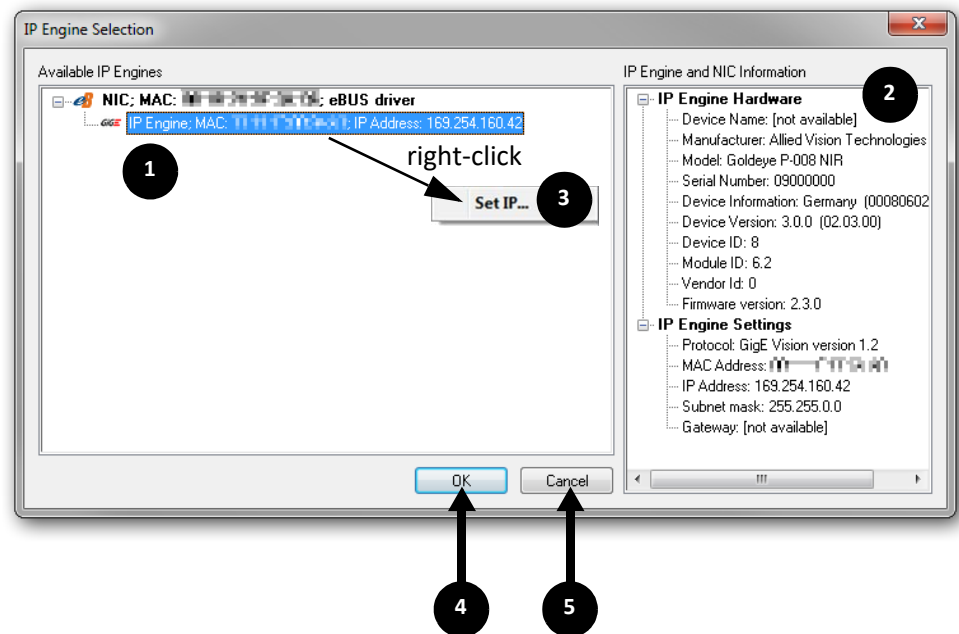
Figure 19: IP Engine selection

Number	Element	Description
1	List	List of all found NICs (Network interface cards), iPORT and eBUS IP devices (cameras).
2	IP Engine and NIC information	Shows detailed information about the used network card and the selected camera.
3	Set IP...	Right-click a camera entry. In the context menu, click `Set IP...` to change the IP address of the camera.
4	OK	Confirms the adjustments and closes the dialog.
5	Cancel	Rejects the adjustments and closes the dialog.

Table 17: IP engine selection - description

Yellow exclamation mark

If a yellow exclamation mark is displayed on the camera icon, there is a conflict regarding the IP address of the camera.

Right-click the camera name and open the IP dialog to change the settings.
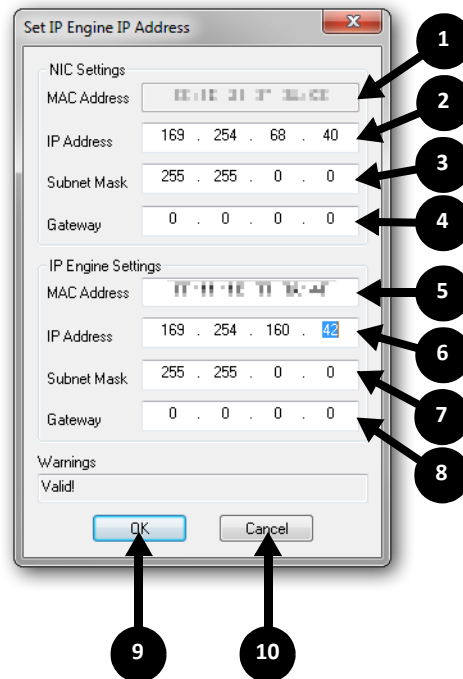
Figure 20: Set IP: Engine IP Address

Number	Element	Description
1	MAC Address	MAC address of the network interface card (NIC)
2	IP Address	IP address of the NIC. The GigE camera and the NIC must work in the same IP address range. Example: NIC IP address: **169.254.68.40** NIC subnet mask: **255.255.0.0**
3	Subnet Mask	Subnet address of the NIC
4	Gateway	IP address of the gateway If the Ethernet interface is not used for other communication, then you can set the gateway to 0.0.0.0
5	MAC Address	MAC address of the GigE camera.

Table 18: Set IP: Engine IP Address - description (sheet 1 of 2)

Number	Element	Description
6	IP Address	IP address of the GigE camera. The GigE camera and the NIC must work in the same IP address range. Example: GigE camera IP address: **169.254.160.42** GigE camera subnet mask: **255.255.0.0**
7	Subnet Mask	Subnet address of the GigE camera
8	Gateway	IP address of the gateway If the Ethernet interface is not used for other communication, then you can set the gateway to **0.0.0.0**
9	OK	Confirms the adjustments and closes the dialog.
10	Cancel	Rejects the adjustments and closes the dialog.

Table 18: Set IP: Engine IP Address - description (sheet 2 of 2)

Adjustment of frame grabber parameters for Matrix Vision

To change the hardware configuration for a grabber, use the Grabber Options button in the Hardware Setup dialog. In most cases however, work with the basic settings.
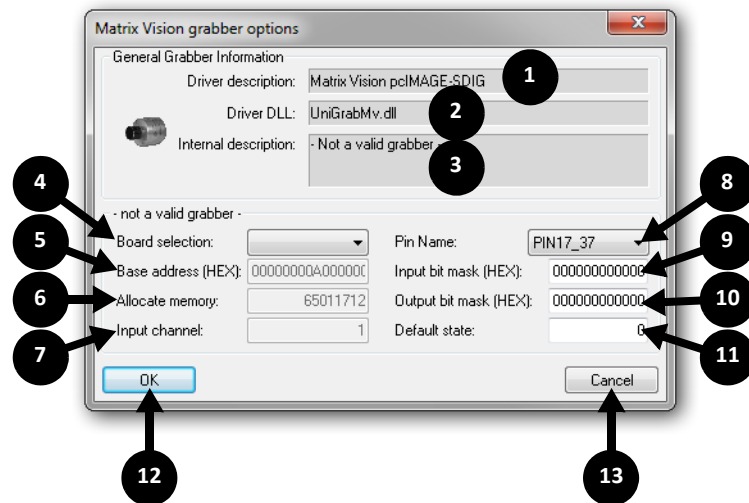
Figure 21: Matrix Vision frame grabber options

Number	Element	Description
1	Driver description	Name of the frame grabber.
2	Driver DLL	Used frame grabber library.
3	Internal description	Further information on the driver and the used low-level driver.
4	Board selection	Choose the hardware frame grabber. This is necessary if you work with more than one frame grabber.
5	Base address (HEX)	For pcImage-SDIG boards older than V2.05, the base address has to be adjusted as a hexadecimal value. Standard: A0000000.
6	Allocate memory	Allocated frame grabber memory in bytes. This value has to be at least as big as **Camera resolution x Number of buffers from Application options dialog**. (Adjustment is only valid for pcImage-SDIG frame grabbers, standard: 65011712). **Note**: In case of an mvTITAN-DIG/mvTITAN-CL or an mvGAMMA-CL frame grabber, the memory is adjusted with the Matrix Vision tool **SetDMA**.
7	Input channel	Input channel for Matrix Vision mvTITAN-CL frame grabbers.
8	Pin Name	Name of the frame grabber I/O port-pin to be configured.
9	Input bit mask (HEX)	Hexadecimal bit mask for an input signal.
10	Output bit mask (HEX)	Hexadecimal bit mask for an output signal.
11	Default state	Standard value for the actual port (0 or 1).
12	OK	Confirms the adjustments and closes the dialog.
13	Cancel	Rejects the adjustments and closes the dialog.

Table 19: Matrix Vision frame grabber options - description

Adjustment of frame grabber parameters for Active Silicon

To change the hardware configuration for a grabber, use the Grabber Options button in the Hardware Setup dialog. In most cases however, work with the basic settings.
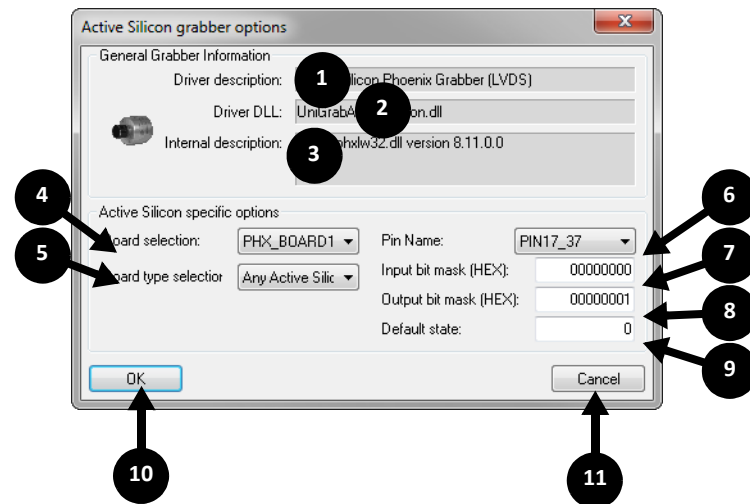
Figure 22: Active Silicon frame grabber options

Number	Element	Description
1	Driver description	Name of the frame grabber.
2	Driver DLL	Used frame grabber library.
3	Internal description	Further information on the driver and the used low-level driver.
4	Board selection	Choose the hardware frame grabber. This is necessary if you work with more than one frame grabber.
5	Board type selector	The frame grabber type can be adjusted here.
6	Pin Name	Name of the frame grabber I/O port-pin to be configured.
7	Input bit mask (HEX)	Hexadecimal bit mask for an input signal.
8	Output bit mask (HEX)	Hexadecimal bit mask for an output signal.
9	Default state	Standard value for the actual port (0 or 1).
10	OK	Confirms the adjustments and closes the dialog.
11	Cancel	Rejects the adjustments and closes the dialog.

Table 20: Active Silicon frame grabber options - description

Selecting a camera

Depending on the frame grabber used, different dialogs for camera selection appear.

Using Pleora GigE or Matrix Vision frame grabbers

If you work with a Pleora GigE interface or a Matrix Vision frame grabber, the following camera selection dialog appears.

If the selection does not match the real camera hardware, no correct image display occurs.
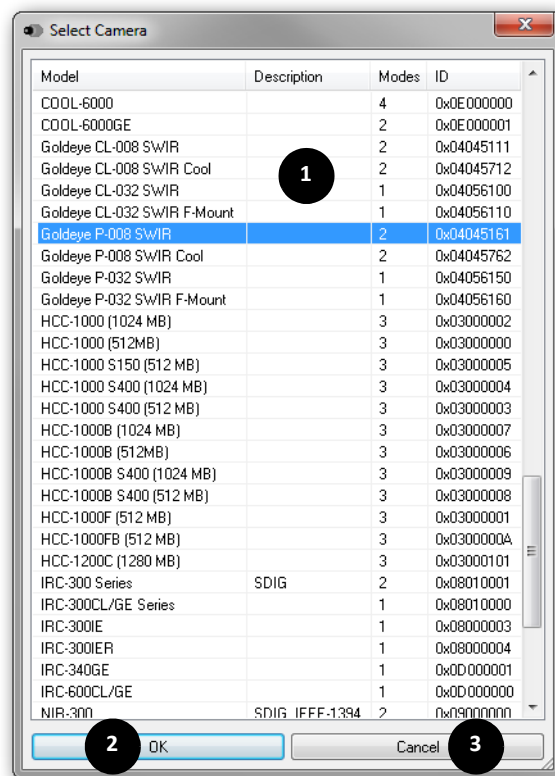
Figure 23: Select camera

Number	Element	Description
1	List	Shows all camera configurations including the number of defined graphic modes and the camera ID.
2	OK	Confirms the adjustments and closes the dialog.
3	Cancel	Rejects the adjustments and closes the dialog.

Table 21: Select camera - description

Selecting a camera using PvAPI

If you work with PvAPI, the following camera selection dialog appears.
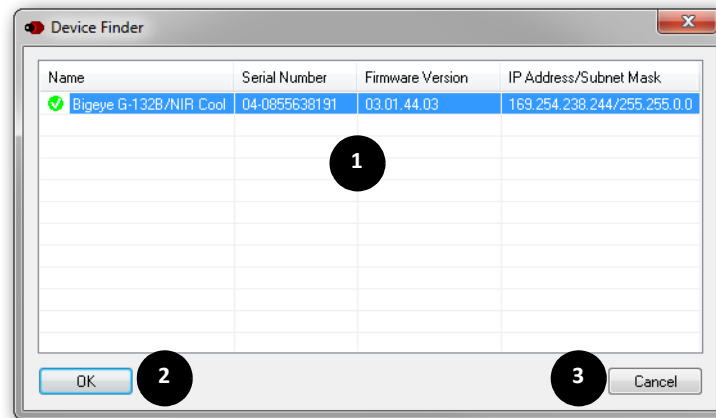
Figure 24: Select camera

Number	Element	Description
1	List	Lists found GigE cameras including the name, serial number, firmware version, and the IP address or subnet mask.
2	OK	Confirms the adjustments and closes the dialog.
3	Cancel	Rejects the adjustments and closes the dialog.

Table 22: IP configuration - description

Right-click a camera entry. In the context menu, configure the IP address of the camera.
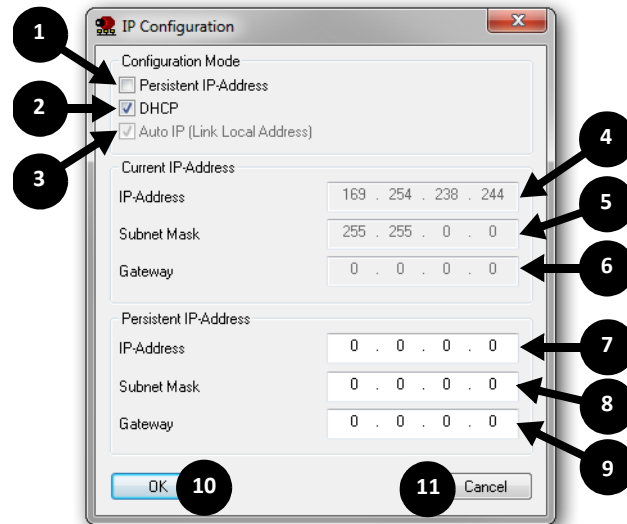
Figure 25: IP configuration

Number	Element	Description
1	Persistent IP address	If you want to set the IP address for the GigE camera manually, activate this check box and enter the data in fields 7/8/9.
2	DHCP	If there is a DHCP server in your network, then the IP address for the GigE camera is distributed from the DHCP server.
3	Auto IP (Link Local Address)	If there is no DHCP server in your network, then the Link-Local Address mechanism (APIPA or Auto IP) provides the GigE camera with an IP address.
4	IP address	**Current** IP address of the GigE camera
5	Subnet Mask	**Current** subnet address of the GigE camera
6	Gateway	IP address of the gateway
7	IP Address	**Persistent** IP address of the GigE camera
8	Subnet Mask	**Persistent** subnet address of the GigE camera
9	Gateway	IP address of the gateway
10	OK	Confirms the adjustments and closes the dialog.
11	Cancel	Rejects the adjustments and closes the dialog.

Table 23: IP configuration - description

Selecting a Camera using Vimba/VimbaX

If you are using VimbaX or Vimba, the following camera selection dialog appears:
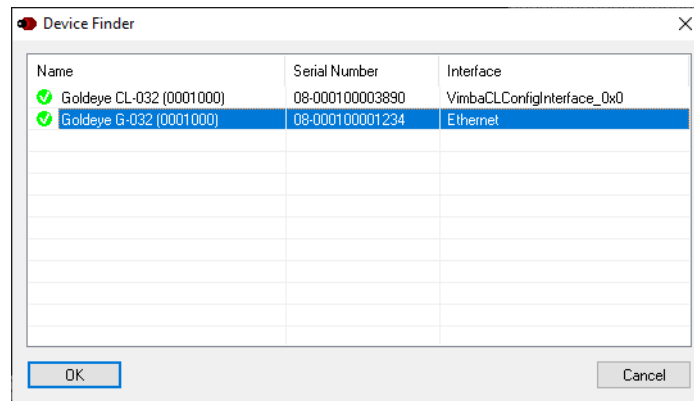
Figure 26: Camera selection in VimbaX or Vimba

Virtual cameras

If you work with the virtual frame grabber dummy grabber, the camera can be simulated completely.
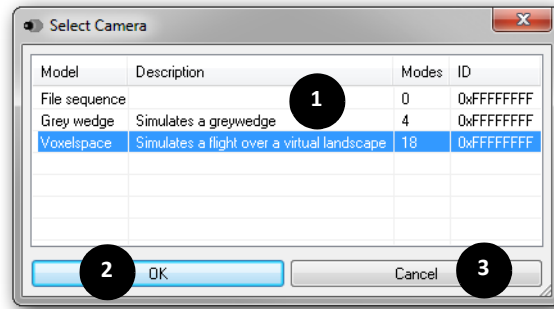
Figure 27: Select virtual camera

Number	Element	Description
1	List	Shows all camera configurations.
		File sequence: A predefined image sequence.
		Gray wedge: Gray or color wedge animation.
		Voxelspace: Scenery animation.
2	OK	Confirms the adjustments and closes the dialog.
3	Cancel	Rejects the adjustments and closes the dialog.

Table 24: Select virtual camera - description

Selecting camera resolution

Also in this case miscellaneous frame grabbers may appear, according to the used frame grabber.

Using Pleora GigE or Matrix Vision Deprecated

For the Pleora GigE or Camera Link interface, the following dialog appears.
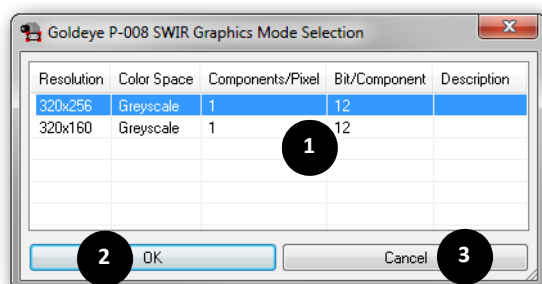
Figure 28: Graphics mode selection

Number	Element	Description
1	List	Shows all camera resolutions, color space, components/pixel and bits/component.
2	OK	Confirmation of adjustments and closing of the dialog.
3	Cancel	Rejection of adjustments and closing of the dialog.

Table 25: Graphics mode selection - description

The resolution listed in this dialog is the resolution of RAW images. This resolution does not have to correspond with the resolution displayed in the main application.

Virtual cameras

If you work with a virtual camera, select the video mode or image sequence.

Allied Vision

Camera control by Pleora GigE and Matrix Vision Deprecated

Cameras with Pleora GigE interface that are connected to Matrix Vision frame grabbers enable timing control by 3 different dialogs that appear according to the connected camera. All modifications regarding the timing and other adjustments of camera parameters are directly transferred to the camera.

Availability

This dialog is **available only** for cameras using deprecated frame grabbers (such as Matrix Vision frame grabbers), with FireWire cameras or Pleora based cameras.

This dialog is **unavailable** when operating PvAPI, VimbaX, or Vimba. It is also unavailable for LWIR cameras.

Figure 29: Camera control for standard cameras

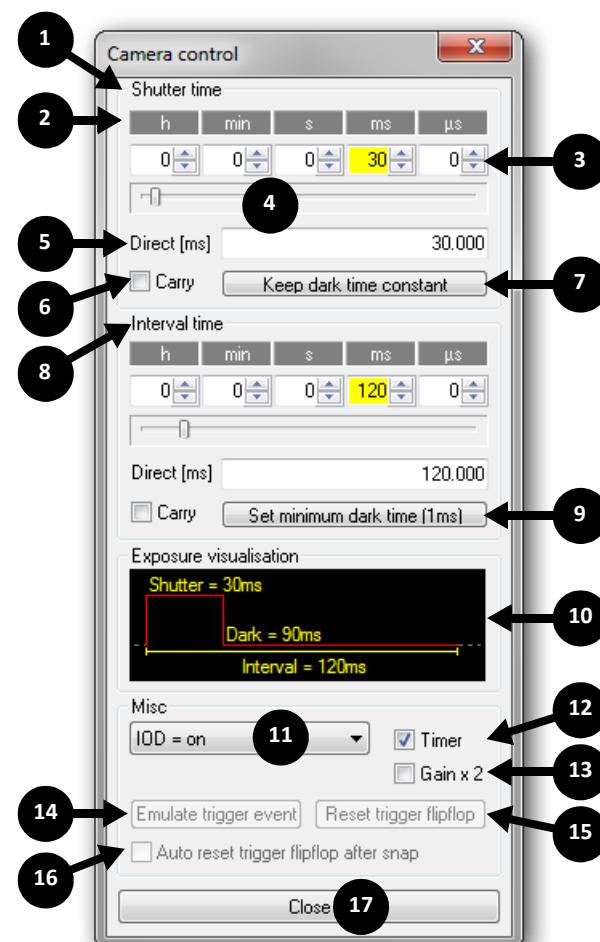| Number	Element	Description
1	Shutter time	Within this group, all parameters regarding the active exposure time are determined.
2	Time units of the input controls	Click on the time unit to set the accompanying value to zero. The value that is adjustable via the main slider is highlighted in color.
3	Input controls for the value per time unit	The input field of the last active time unit is highlighted in color.
4	Main slider	Controls the active exposure time unit. The active unit is always highlighted in color.
5	Direct [ms]	Input control for direct input of the shutter time in milliseconds.
6	Carry	If enabled, an automatic carry to the next time unit occurs.
7	Keep dark time constant	If selected, the dark time is kept constant.
8	Interval time	Within this group, all parameters regarding the interval time are determined. The adjustment mechanism is similar to the shutter adjustments.
9	Set minimum dark time	Sets the minimum possible value for the dark time. Due to this, the camera works with the maximum frame rate.
10	Exposure visualisation	Graphic display of the exposure time signal.
11	Misc	Here the frame output mode is adjusted. The number of available modes depends on the selected camera. • Continuous: Select continuous frame output of the camera. The exposure time adjustment controls have no function. • IOD = on: Enables the Image On Demand mode. The camera now generates a frame only when an external trigger or timer pulse occurs. • Trigger once: A frame is generated once when a trigger pulse occurs. The exposure time is controlled by the pulse length. • Start timer by trigger: Start the timer when a trigger pulse occurs. • Stop timer by trigger: Stop the timer when a trigger pulse occurs. • Start/Stop timer by trigger: Start or stop the timer with every trigger pulse.
12	Timer	Via this button the timer is enabled.
13	Gain x 2	Changes the camera amplification.
14	Emulate trigger event	Emulates a trigger pulse. The pulse is stored within a flip-flop.
15	Reset trigger flip-flop	Erases the trigger pulse within the flip-flop.
16	Auto reset trigger flip-flop after snap	If activated, the flip-flop resets itself after a trigger has been recognized. The camera is ready for the next trigger without user interaction.
17	Close	Closes the dialog.

Table 26: Camera control of standard cameras

Camera control by PvAPI

For cameras controlled by PvAPI, the camera control dialog gives access to all GigE Vision features supported by the camera.

Figure 30: Camera feature control for PvAPI

The controls window is used to configure the camera frame rate, exposure time, imaging mode pixel format, and much more. The features available in this dialog depend on the camera.

Control descriptions

A detailed explanation of the controls can be found in the GigE Camera and Driver Attributes reference document at www.alliedvision.com/en/support/technical-documentation.

Camera control by VimbaX or VimbaX

For cameras controlled by VimbaX or Vimba, the camera control dialog gives access to all features supported by the camera.

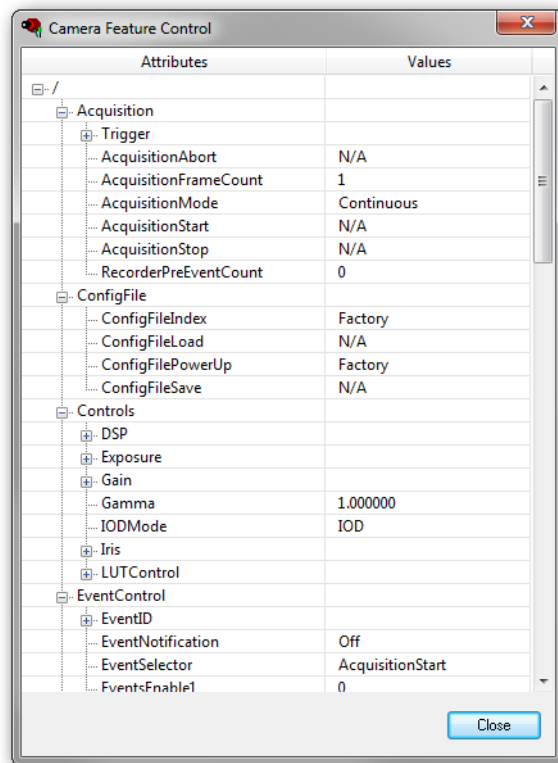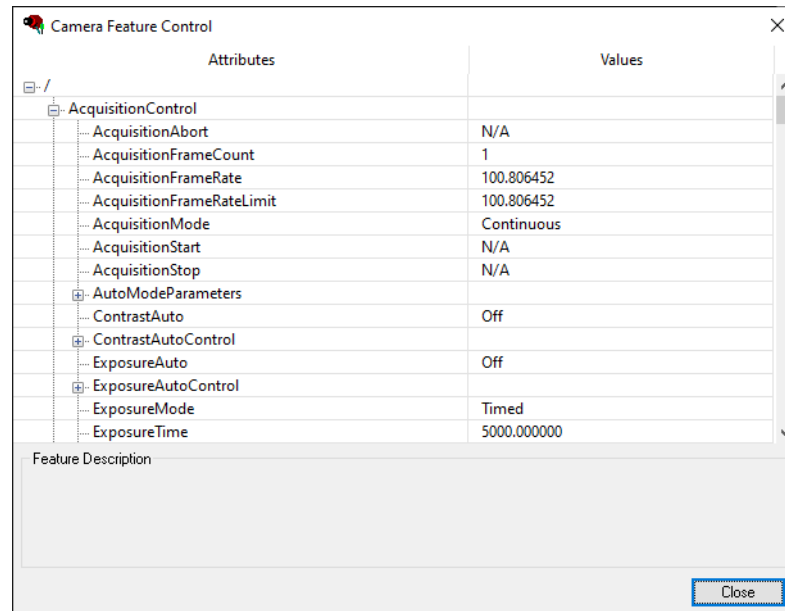*Figure 31: Camera feature control in VimbaX or Vimba*

The controls window is used to configure the camera frame rate, exposure time, imaging mode, pixel format, and much more. The features available in this dialog depend on the camera.

Feature descriptions

A detailed explanation of the features can be found in the GigE Features Reference at www.alliedvision.com/en/support/technical-documentation.

Camera control of LWIR cameras Deprecated

To control the camera, select the menu item Hardware setup → Camera control or the corresponding icon on the hardware setup toolbar.

This dialog is **only available for LWIR** cameras.

Most LWIR cameras don't need this dialog anymore. Therefore the controls may be grayed out.
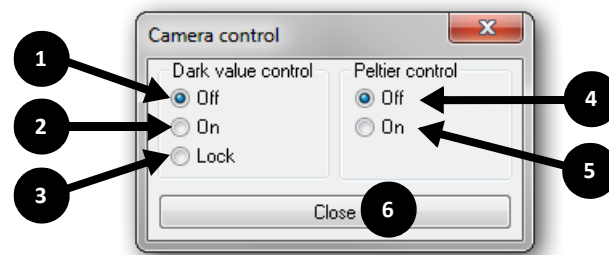
Figure 32: Camera control of LWIR cameras

Number	Element	Description
1	Off	Switch dark value control off.
2	On	The lowest line of the image is used as a reference line for controlling the dark value.
3	Lock	Locks the last determined reference value.
4	Off	Switch off the temperature regulated reference area for dark value control in the camera.
5	On	Switch on the temperature regulated reference area for dark value control in the camera (only available if supported by the camera).
6	Close	Closes the dialog.

Table 27: Camera control of LWIR cameras

Camera communication

For some cameras, you can open a serial communication channel if you want to change, for example, configuration values.

COM port selection

Depending on the selected frame grabber, different ports are listed here.
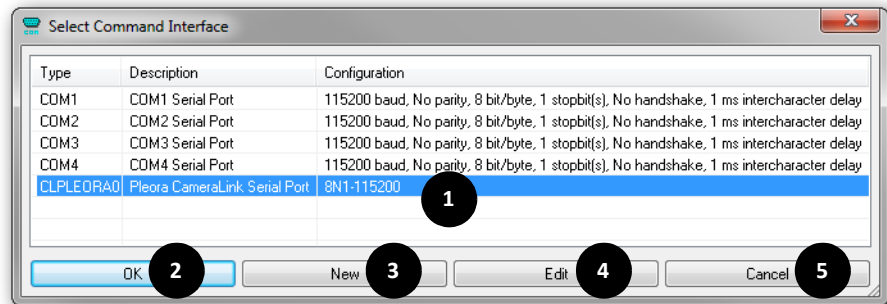
Figure 33: Select serial command interface

Number	Element	Description
1	List	Lists all available communication ports.
2	OK	Confirms adjustments and closes the dialog.
3	New	Creates a new communication port. Opens a pop-up menu. Add a new COM port to the list.
4	Edit	Shows a dialog for configuring the selected COM port.
		If using the Pleora Camera Link Serial Port, choose the interface `Serial port 0`.
		For detailed information, see:
		RS232 COM port on page 57
		Camera Link Serial Port Deprecated on page 58
		Pleora GigE Serial Port on page 59
5	Cancel	Rejection of adjustments and closing of the dialog.

Table 28: Select serial command interface - description

RS232 COM port

To configure a system COM port, use the following dialog:
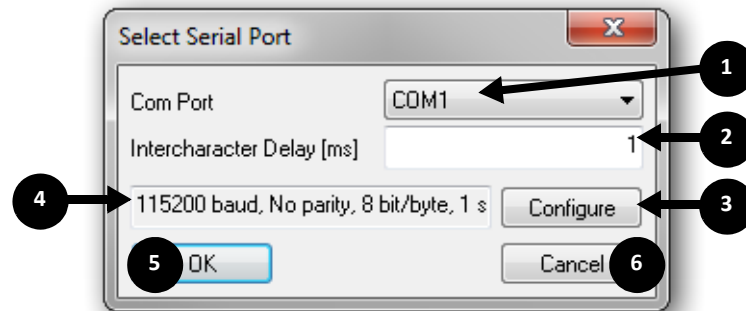
Figure 34: Select Serial Port

Number	Element	Description
1	Com Port	Selects the COM port to configure.
2	Intercharacter delay [ms]	Adjusts the delay between characters.
3	Configure	Opens the system dialog for COM port setup.
4		Current configuration
5	OK	Confirms adjustments and closes dialog.
6	Cancel	Rejects adjustments and closes dialog.

Table 29: DeviceConfig: Select Serial Port

Camera Link Serial Port Deprecated

For controlling a camera directly through its Camera Link Serial Port, the manufacturer of the Camera Link frame grabber must provide a standardized library.

The naming scheme of these libraries is **clser*.dll**. After selecting the library, all available grabber communication channels are listed within the dialog.

The channels are only listed when the grabber is available.

The architecture of the selected library must fit to the architecture of the AcquireControl application:

The **32**-bit (x86) application needs a **32**-bit clser*.dll.

The **64**-bit (x64) application needs a **64**-bit clser*.dll.
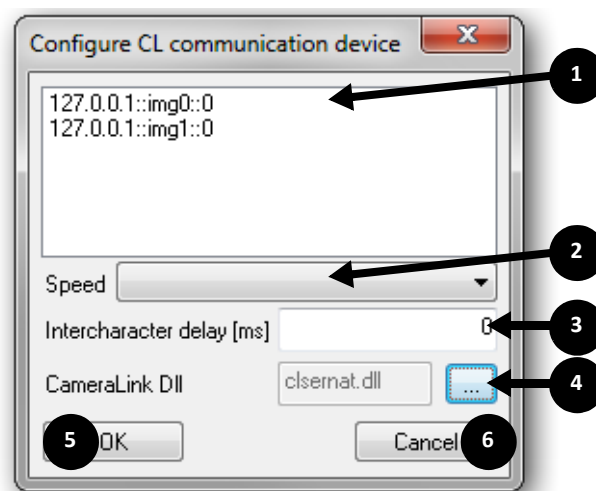
Figure 35: DeviceConfig: Configure CL communication device

Number	Element	Description
1	List	Lists all available ports that the grabber supplies. The name of the port depends on the grabber manufacturer.
2	Speed	Used baud rate. The default value is 115200 baud.
3	Intercharacter delay [ms]	Adjusts the delay between characters.
4	...	Browse for the Serial-Over-Camera Link library.
5	OK	Confirms adjustments and closes dialog.
6	Cancel	Rejects adjustments and closes dialog.

Table 30: DeviceConfig: Configure CL communication device

Exception when using Vimbax or Vimba

Because VimbaX and Vimba use the Camera Link Serial Port for a dedicated GenCP capable transport layer, the **Configure CL** dialog cannot be used when GenCP based Camera Link cameras are operated using VimbaX or Vimba.

Depending on the used Camera Link frame grabber, the **clser*.dll** is located in different folders:

Camera Link frame grabber	Used folder for clser*.dll
National Instruments	C:\Windows\system32\clsernat.dll or C:\Windows\SysWOW64\clsernat.dll
Silicon Software	C:\Windows\system32\clserme4.dll or C:\Windows\SysWOW64\clserme4.dll or C:\CameraLink\clserme4.dll
BitFlow	C:\Program Files\BitFlow SDK x.xx\Bin
Matrox	C:\Windows\system32\clsermtx.dll or C:\Windows\SysWOW64\clsermtx.dll

Table 31: Used folders of different Camera Link frame grabbers

Pleora GigE Serial Port

To configure a Pleora GigE port, use the following dialog:
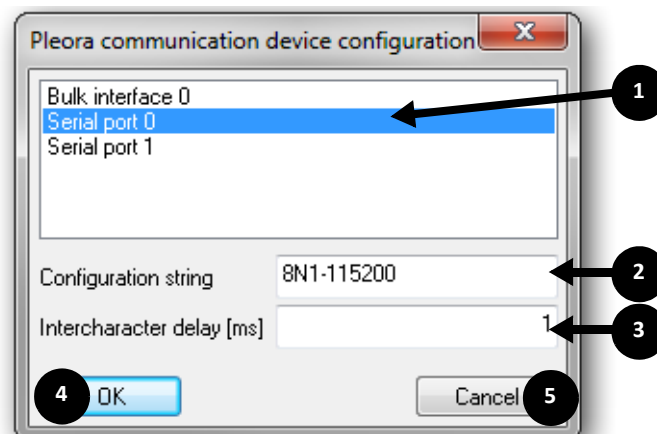
Figure 36: Configure Pleora communication device

Number	Element	Description
1		Lists all available ports. The default port is **Serial port 0**.
2	Configuration string	Configuration string for the selected port. The default string is **8N1-115200**.
3	Intercharact er delay [ms]	Adjusts the delay between characters.
4	OK	Confirms adjustments and closes the dialog.
5	Cancel	Rejects adjustments and closes the dialog.

Table 32: DeviceConfig: Configure Pleora communication device

COM terminal

The terminal window is used for the communication with the camera. The available commands are listed in the camera manual.
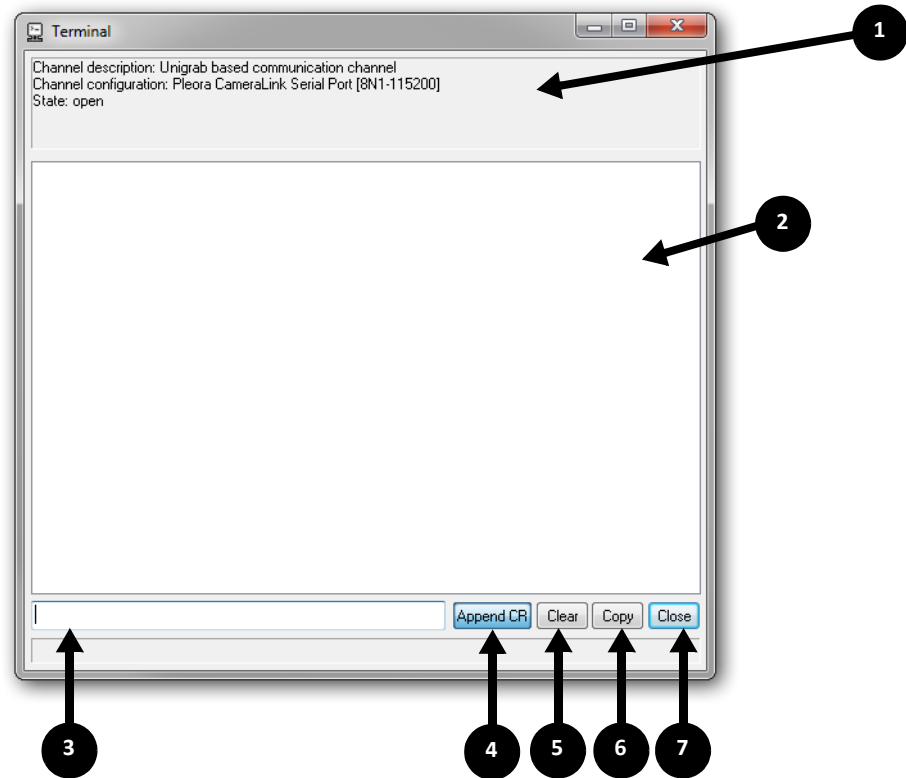
Figure 37: COM terminal

Number	Element	Description
1		This status window displays information about the used COM port and the selected adjustments.
2		Output window
3		Command line
4	Append CR	Toggle on or off: Automatically append a carriage-return after every command.
5	Clear	Clears the output window.
6	Copy	Copies the content of the output window to the windows clipboard.
7	Close	Closes the dialog.

Table 33: COM terminal (descriptions)

Record and image management

Image processing chain

Depending on the format of the input data of the image processing chain, predefined process chains are available. The change is done via the **Image processing toolbar** or via the menu item `Image processing`, → `Select image processing chain.`
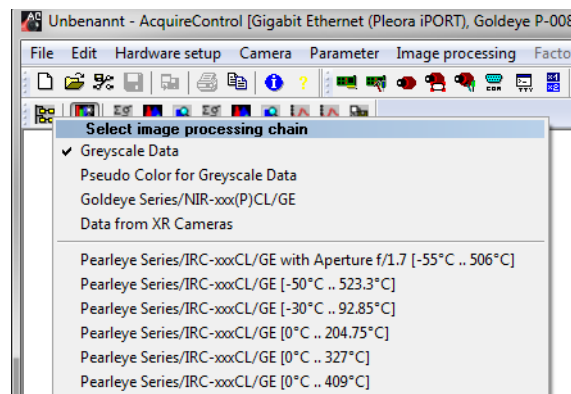
The basic structure of the image process chain is shown in .

Figure 38: Select image processing chain

Name of the image processing chain	Description	Available processing modules
Gray-scale Data	This image processing chain is used for gray-scale cameras or loaded gray-scale images.	BCG LUT
Pseudo Color for Gray-scale Data	This image processing chain is used for gray-scale cameras or loaded gray-scale images. In addition to the *Gray-scale Data* chain, a pseudo color LUT and an image flip can be applied.	Pseudo Color LUT Image flip
Goldeye series/NIR-xxx(P)CL/GE	This image processing chain is used for the following camera series: Goldeye cameras: • Goldeye G/CL-008 • Goldeye G/CL-032 • Goldeye G/CL-033 Goldeye first generation: • Goldeye P-008/NIR-300 • Goldeye-P-032/NIR-600	Background Correction Recursive Filter Flip image Pseudo Color LUT

Table 34: Image processing chain (sheet 1 of 2)

Name of the image processing chain	Description	Available processing modules
Data from XR cameras	This chain is used for X-Ray cameras.	Gain/Offset Correction Background Correction Recursive Filter Flip Image Image Rotation BCG LUT
Pearleye series/IRC-xxxCL/GE with aperture f/1.7 [-55°C...+506°C] [-50°C...+523.30°C] [-30°C...+92.85°C] [0°C...+204.75°C] [0°C...+327°C] [0°C...+409°C]	This chain is used for LWIR cameras with the given temperature range.	Background Correction Recursive Filter Pseudo Color LUT Background Correction Recursive Filter Pseudo Color LUT
RGB-CFA Data	This chain is used for Bayer Mosaic Filter cameras or corresponding loaded CFA images.	Bilinear Interpolation BCG LUT
RGB Data	With this chain loaded RGB images can be displayed.	BCG LUT

Table 34: Image processing chain (sheet 2 of 2)

Live image display

To control the live image display: In the **Camera** menu:
- Start the continuous display (`Start continuous snap`) or
- Start the single snap (`Start single snap`)
- Stop a previously started image acquisition (`Stop snap`).
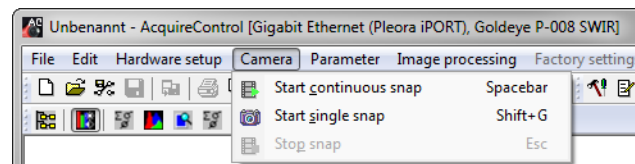

Figure 39: Control live image display

Selecting the displayed image

With the menu `Display`, → `Select display image` you can change the image to be displayed. Depending on which image process chain is available or rather, was chosen, more or less images are available. After every passed image processing module, a display image can be set up.
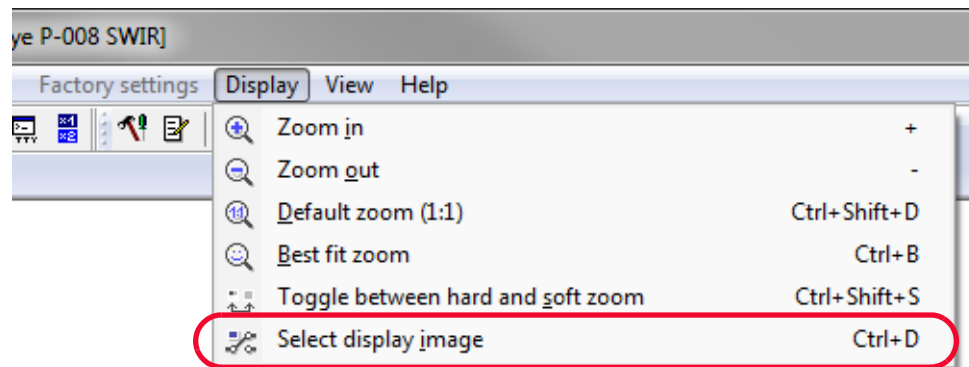

Figure 40: Select display image

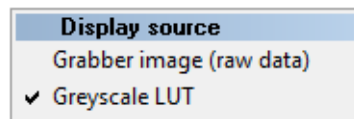As an example, the menu for a gray-scale image is shown here:

Figure 41: Sample Display source menu

Zoom

With the **Display Toolbar**, you can enlarge or reduce the image displayed in the document window. Click the 1:1 button to set the zoom to default.

Note: Hard and soft zoom

Hard zoom: setting the enlargement of the image is done by simple pixel repetition.

Soft zoom: the enlargement is done by interpolation between pixels. This algorithm generates softer images, but the processing speed is reduced. Soft zoom works only in combination with DirectX.
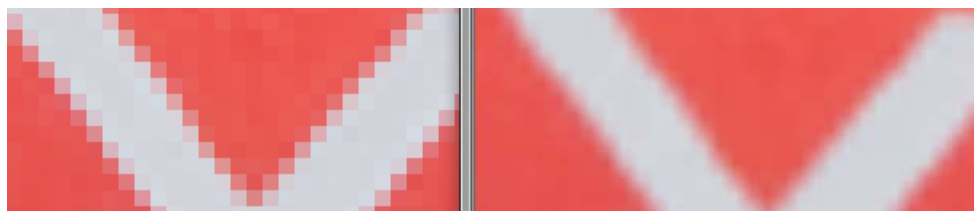

Figure 42: Comparison: hard zoom vs. soft zoom

Loading images

The AcquireControl application is able to load miscellaneous image formats.

The following types are supported:

- TIFF: Tag Image File Format, TIFF-images can be saved with a bit depth of up to 16 bit. Supported are both monochrome formats and RGB formats (uncompressed).
- BMP: Windows Bitmap Format, a maximum of 8 bits per pixel is possible.
- RAW: Raw data format, only the pure image information without additional information is loaded, image resolution, bit depth etc. must be set by the user.
- PGM: (Portable GrayMap) is a proprietary file format for image storage.

Files are loaded via the menu command `File → Open`, the corresponding icon on the main toolbar or simply via drag & drop.

If you work with the **File open** dialog, you can adjust some additional options (click `Options`), in dependence of the image format.
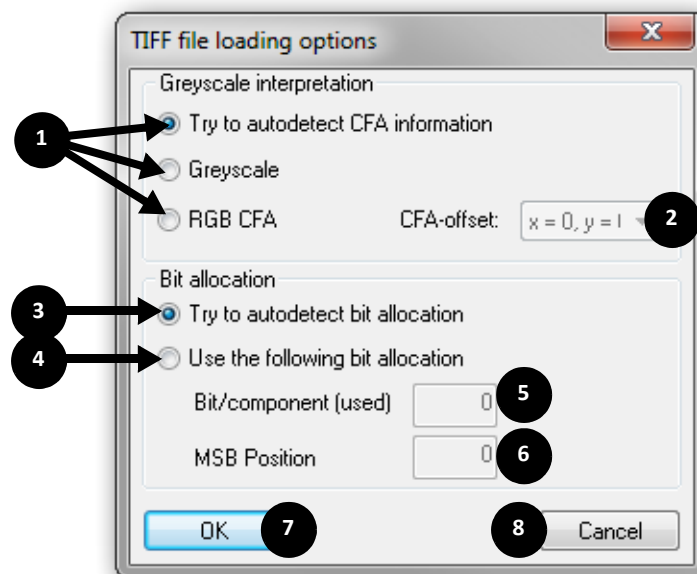
TIFF file loading options

Figure 43: Tiff file loading options

Number	Element	Description
1	Gray-scale interpretation	Indicates if image data are interpreted as: Autodetection Gray-scale values or RGB CFA (Color Field array)
2	CFA offset	Indicates the CFA offset regarding to the pixel within the upper left corner on the sensor.
3	Try to autodetect bit allocation	Tries to automatically detect how the bits are used.
4	Use the following bit allocation	Enter the real used bits per component and the MSB position.
5	Bits/component (used)	Actual number of bits used per component
6	MSB position	**M**ost **S**ignificant **B**it position
7	OK	Confirms the selection and closes the dialog.
8	Cancel	Closes the dialog without applying any changes.

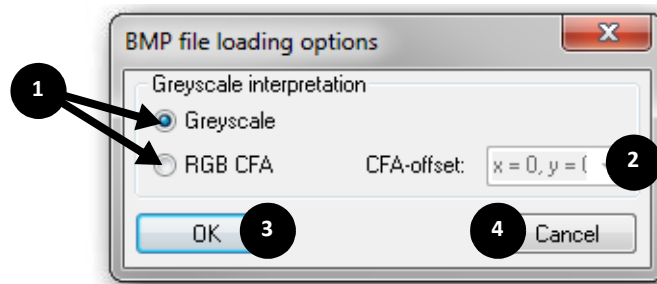*Table 35: TIFF file loading options - description*

BMP file loading options

Figure 44: BMP file loading options

Number	Element	Description
1	Gray-scale interpretation	Indicates if image data are interpreted as: Gray-scale values or RGB CFA (Color Field array)
2	CFA offset	Indicates the CFA offset regarding to the pixel within the upper left corner on the sensor.
3	OK	Confirms the selection and closes the dialog.
4	Cancel	Closes the dialog without applying any changes.

Table 36: BMP file loading options - description

RAW file loading options

Files in RAW format do not contain any kind of image meta information (such as image resolution or pixel format) so it has to be provided from a separate source.
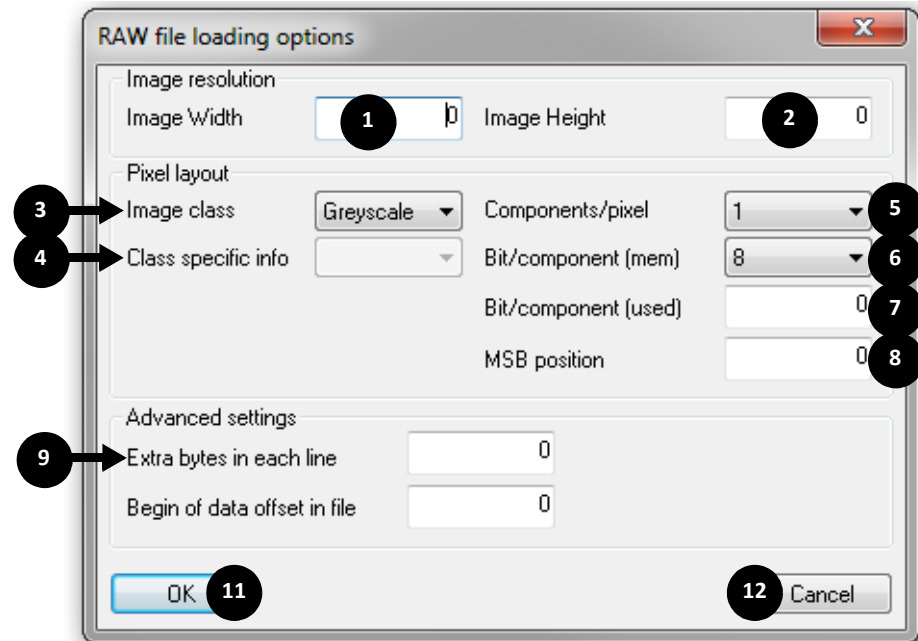

Figure 45: RAW file loading options

Number	Element	Description
1	Image Width	Width of the images in pixels
2	Image Height	Height of the images in pixels
3	Image	Image type
4	Class specific info	Additional parameters depending on image type: e.g. CFA offset
5	Components/pixel	Number of components per pixel: e.g. 3 (for RGB data)
6	Bits/component (mem)	Memory bits per component
7	Bits/component (used)	Actual number of bits used per component
8	MSB position	**M**ost **S**ignificant **B**it position
9	Extra bytes in each line	Number of extra bytes per image line
10	Begin of data offset in file	If the file contains a header, indicate here the position of the first image byte.

Table 37: RAW file loading options - description (sheet 1 of 2)

Number	Element	Description
11	OK	Confirms the selection and closes the dialog.
12	Cancel	Closes the dialog without applying any changes.

Table 37: RAW file loading options - description (sheet 2 of 2)
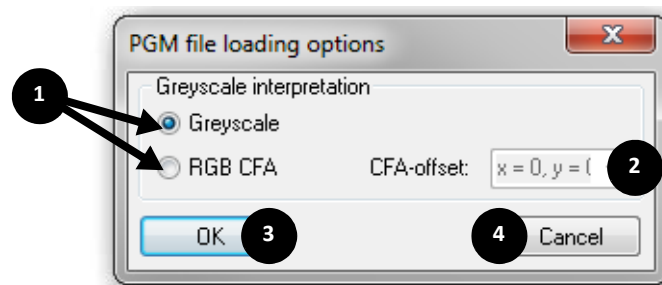
PGM file options

Figure 46: PGM file loading options

Number	Element	Description
1	Gray-scale interpretation	Indicates if image data are interpreted as: Gray scale values or RGB CFA (Color Field array)
2	CFA offset	Indicates the CFA offset regarding to the pixel within the upper left corner on the sensor.
3	OK	Confirms the selection and closes the dialog.
4	Cancel	Closes the dialog without applying any changes.

Table 38: PGM file loading options

Practical Tip

To create a new frame grabber document after loading an image:

Click `File` → `New`

(see Closing the camera and frame grabber on page 118)

Saving images

To save a recorded image, several options are available.

In menu **Select image to save**, define how an image should be saved.

The menu items **Save** and **Save as**... store the defined image.

If at program end an unsaved document exists, a warning is displayed.

The menu item **Select image to save** displays more or less entries, in dependence of the used image process chain.
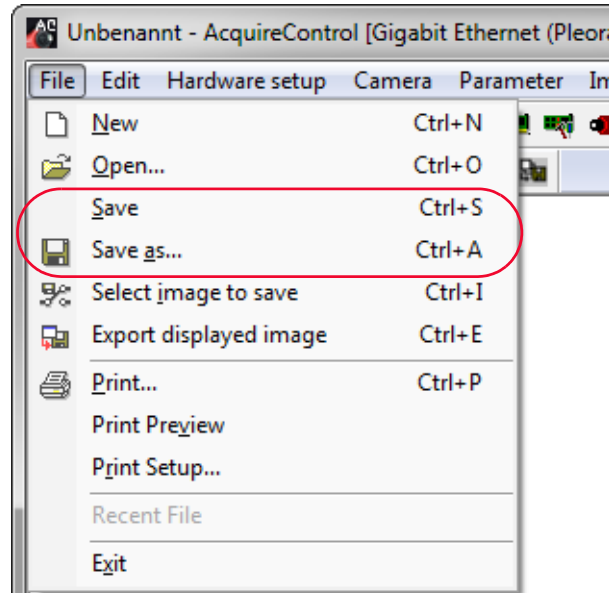

Figure 47: Select image to save

The image which is created in the chain after the menu entry will be saved. The image below shows an example menu for a gray-scale image. With this setting, the raw-data image is saved.
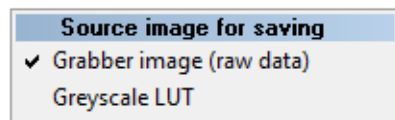

*Figure 48: Example menu for **Source image for saving***

Clipboard

Via the command `Edit → Copy`, the image displayed in the actual document is copied to the Windows clipboard.
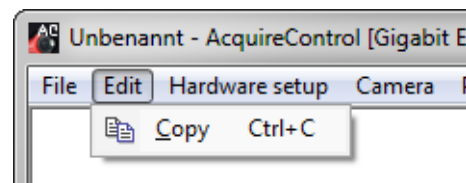

Figure 49: Copy to clipboard

Image parameters and program parameters

AcquireControl offers miscellaneous adjustment and display options for image parameters. All accompanying options are listed on the Image Processing Toolbar. This toolbar is created dynamically and depends on the used image process chain.

Furthermore, all modules are listed within the Image processing menu. The numbers of the analysis modules represent the group number. Each group has one common ROI.
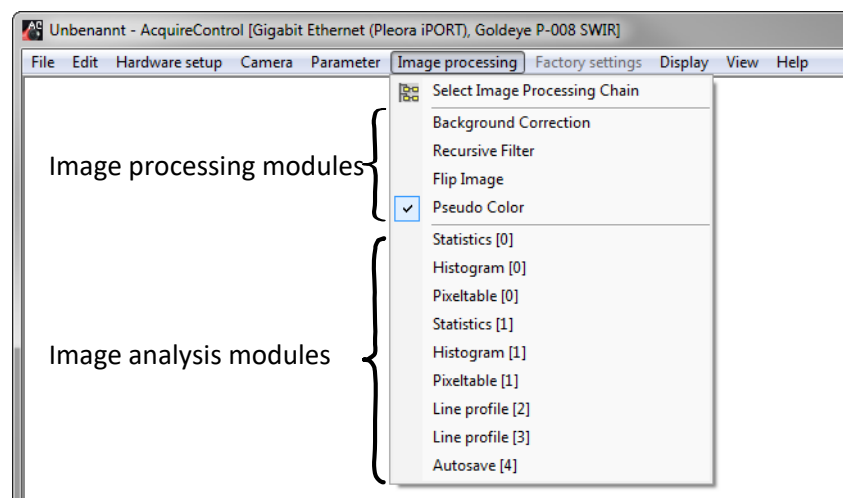

Figure 50: Image processing menu

Options for an analyze group

An analyze group can be configured by the respective button within the analysis dialog. The following menu is shown. An analyze group consists of an ROI, a certain number of analysis modules and a reference to the image in the image process chain to be analyzed (see Functional overview on page 23).
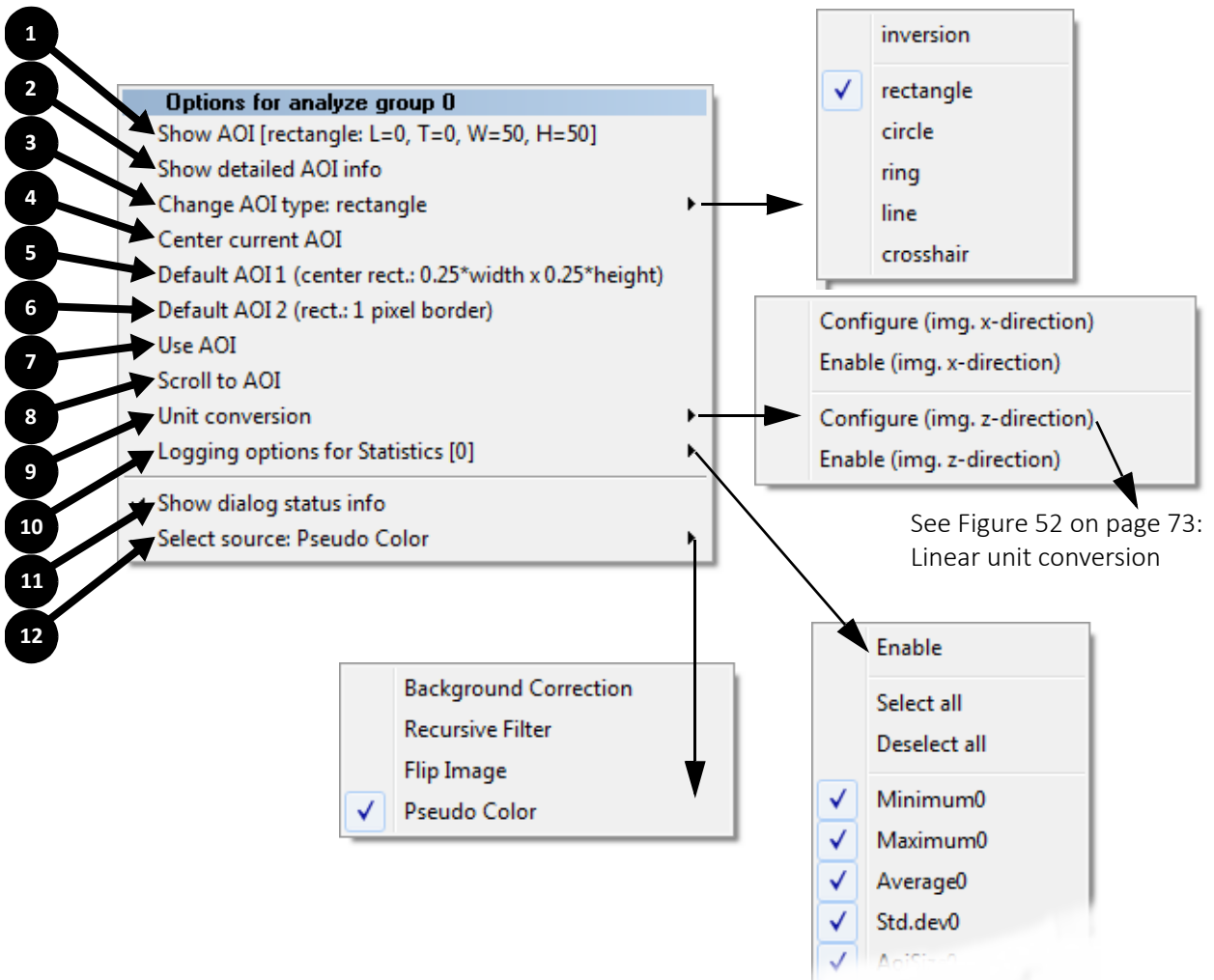
Figure 51: Options for analyze group 0

Number	Element	Description
1	Show AOI	Shows or hides the corresponding ROI (AOI).
2	Show detailed AOI info	Shows additional details for this ROI (AOI).

Table 39: Options for an analyze group - description (sheet 1 of 2)

Number	Element	Description
3	Change AOI type	Changes the ROI (AOI) form: • Inversion: If this option is chosen, the ROI (AOI) is inverted. • Rectangle • Circle • Ring • Line • Crosshair
4	Center current AOI	Moves the current ROI (AOI) to the center of the image.
5	Default AOI1	Sets the default configuration for this ROI (AOI). That is: 0.25 x width of the image and 0.25 x height of the image
6	Default AOI2	Sets the ROI (AOI) to a rectangle covering the full image except a 1 pixel border.
7	Use AOI	Switches this ROI (AOI) on or off. If the ROI (AOI) is disabled, the whole image is used for the analysis module.
8	Scroll to AOI	Scrolls the main window to the ROI (AOI).
9	Unit conversion	Configure (img. x-direction): Currently without function. Enable (img. x-direction): Currently without function. Configure (img. z-direction): Shows the dialog for z-direction (gray-scale) conversion setup. Enable (img. z-direction): Turns conversion on or off. See Figure 52 on page 73 and Figure 40 on page 74: Linear unit conversion.
10	Logging options for ...	Enables the logging options for the calling dialog (e.g. Histogram dialog) (Logging on page 114) This menu entry is only available if the menu is displayed from a dialog. Use the submenu to configure the logging: • `Enable`: Enables or disables the logging for the calling module. • `Select all`: Selects all values. • `Deselect all`: Deselects all values. Subsequently all selectable values of the module are listed.
11	Show dialog status info	Enables or disables the status bar of the corresponding dialog.
12	Select source	Changes the source image for the analyze group. In dependence of the used image process chain, more or less images are available here.

Table 39: Options for an analyze group - description (sheet 2 of 2)

Linear unit conversion

Use the linear unit conversion dialog to convert incoming pixel count values into a user-defined unit according the following formula:

$$y(x) \ = \ m \times \frac{x}{maxX} + b$$

Formula 1: Linear unit conversion (z direction)

x is an input pixel value to be converted

y is the converted output pixel value of the given input pixel value in the desired unit

z-dir means: the unit conversion is applied to the intensity of the pixel value

maxX is calculated by 2^{bits-1}

The adjustments made in this dialog affect all analyze modules within the same group.
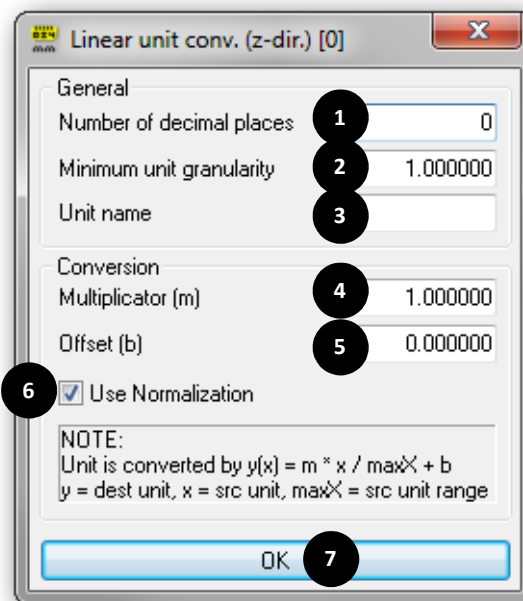
Figure 52: Linear unit conversion

Number	Element	Description
1	Number of decimal places	Number of decimal places
2	Minimum unit granularity	Minimum granularity for unit rounding
3	Unit name	Name of the unit
4	Multiplicator (m)	Multiplicator for conversion
5	Offset (b)	Offset for conversion
6	Use Normalization	The output value is normalized to the bit depth of the acquired image.
7	OK	Confirms the selection and closes the dialog.

Table 40: Linear unit conversion - description

Brightness, contrast and color adjustments

Menu: Image processing → BCG LUT
or

Image processing toolbar: click

To modify brightness, contrast, and gamma, use the LUT dialog (look-up table). After a restart of the application, the last adjustment of the LUT is reconstructed for the camera document.

Monochrome LUT

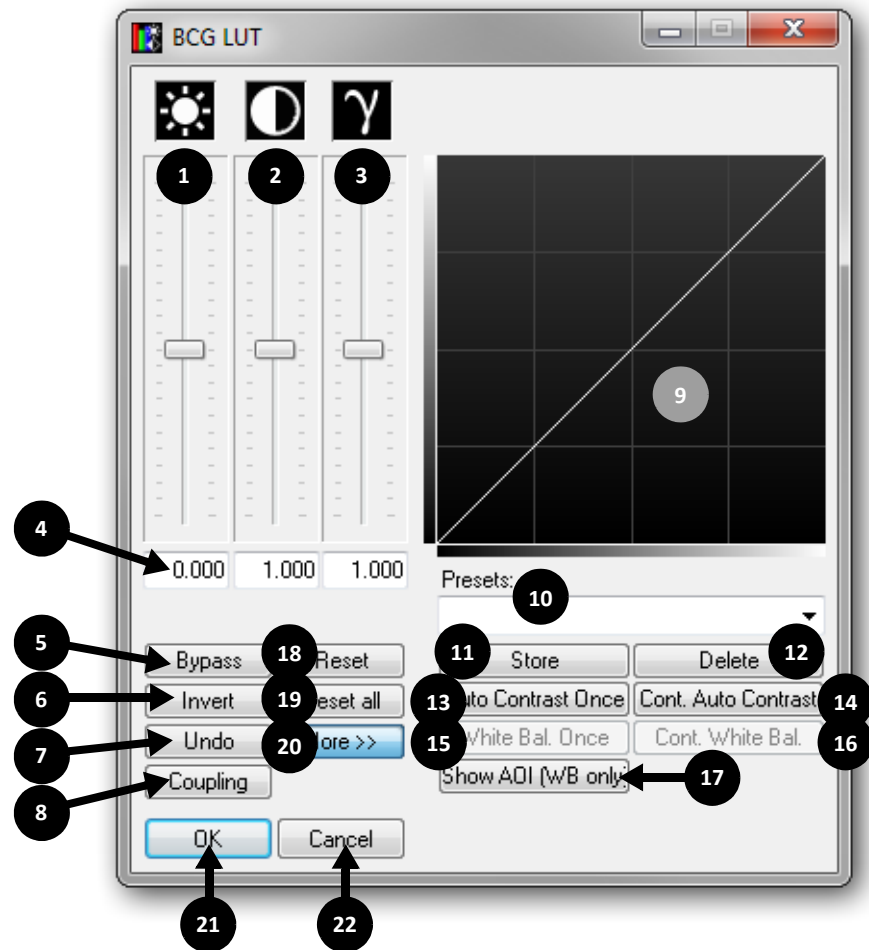The following dialog controls brightness, contrast and gamma for monochrome or temperature images.

Figure 53: Monochrome LUT

Number	Element	Description
1		Control for brightness
2		Control for contrast
3		Control for gamma value
4		Decimal value for the control adjustments

Table 41: Monochrome LUT - description (sheet 1 of 2)

Number	Element	Description
5	Bypass	If this button is active, the LUT becomes invalidated. Therefore a rapid comparison of before and after is possible.
6	Invert	Inverts the LUT.
7	Undo	Cancels the executed adjustments.
8	Coupling	With this button the sliders for brightness and contrast can be coupled.
9		This main graphic shows the LUT characteristic curve resulting from all channel adjustments.
10	Presets	Selects predefined and user characteristic curves.
11	Store	Stores the actual adjustments under the preset name to be input beforehand.
12	Delete	Deletes the actual user characteristic curve.
13	Auto contrast once	Auto contrast once Adjusts the contrast of the incoming image to its optimal value.
14	Cont. auto contrast	Continuous auto contrast Adjusts continuously the contrast of the incoming image to its optimal value.
15	White bal. once	White balance once Applies **once** an automatic white balance to the image. The ROI (AOI) is used for this operation.
16	Cont. white bal.	Continuous white balance **Continuously** adjusts the white balance to its optimal value. The ROI (AOI) is used for this operation.
17	Show AOI (WB only)	Show ROI (AOI) (white balance only) Shows the ROI (AOI) which is used for the white balance operation.
18	Reset	Sets all adjustments for the actual channel to neutral.
19	Reset all	Sets all adjustments for all channels to neutral.
20	More >>	Switches between standard and extended view of the dialog.
21	OK	Confirms the selection and closes the dialog.
22	Cancel	Closes the dialog without applying any alterations.

Table 41: Monochrome LUT - description (sheet 2 of 2)

RGB LUT

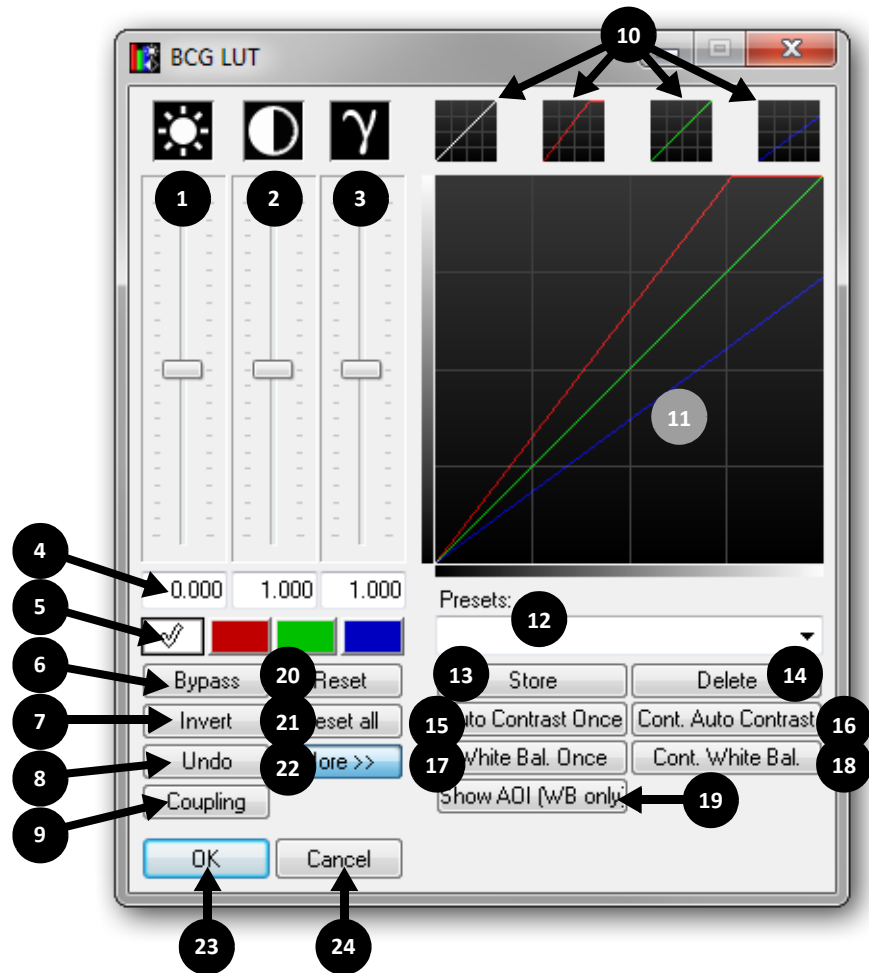Via this dialog, the white adjustment can be applied, which is necessary for color cameras.

Figure 54: RGB LUT

Number	Element	Description
1		Control for brightness
2		Control for contrast
3		Control for gamma value
4		Decimal value for the control adjustments.

Table 42: RGB LUT - description (sheet 1 of 2)

Number	Element	Description
5		Select the channel for which the slider control adjustments should be valid. Available channels are: Total, red, green and blue.
6	Bypass	If this button is active, the LUT becomes invalidated and for this reason a rapid comparison of before and after is possible.
7	Invert	Inverts the LUT.
8	Undo	Cancels the executed adjustments.
9	Coupling	With this button the sliders for brightness and contrast can be coupled.
10		Select channel to be displayed: Total, red, green or blue.
11		This main graphic shows the LUT characteristic curve resulting from all channel adjustments.
12	Presets	Selects predefined and user characteristic curves.
13	Store	Stores the actual adjustments under the preset name to be input beforehand.
14	Delete	Deletes the actual user characteristic curve.
15	Auto contrast once	Auto contrast once Adjusts the contrast of the incoming image to its optimal value.
16	Cont. auto contrast	Continuous auto contrast Adjusts continuously the contrast of the incoming image to its optimal value.
17	White bal. once	White balance once Applies **once** an automatic white balance to the image. The ROI (AOI) is used for this operation.
18	Cont. white bal.	Continuous white balance **Continuously** adjusts the white balance to its optimal value. The ROI (AOI) is used for this operation.
19	Show AOI (WB only)	Show ROI (AOI) (white balance only) Shows the ROI (AOI) which is used for the white balance operation.
20	Reset	Sets all adjustments for the actual channel to neutral.
21	Reset all	Sets all adjustments for all channels to neutral.
22	More >>	Switches between standard and extended view of the dialog.
23	OK	Confirms the selection and closes the dialog.
24	Cancel	Closes the dialog without applying any changes.

Table 42: RGB LUT - description (sheet 2 of 2)

White balance

The basis for a good white adjustment is a good measurement window in the image. Use the **Whitebalance AOI** for this. To change the ROI (AOI), click `Show AOI (WB only)` in the LUT dialog. Move the ROI (AOI) to an image section, if possible containing a neutral gray area in reality. Overexposed and underexposed areas negatively influence the result of the white adjustment. The following images illustrate a typical white adjustment with the corresponding histogram.
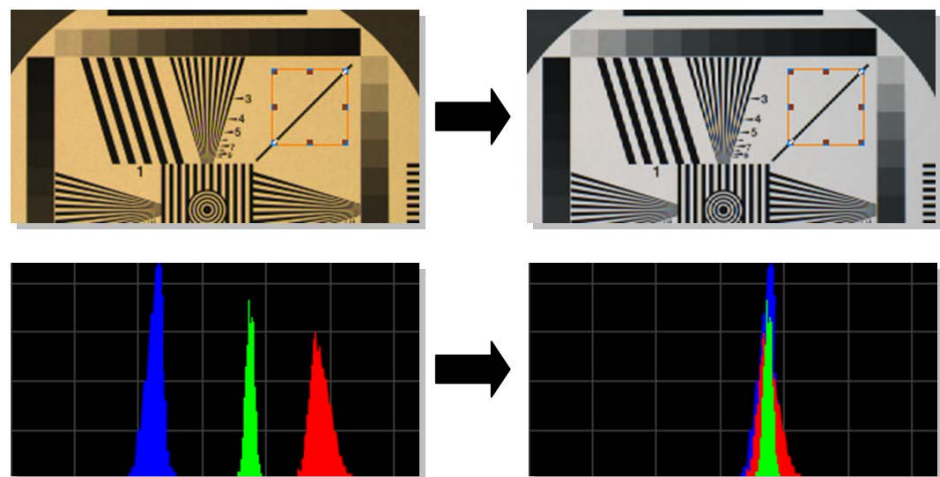

Figure 55: White adjustment

Histogram

Menu: `Image processing` → `Histogram`
or

Image processing toolbar: click

Definition

A histogram is a bar chart indicating a frequency distribution of all occurring pixel values. The X-axis indicates the pixel value and the Y-axis indicates the frequency.

The determined area for the **Histogram AOI** is analyzed.

Monochrome histogram
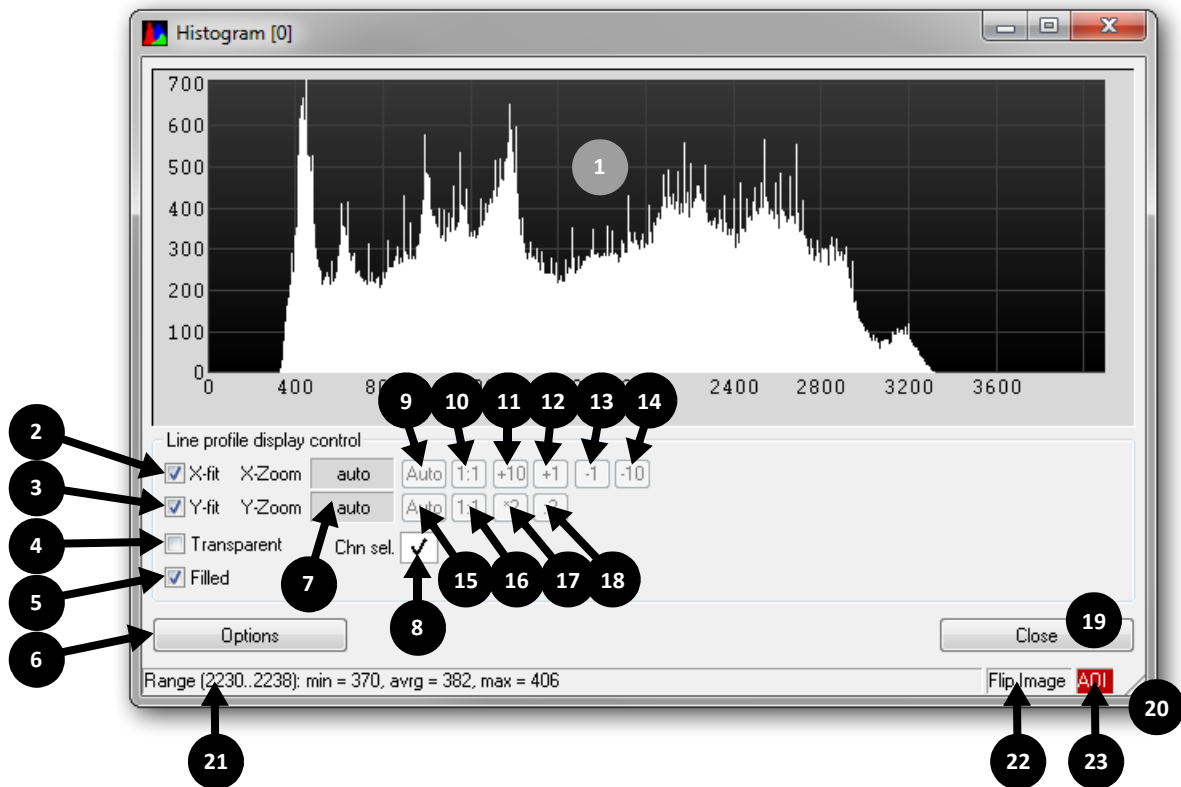
Figure 56: Monochrome histogram

Number	Element	Description
1		Histogram window
2	X-fit	Adapts the scale in X-direction to the actual size of the histogram window.
3	Y-fit	Adapts the scale in Y-direction to the actual size of the histogram window.
4	Transparent	Draws the histogram channels transparent.
5	Filled	Changes the draw mode of the histogram display from a bar chart to a point chart.
6	Options	A menu with all options regarding this analyze group is shown (see Options for an analyze group on page 70).
7	X-Zoom/Y-Zoom	Actual zoom ratio for the display window
8	Chn. sel.	Individual color channels can be deactivated here.

Table 43: Monochrome histogram - description (sheet 1 of 2)

Number	Element	Description
9	Auto	Click Auto. An integer is determined for the **X-zoom** so all values fit in the display area.
10	1:1	Adjusts the X-zoom-ratio to 1:1.
11	+10	Increments the X-zoom-ratio by 10.
12	+1	Increments the X-zoom-ratio by 1.
13	-1	Decrements the X-zoom-ratio by 1.
14	-10	Decrements the X-zoom-ratio by 10.
15	Auto	Click Auto. An integer is determined for the **Y-zoom** so all values fit in the display area.
16	1:1	Adjusts the Y-zoom-ratio to 1:1.
17	x2	Multiplies the Y-zoom-ratio with 2.
18	:2	Divides the Y-zoom-ratio by 2.
19	Close	Closes the dialog.
20		Click here and move mouse cursor to change the size of the histogram window manually.
21	Status bar Range (2230..2238):	The status bar has three panes: To show the frequency of a pixel value, move the mouse cursor over the histogram window.
22	Flip Image	The source image for the histogram is displayed here. **Click this pane to open the source image selection menu**.
23	AOI	Shows if the histogram is calculated within an ROI (AOI) or over the whole image. **Click this pane to switch between AOI and full image calculation.**

Table 43: Monochrome histogram - description (sheet 2 of 2)

RGB histogram
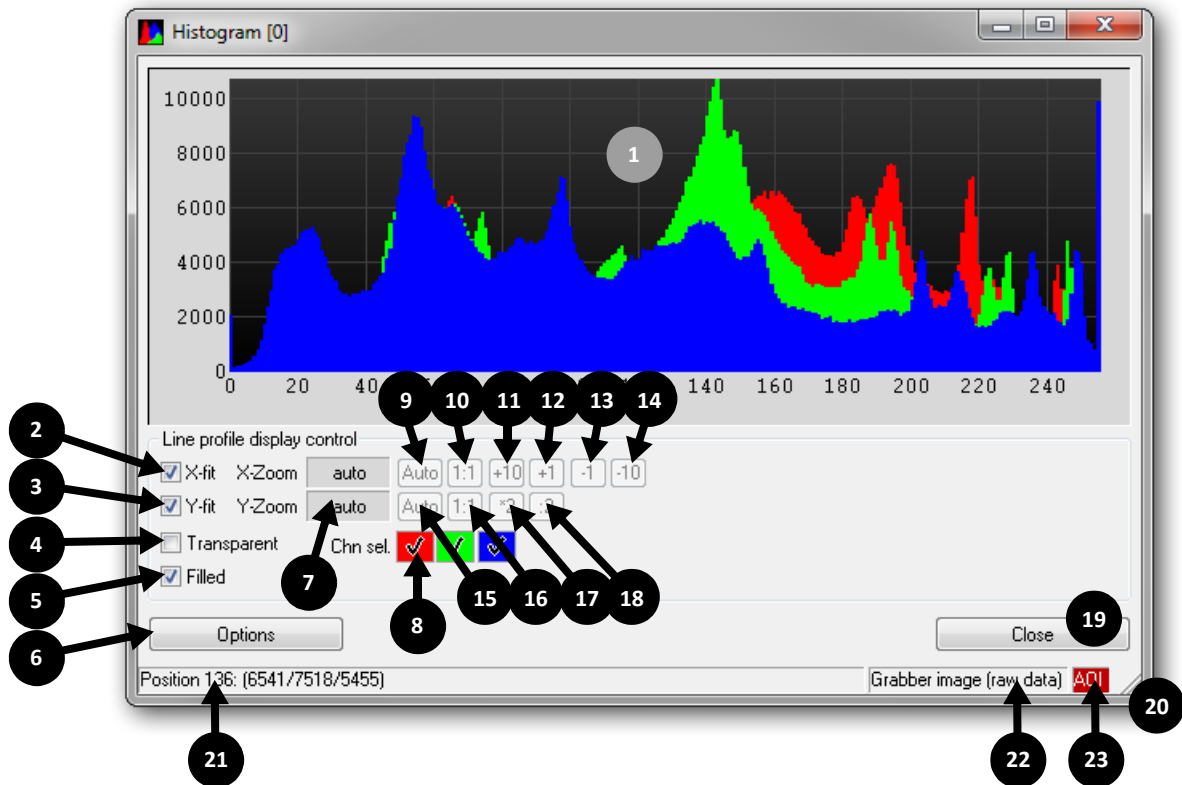

Figure 57: RGB histogram

Number	Element	Description
1		Histogram window.
2	X-fit	Adapts the scale in X-direction to the actual size of the histogram window.
3	Y-fit	Adapts the scale in Y-direction to the actual size of the histogram window.
4	Transparent	Draws the histogram channels transparent.
5	Filled	Changes the draw mode of the histogram display from a bar chart to a point chart.
6	Status line	In the status line, the frequency of a pixel value is indicated, as soon as the mouse cursor is moved over the histogram window.
7	Options	A menu with all options regarding this analyze group is shown (see Options for an analyze group on page 70).

Table 44: RGB histogram - description (sheet 1 of 2)
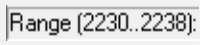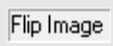
Number	Element	Description
8	Chn. sel.	Individual color channels can be deactivated here.
9	Auto	Click `Auto`. An integer is determined for the **X-zoom** so all values fit in the display area.
10	1:1	Adjusts the X-zoom-ratio to 1:1.
11	+10	Increments the X-zoom-ratio by 10.
12	+1	Increments the X-zoom-ratio by 1.
13	-1	Decrements the X-zoom-ratio by 1.
14	-10	Decrements the X-zoom-ratio by 10.
15	Auto	Click `Auto`. An integer is determined for the **Y-zoom** so all values fit in the display area.
16	1:1	Adjusts the Y-zoom-ratio to 1:1.
17	x2	Multiplies the Y-zoom-ratio with 2.
18	:2	Divides the Y-zoom-ratio by 2.
19	Close	Closes the dialog.
20		Click here and move mouse cursor to change the size of the histogram window manually.
21	Status bar Range (2230..2238):	The status bar has three panes: To show the frequency of a pixel value, move the mouse cursor over the histogram window.
22	Flip Image	The source image for the histogram is displayed here. **Click this pane to open the source image selection menu**.
23	AOI	Shows if the histogram is calculated within an ROI (AOI) or over the whole image. **Click this pane to switch between AOI and full image calculation**.

Table 44: RGB histogram - description (sheet 2 of 2)

Statistics

Menu: `Image processing` → `Statistics`
or

Image processing toolbar: click

You can evaluate statistic data for any ROI (AOI) area or for the entire image.
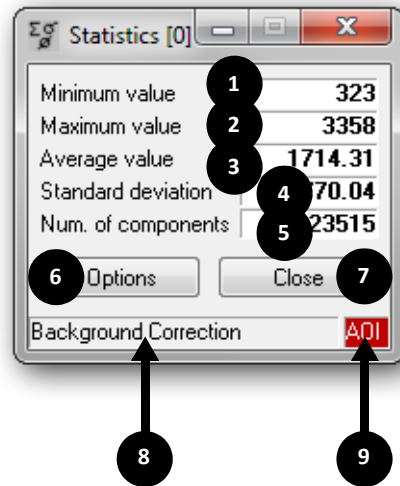
Monochrome statistics

Figure 58: Monochrome statistics

| Number	Element	Description
1	Minimum value	Indicates the minimal pixel value within the determined ROI (AOI).
2	Maximum value	Indicates the maximum pixel value within the determined ROI (AOI).
3	Average value	Indicates the arithmetic average value of all pixels within the ROI (AOI).
4	Standard deviation	Indicates the standard deviation within the ROI (AOI).
5	Num. of components	Number of pixels used for calculating the statistics.
6	Options	A menu with all options regarding this analyze group is shown (see Options for an analyze group on page 70).
7	Close	Closes the dialog.
8	Status bar Background Correction	The status bar has two panes: The source image for the statistics is displayed here. Click this pane to open the source image selection menu.
9	AOI	Shows if the histogram is calculated within an ROI (AOI) or over the whole image. Click this pane to switch between ROI (AOI) and full image calculation.

Table 45: Monochrome statistics - description

RGB statistics
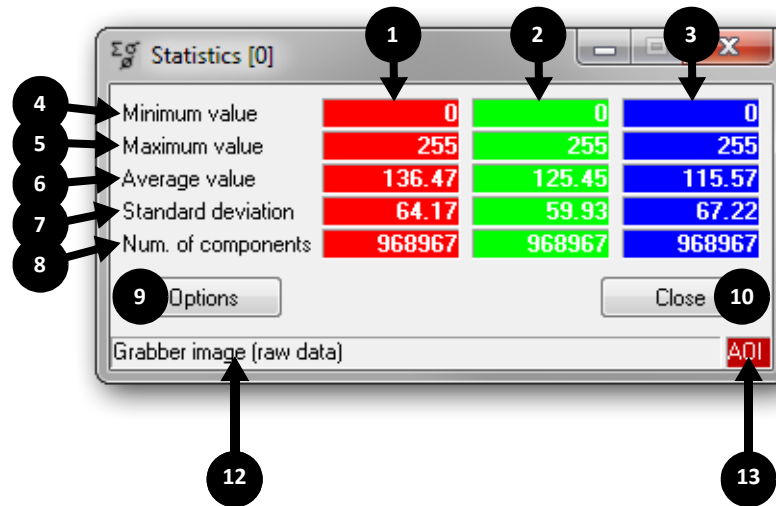
Figure 59: RGB statistics

Number	Element	Description
1		Statistics data for the red channel
2		Statistics data for the green channel
3		Statistics data for the blue channel
4	Minimum value	Indicates the minimal pixel value within the determined ROI (AOI).
5	Minimum value	Indicates the maximum pixel value within the determined ROI (AOI).
6	Average value	Indicates the arithmetic average value of all pixels within the ROI (AOI).
7	Standard deviation	Indicates the standard deviation within the ROI (AOI).
8	Num. of components	Number of pixels used for calculating the statistics.
9	Options	A menu with all options regarding this analyze group is shown (see Options for an analyze group on page 70).
10	Close	Closes the dialog.

Table 46: RGB statistics - description (sheet 1 of 2)

Number	Element	Description
11	Status bar Grabber image (raw data)	The status bar has two panes: The source image for the statistics is displayed here. **Click this pane to open the source image selection menu**.
12	AOI	Shows if the histogram is calculated within an ROI (AOI) or over the whole image. **Click this pane to switch between AOI and full image calculation**.

Table 46: RGB statistics - description (continued)(sheet 2 of 2)

Row/column statistics

Menu: `Image processing` → `Row/column statistics`
or

Image processing toolbar: click

The row/column statistics calculates the standard deviation of the row/column statistic data only.
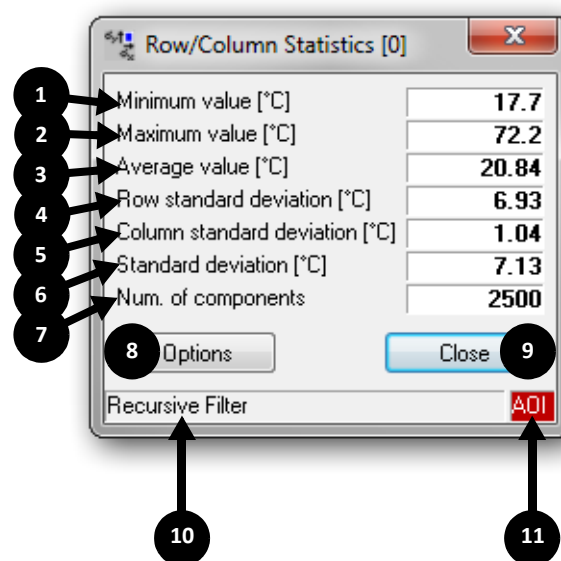
Figure 60: Row/column statistics

Number	Element	Description
1	Minimum value	Indicates the minimal pixel row/column value.
2	Maximum value	Indicates the maximum pixel row/column value.

Table 47: Row/column statistics - description (sheet 1 of 2)
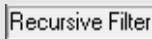
Number	Element	Description
3	Average value	Indicates the arithmetic average row/column value of all pixels.
4	Row standard deviation	Indicates the standard deviation of rows only.
5	Column standard deviation	Indicates the standard deviation of columns only.
6	Standard deviation	Indicates the standard row/column deviation.
7	Num. of components	Number of pixels used for calculating the statistics.
8	Options	A menu with all options regarding this analyze group will be shown (see Options for an analyze group on page 70).
9	Close	Closes the dialog.
10	Status bar Recursive Filter	The status bar has two panes: The source image for the statistics is displayed here. **Click this pane to open the source image selection menu.**
11	AOI	Shows if the histogram is calculated within an ROI (AOI) or over the whole image. **Click this pane to switch between AOI and full image calculation**.

Table 47: Row/column statistics - description (sheet 2 of 2)

Time-based statistics

Menu: `Image processing` → `Time-based statistics`
or

Image processing toolbar: click

The time-based statistics calculates the standard deviation on every pixel within the ROI (AOI) separately over the time.

$$\frac{1}{n} \sum_{i=0}^{n-1} \sigma_{P_i} \ = \ \text{time-based statistics value}$$

where

$$\sigma_{P_i} \ = \ \sqrt{\frac{1}{T-1}\left[\left(\sum_{t=0}^{T-1} P_{i,t}^2\right) - \frac{1}{T}\left(\sum_{t=0}^{T-1} P_{i,t}\right)^2\right]}$$

Formula 2: Time-based statistics value

P_i: value of the pixel with index i

σ_{P_i}: Standard deviation of the pixel with index i

n: number of pixels of the ROI (AOI)

i: index of the pixel inside the ROI (AOI)

t: index of the image in the sequence of the statistics (calculated over time)

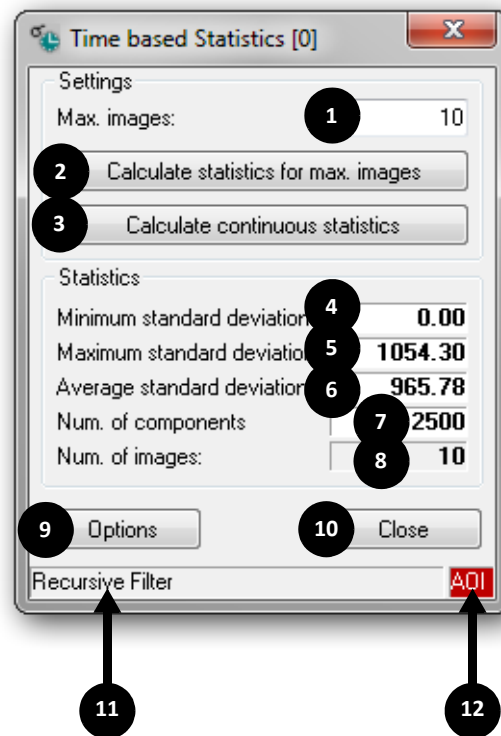T: total number of images (calculated over time), $T \geq 2$

Figure 61: Time-based statistics

Number	Element	Description
1	Max. images	Limits the calculation to a defined number of images.
2	Calculate statistics for max. images	Calculates the statistics for the defined number of images only.
3	Calculate continuous statistics	Calculates the statistics continuously.
4	Minimum standard deviation	Indicates the minimum standard deviation within the ROI (AOI) and for the defined number of images.

Table 48: Time-based statistics (sheet 1 of 2)
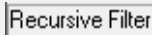
Number	Element	Description
5	Maximum standard deviation	Indicates the maximum standard deviation within the ROI (AOI) and for the defined number of images.
6	Average standard deviation	Indicates the average standard deviation within the ROI (AOI) and for the defined number of images.
7	Num. of components	Number of pixels used for calculating the statistics.
8	Num. of images	Number of images used for calculating the statistics.
9	Options	A menu with all options regarding this analyze group will be shown (see Options for an analyze group on page 70).
10	Close	Closes the dialog.
11	Status bar Recursive Filter	The status bar has two panes: The source image for the statistics is displayed here. **Click this pane to open the source image selection menu**.
12	AOI	Shows if the histogram is calculated within an ROI (AOI) or over the whole image. **Click this pane to switch between AOI and full image calculation**.

Table 48: Time-based statistics (sheet 2 of 2)

Line profile

Menu: `Image processing` → `Line profile`
or

Image processing toolbar: click

The line profile measures pixel values along a line within a source image.

This tool is useful e.g. to measure shading within an image.
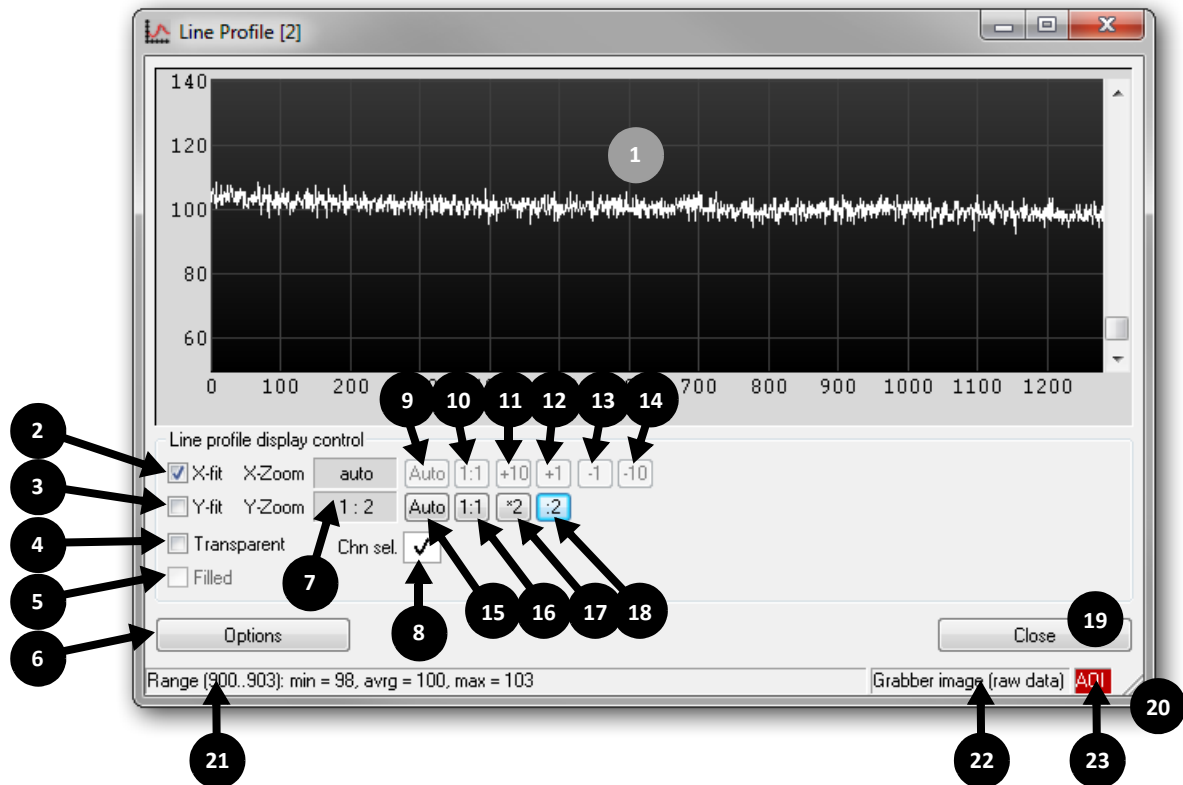
Figure 62: Line profile

Number	Element	Description
1		Line Profile window
2	X-fit	Adapts the scale in X-direction to the actual size of the line profile window.
3	Y-fit	Adapts the scale in Y-direction to the actual size of the line profile window.
4	Transparent	Draws the line profile channels transparent.
5	Filled	Changes the draw mode of the line profile display from a bar chart to a point chart.
6	Options	A menu with all options regarding this analyze group will be shown (See Options for an analyze group on page 70).
7	X-Zoom/Y-Zoom	Actual zoom-ratio for the display window
8	Chn. sel.	Individual color channels can be deactivated here.

Table 49: Line profile - description (sheet 1 of 2)
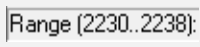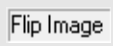
Number	Element	Description
9	Auto	Click Auto. An integer is determined for the X-zoom so all values fit in the display area.
10	1:1	Adjusts the X-zoom-ratio to 1:1.
11	+10	Increments the X-zoom-ratio by 10.
12	+1	Increments the X-zoom-ratio by 1.
13	-1	Decrements the X-zoom-ratio by 1.
14	-10	Decrements the X-zoom-ratio by 10.
15	Auto	Click Auto. An integer is determined for the Y-zoom so all values fit in the display area.
16	1:1	Adjusts the Y-zoom-ratio to 1:1.
17	x2	Multiplies the Y-zoom-ratio with 2.
18	:2	Divides the Y-zoom-ratio by 2.
19	Close	Closes the dialog.
20		Click here and move mouse cursor to change the size of the line profile window manually.
21	Status bar Range (2230..2238):	The status bar has three panes: To show the frequency of a pixel value, move the mouse cursor over the line profile window.
22	Flip Image	The source image for the line profile is displayed here. Click this pane to open the source image selection menu.
23	AOI	Shows if the line profile is calculated within an ROI (AOI) or over the whole image. Click this pane to switch between ROI (AOI) and full image calculation.

Table 49: Line profile - description (sheet 2 of 2)

Background correction

Menu: `Image processing` → `Background correctio`n
or

Image processing toolbar: click

Use this image processing module for the suppression of the visible underground structure of digital cameras. This module acquires first a predefined number of camera dark images and puts them in a reference image.

This reference image will be charged with the input data according the following formula:

$$Y(x, y) \; = \; E(x, y) - D(x, y) + K$$

Formula 3: Background correction

with

Y(x,y) = Output data

E(x,y) = Input data

D(x,y) = Reference data (Dark image)

K = Additive constant factor (offset)
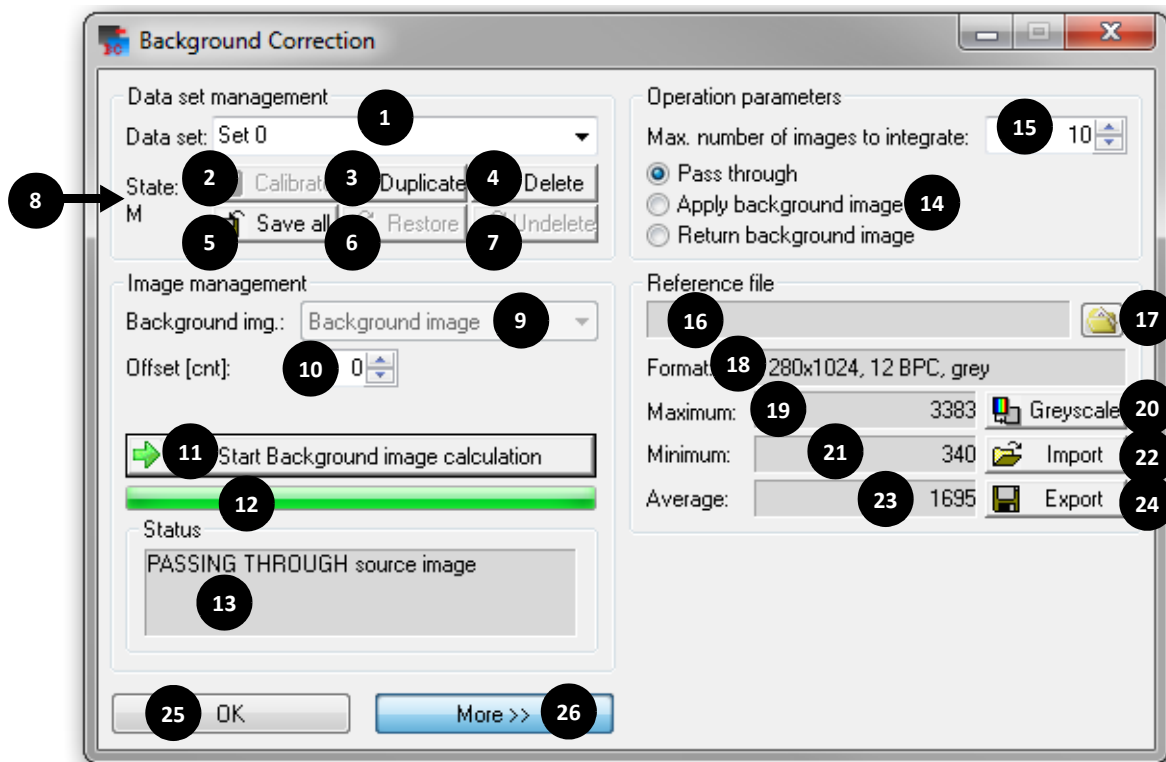
Set the additive constant factor to the average value.

Figure 63: Background correction

Number	Element	Description
1	Data set	Correction image data set consists of a low-light and a high-light image (or a low-temperature and a high-temperature image).
2	Calibrate	Search automatically for the best correction data set.

Table 50: Background correction (sheet 1 of 3)

Number	Element	Description
3	Duplicate	Duplicate the currently selected data set.
4	Delete	Marks the currently selected data set for deletion.
5	Save all	Saves all correction data set on hard disk.
6	Restore	Restore the previous data set from hard disk including ideal value.
7	Undelete	Delete the data set delete mark.
8	State	Data set state: • **M**: Modified: Data set was modified. • **L**: Loaded: Data set was loaded from hard disk. • **D**: Delete: Data set is highlighted for deletion.
9	Background image	Name of the background image
10	Offset [cnt]	Offset value for the background image (refers to 12 bit).
11	Start background image calculation	Starts the integration of the input data. Afterwards you have to start the image acquisition in the main application with Start continuous snap.
12		Progress bar for the integration process.
13	Status	Module state
14		Type of correction operation: • **Pass through**: The background correction is disabled and the original data is passed through. • **Apply background image**: Activates the background correction. • **Return background image**: The background image is returned.
15	Max. number of images to integrate	Number of images to integrate
16		Shows the current import or export path.
17		Enter the import or export path.
18	Format	Information about the image format
19	Maximum	Displays the maximum gray value of the integration image. Click the value to set the value as offset.
20	Gray scale	If the input image is a color image, click `Grayscale` to convert the reference image to a gray image.
21	Minimum	Displays the minimum gray value of the integration image. Click the value to set the value as offset.
22	Import	Imports the reference image.
23	Average	Displays the average gray value of the integration image. Click this value to set the average value as offset for the background correction module.
24	Export	Exports the reference image.

Table 50: Background correction (sheet 2 of 3)

Number	Element	Description
25	OK	Closes the dialog.
26	More >>	Switches between the standard and extended view of the dialog.

Table 50: Background correction (sheet 3 of 3)

Gain/offset correction

Menu: `Image processing` → `Gain / offset correction`
or

Image processing toolbar: click

The gain/offset correction is used for a linear characteristic curve correction per pixel.

The gain / offset correction uses a low-brightness and a high-brightness image to calculate the optimal pixel characteristic.
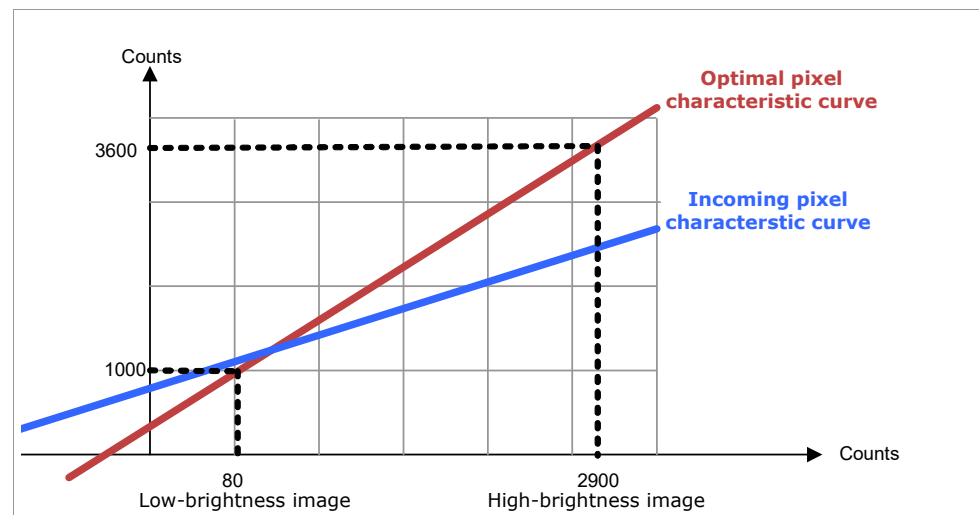
Figure 64: Pixel characteristic curves

To always guarantee the optimal correction, the gain/offset correction manages several correction data sets. If required, the gain/offset correction automatically selects the best data set.

A correction data record is built up as follows:
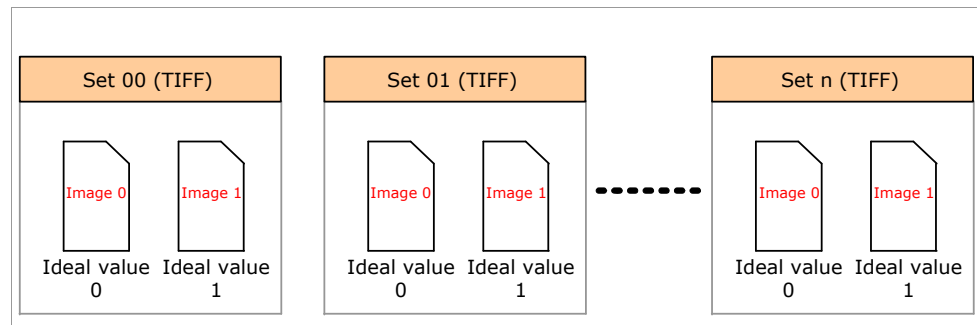
Figure 65: Example of correction data record
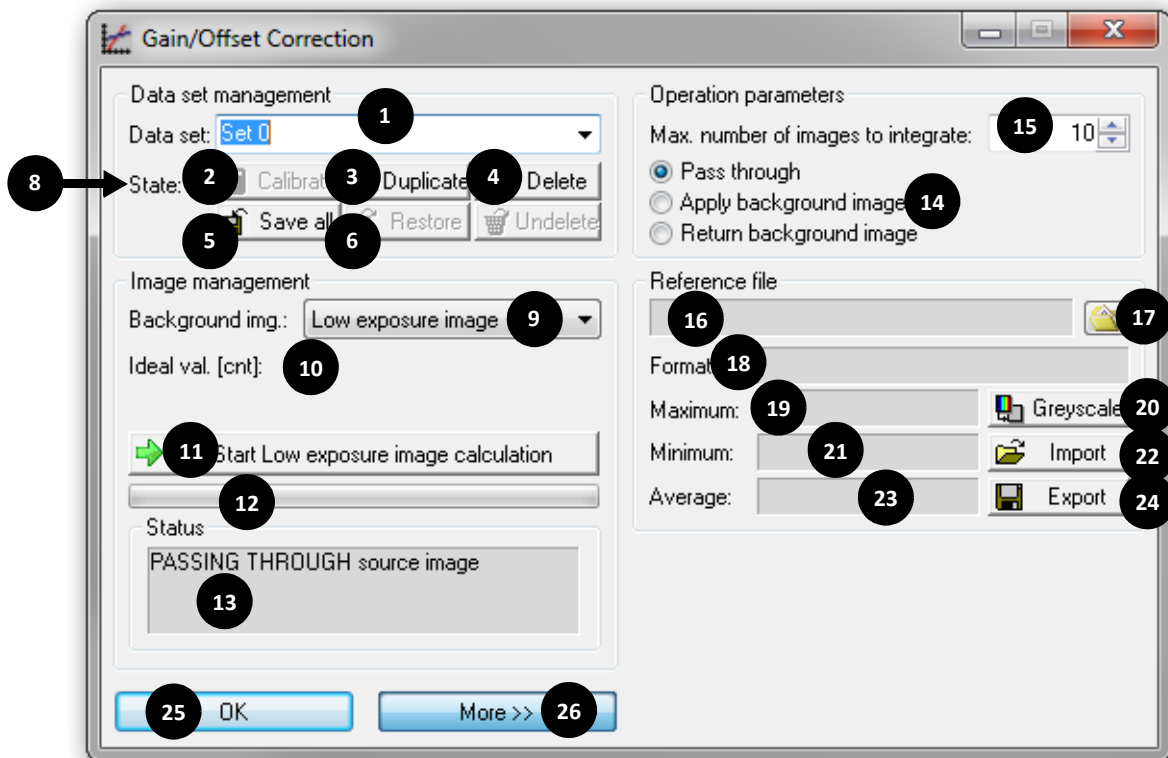
Figure 66: Gain/offset correction

Number	Element	Description
1	Data set	Correction image data set consists of a low-light and a high-light image (or a low-temperature and a high-temperature image).
2	Calibrate	Searches automatically for the best correction data set.
3	Duplicate	Duplicates the currently selected data set.
4	Delete	Marks the currently selected data set for deletion.
5	Save all	Saves all correction data set on hard disk.
6	Restore	Restores the previous data set from hard disk including ideal value.
7	Undelete	Deletes the data set delete mark.
8	State	Data set state: • **M**: Modified: Data set has been modified • **L**: Loaded: Data set was loaded from hard disk. • **D**: Delete: Data set is marked for deletion.
9	Background image	Name of the background image. Low exposure image: Low-light (or low-temperature) image. High exposure image: High-light (or high-temperature) image.
10	Ideal val. [cnt]	Digital ideal value for the background image (refers to 12 bit).
11	Start low exposure image calculation	Starts the integration of the input data. Afterwards you have to start the image acquisition in the main application with `Start continuous snap`.
12	Progress bar	Indicates progress for the integration process.
13	Status	Module state
14	Type of correction operation	**Pass through**: The background correction is disabled and the original data is passed through. **Apply background image**: Activates the background correction. **Return background image**: The background image will be returned.
15	Max. number of images to integrate	Choose the maximal number of images to integrate.

Table 51: Gain/offset correction

Selecting temperature range, color profile

Menu: `Image processing` → `Pseudo color`
or

Image processing toolbar: click

You can arbitrarily spread the displayed temperature range of the infrared camera if you want to emphasize a specific temperature range.

Additionally, you can change the used color palette:
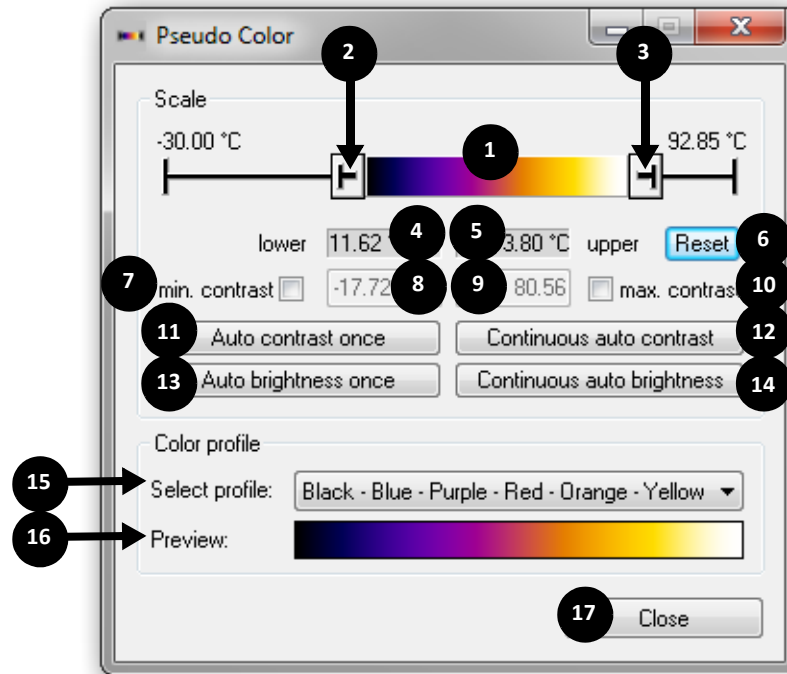
Figure 67: Pseudo color

Number	Element	Description
1		If you move the slider's body, the brightness of the image is changed. Move the slider **left** to **increase** image brightness. Move the slider **right** to **decrease** image brightness. The upper and the lower positions are changed simultaneously, but their distance remains constant.
2		Control for the slider's lower position
3		Control for the slider's upper position
4	lower 11.62 °C	Numerical representation of the slider's lower position

Table 52: Pseudo color - description (sheet 1 of 2)
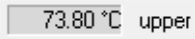
Number	Element	Description
5	73.80 °C upper	Numerical representation of the slider's upper position
6	Reset	Resets the slider setting.
7	min. contrast	Enable/disable **minimum contrast** value for auto adjustment.
8	Edit field min. contrast	**Minimum contrast value** for the image.
9	Edit field max. contrast	**Maximum contrast value** for the image.
10	max. contrast	Enable/disable **maximum contrast** value for auto adjustment.
11	Auto contrast once	Adjusts the **contrast** to its optimal value by means of the incoming image data.
12	Continuous auto contrast	Adjusts the **contrast continuously** to its optimal value by means of the incoming image data.
13	Auto brightness once	Adjusts the **brightness to** its optimal value by means of the incoming image data.
14	Continuous auto brightness	Adjusts the **brightness continuously** to its optimal value by means of the incoming image data.
15	Select profile	Changes the current color profile.
16	Preview	Preview of the color profile
17	Close	Closes the dialog.

Table 52: Pseudo color - description (sheet 2 of 2)

Temperature scale display

Menu: Image `processing` → `Temperature scale`
or

Image processing toolbar: click

If required, the actual temperature scale can be displayed via the image process toolbar. The scale corresponds to the current pseudo color setting.
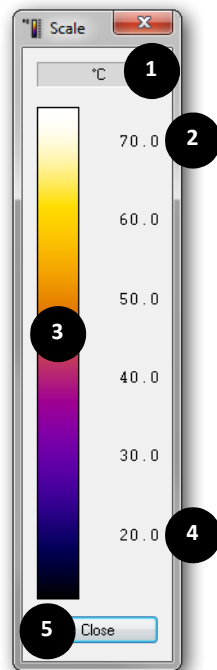
Figure 68: Temperature scale
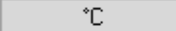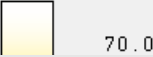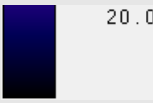
Number	Element	Description
1	°C	Actual unit of the temperature scale
2	70.0	Current displayable **maximum** temperature
3		Actual temperature profile
4	20.0	Current displayable **minimum** temperature
5	Close	Closes the dialog.

Figure 69: Temperature scale - description

Flip image

Menu: Image `processing` → `Flip image`
or

Image processing toolbar: click

Use the Flip module to mirror images from the camera.

In the `Flip Image` dialog you can flip the image:
- horizontally
- vertically
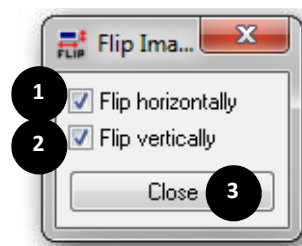
Figure 70: Flip image

Number	Element	Description
1	Flip horizontally	Flips the image horizontally.
2	Flip vertically	Flips the image vertically.
3	Close	Closes the dialog.

Table 53: Flip image - description

Image rotation

Menu: `Image processing` → `Image rotation`
or

Image processing toolbar: click

In the image processing toolbar click `Image Rotation`. In the `Image Rotation` dialog, you can rotate the image to an adjustable angle.
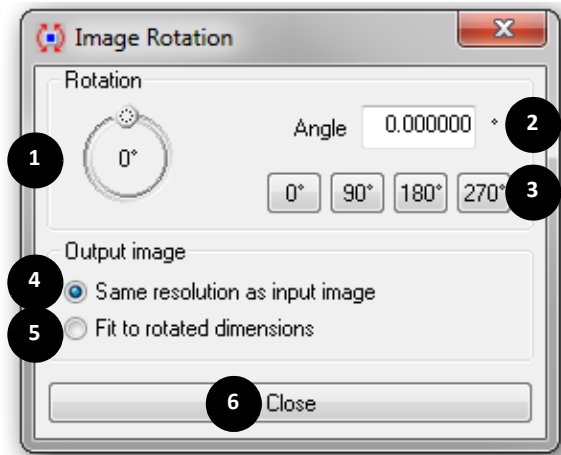
Figure 71: Image rotation
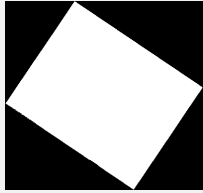
Number	Element	Description	Example image
1	Rotary knob image	Rotary knob Adjusts the rotation angle.	
2	Angle	Set numerical value for angle manually.	
3	0°, 90°, 180°, 270°	Angle presets	
4	Same resolution as input image	The size of the resulting image is not changed. The image might be cropped.	
5	Fit to rotated dimensions	The resulting image size is adjusted, so that the complete image is always visible.	
6	Close	Closes the dialog.	

Table 54: Image rotation - description

Recursive filter configuration

Menu: `Image processing` → `Recursive filter`
or

Image processing toolbar: click

Use this image processing module to apply an additional recursive filter to the incoming data.
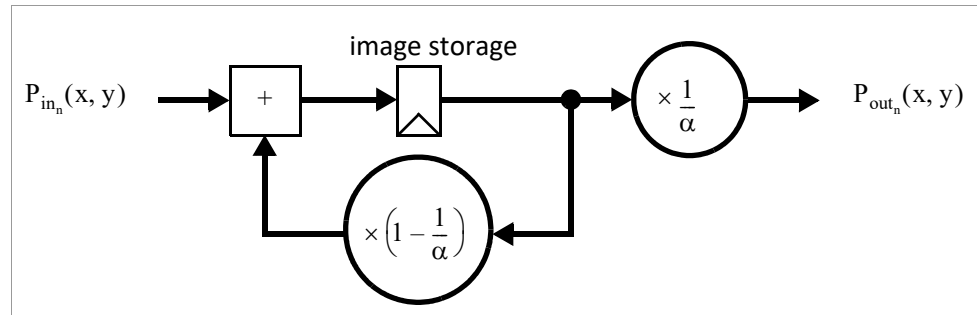
Figure 72: Principle of recursive filter

$$P_{out_n}(x,y) \;=\; \frac{1}{\alpha} \sum_{i=0}^{n} P_{in_i}(x,y) \left(1 - \frac{1}{\alpha}\right)^{n-i}$$

$$\;=\; \frac{1}{\alpha} \left(P_{in_n}(x,y) + (\alpha - 1) P_{out_{n-1}}(x,y) \right)$$

$P_{out_n}(x,y)$: Pixel in destination image at position (x,y) after $n+1$ processed images
$P_{in_n}(x,y)$: Pixel in source image at position (x,y) while processing image n
n: Index in image sequence
α: Filter depth

Formula 4: Recursive filter

Buffer is reset when filter depth is changed
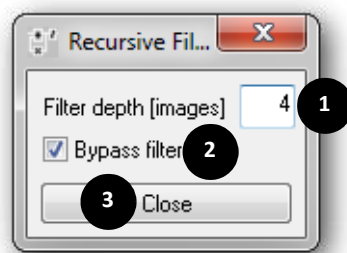
Figure 73: Recursive filter

Number	Element	Description
1		Filter depth (α)
2	Bypass filter	Bypasses the filter processing.
3	Close	Closes the dialog.

Table 55: Recursive filter - description

Temperature display

Menu: `Image processing` → `Temperature display`
or

Image processing toolbar: click

AcquireControl analyzes up to five temperature measurement areas in the image simultaneously. A temperature measurement dialog can be shown with the image process toolbar.
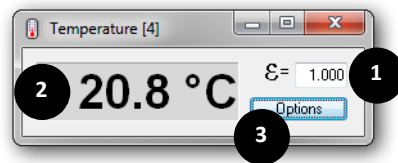
Figure 74: Temperature display

Number	Element	Description
1	$\mathcal{E} =$ 1.000	Enter the emission value for the measurement window.
2	20.8 °C	Displays the average temperature value in the measurement window.
3	Options	Shows a menu with all options of this analyze group (see Options for an analyze group on page 70).

Table 56: Temperature display - description

Pixel table

Menu: `Image processing` → `Pixel table`
or

Image processing toolbar: click

Use the pixel table for a detailed pixel analysis.
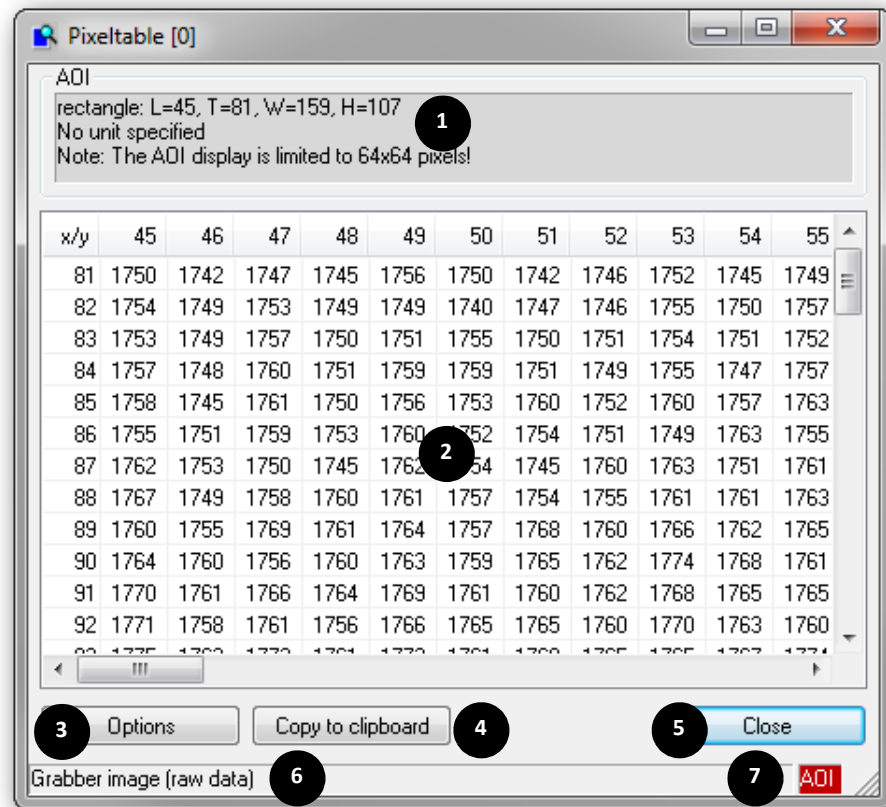
Figure 75: Pixel table

Number	Element	Description
1		Here the form and size of the used ROI (AOI) is shown. Independent from the size of the ROI (AOI), the evaluation is limited to the maximum size of 64x64 pixels, in order not to reduce the execution speed too much.
2		Table with pixel data.
3	Options	Shows a menu with all options regarding this analyze group (see Options for an analyze group on page 70).
4	Copy to clipboard	Copies the table data to the windows clipboard.
5	Close	Closes the dialog.
6	Status bar	The status bar has two panes:
	Grabber image (raw data)	Displays the source image for the pixel table. **Click this pane open the source image selection menu**.
7	AOI	Shows if the pixel table is calculated within an ROI (AOI) or over the whole image. **Click this pane to switch between AOI and full image calculation.**

Table 57: Pixel table - description

Autosave

Menu: `Image processing` → `Autosave`
or

Image processing toolbar: click

Use the autosave module to automatically store every acquired image into a directory. This is a simple sequence recording with the following output formats:

Output format	Description
AVI	Movie file containing all images
BMP	Every image is stored separately.
PGM	Every image is stored separately.
RAW	Every image is stored separately.
TIFF	Images are stored separately or within one single file.
VSQ	Images are stored separately or within one single file.

Table 58: Output formats - description
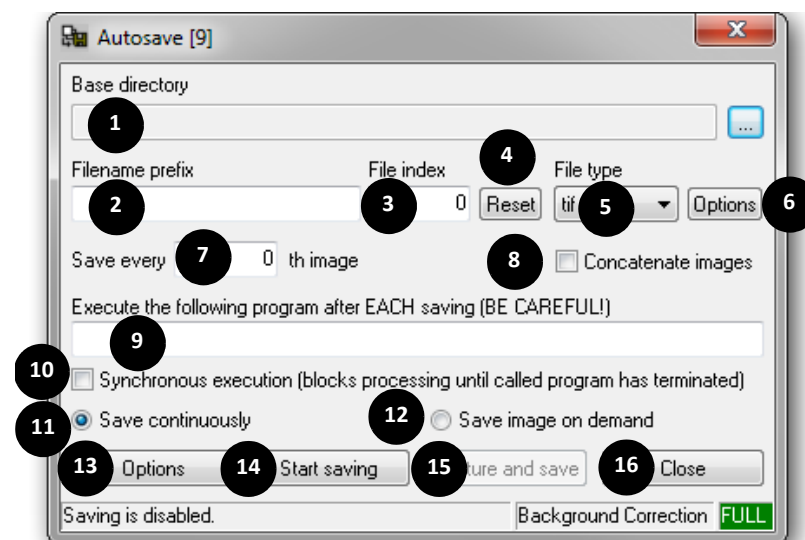
Figure 76: Autosave

Number	Element	Description
1	Base directory	Path for the files to be stored.
2	Filename prefix	Prefix of the filename.
3	File index	Starting index of the file number.
4	Reset	Reset the starting index for file numbering.

Table 59: Autosave - description (sheet 1 of 2)
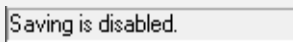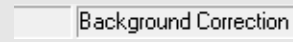
Number	Element	Description
5	File type	File type (see File saving options on page 107)
6	Options	Adjusts additional settings for the chosen file type.
7	Save every ... th image	Store only every n-th picture. Since the storage process requires more or less time in dependence of the image size, it is necessary to reduce the storing frequency to a reasonable value.
8	Concatenate images	Store all images into a single file as sub-images. This is only possible when using TIFF, RAW, or VSQ images.
9	Execute ...	Executes a program after every storage.
10	Synchronous ...	Executes the entered program synchronously. This means that the internal execution of the main application is stopped until the external program has finished.
11	Save continuously	Stores the images continuously.
12	Save image on demand	Stores an image only on mouse click.
13	Options	Shows a menu with all options of this analyze group (see Options for an analyze group on page 70).
14	Start saving	Start autosave process.
15	Capture and save	In the *Save image on demand* mode this button stores one image.
16	Close	Closes the dialog.
17	Status bar Saving is disabled.	The status bar contains three panes: Current status
18	Background Correction	Displays the source image for auto save. **Click on this pane to open the source image selection menu.**
19	FULL	Shows if the auto save module stores the full image or the content of an ROI (AOI) only. **Click on this pane to switch between AOI and full image calculation**.

Table 59: Autosave - description (sheet 2 of 2)

File saving options

TIFF file saving options

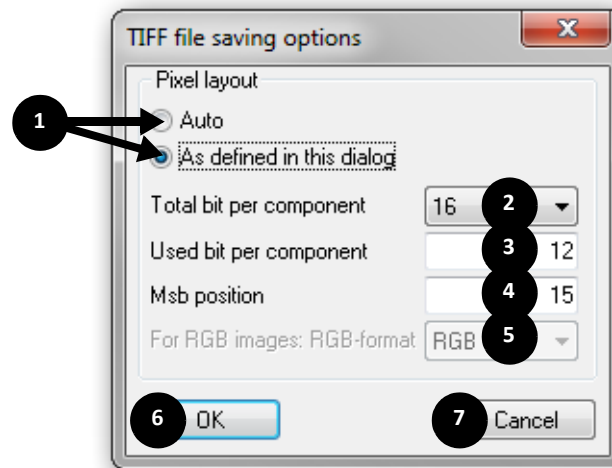For TIFF images (Tagged Image File Format): Choose bit depth options.

Figure 77: TIFF file saving options

Number	Element	Description
1	Auto or As defined in this dialog	Choose `Auto` for automatic output format. Choose `As defined` in this dialog for manual selection of output format (see elements 2 ... 5).
2	Total bits per component	Choose the total number of bits per component: 8, 16 or 32 bits.
3	Bits used per component	Choose the number of bits used per component.
4	MSB position	Choose the most significant bit position.
5	For RGB images	Choose the RGB format of the RGB triple.
6	OK	Confirms your adjustments and closes the dialog.
7	Cancel	Rejects your adjustments and closes the dialog.

Table 60: TIFF file saving options - description

BMP file saving options

For bitmap images (BMP): Select an optional (lossless) compression.
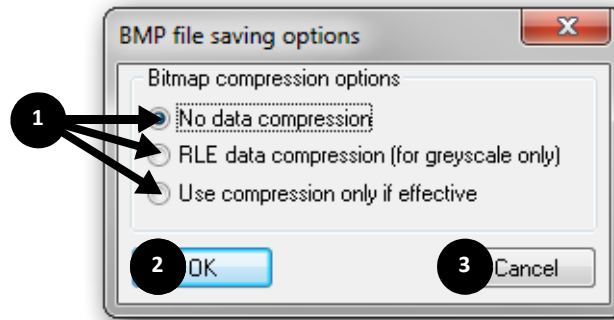
Figure 78: BMP file saving options

Number	Element	Description
1	Bitmap compression options	Select the compression for the bitmap format.
2	OK	Confirms your adjustments and closes the dialog.
3	Cancel	Rejects your adjustments and closes the dialog.

Table 61: BMP file saving options - description

PGM file saving options

For PGM images (portable gray map): Select desired output format.

PGM is a proprietary image data format for gray-scale images with 8 bits per pixel.
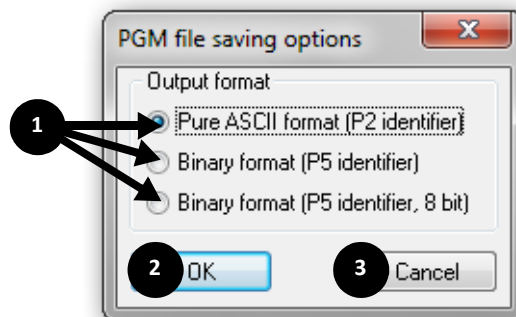
Figure 79: PGM file saving options

Number	Element	Description
1	Output format	Select the output format for PGM files.
		Pure ASCII format: results in very large image files
		Binary format (P5 identifier): The PGM file is saved as 16-bit data, big endian. Check if your application can read this format. If not: use 8-bit format.
		Binary format (P5 identifier, 8 bit): forces 8-bit file format to avoid problems concerning endianness.
2	OK	Confirms your adjustments and closes the dialog.
3	Cancel	Rejects your adjustments and closes the dialog.

Table 62: PGM file saving options - description

RAW file saving options

For RAW images: Select RAW file options.

RAW image files contain the pure image data only.
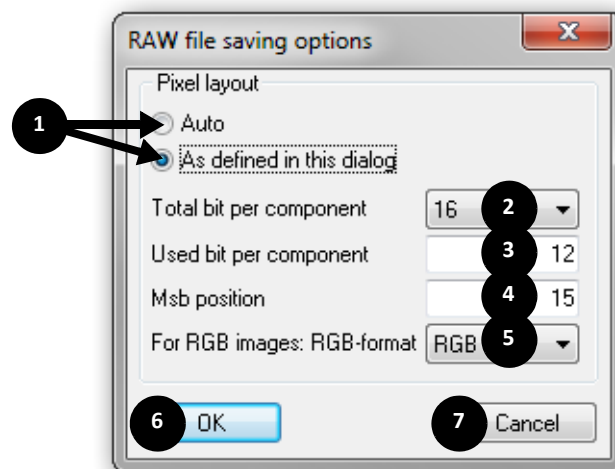
Figure 80: RAW file saving options

Number	Element	Description
1	Auto or	Choose `Auto` for automatic output format.
	As defined in this dialog	Choose `As defined` in this dialog for manual selection of output format (see elements 2 ... 5).
2	Total bits per component	Choose the total number of bits per component.

Table 63: RAW file saving options - description (sheet 1 of 2)

Number	Element	Description
3	Bits used per component	Choose the number of bits used per component.
4	MSB position	Choose the most significant bit position.
5	For RGB images	Choose the RGB format:
		The following formats are possible:
		RGB, XRGB, RXGB, RGXB, RGBX
		BGR, XBGR, BXGR, BGXR, BGRX
		GRB, XGRB, GXRB, GRXB, GRBX
		GBR, XGBR, GXBR, GBXR, GBRX
		RBG, XRBG, RXBG, RBXG, RBGX
		BRG, XBRG, BXRG, BRXG, BRGX
6	OK	Confirms your adjustments and closes the dialog.
7	Cancel	Rejects your adjustments and closes the dialog.

Table 63: RAW file saving options - description (sheet 2 of 2)

AVI file saving options

For AVI files: Set parameters regarding the codec and output quality.
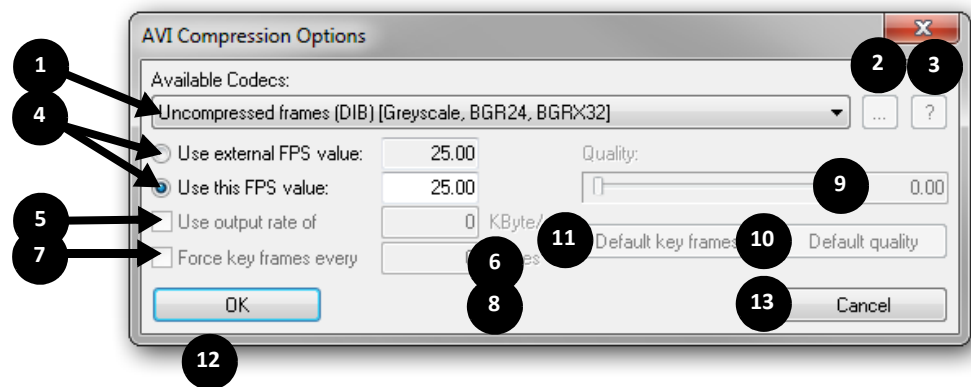
Figure 81: AVI file saving options

Number	Element	Description
1	Available Codecs	Select the AVI codec. The number of the codecs can vary depending on the system. The image formats supported by the codec are listed in square brackets.
2	... button	In dependence of the selected codec: Adjusts some fine tuning parameters.
3	? button	Displays information about the selected codec.
4		Adjusts the playback speed of the AVI:
	Use external FPS value or	As display speed, the original speed from the database is used. This is for example necessary, if the AVI should be post-processed with some other video software and the original time code is needed.
	Use this FPS value	The playback speed is adjusted manually.
5	Use output rate of	Adjusts the maximum data rate for the AVI video.
6		Data rate in kByte/s
7	Force key frames every	Some compressors allow changing the interval of storing a key image in the video. A key image is compressed in the video as full frame. The following images are only stored as the difference to this key image. By using a sensible value here (depending on the codec used), the data file size can be reduced. However, the search speed within the video is reduced with raising key frame intervals.
8		Key frame rate
9	Quality	If this slider is active, the quality of the video can be modified.
10	Default quality	Set the quality slider to its default value.
11	Default key frames	Set the key frame value to its default value.
12	OK	Confirms your adjustments and closes the dialog.
13	Cancel	Rejects your adjustments and closes the dialog.

Table 64: AVI file saving options - description

Not all installed compressors in the system may support the selected image format. If the selected compressor is unsuitable, an error message is indicated.

VSQ file saving options Deprecated

VSQ is an old image format similar to TIFF: Use TIFF or AVI format instead.
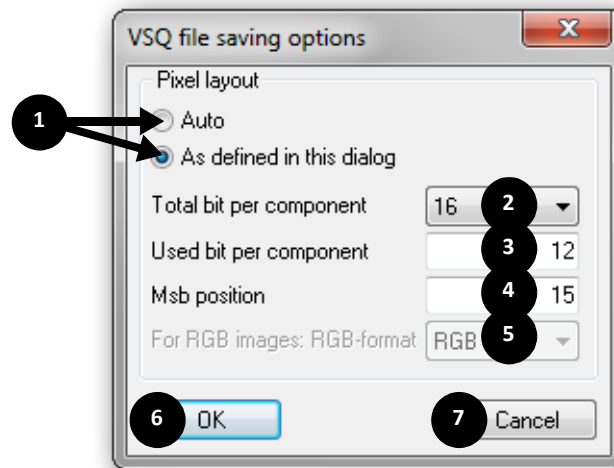
Figure 82: VSQ file saving options

Number	Element	Description
1	Auto or As defined in this dialog	Choose `Auto` for automatic output format. Choose `As defined in this dialog` for manual selection of output format (see elements 2 … 5).
2	Total bits per component	Choose the total number of bits per component: 8, 16 or 32 bits.
3	Bits used per component	Choose the number of bits used per component.
4	MSB position	Choose the most significant bit position.
5	For RGB images	Choose the RGB format of the RGB triple.
6	OK	Confirms your adjustments and closes the dialog.
7	Cancel	Rejects your adjustments and closes the dialog.

Table 65: VSQ file saving options - description

ROI (AOI) configuration

If an ROI (AOI) for an analyze group is displayed, right-click the drawing area to show the corresponding group menu.
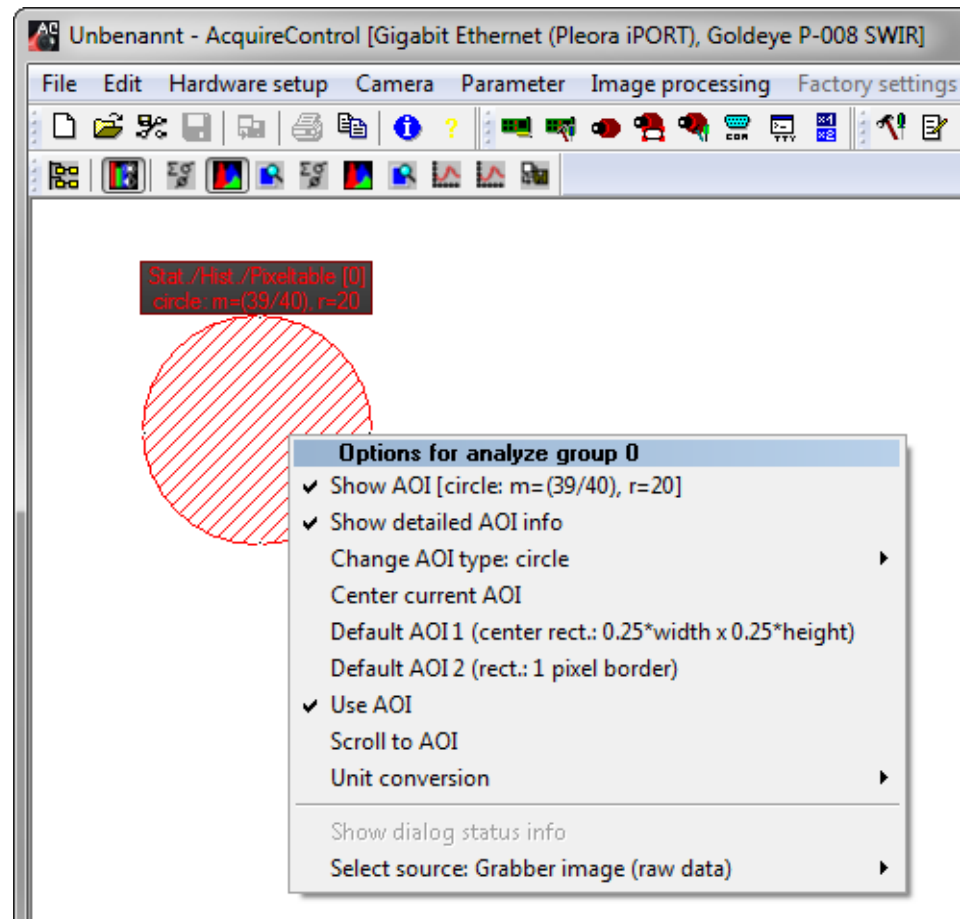
Figure 83: AOI configuration

Logging

Menu: `Parameter` → `Modify logging settings` or

Parameter toolbar: Click

Use logging, for example, if you want to determine statistical data over a longer period and afterwards to process the data in a spreadsheet.
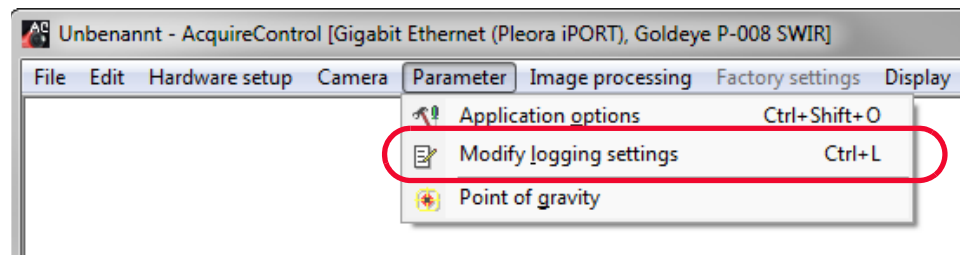
Figure 84: Modify logging settings
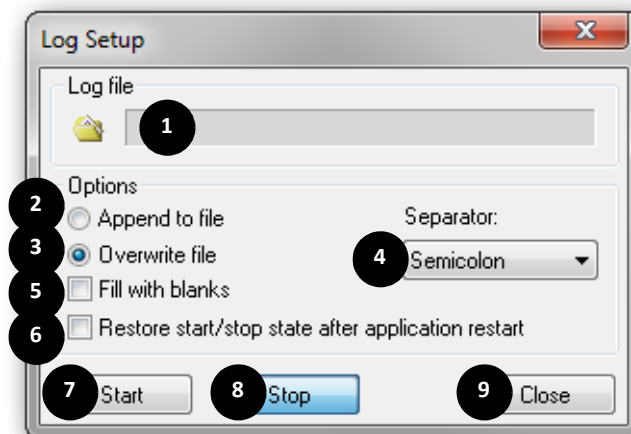
Figure 85: Log setup

Number	Element	Description
1		Set the path to the log file.
2	Append to file	Appends the log to the end of an existing file. If the file does not exist, it will be created.
3	Overwrite file	Overwrites an existing file. If the file does not exist, the file is created.

Table 66: Log setup (sheet 1 of 2)

Number	Element	Description
4	Separator	Set the separator character for the columns in the log file. Tabulator Semicolon (;) Pipe (	)
5	Fill with blanks	Fills the lines with blanks.
6	Restore start/ stop ...	Restores the start or stop state after a restart of the application
7	Start	Starts the logging.
8	Stop	Stops the logging.
9	Close	Closes the dialog.

Table 66: (continued)Log setup (sheet 2 of 2)

The logging can be enabled for the data of miscellaneous analysis modules. For every analysis module, the logging must be enabled separately (see Options for an analyze group on page 70).

After every logging start some general parameters are written, like:
- Name of the application
- Used frame grabber
- Used camera
- Used image process chain
- ROI (AOI) parameter
- Source image for the analysis module

Currently the following modules are supported:

Analysis module	Logging data
Statistic	• Image number • Time stamp • Minimum • Maximum • Average value • Standard deviation • Number of evaluated pixels

Table 67: Supported modules for logging

Image point of gravity

Menu: `Parameter` → `Point of gravity`

Displays the point of gravity of a gray-scale image or an ROI (AOI).
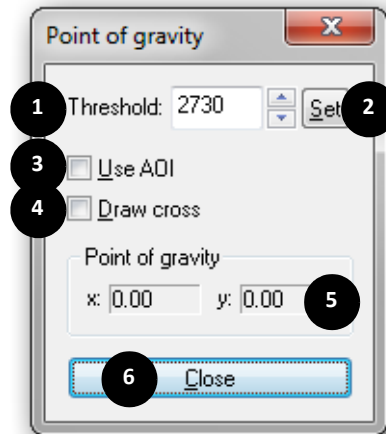
Figure 86: Point of gravity

Number	Element	Description
1	Threshold	Only pixel values above this value are included in the calculation.
2	Set	Sets the current value.
3	Use AOI	If this option is activated, only the ROI (AOI) is used for the calculation.
4	Draw cross	Draws a coordinate cross hair on the calculated point of gravity.
5	Point of gravity	Point of gravity coordinates.
6	Close	Closes the dialog.

Table 68: Point of gravity - description

Application options

All program parameters will be configured with the menu `Parameter →` `Application options` or the corresponding icon on the Parameter Toolbar.
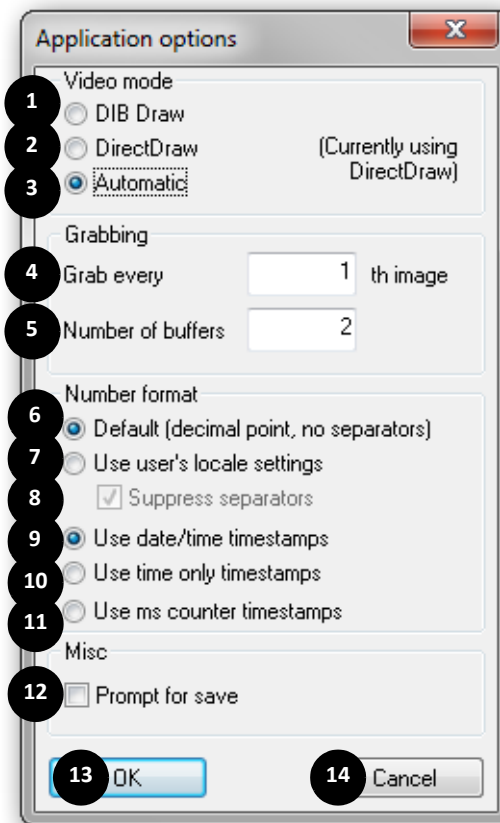
Figure 87: Application options

Number	Element	Description
1	DIB Draw	This drawing method can be chosen if there is no DirectX installation on the PC or if any display problems occur while using DirectX. Here only standard Windows GDI procedures are used.
2	DirectDraw	Here only DirectX functions are used to draw an image which results in a flicker-free and faster drawing.
3	Automatic	(Recommended) This mode tries to give preference to the use of a DirectX display and only changes to DIB Draw in case of missing of the DirectX support. At a repeated opening of the dialog, the automatically determined mode is indicated.

Table 69: Application options - description (sheet 1 of 2)

Number	Element	Description
4	Grab every ... image	Grabs only every n-th image.
5	Number of buffers	Number of the image storages to be used. We recommend you to adjust this value to 2.
		If you have speed problems, try different values.
6-11	Number format	Use this settings to change the way number formats are used by the application.
12	Prompt for save	Enables or disables the request to save a changed document.
13	OK	Confirms the selection and closes the dialog.
14	Cancel	Closes the dialog without applying any changes.

Table 69: Application options - description (sheet 2 of 2)

Miscellaneous

Closing the camera and frame grabber

To close a camera and to initialize the application:

Click `File` → `New`

This is also necessary if an image is loaded and a new image acquisition should be started afterwards.
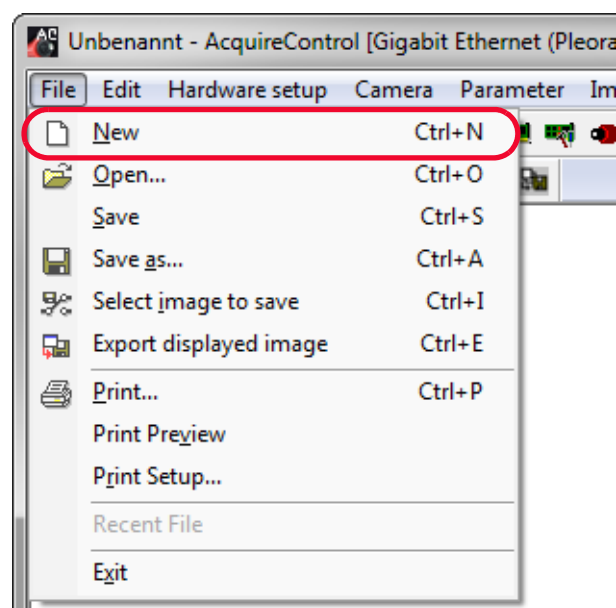
Figure 88: Close camera/initialize application

Help
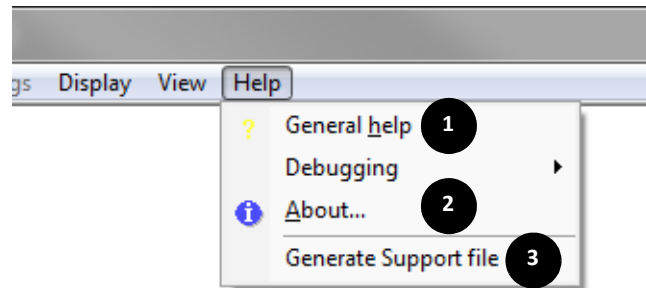
Figure 89: Help

Number	Element	Description
1	General help	Opens this help file
2	About...	Displays information about AcquireControl application.
3	Generate Support file	Generates support file. If you have any problems with this application: Click Generate Support file to generate a file. Please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Table 70: Help

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