



ImageCapture-I Handbook

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Introduction

ImageCapture-I is a new powerful camera software of EHD imaging GmbH. Besides completely revised user interface, attractive design and versatile features the software is characterized by easy interoperability and user friendly utilization. The software supports an individual adaptable powerful multi-window technique.

Shipment

- Installation-CD
- Camera
- USB cable
- External power supply (for special cameras)

System requirements

Recommend:

- Computer: Dual core PC with 2.5 GHz, 4 GB RAM
- Operating System: Windows 7
- Monitor resolution: 1920 × 1080

Minimum:

- Computer: Dual Core PC with 2 GHz, 2 GB RAM
- Operating system: Windows 7
- Monitor resolution: 1280 × 1024



Information for laptop application:

Often the USB interface of some laptops does not really comply with the specification. The applying of USB hubs with own power supply is strongly recommended.

Installation

The content of the delivered CD:

- Software and program files for ImageCapture-I
- The appropriate camera driver
- All required DLLs
- The license file, for software unlocking
- Documentations



Note: Please install the software before connecting the camera with the computer. You must have administrator rights. Installation of older operation systems is generally rejected.

1. To start with the installation put the delivered CD in the drive. In case of deactivated start you have to start the installation with help of setup.exe from the root directory. After starting acknowledge the dialogue to start the installation routine.

After this you should see a window like in figure 1. You can install the software in the recommended directory or choose another with the button “browse”.

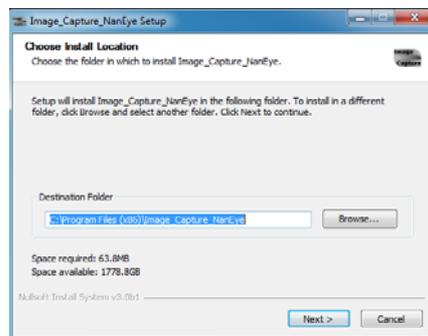


Figure 1: Choose a directory



Note: The images can vary in detail. This depends on the operation system.

2. After pressing “Next” you will see the following window (figure 2).

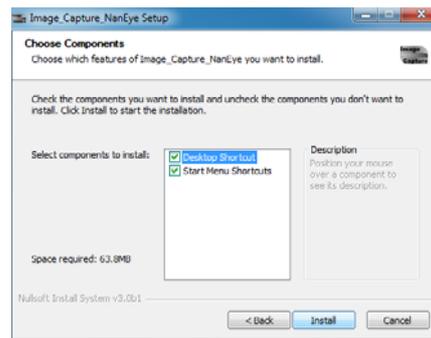


Figure 2: Components

With activation of the so called check marks one can decide to start the software via start menu and/or via desktop. Pressing “install” will start the installation of the software. You will see a view like in figure 3.

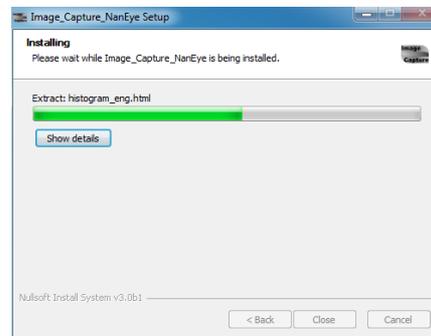


Figure 3: Installation

3. With pressing of “close”, after installation, the corresponding windows is closed and you can use the software.
4. The next step is the installation of the delivered camera driver. The process is described for the USB interface (see figure 4).



Figure 4: Driver

5. During the software installation from the delivered CD the USB driver (“USBGenDv.sys”) was loaded in the system directory. Plug the USB cable to the camera. Now you can connect the USB cable with the PC before power on the PC or after the operating system is ready for working. The PC will recognize the camera. Use the option “Software automatically install”, shown in figure 5, and press “Continue”.

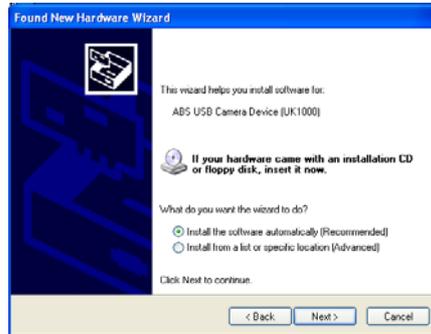


Figure 5: Installer

6. Normally the installation procedure works self-acting and you can close the process. In case of trouble please first read the file “UK3000_Documentation_USB_Driver_Installation_Vxxx.pdf“ in the directory documentation on the delivered CD.



Figure 6: Get ready



Note: Please use ImageCapture with the actual graphic card driver of the installed graphic card and not the standard graphic card driver of Windows. Otherwise it can cause undesirable delay in the image generation of ImageCapture.

Using ImageCapture-I

Overview

With start you see the central view of the program. The first start produces an empty view window. Apart from that it looks like in figure 7. At the top on left hand side there is located the menu bar. Thereunder and on the left side you can find the symbol bars. On the right side there is seen the gallery navigator, control window, histogram window and camera selection window. Under this windows the gallery is displayed.

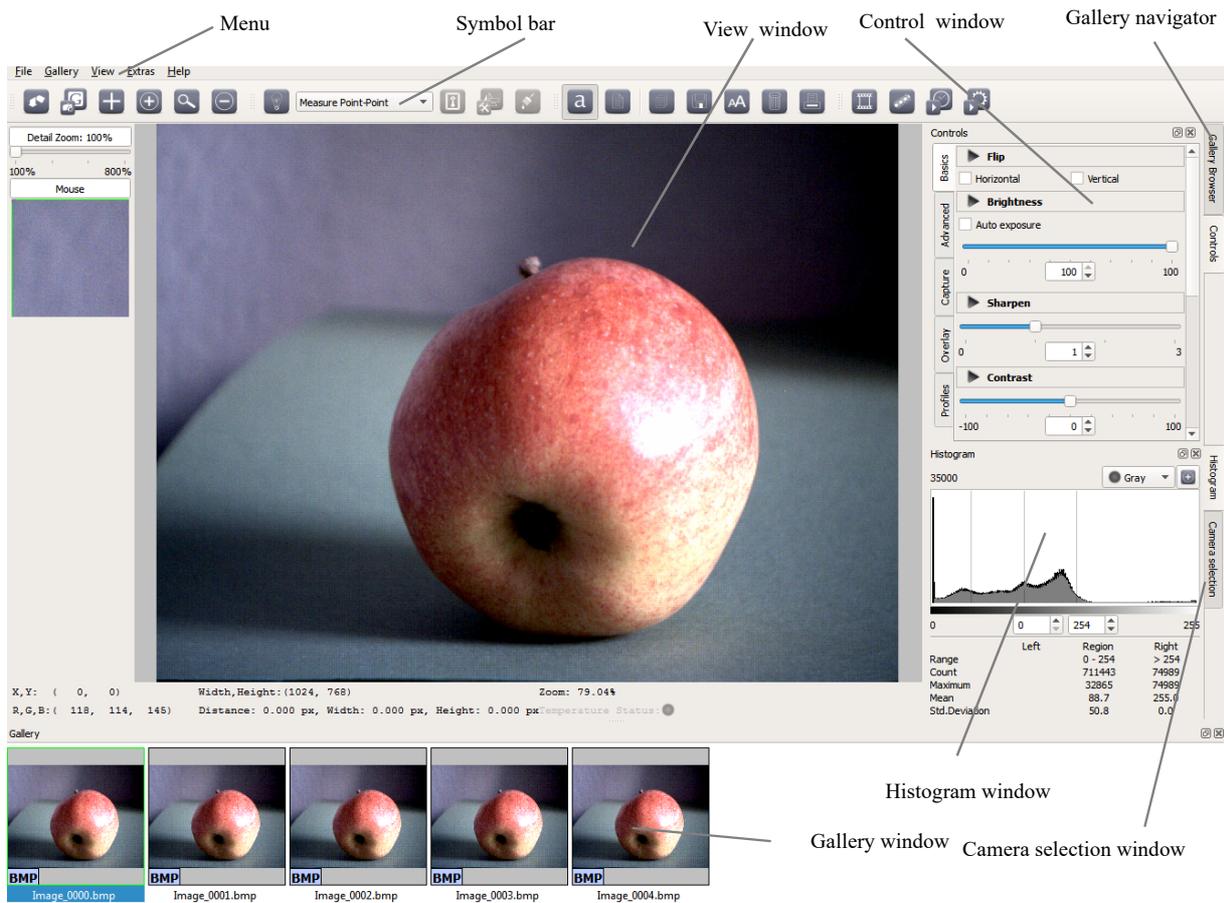


Figure 7: Central view in ImageCapture-I

For the first initial operation of the system you have to choose the appropriate check box in the camera selection window. Prior condition is a connected camera and successful installation of the corresponding camera driver. In the view window there should be seen images delivered from the camera. If you see instead of this the symbol  in the check box this means that the camera is not compatible with the software or your license is not up to date or invalid. If you work with rather long exposure times you will see the blue process bar on the right side below the view window. It shows the start of the next image.

Adaption of the user interface

Individual fitment and storage of the ImageCapture-I user interface is possible with help of a so called user profile. You can find it under menu → “View/Controls/User Profile”. At this place the profiles you can save, rename, delete and activate. It is possible to place the symbols of the symbol bar group wise beneath the menu bar at the left border. Furthermore you can move the gallery window, the histogram window, the camera selection window and the control elements to other places after unlocking from the superior window, masking or arrange one upon the other. Over menu → “View” or the button  at the top in the corner you can mask the corresponding windows. Unmasking is possible over menu → “View”. Unlocking is reachable with the button  on the top or with double click on the title bar. Double click once again locks the windows in the previous fashion. To move a window hold the left mouse button over the title bar. Now you can move the window.

View window

The central point of the application is the view window. Beneath the symbol bar at the left border there is seen a symbol that points the mode of this window. Generally we have to differ between the gallery and the camera mode.

Gallery mode



In this mode the currently selected window from gallery is presented.



Note: In the case of empty gallery nothing is displayed.

The following information are presented at the bottom frame:

- X, Y: Position of mouse pointer in pixel coordinates
- Width, height: Size of the image in pixel coordinates
- Zoom: Factor of enhancement/minimization
- RGB: Intensity in the red, green, blue space at the position of the mouse pointer
- Distance: Calculated with the option “Measure Point to Point” (see table 1 on pages 14 and 15 and chapter “Ascertaining distances in images”)
- Area
Rectangle: Calculated with the option “Measure Rectangle ”(see table 1 on pages 14 and 15 and chapter “Ascertaining rectangle areas in images”)
- Angle: Calculated with the option “Measure Angle” (see table 1 on pages 14 and 15 and chapter “Detection of angles in images”)
- Area
Circle: Calculated with the option “Measure Circle” (see table 1 on pages 14 and 15 and chapter “Ascertaining circle areas in images”)

Camera mode



In this operation mode the images from the camera are displayed in the view window.

In the view window the following information will displayed at the bottom:

- X, Y: Position of mouse pointer in pixel coordinates
- Width, height: Size of the image in pixel coordinates
- Zoom: Factor of enhancement/minimization
- Time stamp: Date and time of image acquisition
- RGB: Intensity level in the red, green, blue space at the position of the mouse pointer
- Distance: Calculated with the option “Measure Point to Point” (see table 1 on pages 14 and 15 and chapter “Ascertaining distances in images”)
- Area
Rectangle: Calculated with the option “Measure Rectangle ”(see table 1 on pages 14 and 15 and chapter ”Ascertaining rectangle areas in images“)
- Angle: Calculated with the option “Measure Angle” (see table 1 on pages 14 and 15 and chapter “Detection of angles in images”)
- Area
Circle: Calculated with the option “Measure Circle” (see table 1 on pages 14 and 15 and chapter ”Ascertaining circle areas in images“)
- Temperature: If supported by the camera
- View: Pictured image rate
- Cam: Image rate of the Camera

Change of mode

Switching between the modes is possible by click on the active symbol for gallery respectively camera mode.

Menu bar

At the top on the left hand side six selectable items with the identification “File”, “Gallery”, “Plug-ins”, “View”, “Extras” and “Help” are disposable. They serve as input for the sub menus.

- **File:** In this menu selected images from gallery are printed through choosing “Print images”. The application is closed by pressing the button “Exit”.
- **Gallery:** The following functions are available over this menu
 1. Sort by: Sorting files alternatively by type or name
 2. Copy to: Create a copy in a free selectable directory.

3. Save as: A copy with a name that differs from the source you can create in a free selectable directory.
4. Rename: Allow to change the name of the image.
5. Delete: Image erasing.
6. Convert TIF: MSB → LSB: shift 10/12/14 bit image to the low byte end of the 16 bit TIF image format.
LSB → MSB: shift 10/12/14 bit image to the high byte end of the 16 bit TIF image format.
7. Print image: Print the image(s).

Focusing an image in gallery mode (click on the desired image) can also activate the functions above. Use the right mouse button to get the context menu.

- **View:** In the sub menus several options for the user visibility are selectable.
 1. Full screen: The whole screen is used to show the active image. The option is activated by pressing “F” or click on the item “Full screen”. Come back to the normal mode is realized by pressing “F” or the Escape button.



Note: This option is only for the camera mode.

2. Dock widgets:
 - Gallery navigator: A click on the corresponding window activates respectively deactivates the navigator. This is documented with the symbol ✓.
 - Gallery window: Here you can activate respectively deactivate the gallery. This is documented with the symbol ✓.
 - Camera selection window: Here you can activate respectively deactivate the camera selection window. This is documented with the symbol ✓.
 - Control elements: Here you can activate respectively deactivate windows for control elements. This is documented with the symbol ✓.
 - Histogram: Here you can activate respectively deactivate window for histogram. This is documented with the symbol ✓.
3. Tool bars
 - Gallery: With click the tool bar for delete, print, rename of images is activated respectively deactivated. Active is documented with the symbol ✓.
 - Capture images: With click the corresponding toolbar for capture images is activated respectively deactivated. Active is documented with the symbol ✓.
 - Zoom Images: With click the corresponding tool bar for enlarge and reduce images is activated respectively deactivated. Active is documented with the symbol ✓.
 - Overlays: With click the corresponding tool bar for exposure warning,

white balance, choosing a region of interest (ROI) is activated respectively deactivated. Active is documented with the symbol ✓.

4. Control elements: In this sub menu you can make visible all control and display function and the corresponding windows.
5. News list: Selecting this sub menu all generated messages/errors of the system through running will be displayed in the window.

- **Extras:** Over this menu you come to:

1. Preferences: Here you can check and change the settings for language, distance measurement, point to point measurement, exposure warning, gallery, display images and appearance. So you can activate the option “Interpolate view” and “Interpolate image details”. In this case you will see floating transitions in the image also by large enhancement. If you switch this functionality off, grating you will see in the image. The reason is, you see then every pixel in the image.



Note: You have to restart the computer to use the changed appearance.

2. Set default GUI profile: Selecting this button, the settings of the first start of the software are activated.
3. Set default camera profile: The factory made settings for active camera will be used.
4. Export/import camera profiles: This function allows to load, set and save camera dependent parameters and settings.
5. Import license: The provided or a new license (new camera or extended software functionality) file you can import with the implemented file navigator. If the license is not saved in the standard directory it is helpful.
6. Import color correction: Beside the provided color corrections, see also table 3 on page 20, additionally items in form of files (*.ccm) one can add to software. You have to restart the program to use them.

- **Help**

1. About: In this window you can check the distributor of the software, his coordinates and the version of the provided software components.
2. About Qt: ImageCapture-I is realized under employment of the Qt-library. It allows a comfortable development of cross platform user interfaces. The software is licensed under GNU LPGL Version 2.1. Over this menu you can find further information about the used version, the valid license regulations and corresponding contact information.
3. Show help dialogue: If the help file is installed in the root directory of the software, over this path you can get the most important information for using the software. Click on the button to go to the next sub menu. There you can select a

help dialogue for several languages. At the moment English and German are supported.

- **Plug ins:** Additional software modules you can activate here. At the moment we support the so called SWIR plug in, the filter wheel plug in, the calibration plug in, the NanEye processing plug in and the VideoCapture plug in.

Symbol bar

The symbols are grouped and you can place them here in any order. To do this, move the mouse to the hatched line above or on the left side of the symbol block. The appearance of the mouse is the changed to . With the left mouse button you can move the group to the desired area.



Note: Changes will be retained after software restart. For temporary using save the original configuration as profile in “Controls/Profiles/User profiles” unless you use the default GUI profile (factory made settings).

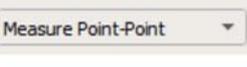
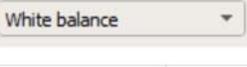
By default the following groups are arranged below the menu bar

- Group 1:
 - Switch between full screen and normal view
 - Selection between gallery and camera mode
 - Detail window hide or show
 - Image enhancement
 - Show image in the 100 % view
 - Minimize image
- Group 2:
 - Exposure warning activating/deactivating
 - ROI, Measure point to point, Measure rectangle, Measure angle, Measure circle, Row an column graph activating/deactivating, white balance
 - Reset ROI
 - Scaling distance
 - Do a white balance

- Group 3:
 - Sort by name
 - Sort by type
 - Copy to
 - Save as
 - Rename
 - Delete
 - Print (marked) images

- Group 4:
 - Grabbing single image to the gallery
 - Capture multiple images to the gallery
 - Save image sequences time controlled to the gallery
 - Back up images in the gallery with hardware trigger

In the following table 1 (on page 14 and 15) symbols, keys and functionality are presented in detail.

Symbol	Key	Notation	Function
Left, below the menu			
	F	Full screen	Switch between full screen and normal view
	space	Switch view	Change between gallery and camera mode in the view window.
	D	Detail window	Hide/Show the detail window.
	+	Enhance	Enhance the view (125 %, 150 %, 200 %, 400 %, 800 %) in the view window.
	*	100 % view	Show images in 100 % view.
	*	Fit	Fit the view to the size of the view window.
	-	Minimize	Minimize the view in the view window (75 %, 50 %, 25 %).
	E	Exposure warning on	Pressing disables the exposure warning.
	E	Exposure warning off	Pressing enables the exposure warning.
		Mode for region of interest (ROI)	Select the mode for region of interest.
		Activate point to point mode	Choose point to point mode
		Activate rectangle mode	Choose rectangle mode
		Activate angle mode	Choose angle mode
		Activate circle mode	Choose circle mode
		Row and color graph mode	Choose Row and color graph mode
		Activate white balance for ROI	Select the mode for white balance for an still to designed ROI.
		Reset ROI	Reset the properties for ROI.
		Scaling	Scale the reference level for distance measurements in the image.

Symbol	Key	Notation	Function
		White balance	Perform a white balance.
By default centric beneath the menu bar, files in the gallery			
		Sort by name	Sorting images in the gallery by name.
		Sort by type	Sorting images in the gallery by type.
		Copy to	Copy on or more images to a free selectable directory.
		Save as	Build a copy with different name. It is possible to change the format in dependence of the supported types.
		Rename	Rename the image.
		Delete	Erase the image.
		Print	Print the selected image in the gallery.
Capture modes of the camera			
	S	Image	Save a single image in the gallery.
	M	Multiple images	Save multiple images in the gallery. The detailed mode depends on the settings under “controls/capture/save images”.
	T	Start time controlled image capture	Start time controlled image capture according the settings.
	T	Stop time controlled image capture	Stop time controlled image capture.
	H	Start hardware triggered	Start hardware triggered image capture.
	H	Stop hardware triggered	Stop hardware triggered image capture.

Table 1: Overview symbol bar

Camera selection window

Here you can get an overview of all available cameras. You can select the actual connected camera to get further information about the device. Cameras that are displayed in gray you can not select. These cameras are already in use by other applications. A camera which is displayed with the sym-

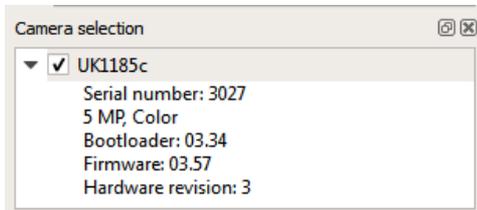


Figure 8: Camera selection

bol  is locked. The license is expired or not compatible with this software. You can activate a camera with help of the corresponding check box. Only one camera can be active at the same time. To get further information like serial number firmware version and so on click on the symbol  before the box. In figure 8 the described symbol was already clicked. Therefore the appearance is changed in .

Gallery navigator

You can select a directory for the actual gallery. The gallery browser provides an overview of your directory structure, see figure 9. If you find the desired directory activate this with a double click. The gallery view should now display all images in this directory which are supported by the software. In the future all captured images will be saved in this gallery until you change this. Right

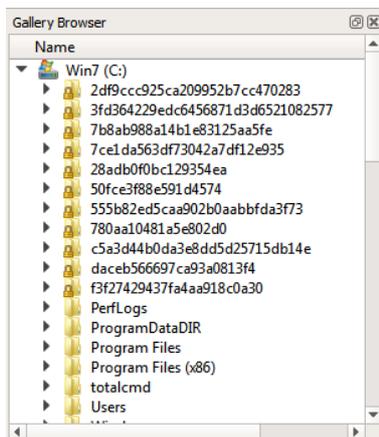


Figure 9: Gallery navigator

click in a directory with all permissions allows you to create, rename or delete a directory. Note, that it is not possible to save to read only mediums like CD ROM. But you can open them to have a look on the images.

First Steps

The further detailed settings we will discuss in the following chapter. At first let us start with the basics of ImageCapture-I. All images will be saved in the actual selected gallery. File name, format, extension and capture type can set under “Controls/Capture/Save image” (see the figure at line multi shot in Table 2). Images with a bit depth over 8 bit you must handle in the TIF format. Otherwise the BMP, PNG and JPG format is available. You can decide to get a number or a time stamp to attach on your file name. Furthermore it is possible to save the image like you see on monitor or as complete sensor image. In the case that a camera is in sequence mode (settable under: Menu → “View/Controls/Sequence”) a sequence of images is captured. The following possibilities for image capturing are supported:

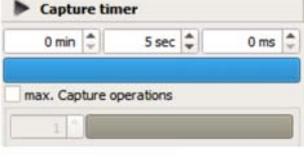
Symbol	Key	Function	Control element
	S	Single shot: Capture a single image for the gallery.	
	M	Multi shot: Capture multiple images one after another in the gallery. Set the number in “View/Controls/Capture/Save image”.	
	T	Time controlled: Capture the images in defined time intervals. Make the settings in “View/Controls/Capture/Capture timer”. Additionally you can set the number of images with help of the option “max. Capture operations”.	
	H	Hardware controlled: The capture of images is controlled by hardware. Make corresponding settings in “View/Controls/Advanced/Port settings”.	

Table 2: ImageCapture-I modes

The captured images are supplied with a name, displayed in the gallery window and saved (with gallery navigator) according the settings.



Note: In gallery mode no actual image captured by camera is shown in the view window. For this purpose you have to switch to the camera mode.

In the gallery overview every supported format is displayed. These are PNG, JPG, BMP and TIF. The format is shown in the miniature view button on the left side with a color code. The actually selected image (also seen in the view window) you can recognize on the green frame around the image. The corresponding file has a blue background. To select a set of images create a frame with pressed, left mouse button. Please have a look to figure 10. To add or remove a single image use the combination Ctrl + left mouse button. With Shift + left mouse all images until the actual image are marked. With the right mouse button you can activate the context menu.

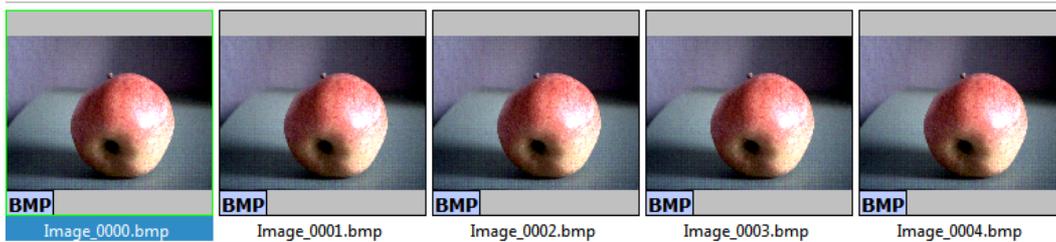


Figure 10: Gallery window

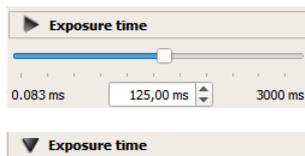
In the context menu you can sort by, copy to, save as, delete, rename and print images. Instead of this you can use the already introduced symbols beneath the menu bar (see also figure 11).



*Figure 11: Function bar for files
in the gallery window*

For advanced learners

To achieve the full performance of the camera and software a multitude of settings are available. You can arrive these settings over the control elements top at right hand side. The setting points are grouped to control element groups. If you don't need a setting point you can minimize it. Click for this goal with the left mouse button at the triangle left on top. With this feature you can get a clear arrangement of the user interface. The application will save and keep this configuration also after program restart.



By default control element “Exposure time” is displayed in this way

Minimized displayed control element exposure time

A second click of the triangle resets the previously action. You can show the single control elements directly over the menu. For this purpose click on the desired element under “Views/Controls/<element>”. The selected control element is then displayed.

Control window

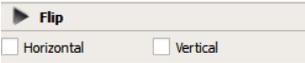
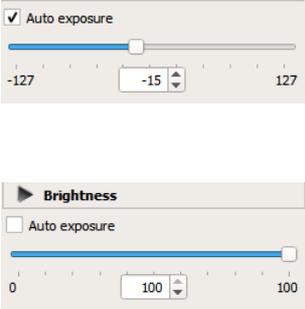
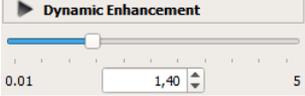
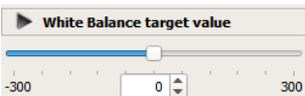
All control elements are achievable over the control window. For a better arrangement the control elements was grouped in 5 categories. These are:

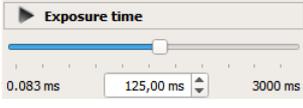
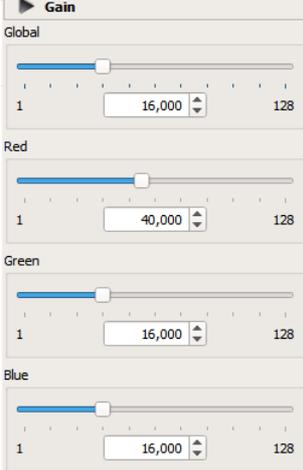
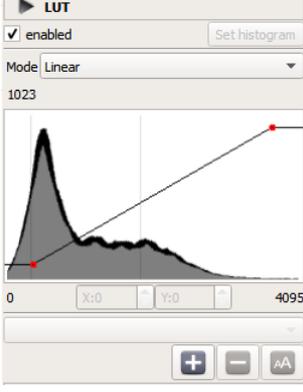
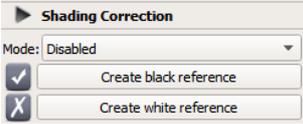
- Basics
- Advanced
- Capture
- Overlay
- Profiles
- Plug ins (if disposable)

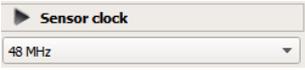
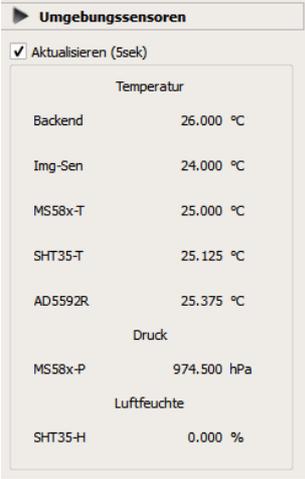
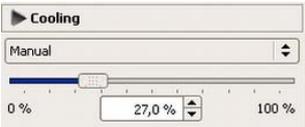
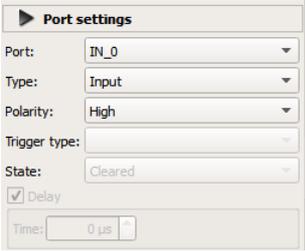


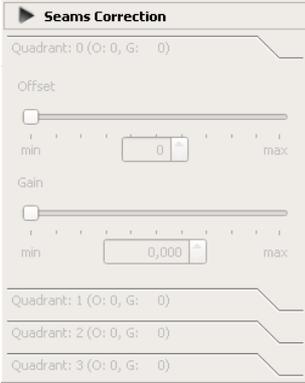
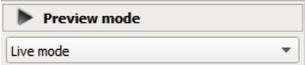
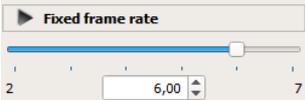
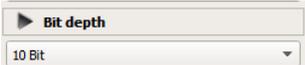
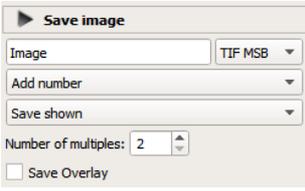
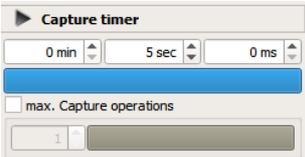
Note: Plug ins are not essential components of the software. They are only required for some extra functions of particular camera types and delivered according to this.

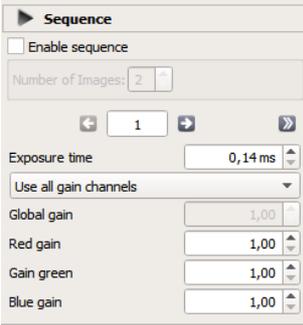
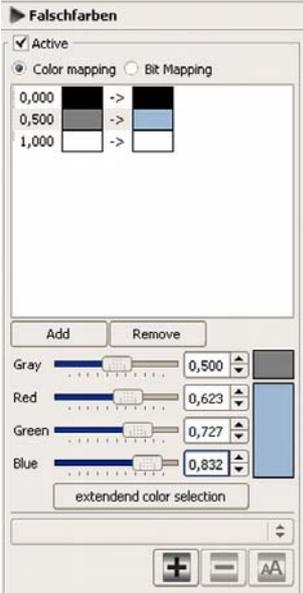
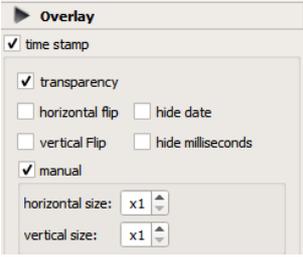
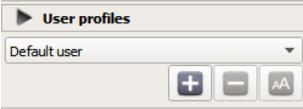
You find an overview about the controls in table 3 on page 20 to 26.

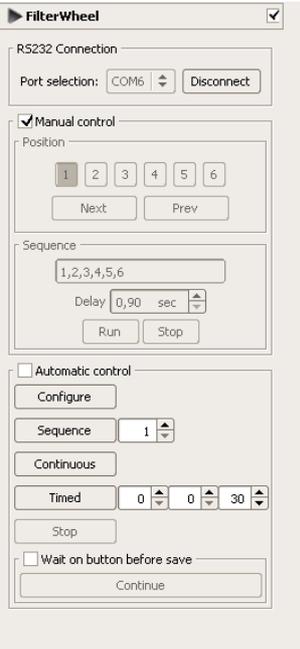
Control element	Explanation
Basics	
	You can activate flip respectively mirror the image in horizontal and vertical direction.
	<p>Type a) With activated automatic exposure the software takes the control to display an image at defined brightness. This is an iterative process. It takes some images to make the changes observable. The user can change the target value.</p> <p>Type b) With deactivated automatic exposure the user can control this level manually.</p>
	Using an additional sharpness filter. Four levels are possible (level 0 → no sharpening, level 3 → powerful sharpening).
	Here the contrast of camera images you can adjust.
	Here the saturation of color of the camera image you can adjust.
	Here the dynamic improvement (di) you can adjust with help of a non linear characteristic line (di = 1 → linear, di < 1 → progressive, di > 1 → declining).
	Define the target value for the so called white balance (a color correction of bad exposure conditions that results in faults of color). With help of the slider the target level is adjustable to bluish (< 0) and reddish (> 0) shades. For the procedure of white balance select and start the white balance mode in the menu bar (left border by default) and use the camera mode (see also chapter. „Make a white balance“ on page 31).
	Is an extension of the possibilities of white balance. Select between several options for color correction (no color correction, daylight 1, daylight 2, standard, daylight). Only possible with connected color camera.
Advanced	
	You can choose between several color display modes of the camera. Typically these are color images, black/white images and Bayer images (green/red).

Control element	Explanation
	<p>The exposure time for the camera is directly adjustable. For this, automatic exposure must be deactivated. Change of this value causes modification of the control element “Brightness” in the group “Basics”.</p>
	<p>With automatic exposure this control element is deactivated. You can set the gain of the single color channels. Changing the global gain conserve the ratio of the color channel to each other. In black/white recording the color channel are deactivated.</p>
	<p>This is an additional parameter to set the gain (with bit shifting) for brightness.</p>
	<p>So called look up tables are an easy approach to map transfer functions in systems. An input level, in this case the brightness level of an gray level image, is assigned to an output level according to a desired rule. Functions are calculated one time and save in a table. For creation of rules the modes “Linear”, “Points”, “Zeropoint”, “Threshold”, “Gamma” and “Gradient” are available. The realized settings you can save and reload. For further details go to chapter „Working with look up tables (LUTs)“ on page 35.</p>
	<p>The correction of inhomogeneous illumination (shading) caused by optic and differential gain and offset of sensor pixels is settable in this control element. To create a shading reference image press the corresponding button. This process takes some seconds. Note the image shall not to be too bright respectively dark. You have to create a black reference image before you can start with the white reference image. The success of the creation is shown with a check mark. After this you can select the mode (deactivated, both, only black reference, only white reference).</p>
	<p>Deactivate/Activate the bad pixel correction. Defective camera pixels are calculated out of the image with a special algorithm to get an improved image.</p>

Control element	Explanation
	Set and activate the black level compensation.
	Several cameras support a variable clock rate for the sensor. This is selectable at this point, if available.
	According to the used camera one or more parameters for temperature pressure and humidity values will be shown
	In the case of a camera without sensors you will see a windows like this(left hand).
	With help of this function (if supported by the camera) you can set the temperature at the sensor. This can be done by hand (manual) or automatically. You can also switch off this function. For automatic function you can choose the target temperature value in a range between -50 °C and +20 °C. For proper work of the cooler the slider for manual operation should never exceed the 70 % point on the scale.
	<p>Here you can adjust the port settings for hardware trigger.</p> <p>Port: Selection of port that is needed to adjust (IN_0, IN_1, OUT_0, OUT_1, TRG_IN)</p> <p>Type: Function of the i/out port (input, trigger in, output, strobe out [exposure control], vertical sync out)</p> <p>Active: Selection of the active level (high, low)</p> <p>Trigger type: Not supported at time</p> <p>State: Sets and shows active respectively inactive ports</p> <p>Delay: You can set and activate a defined signal delay at particular input port</p>

Control element	Explanation
	<p>With seams correction it is possible to adjust offset and gain of video signal outputs with each other. The background are variations at image sensors with separate image areas and signal paths. Seams correction is only available at cameras which contain such a sensor type and support this functionality.</p>
<h2>Capture</h2>	
	<p>Switching between three image modes “Live”, “Quality” an “Fixed frame Rate” is possible here. In “Live mode” the camera sends images with a frame rate at least 20 fps in all resolutions. The “Quality mode” operates at smaller frame rates with better image quality (higher resolution). The “Fixed frame rate” uses a fix frame rate until an implemented limit, that not can overcome. You can set the frame rate in the control element “Fixed frame rate”, see next line for this.</p>
	<p>This element is only activated in the “Fixed frame rate” mode. The actual frame rate will never exceed the target level. Note: You can only drive a frame rate that is also supported by the monitor!</p>
	<p>Here you can select and see the available resolution for the preview mode. At time the following standards are supported: sensor resolution, XGA, SVGA, VGA, CIF, QVGA.</p>
	<p>Sets the bit depth of the transferred images. The TIF format supports 16 bit. Typically cameras use 10, 12 or 14 bit. Because of that, bit depths over 8 are matched to TIF format with a shifting to the more significant byte to avoid a too dark presentation of the image → “scaled TIF”.</p>
	<p>Define name, format, number of the images for capturing. The supported images are 8 Bit BMP, JPG, PNG and TIF with 16 bit. You can activate the option “Save overlay”. In this case all image information, created with help of the measurement function (see chapter “Ascertaining distances in images“ on page 29), will be saved with the image.</p>
	<p>Here you can adjust the time interval for time controlled capture. The blue bar beneath at the left side has the functionality of a progress bar. Additionally you can set the number of images with help of the option “max. Capture operations”.</p>

Control element	Explanation
	<p>Several cameras can save images one after another in the memory with high speed. These images can have different exposure times and gains. You can make the settings here. Activation of the check mark at “Enable Sequence” enables the mode. A single shot realizes a single image capture sequence, a multi shot leads to multiple sequences. With help of the arrows you can switch between the individual images of the sequence. The double arrows assign actual settings to all following images. In this mode the exposure time is settable in the window hereunder. The following window allows to set the gain of the color channels. For more details go to chapter “Realization of image sequences” on page 32.</p>
<h3>Overlay</h3>	
	<p>Optional: In pseudo-color (Falschfarben) the image is converted to gray level image. With the methods “Color mapping” and “Bit mapping” you can make a direct mapping of gray levels to colors. Use for this the sliders or input discrete numbers in the corresponding windows. With the extended color selection you can allocate color tones of a color palette. For details about the procedure go to chapter “Optional: Using pseudo colors“ on page 37.</p>
	<p>Here it is possible to show a time stamp in the image. It can displayed with transparency. You can flip it in vertical and horizontal direction and change the size. Furthermore you can hide the information of date and milliseconds.</p>
<h3>Profiles</h3>	
	<p>User interface settings you can save here. Arrange the user interface according to your requirements. Create a new profile. With using of the profile you can reconstruct the user interface at every time.</p>

Control element	Explanation
	<p>Save the actual camera settings for reconstruction in the future.</p>
<h3>Plug ins</h3>	
<p>Short Wave Infra Red (SWIR) plug in¹: This feature realizes the correct initialization of the SWIR camera family. Furthermore it supports the access to functions which are implemented in this type.</p>	
	<p>From already existing profiles, for the used camera, you can filter those which are conform with target value area. You can create a profile with setting the desired parameters with the SWIR profile wizard (see “Optional: The SWIR profile wizard” on page 39). For using you have to choose menu → “Extras”. Go to “Export/Import camera profiles”, rename if you like and save it, see also chapter “Menu bar” on page 9 under Extras.</p>
<p>Filter wheel plug in: This accessory is helpful for control of a filter wheel in combination with an ABS camera. The filter wheel can set different filters in the optical light path for systematic control the spectral range.</p>	
	<p>Settable is a manual and an automatic mode. In conjunction with the camera the realization of image sequences by different filters in the optical path is possible. For more details go to chapter “Optional: The filter wheel plug in” on page 43.</p>

¹ Only usable after unlocking and with the appropriate camera

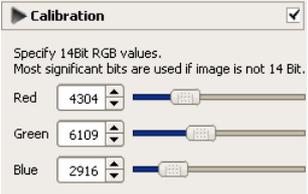
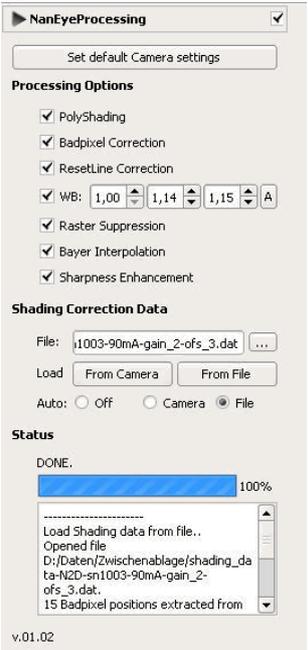
Control element	Explanation
<p>Calibration plug in: The tool it allows to analyze the influence of graphic cards on adjusted color values</p> 	<p>With help of sliders respectively input windows for the colors red green and blue you can set defined color values to evaluate the values displayed by the graphic card, see chapter “Optional: The calibration plug in” on page 45.</p>
<p>NanEye processing plug in (optional): Is necessary for operation with NanEye sensors.</p> 	<p>It is an extension of ABS ImageCapture software with functions for image processing in conjunction with the 2 B/C/D-Sensor. For more details go to chapter “Optional: The NanEye processing plug in” on page 46.</p>
<p>VideoCapture plug in (optional): Capturing of video streams in WebM format.</p> 	<p>The VideoCapture plug in can use for capturing video streams in the WebM format on base of video codec “VP8” and audio codec “Vorbis”. For more details go to chapter “Optional: The VideoCapture plug in” on page 47.</p>

Table 3: Control elements

With help of the several control elements it should be possible to optimize the camera for the intended use. In the case that after configuration the camera does not work anymore reset the camera to the factory-made settings with menu → “Extras/Set default camera profile”. In the case of the user interface you can select “Set default GUI profile”.

Histogram window

For special investigations it make sense to check the frequency distribution of colors and gray levels in images. For this purpose one can use histograms (see figure 12). It is possible to unlock the histogram window from the superior dialogue with help of the symbol  top on the left border or with

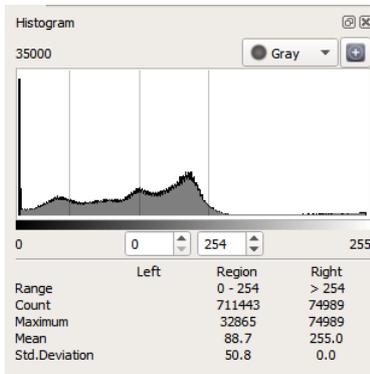


Figure 12: Histogram

double click on the title bar. In this state you can enhance it. Another double click locks the windows again to the superior dialogue. With the button  you can completely close the window. Activation is possible with menu → “View/Histogram”. With help of the buttons  and  the presentation of the distribution over the x-axis you can zoom. In the main section of the histogram window top on the right sight one can select a color channel or gray. On the left side there is shown the actual maximal displayed frequency. Moving the mouse over the histogram (not seen in figure 12), activates a gray vertical line to show the actual position and level on top in the middle. Beneath the characteristics hereunder on the right side the maximum of color number is shown. In the middle there is a filter for the presentation and statistic. Histogram and statistic is ever shown from including biggest histogram level to including smallest histogram level. The settings of the display are matched in the case of change of the bit depth.

Creation of image details

Often you have the task to inspect details in images. The easiest way is to zoom in the image. One can use the symbol for enhancement from table 1 on page 14 and 15 for this intention. The software contains significant better tools for this scope. With selecting the symbol “En-/Disable details view” (see figure 13) a new window is opened in the view window. Here you can set an enlargement factor.

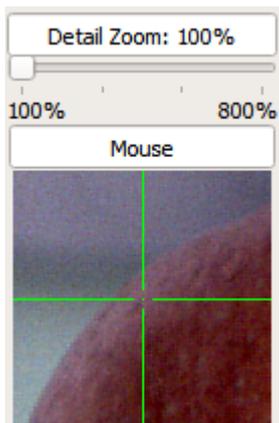


Figure 13: Detail view

Possible are 100 %, 200 %, 400 % and 800 %. In the window hereunder the image details of region, where the mouse pointer resides, are displayed with the selected factor. Now select the measure distance mode in the menu bar (refer for this chapter “Ascertaining distances in images” on page 29). With pressing the left mouse button and move over the displayed image you can draw a straight line. The image areas at start and end are displayed in the windows “Line start” and “Line end”. This option is also usable for calculation object sizes, see mentioned chapter above. Pressing the button “Enable/Disable details view” once again close the window. The user interface contains another possibility by selection of so called region of interest (ROI). Select the button “ROI selection” in the symbol bar to get the ROI mode (see also table 1 on page 14 and 15). With pressed left mouse button now you can create a frame.



Go to the desired area, press the left mouse button to draw a frame with larger scale. A double click in the window resets the settings. The symbol “Reset ROI” is also usable for this intention.



Reset ROI

Ascertaining distances in images

At first you have to create a reference level in the image. Go to the menu and choose the option window. Select “Measure point to point” like shown in the figure below.



Create, with pressed, left mouse button, a straight line to determine the length of an object in the image with known size.



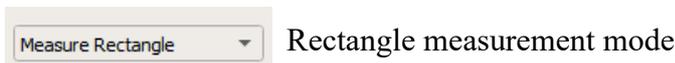
Click on the left symbol to calibrate the distance

After clicking, a window is opened to input a number for the length and the unit. You should prefer typical units like mm, cm or m. Level and unit, they are used as reference for other objects in the image. Creating a new line over unknown objects, it allows the calculation of sizes and distances in the image. The corresponding result is shown in the view window beneath the view window at point “Distance”.

The described functionality is extensible. Activate under “Extras/Preferences” the option “Measurement: Point to Point”. In this case you will get cross hairs as measurement points.

Ascertaining rectangle areas in images

Choose “Measure rectangle” at first.



Create, with pressed, left mouse button, a rectangle, showing in green. With help of the mouse you can move the edge of the rectangle. Moving the mouse inside the rectangle allows you to move the complete rectangle. According the settings (refer to chapter ”Ascertaining distances in images“) the area will display in the corresponding units.

Detection of angles in images

Choose “Measure angle” at first.



Create, with pressed, left mouse button, a straight line, showing in green. The program will extend this to the border of the image (in red). Press now the Strg-Key and use the mouse in the same to create the second line. On the green ends of the lines you can correct the position now. In the view window now is showing the resulting angle between the lines. Double click remove the lines.

Ascertaining circle areas in images

Choose “Measure circle” at first.



Create, with pressed, left mouse button, a circle, showing in green. With help of the mouse you can move the edge of the object to increase the diameter. Moving the mouse inside the circle to the cross allows you to move the complete circle. According the settings (refer to chapter ”Ascertaining distances in images“) the area will display in the corresponding units.

Generate a shading correction

Shading is caused by optics with inhomogeneous illumination and by differential gain and offset. This effect needs to be corrected. Basically you have to proceed a black and white balance for proper correction of shading. To start the procedure go to “Controls/Advanced/Shading Correction”. Use a rather dark scene. Activate the black reference with corresponding button (use the mouse). In case of proper function the symbol , on the left side contiguous to the button will be replaced through a check mark (). If the brightness was too powerful a corresponding message in the message box is listening on screen. (refer to chapter “Menu bar” on page 9). If so, repeat the process with smaller illumination. In the case of the white reference carry out in analogous way but with brighter scenes. After successful creation of white and black reference you can select an option for shading correction. These are:

- Deactivated → no correction,
- Both → all references are in usage (default case),
- Only black reference → black reference is using,
- White reference → white reference is using.

At some special camera types the settings for shading correction with several independent parameters are necessary. For support of the users a special profile wizard is implemented in the software. For further information go to chapter “Optional: The SWIR profile wizard” on page 39.

Make a white balance

In presence of inappropriate illumination conditions images can contain color casts. For correction one can process a white balance. In a scene an area as white as possible you should use as reference level. In some cases a systematic coloration is desired. In that case you can use the slider for “White balance target value” under “Controls/Basics”. With its help the target value can shift to bluish (< 0 , cold light) respectively reddish (> 0 , warm light). As default the slider is at zero. The procedure of white balance is realized in the corresponding mode by selection the following window.



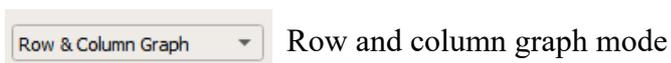
Create a frame with pressed left mouse key to choose the area for white balance.



Click to the symbol (left) to process a white balance. A white balance will be carry out according the specified values.

Using row and column graph

In some applications knowledge about the gray value gradient respectively color gradient in x- and y-orientation in relation to a coordinate plane is required (the characteristic of intensity of the adjusted ordinate and abscissa is displayed). For this case you can use the row and color graph in ImageCapture-I. At first you have to activate this mode in the mode option window.



The appearance of the view window is now supplemented with a horizontal window at the upper image border and a vertical window at the right border of the image. In the image itself a cross line is showed. At the left boarder of the image now there are displayed some entries. Here you can see the actual position (in pixel) of row and column, mean value and frequency distribution for red, green and blue. Thereunder is a slider for adjusting the biggest and smallest displayed value in the window for the row and column graph. In figure 14 on page 32 you can see all relevant details of the view window. With help of the mouse you can adjust the cross line. Move the mouse pointer over the cross line. The appearance will change to . Now you can slide the ordinate and abscissa at one time with pressed left mouse button to the selected coordinates. You can also adjust the ordinate and abscissa separately. Move the mouse pointer over the ordinate. The appearance will change to .

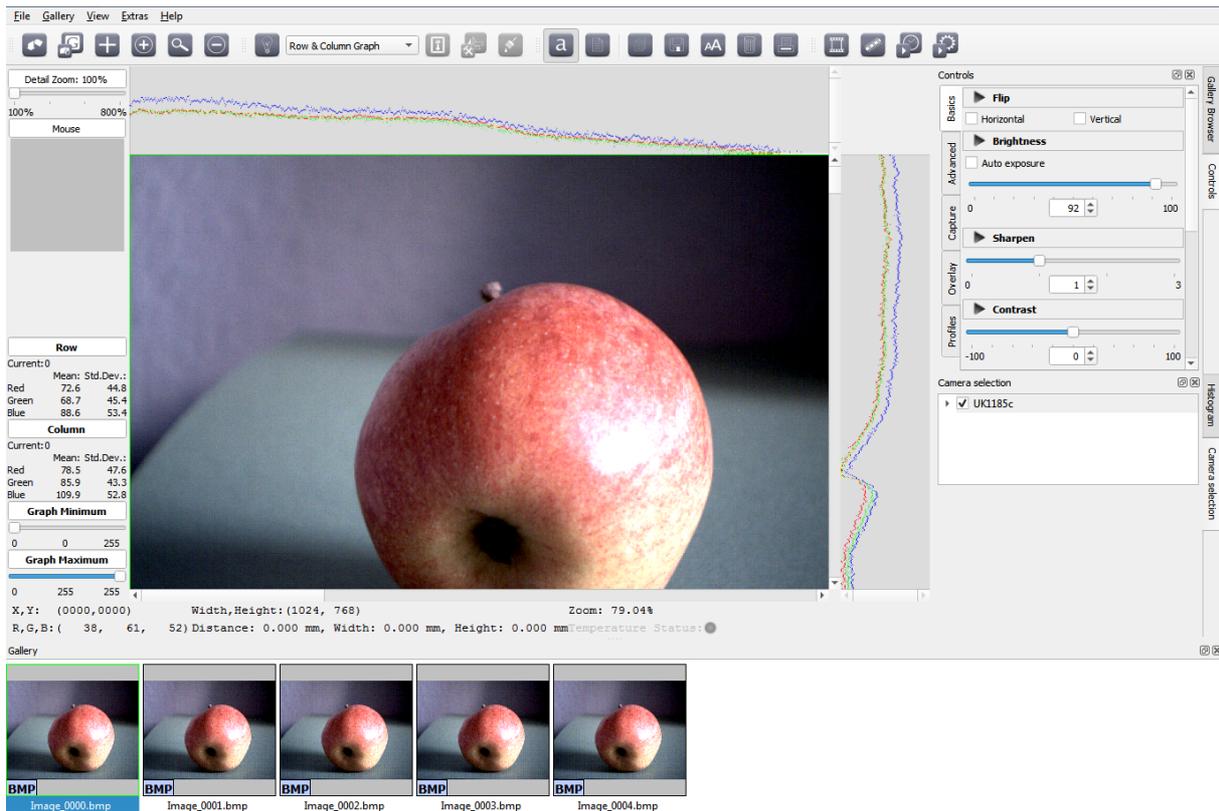


Figure 14: Extract of the view window in mode row and column graph

Now shift the ordinate, with pressed left mouse button, to the desired position. In the case of abscissa the appearance will change to \updownarrow . You can move the abscissa in the same way. The slider with the name “Graph Minimum”, it allows the limitation of the displayed area for small values. In figure 14 the settings for displaying of the whole area of an 10 bit image are seen. If you like to limit the lower area you have to move the slider to the right. If you want to change the view in the upper area move the slider named “Graph Maximum” to the left. In this way you can adapt the display of row and column graph to your requirements. As default the ROI mode is activated in the mode selection window.

Realization of image sequences

At time ImageCapture-I support four variants for realization of image sequences.

Multi image capture: The number of images are settable under “Controls/Capture/Save image”. In dependency of the adjusted parameters the system will capture the desired number of images by pressing the key “M” or using the symbol for multi image capture, also known as multi shot (refer to table 1 on page 14 and 15 plus Chapter “First Steps” on page 17).

Time controlled capture: With the “Controls/Capture/Capture timer” a time interval is settable for image capture. You can start and stop the process with the corresponding symbol in the menu bar by pressing the key “T”.

Hardware controlled capture: In this variant capture is controlled by an external signal. The settings for the ports you can do with port settings in the control element group “Advanced”.

The fourth variant is realized in the control element for sequences in the group “**Capture**”. In figure 15, on page 33, the corresponding possibilities for settings are displayed. At first “Enable sequence” has to be activated by clicking in the left box. A check mark you should see now. At next insert the number of images in the window beneath. For instance, if you choose 3 images per sequence in the single capture mode (single shot) three images will be captured after start (see also chapter. „First Steps“ on page 17).

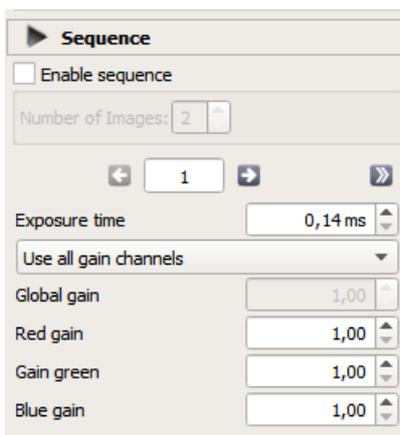


Figure 15: Sequence adjust

In the case of multi image capture (multi shot) a number of sequences will be captured according to the number in the window “Number of images”. In “Controls/Capture/Sequence” the particular image is selectable with and (see also figure 15). Every image can have its own integration time and gain. If all images shall have the same parameters then adjust them in the first image and press the symbol . All following images then will get the same parameters. For the gain the following options are available:

- Use all channels → every channel can adjust separately (red, green, blue).
- Global → The setting for gain will be affected uniform to all colors.
- Relative to red → Gain of green and blue will be changed with the adjusted factor.
- Relative to green → Gain of red and blue will be changed with the adjusted factor.
- Relative to blue → Gain of red and blue will be changed with the adjusted factor.



Note: The settings for global, red, green and blue under “Controls/Advanced/Gain” they have an impact of the resulting gain of each channel!

Build profiles

For the individual settings of camera and user interface you can build profiles. In this way own special configurations can save in profiles for re-use in special tasks. To create a **user profile** arrange the user interface at first. Then go to “Controls/Profiles/User profiles” to build a new profile with the symbol . Create a useful name and acknowledge the input. The name is changeable at every time. For this scope select an already profile, making it visible with . With the symbol  one can rename the selected profile. Delete a profile with the symbol .

In the case of **camera profiles** you carry out in analogous way. Set all required parameters of the camera and save them as profile with a useful name. Select the profile for re-use from the list. In some situations an access of profiles without selection from an overview is useful, especially if you have generate a big number of profiles.



Figure 16: Fast profile access

Examples for this are tasks in microscopy with different magnifications and geometric measurements in images. Other applications require different illuminations with diverse camera settings. For faster access to camera profiles you can activate the corresponding check mark (see figure 16). Besides the window then you can get the icon . It allows faster access to profiles. You can activate this symbol with the mouse (left mouse click). At next you will see a table like in the following figure 17.

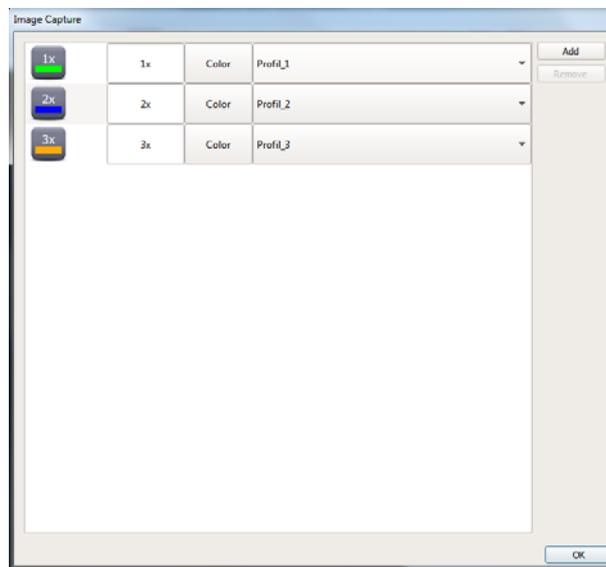


Figure 17: Profile table

Three plugins was previously realized. To add a new profile activate the button “add” with the mouse. It will append a new line to the overview. In the second cell (left) one can input a short text for the new button. For better optical determination you can additional choose a color for the color bar in the button. At the end you have to assign the button to a previously generate profile with the mouse. With “ok” you will finalize the procedure. When you have a view likewise in the figure 18 on page 35.



Figure 18: Profile fast access

The wished camera profile one can activate with the corresponding button.



Note: The actual settings will be kept after restart of the system.

The correct illumination

The typical use case is the utilization of automatic exposure control (exposure time and gain). With help of implemented algorithms the system adjusts the corresponding parameters as good as possible under given conditions. In the case of variation in light conditions the system will track the parameters. Sometimes it is necessary to regulate the illumination by hand. Remove the check mark at “Basics/Brightness/Automatic exposure” under “Controls”. With help of the slider in this window you can adjust the exposure according your requirements. It is also possible to set the exposure time under “Advanced/Exposure time”. For your comfort an **exposure warning** was implemented. If this option is activated, too bright /dark areas are displayed in blue/red color. By default this option is activated. To switch this option off press key “E” or the corresponding symbol in the left bar beneath the menu bar. Pressing again will reactivate the option. For the corresponding symbols and details please have a look to table 1 on page 14 and 15.

Working with look up tables (LUTs)

So called LUTs are a rather simple approach to map transfer functions in systems. An input level is mapped to an output level. ImageCapture-I supports this approach with a special input window in “Controls/Advanced/LUT”. In figure 19, on page 36, the you can see the window. With help of the button “Set histogram” the actual histogram can show as background in the actual LUT window. In

the mode “Linear” two supporting point are offered for creation of the LUT. With the mouse you can set their coordinates. To do this go with the mouse pointer to the interesting point. The software changes to the catch mode visible by the new view of the mouse pointer \leftrightarrow . Press the left or right mouse button to vary the coordinates of the selected supporting point. The values are displayed in the upper right windows.

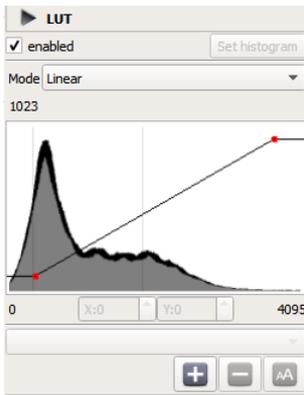


Figure 19: Mode “Linear”

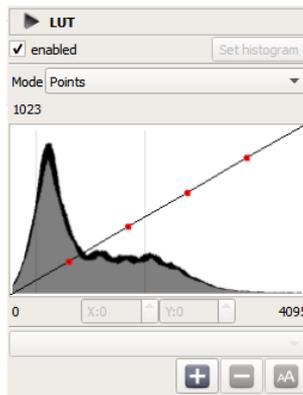


Figure 20: Mode “Points”

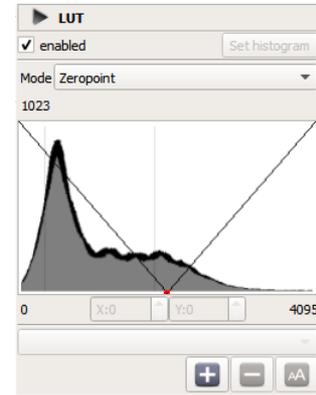


Figure 21: Mode “Zero point”

You can also move the pointer over direct input in windows in the middle. With help of the symbols $+$, AA , $-$ you can create, rename and delete LUTs (refer to chapter “Build profiles” on page 34). The function itself one can activate with a check mark top on the left. In the mode “Points” (see figure 20) four supporting points for creation of the function are available. You can use the mode in analogous way like in mode “Linear”. The mode “Zero point”, in figure 21, it allows to create a linear function with a rising and a falling part. The function starts at the top left corner and ends at top right corner. With help of mouse and keyboard one can move the zero point along the x-axis. The catch mode is shown in this variant with changing the mouse pointer view to \leftrightarrow .

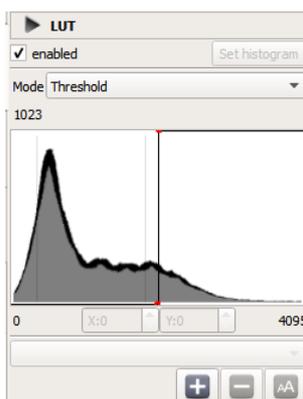


Figure 22: Mode “Threshold”

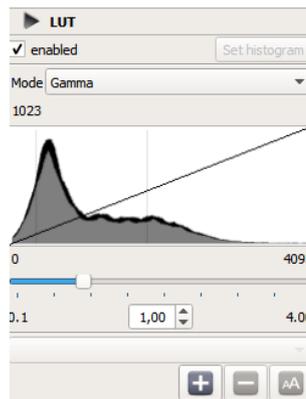


Figure 23: Mode “Gamma”

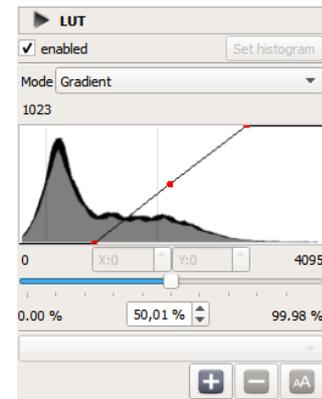


Figure 24: Mode “Gradient”

The so-called threshold mode, see figure 22, realize a vertical edge as transition between the possible minimum and maximum. With help of mouse or keyboard you can determine the coordinate at the x-axis. In the mode “Gamma” with help of a slider, look to figure 23, or with direct number input of γ at the window hereunder you can choose the desired value. The software calculates the

acceptable range of data according the formula $y = x^{\gamma}$ to create the corresponding LUT. In the mode “Gradient” (see figure 24) three supporting points are used.. All three points are movable along the x-axis. In this way you can create locations for maximum, minimum and slope of the function. On base of the function the LUT is created.

Optional: Using pseudo colors

Over “Controls/Overlay” the pseudo color tool (Falschfarben) is available. At first a conversion of the image to a gray level presentation is realized. With the variants “Color mapping ” and “Bit mapping” an assignment to red, green and blue portions can generated, see figure 26. In the first variant with help of sliders a gray level can map to color parts on every color channel. The result is shown

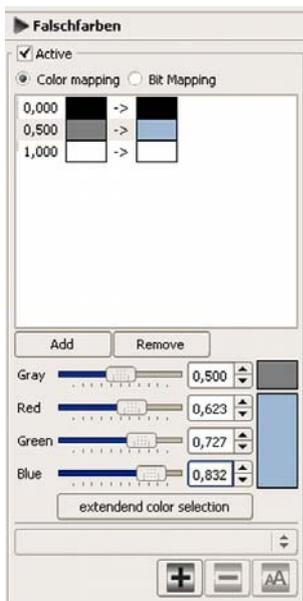


Figure 26: Pseudo color plug in, mode color mapping

on the right side. The corresponding gray level is displayed above. Beside the slides the values for every color channel are shown. You can also use this window for direct input of the levels. Changing the values by slides results in actualization of the windows.

Procedure for color mapping:

- Click on the check box on top to activate pseudo color.
- Select a variant with the corresponding radio button, choose option “Pseudo color”.
- Click with the left mouse button to the desired line. This allows to map the parts of red, green and blue to the corresponding gray level with help of the slides.
- If additional lines for gray level are required, you can add them with the button “Add”. Over the slider for gray level you can adjust the value. By default the value 0,000 for black and 1,000 for white is specified.
- For easement of the settings in the color channels one can pick a color tone over the button “extended color selection”. Use the mouse for this, see figure 27, on page 38, and read out the required part from red, green and blue. Furthermore it is possible to create self defined colors in this menu. Mark the desired box with the left mouse button, choose a color and

then press the button “Add to Custom Colors”.

- With help of the symbol  you can save the new setting as profile in a file. By default these files are saved under “Dokumente und Einstellungen\All Users\Anwendungsdaten\ABS GmbH\ImageCapture” in the directory “Falschfarben”.
- With the selection window above one can select a self-created profile from list
- With help of the symbol  you can delete profiles.
- Renaming is possible with .

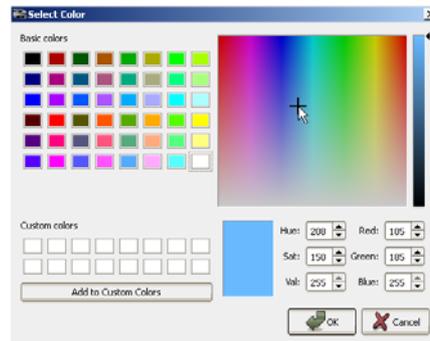


Figure 27: Select color window

Procedure for bit mapping:

- Click on the check box to activate pseudo color.
- Select a variant with the corresponding radio button, choose the option “Bit mapping”.
- Now a table is displayed like in figure 28. On the left side the gray levels are displayed, on the right you see the values for red, green and blue in hex. In the line beneath the same values are displayed as binary number.

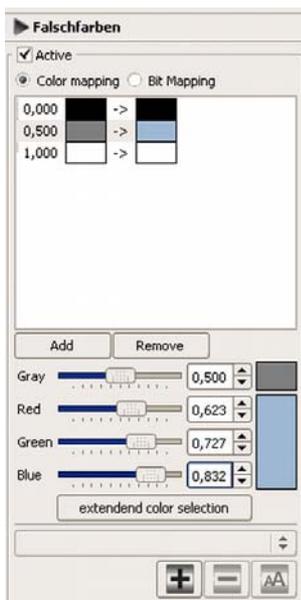


Figure 28: Mode bit mapping

- To change an entry activate the cell with the left mouse button and write the new value at

this position.

- In the lines beneath the values are displayed as binary number.
- If you wish to change the entries, click with the left mouse button to activate and make your modifications.

Optional: The SWIR profile wizard

ImageCapture-I supports an optional plug in dialogue function “SWIR profile-wizard” with user guiding for comfortable and secure determination of the required parameters for shading correction (back ground compensation). This is necessary because of noticeable differences in gray level without illumination (black level) respectively responsivity at some image sensors. Especially with so called InGaAs² image sensors for the SWIR you find this property. This leads to noising in the images. With shading correction all individual differences of the pixel characteristics they are fixed with special reference images and used in the camera for equalization in sensor images. Additionally vignetting occurs. The reason is the camera objective itself. This effect it can be handled in the same manner. The creation of the profile is to do as following:

1. At the begin the wizard has to be unlocked for the user. In this case you can get the tool with menu → “Plug-ins/SWIR 1.4/SWIR Profile Wizard”. Then you can see the standard dialogue window (see figure 29). In this window all required steps are documented. With “Next” you can get to the following window. “Cancel” will abort the procedure.

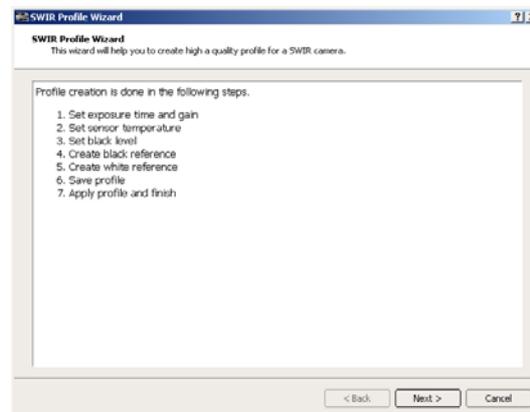


Figure 29: Wizard standard dialogue

2. In figure 30 the settings for exposure time are displayed in the sliders and the windows beneath. For optimal image quality gain should be adjusted to a value as small as possible. With “Next” you will go to the next window. With “Back” you will go to the previous one.

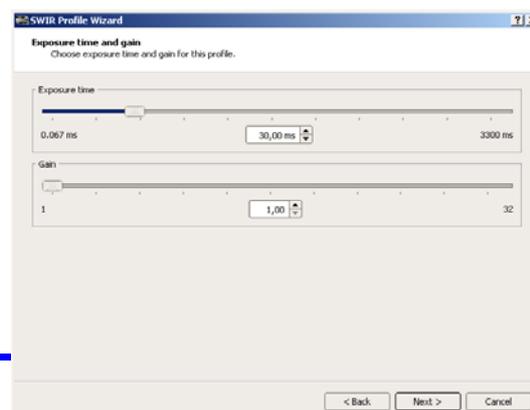


Figure 30: Exposure time and gain

- In sensors with active cooling (Peltier element) you can adjust the wished target value with the slider or with direct input in the box hereunder (see to figure 31). After typing the target value of temperature the control unit starts with work. For a good correction a stable sensor temperature is required. Therefore you can pass this step (unlocking the next button) not before stabilization of temperature in a range of ± 0.5 K for some minutes. In the case of not active cooling of the sensor you can skip this step with help of the “Next” button.

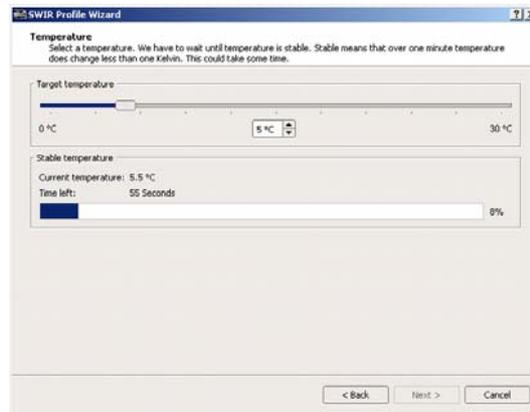


Figure 31: Temperature control

- After setting the exposure parameters and temperature target value the detection of dark offset respectively black level is necessary, see figure 32 for this. At first one has to cover the objective, for instance through closing the blend or if this is not possible using a cap. With help of the black level setting window the histogram of the dark image, you have to adjust in such a way that the spreading gray levels reside as near as possible at zero (left side).

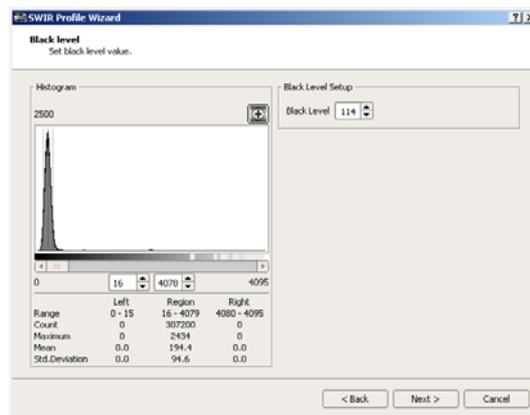


Figure 32: Setting black level

- In the case of too small black level value there can arise a situation, displayed in figure 33. The best is a curve progression similar to Gaussian distribution curve. This is seen in figure 34. For better details you can enhance the x-axis with the button  in the histogram windows. Minimization occurs with using of . With “Next” you go to the following dialogue.

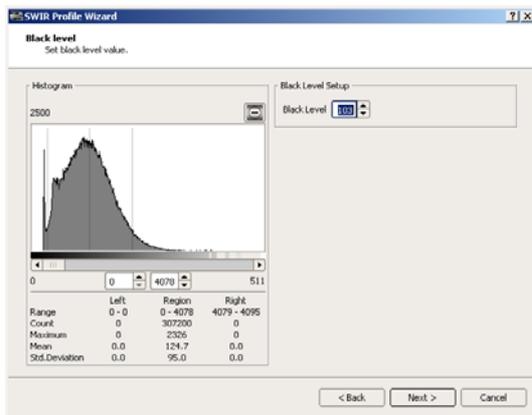


Figure 33: Black level to small

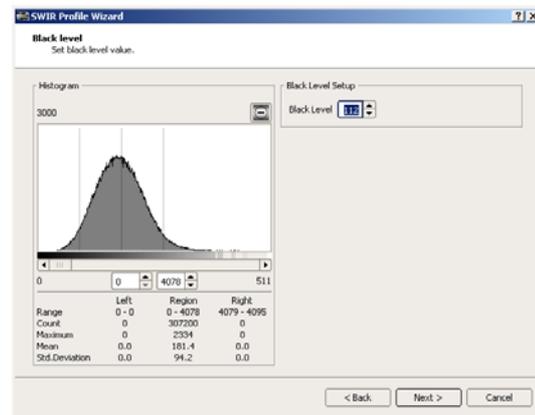


Figure 34: Optimal black level

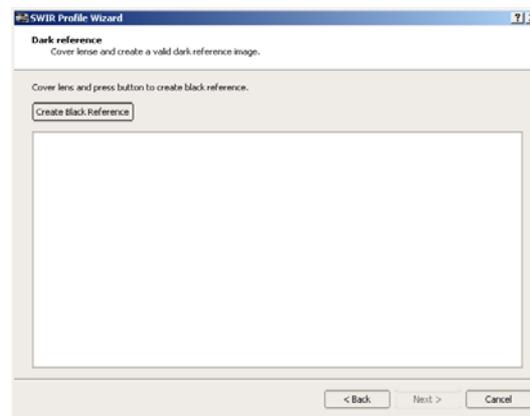


Figure 35: Creation of black reference

6. In this step (use objective with cap!) with help of the button “Create Black Reference” it is possible to grabbing the corresponding reference image. A successful procedure is con-

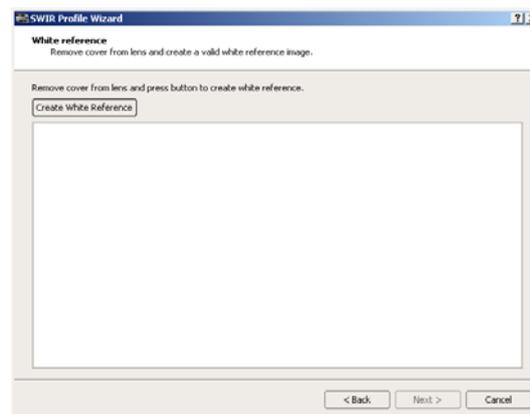


Figure 36: Creation of white reference

firmed with the message “Valid black reference found”. With “Next” you can go to the next step in figure 36. Now you have to remove the cap from the objective. Create a homogeneous bright image for instance with employment of a diffuser or with blurred imaging of a white homogeneous area. Use the histogram for instance to ensure that as small as possible number of pixels are over loaded and create with the button ”Create White Reference” the white reference image. The message “Valid white reference found” informs you about suc-

cessful procedure. All required data for shading correction are captured. With “Next” you can go to the following window for saving all parameters.

7. You need a profile name. In the input window (see figure 37) a part of the name is recommended. It consists of gain factor (G...) and exposure time (E...). These parts you should complete with your own information for instance with the target value for temperature. It is also possible to overwrite the proposed name to use another rule for creation of file names. With “Next” the profile is saved, activated and transferred to the profile list. The contained information are summarized once again.

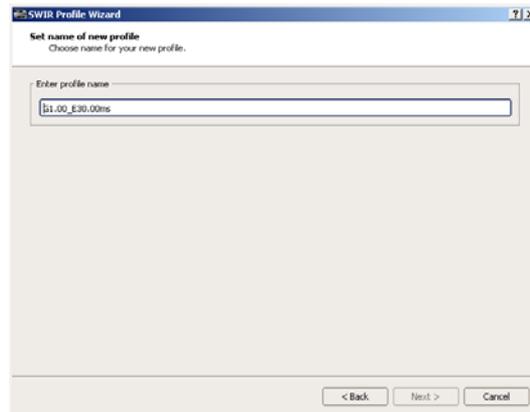


Figure 37: Saving the profile

8. In the following dialogue window you can finalize the procedure.

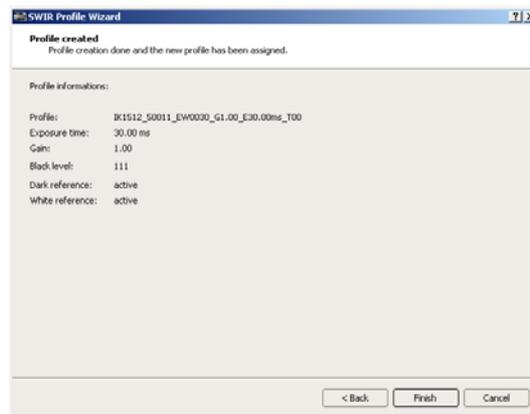


Figure 38: Finish

Optional: The filter wheel plug in

With help of the filter wheel it is possible to position different filters in the optical path. So you can systematic control the spectral range of the incident light. The optional software plug in named “filter wheel” allows the easy use of the filter wheel in combination with an ABS camera. At first you have to copy the software module in the directory “plug in” of “Image Capture-I”. After start of the software activate the functionality of the plug-in with the menu bar over “/plugins/filter wheel/active”. The check mark (✓) is a sign for activation. With “Control/Plugins” on the left hand side of the user interface you get the control. You have to differ between manual and automatic control. The respective mode you can activate in the check mark box of the control element on the left side beside “Manual control” and “Automatic control” with the left mouse button.

Connect the filter wheel to the computer before you start the software to ensure a correct detection of the filter wheel.

Manual Control

In this mode the plug in only controls the filter wheel. The operation of the camera one have to do by hand in the known way.

With starting the filter wheel plug in at the first time ImageCapture will chose an interface (RS232) to get a connection to the filter wheel. In the case of more available interfaces you have to choose one of the interfaces with mouse via “Port Selection” (see figure 39). At the next start the last used interface is activated for communication with the filter wheel. Removing of the interface is possible with the button “Disconnect”.

In the mode for manual control you can set under “Position” the index of the filter for the light path in directly way by pressing the corresponding button. With help of the button “next” and “prev” one can move the filter wheel on step forward or backward.

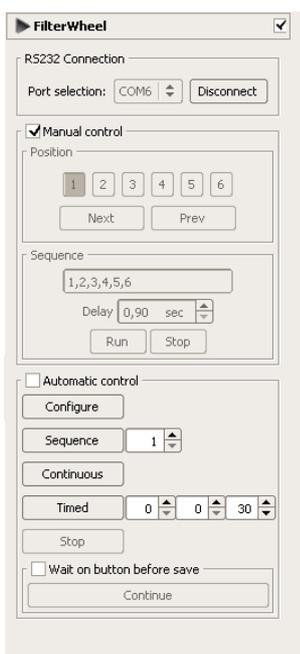


Figure 39: Manual mode

The actual position of the filter wheel is shown with the buttons 1 to 6 in dark gray. Under sequence you can put series of numbers divided by comma. The number of entries is unlimited. In the window “Delay” one can choose the pause time for activation the next filter position. The smallest possible time level is 0,9 seconds (smallest access time of the filter wheel). Pressing the button “Start” lets the filter wheel begin with rotating according the settings. You can abort the sequence with the button “Stop”. The activation of the camera you have to carry out in the known way.

Automatic Control

In this mode the software also controls the camera. The corresponding images are displayed in the gallery and saved in the selected medium for storage. Basically one can divide between the modes “sequential”, “continuous” and “timed”. In the sequence mode the preset numbers of filter sequences will carry out. The filter sequence you have to set before with the button “Configure”. In continuous mode the run is realized as fast as possible (limited through the access time of the filter wheel). You can stop the run by pressing “Stop” (see figure 40). In the timed mode the run is carry out with a pause to the next run according the adjusted time value. If you want to change the

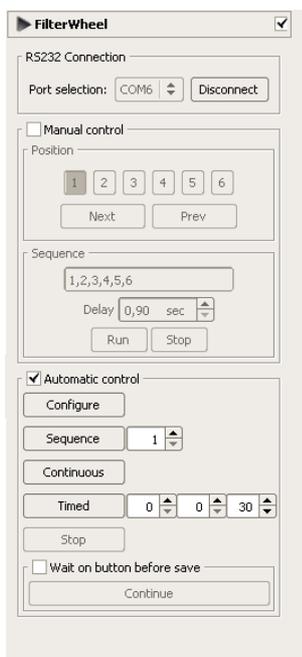


Figure 40: Automatic Mode

camera settings before saving you can activate the option “Wait on button before save”. The corresponding image is not saved until pressing the button “Continue”. The configuration of the filter sequence is realized over the button “Configure”. In figure 41, on next page, you can see this window. With the button “Add” a new entry for the filter wheel is generated. On the left side the index of the filter are displayed. Entries from 1 to 6 are acceptable.

As default the filter name will get the same number, but you can change these items by hand. If you give the same filter name on several entries you will get an error message with leaving this menu and you are invited to change this situation. In the selection window (right alongside) you choose and assign profiles to filters. You have to create and save the profiles before using.

The minus button (right beside the selection window) allows the deletion of entries. With help of the up and down arrows you can move the position of an entry. The names of captured images you can enhance with a serial number or a time stamp. In the field “File format” you can select between

two options for file naming. They differ with respect to the sequence of image name, filter name, and serial number respectively time stamp in the complete file name. The realized configuration one can save with the button “Save” (right above) in a file with the suffix “.fwc”. This file is readable with any text editor. With the button “Load” you can reactivate the configuration. You can delete the complete configuration in this menu with the button “Clear” (left above). With “Close” you can leave this window.

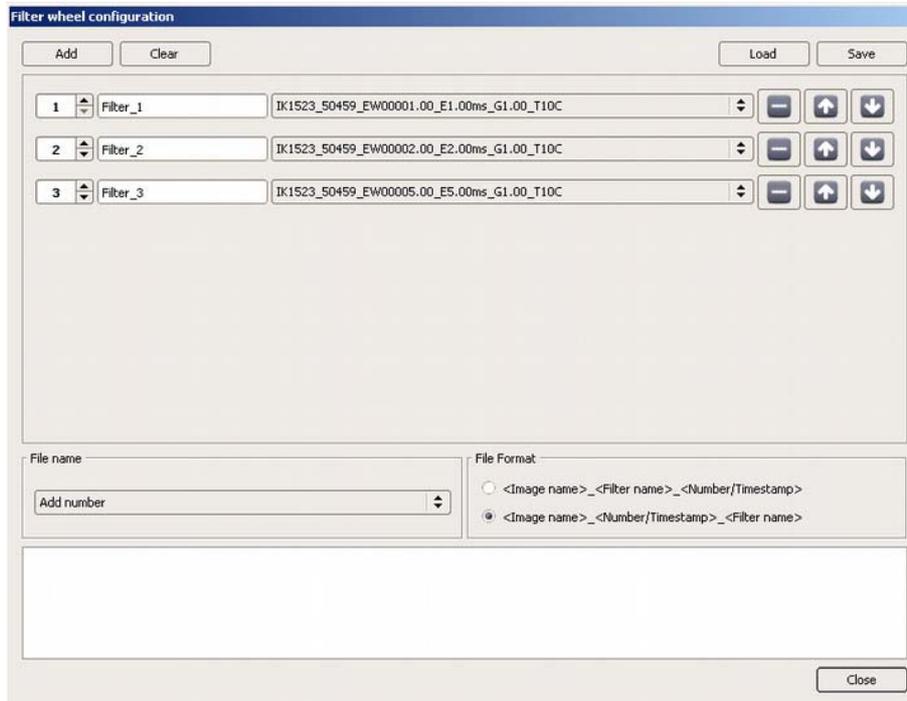


Figure 41: Configuration of the filter wheel

Optional: The calibration plug in

This tool it allows to analyze the influence of graphic cards on adjusted color values. With help of sliders respectively input windows for the colors red, green and blue you can set defined color values to evaluate the values displayed by the graphic card. In this way you can compare the color value on the input with the color on the output of the graphic card. By default 14 bit values are used. In the case of smaller bit width the most significant bits are used by the software. In figure 42 the corresponding user interface is displayed.

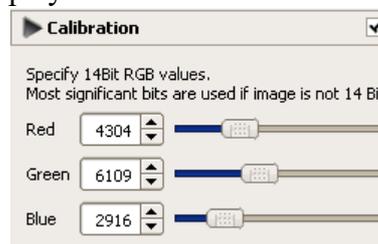


Figure 42: Calibration plug in

At first you have to copy the module in the directory “plug in” of “Image Capture-I”. After start of the software activate the functionality of the plug-in with the menu bar over “/plugins/calculate/active”. The check mark (✓) is a sign for activation. With “Control/Plugins” on the left hand side of the user interface you arrive the control.

Optional: The NanEye processing plug in

The “NanEye processing“ plug in is necessary for operation of cameras with sensor devices with the same designation. It is an extension of ABS ImageCapture software with functions for image processing in conjunction with the 2 B/C/D-Sensor. Copy the file “NanEyeProcessing.dll” in the sub folder “Plugins“ in the ImageCapture installation directory. Furthermore the file “BayIntpo.dll” is necessary. In figure 43 the graphical user interface is presented.

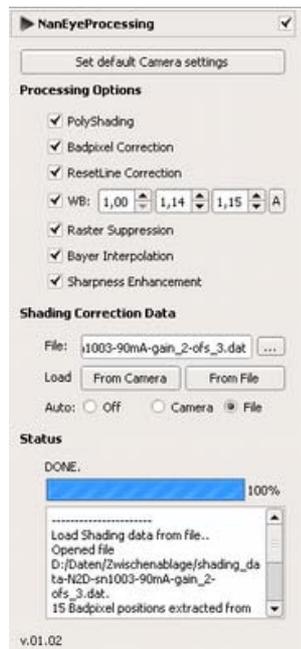


Figure 43: NanEye processing plug in

Pressing the button “Set default Camera settings” activates the default settings for the connected camera. The following options can set with the check marks (see figure 43):

- Polynomial based shading correction
- Bad pixel correction
- Reset line correction (exposure time depended error line)
- White balance factors (R/G/B) and button for one push adjustment
- Raster suppression
- Bayer interpolation 5×5
- Sharpness filter (ABS level 1)

In the input window below, it is possible to choose a file with the data for shading correction via name in the window “file” or with the search button. With help of the button “Load” you can load manually data from camera or selected file. The radio buttons below they allow an automatic load on start or load from camera or file at re-initialization of the system. The window “State” shows a progress bar showing the process of loading. In the news window the corresponding messages are displayed.

Setting the default camera settings will result in the following parameters:

- Automatic exposure time controlling off
- Exposure time 250 ms, attention this equates in real around 20 ms (value = number lines exposures)
- Gain 2,0, important for shading correction, do not modify
- Black level 3 -“-
- Bit depth 10 Bit -“-
- Color-Mode Bayer-GR -“-
(Bayer interpolation is carry out after shading correction in the plug in)
- Sharpness filter 0 (in API)
- Gamma 1.0 (in camera)

The following settings will be saved in the case of change and a restart of ImageCapture:

- White balance factors R/G/B
- File name shading correction data
- Setting for automatic loading of shading correction data

The data are saved in the file “NanEyeProcessingPlugin.ini” in the user directory (C:\Users\<<Benutzer>\AppData\Roaming\ABS GmbH under Windows 7).

Optional: The VideoCapture plug in

The VideoCapture plug in can use for capturing video streams in the WebM format on base of video codec “VP8” and audio codec “Vorbis” (see „<http://de.wikipedia.org/wiki/WebM>“). Via button “Folder Select” (see figure 44) choose the directory for storing the video at first. At next you have to choose a file name for the video data stream.

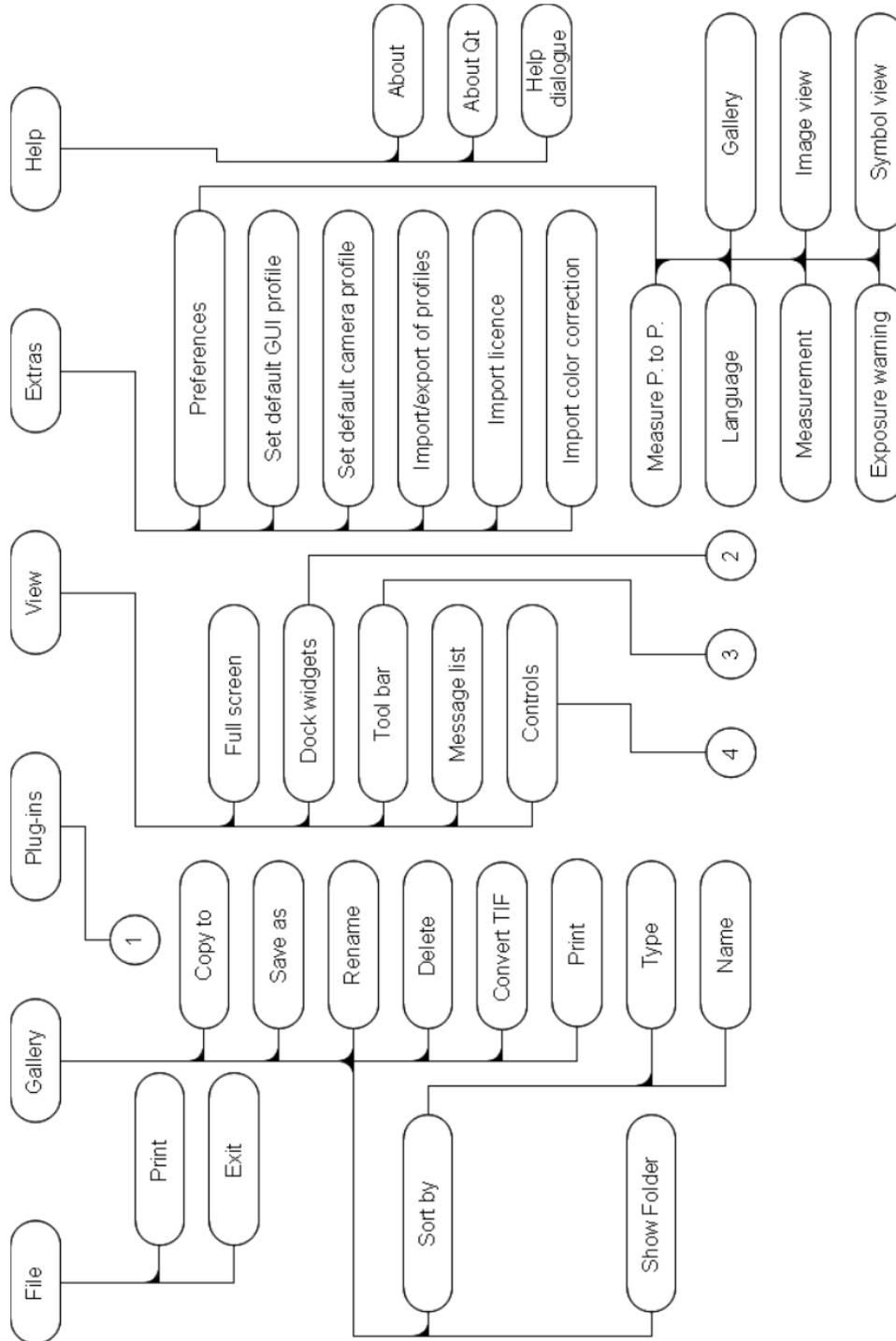


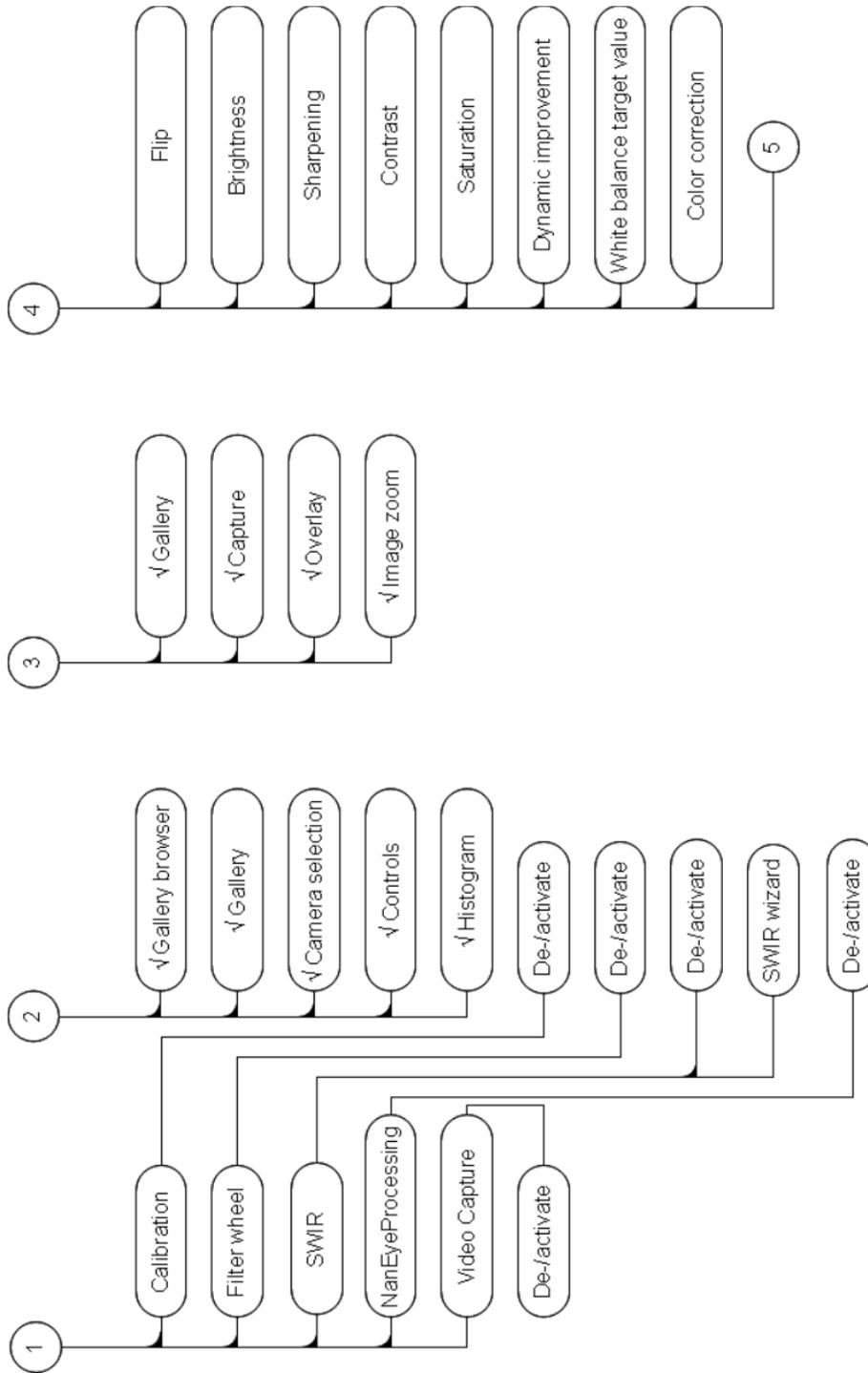
Figure 44: Video capture plug in

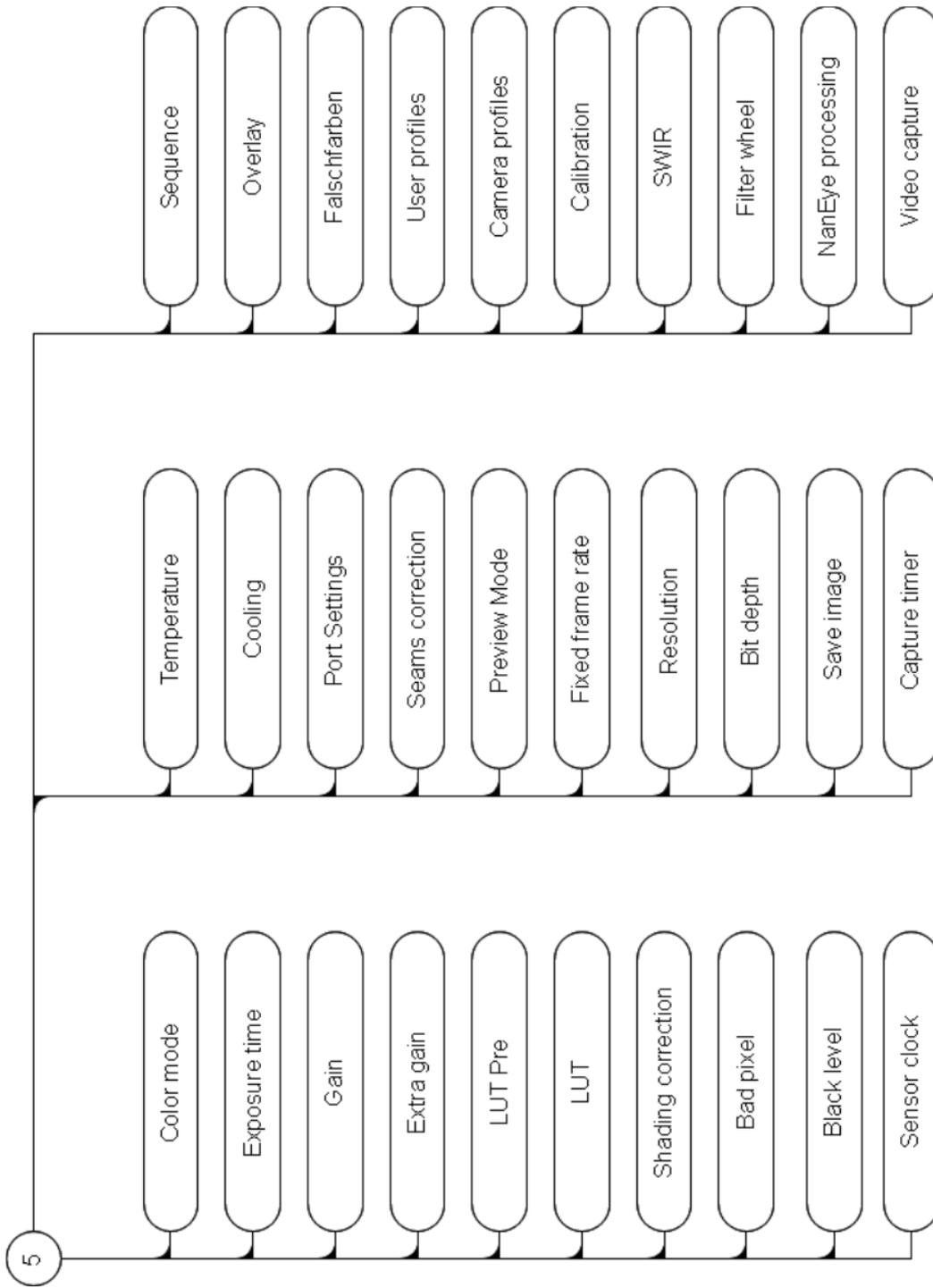
With help of the button “Record” you can start video capturing. The identification of the button will change to “Stop” and allows the later termination. Viewing of the video is possible via button “Open Video File”. In this case the file is opened and the corresponding viewer is started. This viewer is not a part of ImageCapture! A selection of media player which support the used data format you can find under “<http://www.webmproject.org/users/>” in the category “Media player and Components”.

We advice the VLC viewer in the most actual version. Pay attention to download this player from the project web side “<http://www.videolan.org/index.de.html>” or other trustable sources. There are known some download portals offering this player enhanced with so called malware. After installation of the software you should check the operation system for the proper configuration of the suffix “.webm” by starting the corresponding video player.

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