*CaptaVision+ ™ * Software Instruction Manual
for CaptaVision+ v2.4.1

Contents

General Introduction

CaptaVision+™ is a powerful software that integrates the micro-imaging camera control, image calculation and management, image processing into a logical workflow for acquisition, processing, measuring and counting to give scientists and researchers a more intuitive operating experience.

CaptaVision+ drives and controls our Excelis™ portfolio of cameras, to give you the best performance in your microscopy imaging applications. Through its user-friendly and logical design, *CaptaVision+* helps users maximize the potential of their microscope and camera system for their research, observation, documentation, measurement and reporting tasks.

CaptaVision+ allows users to customize their desktop within the application according to their application and need. Users can turn features on or off, and arrange the menus to follow your workflow. With such control, users are assured of completing their imaging work with more efficiency and efficacy, generating results faster and with greater confidence than ever before.

Thanks to its powerful real-time calculating engine, *CaptaVision+* achieves superior quality images with less effort by the user. The real-time stitching feature allows the user to capture a super wide Field of View (an entire slide if desired) simply by translating a specimen on the mechanical stage of a microscope. In about 1 second, the real-time Extended Depth of Focus ("EDF") feature can rapidly assemble in-focus features of a specimen as the focal plane passes through it, resulting in a 2-dimensional image containing all of the detail of the 3-dimensional sample.

CaptaVision+ was developed from the user's perspective, assuring the best operating procedures through the implementation of its all-new camera operating workflow with modular menus for efficient image acquisition → Image processing and editing → measurement and counting → reporting of findings. In conjunction with the latest image processing algorithms, the workflow saves time from the moment the imaging process begins to the delivery of a report at the end.

Starting Interface

When starting *CaptaVision+* for the first time, a biological or industrial application option box will display. Select the desired application type to finish launching the software. *CaptaVision+* will automatically optimize parameter settings based on your choice. This setting will be remembered by *CaptaVision+* the next time you launch the software.

- [Biological]. The default is to use automatic white balance with gamma value 2.10 and the mode of exposure to the right.
- [Industrial]. The default color temperature value is set to 6500K. *CaptaVision+* is set to use area white balance with a gamma value of 1.80 and middle exposure mode.

You may also change the application type preference through [Information] > [Options] > [Microscope] in the upper right part of the menu bar.

Starting Interface

Note:

1) The *CaptaVision+* software launches very quickly, typically within 10 seconds. It may take longer for particular cameras e.g., MPX-20RC.

2) If no camera is detected or an unsupported camera is connected when *CaptaVision+* launches, the software will only support image processing, measurement operations and report operations.

Windows

Main Interface

The *CaptaVision+* software interface consists of 5 main areas:
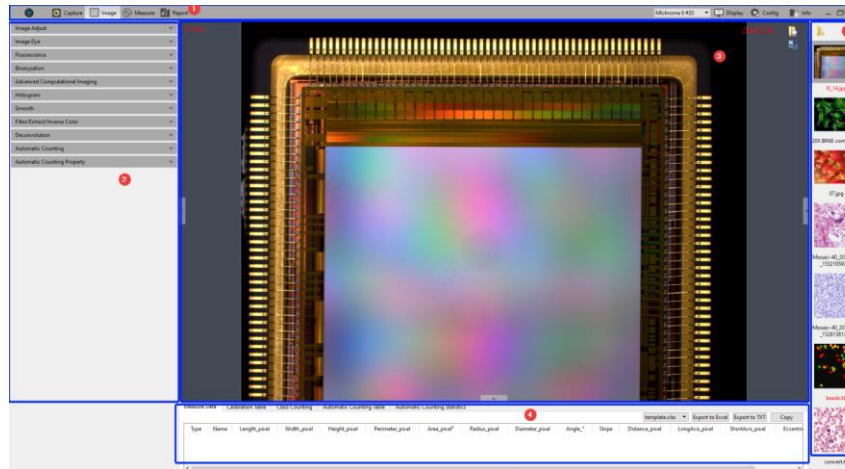
① Status Bar ② Control Bar ③ Preview Window ④Data Bar ⑤Image Bar
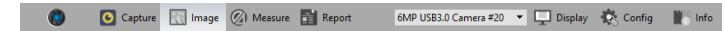
① Status Bar

There are eight main modules in the status bar: Capture / Image / Measure / Report / Camera List / Display / Config / Info. Click on the module tab and the software will switch to the related interface.

CaptaVision+ v2.3 supports multiple camera connections and hot swapping of cameras**. For USB3.0 cameras, please use computer's USB3.0 port for the hot swap**, and do not unplug or plug in the camera when the camera list is refreshed.
In the camera list, the recognized camera model is displayed. Click the camera name to switch to that camera.
When the current camera is removed, it will automatically switch to another camera, or display no camera.

Note: Hot swap is not supported in the MacOS version of CaptaVision+.

Windows

② Control Bar

To display the available functions and controls within a module, click the ⌄ button to expand the function. Click the ⌃ button to collapse the display of the functions.

Windows

③ Preview Window

To display live and captured images.

With the cursor placed over the image, use the wheel of the mouse to zoom in and out of the image, show the magnified area around the cursor in the middle of the screen.

Hold down the left button / right button / scroll wheel of mouse to drag the image display area.

Click the control button at the edge of the window: | < | , | > | , | v | , to show or hide the corresponding operating bar.

Click the 💾 button to save the currently selected picture as another format (see the "Save image" dialog figure in upper right). The software supports four image formats for saving or saving as: [JPG] [TIF] [PNG] [DICOM]*.

*DICOM format is not available in the Macintosh version of CaptaVision+.

④ Data Bar

Displays the measurement and statistics tables. This is where measurements, calibrations and counts will be collected and available to apply (e.g., calibrations) or export.

The measurement table supports the export of custom templates.

For specific instructions, please refer to the Report chapter.

Windows

⑤ Image Bar

The Image Bar displays thumbnails of all captured images and videos from all saving paths. Click on any thumbnail and the interface automatically switches to the [Imaging] window for image processing.
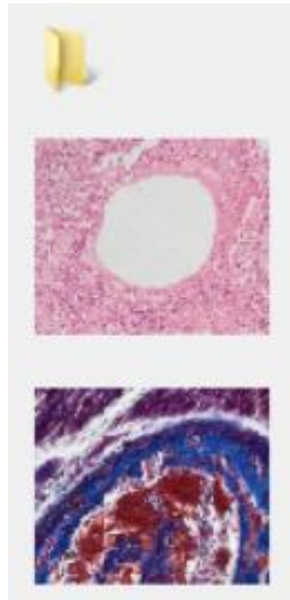
a) Click the 📁 button to locate the saving path of the file, select the desired directory from which the image will be opened, and the interface changes to the following view.
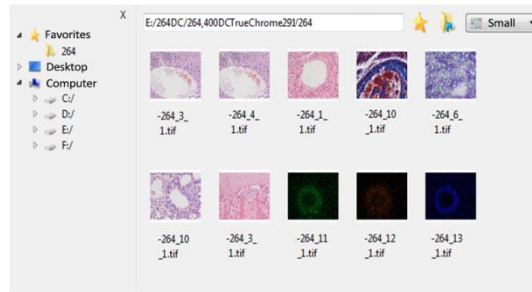
· Select the files-saving path on the left side. Click the X button to close the window.

b) Right click on an image or on the blank area of the interface to display the operation menu, and choose from the operations to perform: "Select All", "Deselect All", "Open", "New Folder", "Copy", Paste", "Delete" and "Rename". You can also use Ctrl+c and Ctrl+v shortcut keys to copy and paste images. ; Select the files-saving path on the left side. Click the X button to close the window.
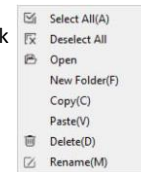
· The saving path and all the images under this path will display on the right side of the window.

· Click the ⭐ button to add the current saving path to the favorites folder for fast access the next time.
· Click the 📁 button to return to the upper directory.

· The button in the upper right corner of the dialog box allows you to choose the thumbnail display size.
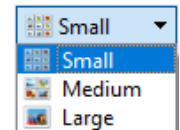
Windows

b) Right click on an image to choose from operations such as "Rename", "Close", "Close all", "Delete" and "Compare".
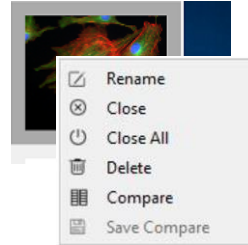
After choosing "Compare", the user can choose "Dynamic" or "Static".

Dynamic compares a live preview image with a saved image. With a live preview image active, place the cursor over a saved image in the picture bar and right-click, then choose [Contrast]. The live preview image displays on the left side, and the saved image on the right. Saved images can be changed any time.
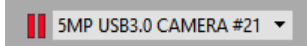
Static compares two saved images. Place the cursor over a saved image in the picture bar, right-click the mouse and choose [Contrast]. Repeat with a second saved image. The first selected image will appear on the left. To replace an image, click on it in the viewing window, then move the cursor to the picture bar to choose another image.

Click [image] in the upper right corner to exit Contrast viewing.

The Contrast view can also be saved.
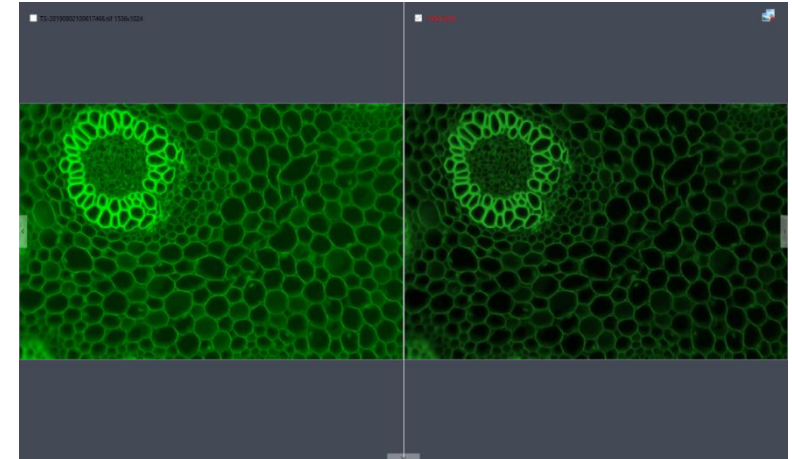
⑥ Shortcut Keys

For convenience, *CaptaVision+* provides the following shortcut key functions:

Function	Key	Remarks
Capture	F10	Take and automatically save image
Record video	F11	Press to start recording; press again to stop recording
Close all	F9	Closes all image thumbnails in picture bar
Save image as	F8	Specify image format or save location
Pause	F7	Pause/Resume the live view. When the preview is paused, a pause state prompt is displayed as shown here:
		‖ 5MP USB3.0 CAMERA #21 ▾

⦿ Capture

Capture

➢ Click the camera button to capture an image of the live view. Also supports continuous click.

Resolution

Resolution Setting

➢ **Resolution**: select the resolution of the preview image and captured image. A lower preview resolution will typically provide a better image when moving the sample (faster camera response).

Note:
- High Speed binning resolution of monochrome cooled camera can increase the frame rate:
- Compressed resolution of HDMI series cameras will increase frame rate and increases CPU usage.

Binning

If supported by your camera, Binning mode can improve the sensitivity of the image particularly in low light applications. The larger the value, the greater the sensitivity. Binning works by adding signal in adjacent pixels and considering it as one pixel. 1x1 is the default setting (1 pixel by 1 pixel).

Note: This function performs sum binning based on the original data, the amount of data does not change, so the frame rate does not change.

Exposure Control

Set the exposure time of camera and calculate the real-time frame per second (fps) will be displayed.

➢ **Target Value:** Adjusting the target value changes the automatic exposure brightness of the image. Target value range for MPX series is 10~245; HDMI (HD, HDS, 4K) series is 0-15.
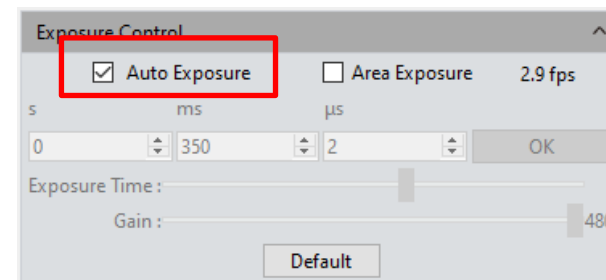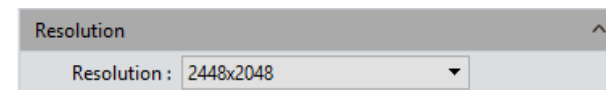
⬤ Capture

Exposure Control (continued)

Auto Exposure: Check the box before [Auto Exposure] and the software automatically adjusts the exposure time to achieve the appropriate brightness level. The automatic exposure time range is 300µs~350ms. Exposure Time and Gain are not available to change in Auto Exposure mode.

Area Exposure: Check the [Area Exposure], the software automatically adjusts the exposure time according to the image brightness in the area.

Manual Exposure: Uncheck the box next to [Auto Exposure] and the software enters [Manual Exposure] mode. The user can manually enter exposure time into the boxes, then click [OK] button to apply, or manually adjust the exposure time with the slider. The manual exposure time range is 130µs~15s.

➢ **Gain:** User can select the most suitable gain setting depending on application and needs for generating a good image preview. Higher gain brightens an image but may also produce increased noise.

➢ **Default:** Click the [default] button to restore this module's parameters to the factory default. The default setting is [auto exposure] .
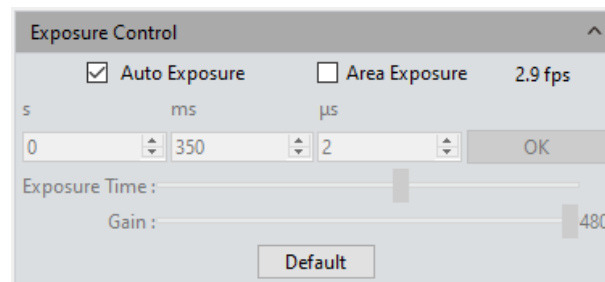
Bit Of Depth (Bit Depth)
ONLY FOR MONOCHROME CAMERA WITH COOLING

Where supported by the camera, the user can choose standard (8 bit) or high (16 bit) bit depth. Bit depth is the number of levels in a channel and is noted as the exponent to 2 (i.e. 2^n). 8 bit is 2^8 = 256 levels. 16 bit is 2^{16} = 65,536 levels. Bit depth describes how many levels can be distinguished between black (no signal) and white (maximum signal or saturation).

Default bit depths: Monochrome cooling camera: 16 bits; USB 3.0 color camera: 8 bits; USB 2.0 camera: 8 bits (16 bit not supported)

◉ Capture
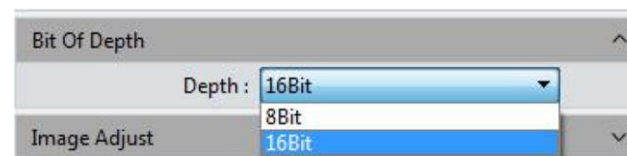
White Balance

White Balance provides for more consistent images, accommodating for changes in light composition and its impact on the sample.

➢ **White balance:** By adjusting the ratio of the three individual components of red, green and blue, the camera can reflect the true image color under various illuminating conditions. The default setting of the white balance of the camera is Auto-white balance (enabled when [Lock WhiteBalance] is unchecked). To manually set white balance, uncheck [Lock White Balance], move the sample out of the light path or place a white or neutral gray paper under the camera, then recheck [Lock White Balance] to lock the current white balance setting.

➢Area white balance: In Biology mode and when [Area White Balance] is selected, a region for measuring white balance opens on the preview image.

In Industry mode, an area white balance box is displayed on the preview image. The size of area white balance box is adjustable. Under a stable lighting environment, drag the area white balance box to any white part of the image, adjust its size, and check [Lock White Balance] to lock the current white balance setting.

➢ **Gray:** Check this box to convert a color image to a monochrome image.

➢ **Red, Green, and Blue(Gain):** Manually adjust the gain values of the red, green, and blue channels for suitable white balance effect, adjusting range is 0~683
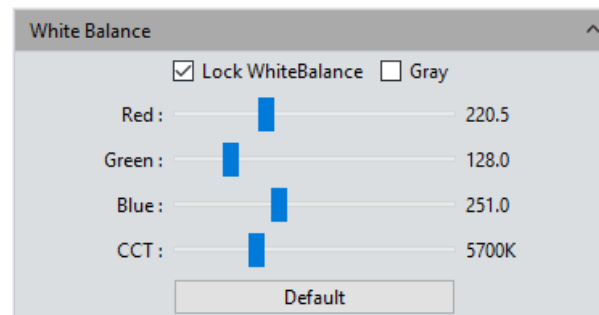
Color temperature(CCT): The current close color temperature can be achieved by adjusting the three gains which are Red, Blue and Green (as above). It can also be manually adjusted and matched to approximate the color temperature of the illuminating environment. Manually setting the white balance is more accurate at achieving the correct color temperature. Color temperature setting range is 2000K to 15000K.

➢ **Default:** Click the [Default] button to restore this module's parameters to the factory default. The default setting of white balance is [Auto-white balance].

⬤ Capture

Histogram

Color level adjustment can lead to more realistic images for observation and analysis. Red (R), green (G) and blue (B) color levels can be adjusted in each channel, and the associated pixel values distributed accordingly. Adjust the color level (gradation) to increase or decrease the range of the highlight area in the image. Alternatively, the color components of the individual RGB channels can be adjusted separately. When used with white balance and a neutral target, each color channel of the histogram will overlap as illustrated in the figure to the right. The values for Max and Gamma will vary by camera series.

➢ **Manual Color Level:** Manually adjust the image's dark tone (left gradation), the gamma and highlight brightness level (right gradation) on the histogram to regulate the image's tones, such as the contrast, shading and image layers, to obtain the desired balance of the whole image.

➢ **Auto Color Level:** Check [Auto Min] and [Auto Max] to automatically adjust the brightest and darkest pixels in each channel as white and black, and then re-distribute the pixel values in proportion.

➢ **Gamma:** Non-linear adjustment of the median of the color level, often used to "stretch" darker areas in the image to see more detail. Setting range is 0.64 to 2.55

➢ **Line or Logarithm:** The histogram supports Linear (Line) and logarithmic display.

➢ **Default:** Click [Default] button to restore the module's parameters to the factory default setting. The default of color level adjusting is manual, and the default gamma value is 2.10.

Note: a) The composing and displaying of the histogram curve is the result of the software's running real-time data statistics, so some the resources of the software will be used. When this module active, the camera frame rate may be affected and drop slightly. When the module is not used (set to Default), the data statistics are turned off and the frame rate of the camera can reach the maximum based on other camera settings. b) After cancelling the automatic color level adjusting, the level value will be the default (0 and max).
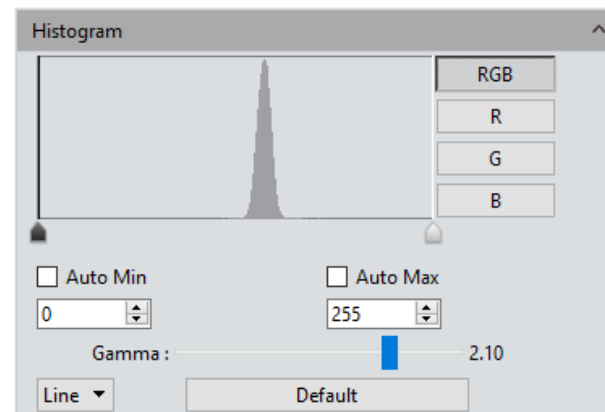
Example histogram of an empty field with proper white balancing. All color channels overlap exactly.
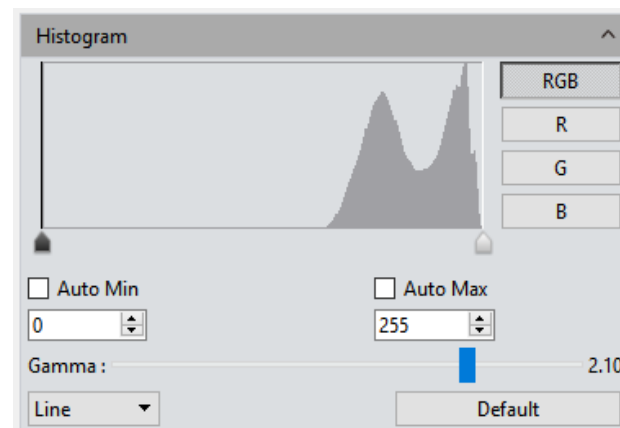
Example histogram of a sample with color. Note the multiple peaks as compared to the empty field example above.

⦿ Capture

Image Adjust

The user may perform real-time dynamic adjustment of images to achieve the desired image effect. Parameter ranges may be different by camera series.

➢ **Hue:** Adjusts the shade of the color, adjusting range from 0 to 360.

➢ **Saturation:** Adjusts the intensity of the color, the higher the setting, the more vivid the color. A setting of "0" is essentially monochromatic. Setting range is 0~255.

➢ **Light:** The brightness and darkness of the image, setting range is 0~255

➢ **Contrast:** The difference in brightness level between the brightest white and the darkest black in the light and dark areas of an image, setting range is 0~63. Default is 33.

➢ **Sharpness:** Improves clarity of feature edges in the image.

➢ **Permeability:** The sharpness effect of the image, setting range is 0~48 for MPX series cameras. Default is 16.

➢ **DPC:** Reduce bad pixels on camera.

➢ **Black level:** *ONLY FOR MONOCHROME CAMERA WITH COOLING*. Adjust the gray value of a dark background, range is 0-255. Default is 12.

➢ **3D Noise reduction:** Automatically averages adjacent frames of images to filter out non-overlapping information ("noise"), thereby producing a cleaner image. Setting range is 0-5 frames for MPX-20RC. Default is 3.

➢ **Default:** Click the **[**Default**]** button to restore this module's parameters to the factory default ones.

The factory default values of some parameters (settings) for image capturing (acquisition) are as followed: Hue:180/ Contrast:33/ Saturation:64/ Brightness:64/ Permeability:16/ [Image Enhancement Save] on uncheck/ Image Enhancement:1/ Noise reduction:1
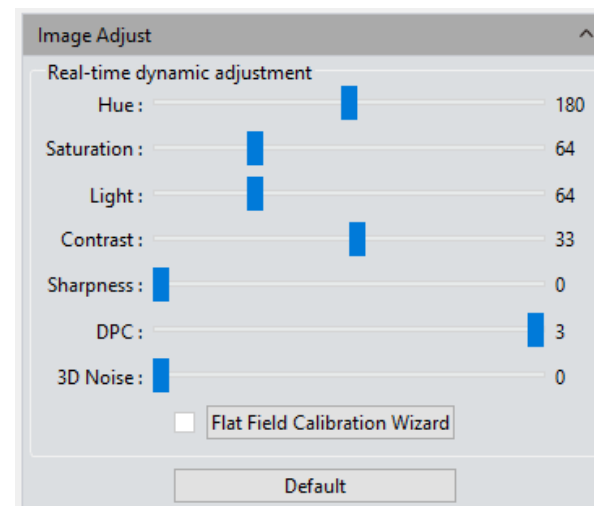
Image Adjust menu for MPX-20RC camera.
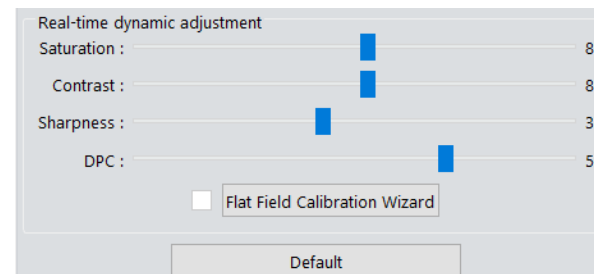
Image Adjust menu for Excelis HD series cameras.

⊙ Capture

Image Adjust: Background Correction

➢ **Flat Field Calibration**: In microscopy applications, live and captured images may contain uneven illumination, shading, vignetting, color patches or dirty spots due to microscope illumination, microscope alignment, optical path systems and alignment or dirt in the optical system (objectives, camera couplers, camera window or sensor, internal lenses, etc.). Flat field correction compensates for these types of image defects in real-time through a reduction of repeatable and predictable artifacts to deliver an image with a more uniform, smoother and realistic background.

Operation:
a) Click [Flat Field Calibration Wizard] to initiate the process. Move the specimen out of the camera's field of view (FOV) to a blank background, as shown in the right figure (1). It is recommended to move the sample/slide completely out of the FOV. See Note c) below for reference to reflected light applications;
b) Click [Next] then move the first background to another new blank background, click [OK] to apply the Flat Field Calibration function, as shown in the right figure(2);
c) Select [☑] uncheck) to exit the flat field correction mode. If you need to apply it again, re-check it, no need for repeating the wizard procedures again.
➢ **Default:** Click the **[**Default**]** button to restore this module's parameters to the factory default ones.

Note:
a) The Flat Field Calibration requires manual setting of the exposure time, so that the image brightness will not overflow up or down, and all the pixel values are range from 64DN to 254DN (i.e., the background should not be white, rather slightly gray).
b) The brightness of the two backgrounds being used for correction should be similar, and some different spots on the two backgrounds is acceptable.
c) Plastic, ceramic or professional white balance paper are recommended as the standard samples for flat field correction in reflected light applications.
d) For optimal results, Flat Field Correction requires backgrounds with uniform or predictable illumination. NOTE: **Repeat Flat Field Correction for every lens/objective/magnification change.**
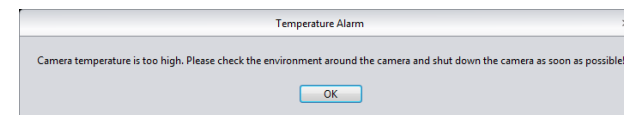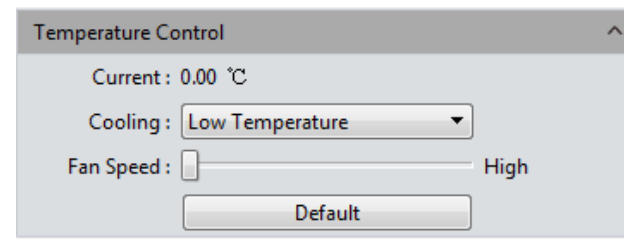
(1)

(b)

(2)
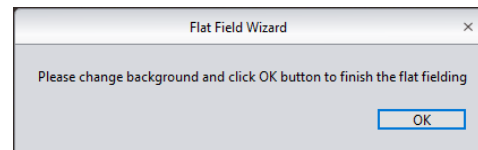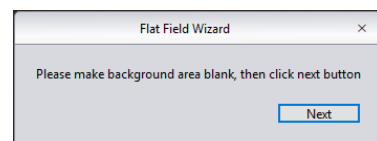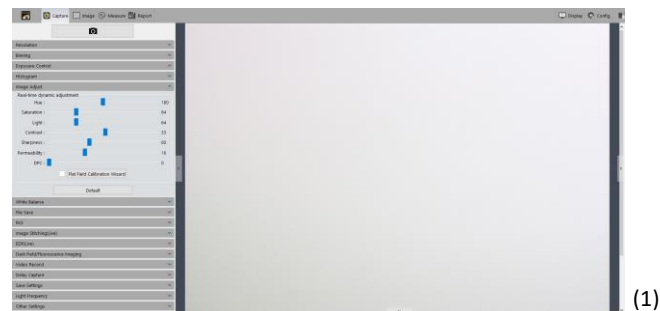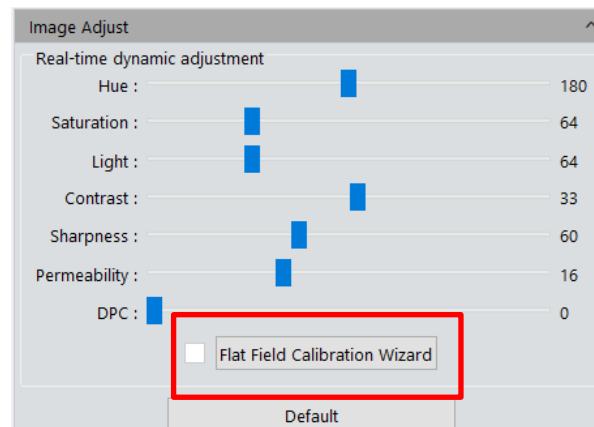
◎ Capture

Temperature Control
ONLY FOR MONOCHROME CAMERA WITH COOLING

CaptaVision+ supports the temperature adjustment of cameras with cooling; optimal noise reduction can be achieved by reducing the working temperature of the camera sensor.

➢ **Current:** Displays the current temperature of the camera sensor.

➢ **Cooling:** Offers three options – Normal Temperature, 0°, Low Temperature. The user can choose a Cooling setting that best fits the imaging experiment.

➢ **Fan Speed: C**ontrol the fan speed to increase/decrease cooling and to reduce noise from the fan. Default setting is High and is adjustable to medium and low speed. NOTE: Slower fan speeds reduce noise but provide less effective cooling. This feature is only for Monochrome Cameras with cooling.

➢ **Default:** Restores current settings to factory default settings – Low Temperature and High fan speed.

Note: When the external environment temperature is too high, a high temperature warning prompt message may appear, and the indicator light on the camera will flash red. This feature is only for Monochrome Cameras with Cooling.

Temperature Control

Current : 0.00 ℃

Cooling : Low Temperature ▼

Fan Speed : _____ High

Default

Temperature Alarm   ×

Camera temperature is too high. Please check the environment around the camera and shut down the camera as soon as possible!

OK

⊙ Capture

File Save

Capture the currently needed data from the real-time video data stream and record it into image format for later development and analysis.

Click the [📷] button to capture a preview image and display the File Save dialog.

➤ **Use Dialog:** After clicking Capture, CaptaVision+ opens a Windows File Explorer or Finder dialog window for naming and saving the image file.

➤ **Use File name:** The name of the file to be saved is "TS" by default and can be readily edited by the user.

The software supports file name suffix format of "custom + time-stamp". There are four formats of time-stamp naming available, and numerical suffix augmentation (nnnn).
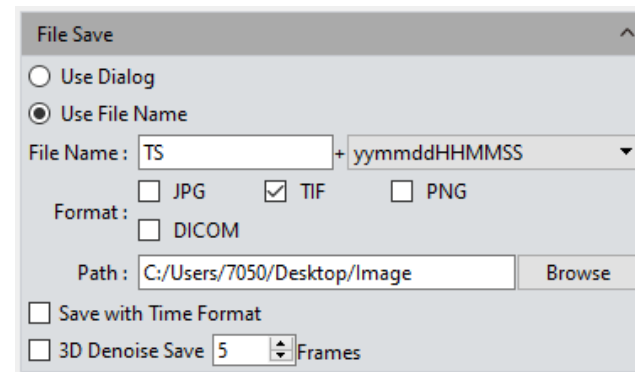
```
yymmddHHMMSS
yyyymmddHHMMSS
yy-mm-dd-HH-MM-SS
yyyy-mm-dd-HH-MM-SS
nnnn
```

Note: The file name cannot contain special characters \/:*?"<>|. Using these characters will generate an error message as below:

> A file name can't contain any of the following characters:
> \ / : * ? " < > |

➤ **Format:** Images may be saved as JPG\TIF\PNG\DICOM files. The default format is TIF. The formats may be checked individually or in multiples. Captured images saved in multiple formats will be displayed together.

1) JPG: an information-losing and compressed image saving format, its image size is small, but the image quality is degraded compared with the original.

2) TIF: a Lossless image saving format, saves all the data transmitted from the camera to your storage device without losing data. TIF format is recommended when high image quality is required.

3) PNG: Portable Network Graphics is a lossless but compressed bit-image format that uses a compression algorithm derived from LZ77 with a high compressing ratio and a small file size.

4) DICOM: Digital Imaging and Communication Of Medical, an international standard format for medical images and related information. It defines a medical image format that can be used for data exchanging and meet the requirements of clinical practices and applications. Not available on Macintosh versions of CaptaVision+.

File Save

○ Use Dialog
◉ Use File Name

File Name : [TS] + [yymmddHHMMSS ▼]

Format : ☐ JPG ☑ TIF ☐ PNG
         ☐ DICOM

Path : [C:/Users/7050/Desktop/Image] [Browse]

☐ Save with Time Format
☐ 3D Denoise Save [5 ⬍] Frames

➤ **Path:** The destination path for saving images. User can click the [Browse] button to change the saving path. The default saving path is C:/Users/Administrator/Desktop/Image. The path cannot contain special characters \/:*?"<>|, or an error message will be displayed.

➤ **Saved with time format:** The capture time will be displayed and burned into the lower right corner of the image.

➤ **3D Denoise Save:** Obtain low-noise images by acquiring and comparing image data of several consecutive frames, and then filtering out non-overlapping information. The number of frames can be customized. The range is 1~99, the default is 10.

Note:

• To get 3D denoise image, so it will take longer time than taking a general image.

• 3D Denoise Save is only suitable for capturing static scenes;

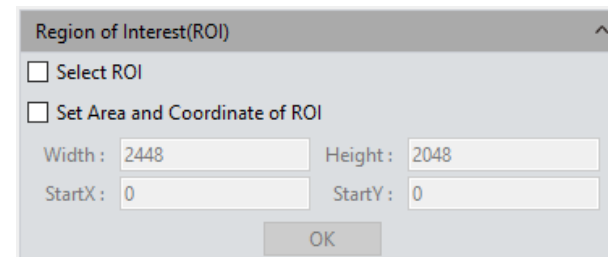• 3D noise reduction has no effect on video recording.

◉ Capture

ROI

ROI (Region of interest) allow the user to define a window area of interest within the effective and sensitive detecting area of the camera sensor. Only image information within this defined window will be read out as the image view and, as such, the image is smaller than capturing an image with the full camera sensor. A smaller ROI area reduces the amount of information and task of image transfer and computer processing resulting in a faster frame rate of the camera.

Regions of interest can be defined using two methods: draw using a computer mouse and specify the X and Y pixel locations (starting point with height and width).

➢ **Select ROI:** Using a computer mouse, check the box next to "Selecting regions of interest(ROI)", then move the cursor to the preview. Click and drag to define the window area to use as the ROI -- the window area will display the coordinate values and resolution of the current selection. Click on the [√] below the cursor to apply the ROI settings.

➢ **Select Area and Coordinate of ROI：** The user can manually enter the starting point coordinate values and the resolution size (height and width) to define the exact ROI area. Enter the actual point offset position of the rectangular area as well as the width and height, then click [OK] to apply the ROI settings.

Region of Interest(ROI)	∧
☐ Select ROI	
☐ Set Area and Coordinate of ROI	
Width : 2448	Height : 2048
StartX : 0	StartY : 0
OK	

⊙ Capture

Mask (previously called Cover)

Almost opposite to ROI, the Mask feature is useful to block an area of the image being viewed to allow the user to concentrate on the area of interest without distraction. Mask does not reduce the area of the camera sensor doing the imaging nor the amount of data being transferred and, therefore, does not provide any increase in frame rate or imaging speed.

Masked areas can be defined using two methods: draw using a computer mouse and specify the X and Y pixel locations (starting point with height and width).

➢ **Select Mask:** Using a computer mouse, check the box next to "Select Mask", then move the cursor to the preview. Click and drag to define the window area to use as the Mask -- the window area will display the coordinate values and resolution of the current selection. Click on the [√] below the cursor to apply the Maksk settings.

➢ **Set Area and Coordinate of Mask:** The user can manually enter the starting point coordinate values and the resolution size (height and width) to define the exact Mask area. Enter the actual point offset position of the rectangular area as well as the width and height, then click [OK] to apply the Mask settings.

➢ **Transparency:** Manually select the opacity of the unselected area.

⊙ Capture
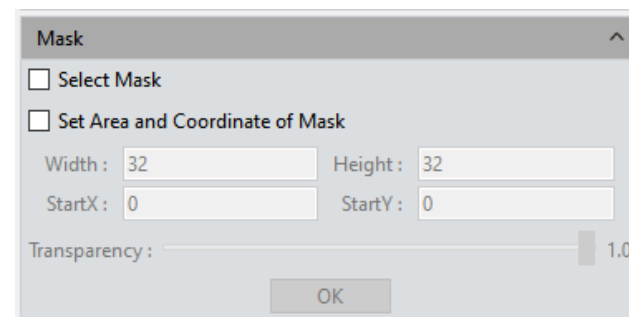
Imaging Stitching(Live)*

Real-time image stitching acquires individual images with overlapping and adjoining positions on the specimen or sample and combines them into a stitched image to present a larger view or the entire specimen at higher resolution than could be obtained with the microscope set up.

➢ **Stitching Speed**: Two options: High Speed (default) and High Quality.
➢ **Background Color**: The default background color of the unused area on the stitched-to-composed image is black. If desired, click on ▮ to choose another color for the background. This color background is visible ▮ final stitched image.
➢ **Start Stitching:**
1. Click [Start Stitching] and a reminder prompt figure (1) is displayed; The cache memory of the computer will be used to save image data during the stitching procedure. To maximize performance, **close all applications not in use**. Figure (2) shows the current field (left) and assembled stitched image during the stitching process.
2. Move the specimen to another new position (keeping about 25% overlap with the former position) and then pause, the navigation frame in the stitching window will turn from yellow to green (figure (3) indicating that the new position is being stitched to the previous.
3. Repeat the process until the stitched area meets your expectation. If the navigation frame turns red as shown in the right figure (4), the present position is too far from a previous position to be stitched – to correct this, move the specimen position towards a previously stitched area, the navigation frame will change to yellow then green and stitching will proceed.
4. Click [Stop Stitching] to end the stitching, and a stitched composite image will be generated in the image gallery.
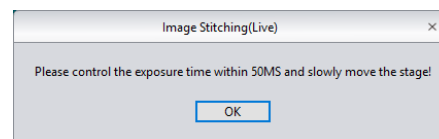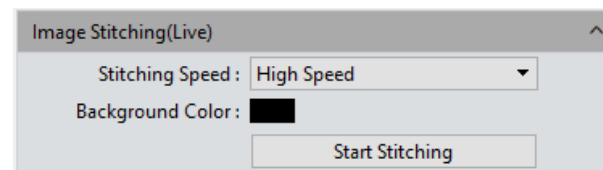
Note: a) Dynamic stitching is not supported by 32-bit operating systems.
b) It is recommended to conduct a white balance correction and flat field correction before starting the stitching to ensure the best quality images.
c) Ensure exposure time is 50ms or lower for best performance.
d) Stitched images are very large in size and occupy considerable memory resources of the computer. It is recommended to use Image Stitching with a computer with sufficient memory volume. A 64-bit computer is required. c) When the stitching process uses 70% of the computer memory volume, the stitching module will stop working automatically.
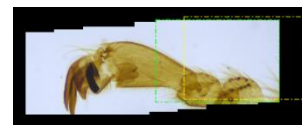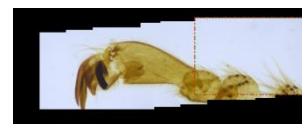
not available on Excelis 4K when using Ethernet mode

(1)
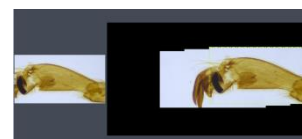
(2)

(3)

(4)

NOTE:
Image Stitching (Live) is not supported by 32-bit operating systems.
NOTE:
Image Stitching is not available on Excelis 4K when using Ethernet mode.

◉ Capture

EDF(Live)*

EDF (Extended Depth of Focus) merges in-focus images across multiple focus planes to generate a 2-dimensional images with everything in focus. EDF is ideally suited for "thicker" specimens or samples (e.g., an insect as opposed to a thin tissue specimen). The EDF image allows for easy observation of sample detail all at once.

NOTE: EDF is not suitable for use with Greenough-style stereo microscopes as the EDF function will produce a "smeared" image due to the optical design of the microscope. When using EDF with Galilean-style (a.k.a. Common Main Objective, CMO or Parallel Light Path) stereo microscopes, the objective must be moved to an on-axis position.

➢ **Quality:** High quality setting acquires and merges images at a slower speed but generates higher image quality in the final EDF image.

1. Click the [Start EDF] button to run.
2. Continuously turn the fine focus knob of the microscope to focus through the specimen, the software automatically merges the obtained focus plane images and shows out the current result in a live preview.
3. Click the [Stop EDF] button to end the stacking and merging process, a new merged image including all the depth focusing information will be generated in the image gallery.

not available on Excelis 4K when using Ethernet mode
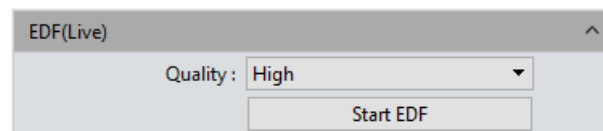
NOTE: Extended Depth of Focus (EDF) is not supported by 32-bit operating systems.
NOTE: EDF is not available on the Excelis 4K when using Ethernet mode.
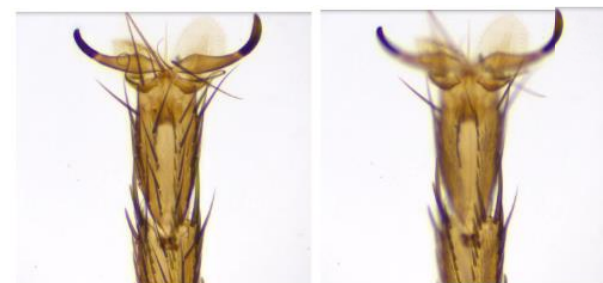
Left: EDF image. Right: As seen through the microscope.

◉ Capture

Realtime Dye (Fluorescence Imaging)

This mode is usually used when acquiring fluorescence images with a monochrome camera to automatically add color to the monochrome image. The "dyed" image can later be used to synthesize a composite fluorescence image overlaying multiple dyes.

Select the desired color (representative of a selection of dyes), click [Apply] to apply selected color to pictures, and click [Cancel] to cancel currently applied color. The false-colored image can be saved and used for creating polychromatic/multi-channel fluorescent image at a later time.

➢ **Current:** This window displays the currently available colors that can be selected by the user, there are the seven commonly used colors. Click RGB to display the full color palette for a much broader selection of color choices. After selecting the color, click [OK] to accept the color.

You can click [Add to New Dyes] to add a color to your pallet for later use. Simply select your color, then click the [Add to New Dye] button. Your new color will appear in the New Dye dropdown list.

➢ **Add to New Dyes:** Adds selected colors on the palette into the New Dye list.
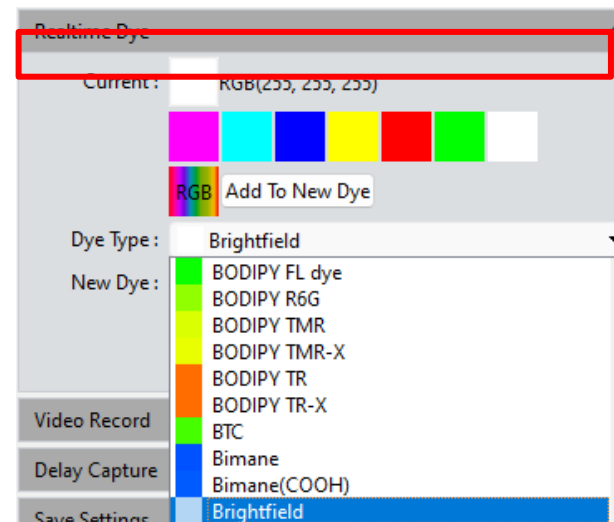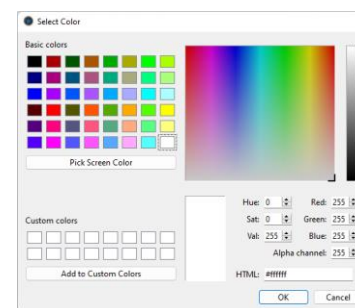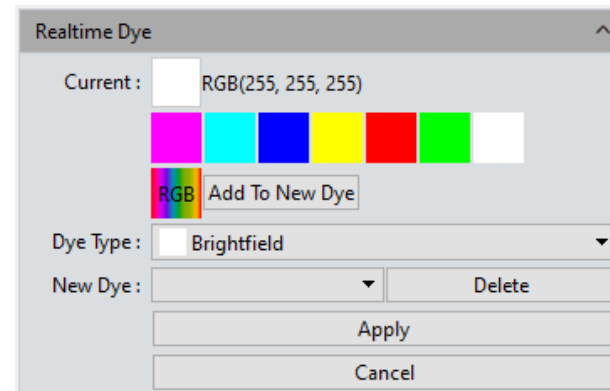
➢ **Dye Type:** Displays list of common dyes, each associated with a color as observed in the microscope.

➢ **New Dye:** Displays user-defined dye colors.

➢ **Delete:** Deletes the selected user-defined dye color.

➢ **Apply:** Applies the selected dye color to the image.

➢ **Cancel:** Cancels the application of certain dyes added through custom mode.

◉ Capture

Dark Field/Fluorescence Imaging (continued)

Select the desired color (representative of a selection of dyes), click [Apply] to apply selected color to pictures, and click [Cancel] to cancel currently applied color. The false-colored image can be saved and used for creating polychromatic/multi-channel fluorescent image at a later time.

➤ **Current:** This window displays the currently available colors that can be selected by the user, there are the seven commonly colors. Click RGB to display the full color palette for a much broader selection of color choices. After selecting the color, click [OK] to accept the color.

You can click [Add to Custom Colors] to add a color to your pallet for later use. Simple set or select a color and click the [Add to Custom Colors] button.

➤ **Add to New Dyes:** To add selected colors on the palette into the new dyes.

➤ **Cancel:** To cancel a certain kind of dyes added through custom mode.

➤ **Dye Type:** The user may be able to quickly select a color based on the fluorochrome used in the specimen staining process and apply that color to the monochrome image.
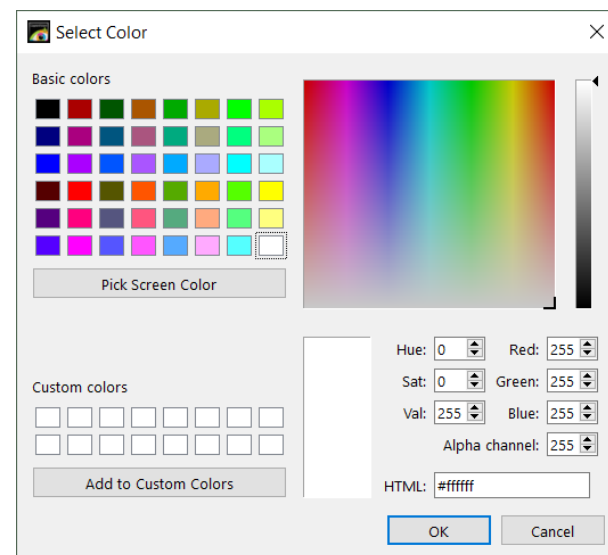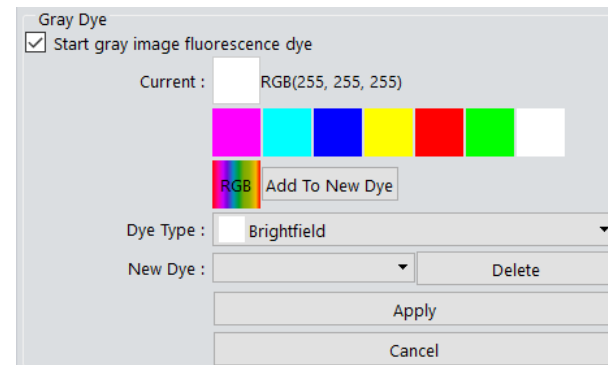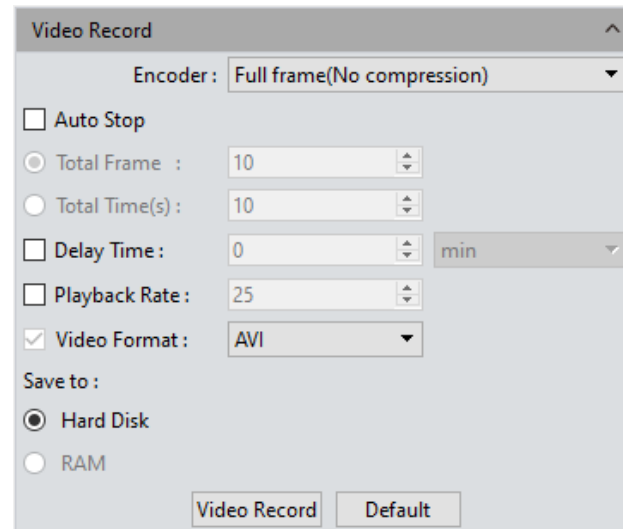
⦿ Capture

Video Record

Click on [Video Record], save the image data in a video format for play back to observe the sample/specimen movement or change over time.

➢ **Encoder:** The software provides two compressing formats: [Full frame (No compression)] and [MPEG-4]. MPEG-4 videos are typically much smaller files than without compression, and the user should choose the format that best suits his need.

➢ **Auto Stop:** Check the Auto Stop box to activate options for capturing a designated number of frames or for a specific time duration.

➢ **Total Frame:** Capture images according to how many frames are desired to be captured, setting range is 1~9999 frames. Camera will operate at the frame rate shown in the Exposure Control menu.

➢ **Total Time(s):** The length of time of video capture at the frame rate shown in the Exposure Control menu, setting range is 1~9999 seconds.

➢ **Delay time:** Assign a delay in capturing images, then capture per total frames or total time. Choose minute, second and millisecond. The delay time range is 1 ms to 120 min.

➢ **Playback Rate:** Records video according to the designated playback frame rate.

➢ **Video Format:** AVI\MP4\WMA are supported, the default is AVI format.

➢ **Save to Hard Disk:** The video file is saved directly to the hard disk. Since the computer takes time to write files to the hard drive, the transmission of data from the camera to the hard drive is reduced. This mode is not recommended for capturing video at fast frame rates (quickly changing scenes or backgrounds), but it is suitable for long capture periods.

➢ **Save to RAM:** The image data is temporarily saved in the computer's RAM, then transferred to the hard drive after image capture is complete. Select Save to RAM and enable the RAM to save images. The software calculates and displays the maximum number of images that can be saved to RAM based on available capacity. This mode allows a high transmission speed of the images, but is limited by the available RAM capacity, therefore it is not suitable for long video recording or high volumes of captured images.

➢ **Video Record:** Click this button to initiate video capture according to the settings above.

➢ **Default:** Click the **[Default]** button to restore the module's parameters to the factory default. The default is the compressed mode with full resolution frame, 10 total frames, and a 10 second capture time, with image data saved to the local hard drive.
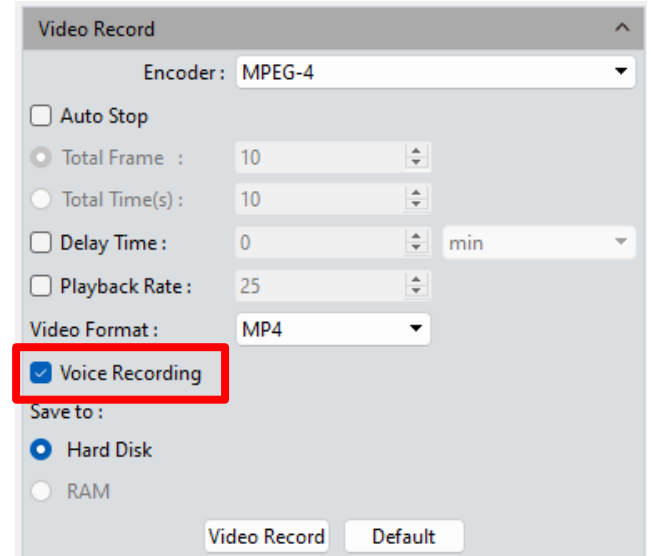
⦿ Capture

Voice Recording

Found in the Video Record menu, check the box next to click the check box next to [Voice Recording] to activate this feature. When recording a video, an audio track will be saved with the video track.

NOTE: The user must have a microphone on the computer.

NOTE: It is highly recommended to save the video in MP4 format or WMA format. AVI videos with audio are very large (10 second video = 1.5GB).

NOTE: Recordings with audio will only be saved to the hard disk.

⦿ Capture
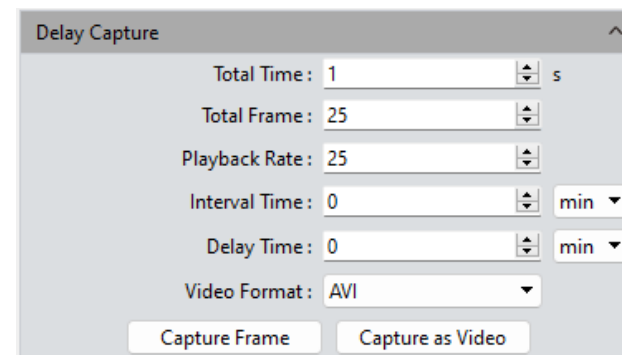
Delay Capture

Also known as time lapse, Delay Capture allows the user to specify the number of frames to capture and the time period between frames. The captured images will be saved in a video format.

➢ **Total Time:** Capture images according to the time set (in seconds). Default is 1 second, the setting range is 1-9999s.

➢**Total Frame:** Capture images according to the number of desired frames, system default is 10 frames, setting range is 1~9999 frames.

➢ **Playback Rate:** Set the frame rate at which the video will play back. The default is 25 with a range of 1-10000 frames per second.

➢ **Interval Time:** Set the time **between** images. The default interval time is 0 minutes. Three time units may be selected: Minutes, seconds and milliseconds. The available range is 0ms-120min. The minimum value is zero meaning images will be captured as fast as possible depending on the camera, processing speed and memory of the computer.

➢ **Delay time:** Applies a delay before acquiring the first image of the series. Set the time (delay) before the first image will be captured. Time units: minutes, seconds and milliseconds; the range is 1 millisecond to 120 minutes.

➢ **Video Format:** Choose a file format for the video. AVI\MP4\WAM are supported. The default format is AVI.

➢ **Capture Frame:** Capture and save frames/images according to the settings in entered in the Delay Capture dialog. Click [Stop] to terminate the capture process early, before all of the frames have been captured.

➢ **Capture as Video:** Capture multiple frames/images according to the set parameters and save them directly as a movie (AVI file is the default). Click [Stop] to terminate the capture process before its conclusion.

Note: There is a quantitative relationship between the total time, the total number of frames, and the playback frame rate. Total time is calculated as below, then rounded down.

$$\text{Total time} = \frac{total\ number\ of\ frames}{playback\ frame\ rate}$$

⊙ Capture

Trigger
ONLY FOR MONOCHROME CAMERA WITH COOLING

Two output modes are available: Frame mode and Flow (stream) mode.

➤ **Frame mode:** The camera is in external trigger mode and outputs images by triggering the frame capture. This can be done with a Hardware trigger or Software trigger.

➤ **Flow mode:** real-time preview mode. Data flow is the output mode. Embed image data in the stream. The image is output circularly like flowing water.

➤ **Hardware setting:**

▪ **"Off" mode:** Indicates that the hardware trigger mode is off at this time, and the camera is producing a live image.

When the "On" mode is selected, the camera switches to the trigger waiting mode, and imaging is paused. Only when the trigger signal is received will the camera capture an image.

▪ **"On" mode:** Turn on the hardware trigger and enter the standard trigger mode. There are several configuration modules (Exposure and Edge):

➤ **Exposure:**
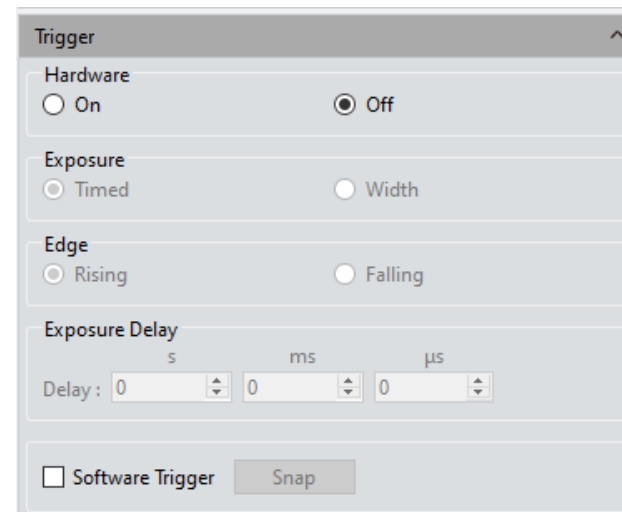
▪ **Time: T**he exposure time is set by the software.

▪ **Width: I**ndicates exposure time is set by input level width.

➤ **Edge:**

▪ **Rising edge: I**ndicates that the trigger signal is valid for rising edge.

▪ **Falling edge: I**ndicates that the trigger signal is valid for falling edge.

➤ **Exposure Delay:** Indicates the delay between when the camera receiving a trigger signal and when the camera captures an image.

➤ **Software Trigger mode:** In the software trigger mode, click [Snap] and the camera is instructed to capture and output one image with each click.

Note:

1) Changing between Hardware "On" or "Off", the settings for Exposure, Edge and Exposure Delay take effect immediately.

2) When you close the software, the software will reopen the next time in the same mode and settings.

3) Hardware "On" external trigger support can control the start and end of image acquisition.

4) Trigger module with external trigger overrides any resolution, bit depth, ROI and video recording settings.
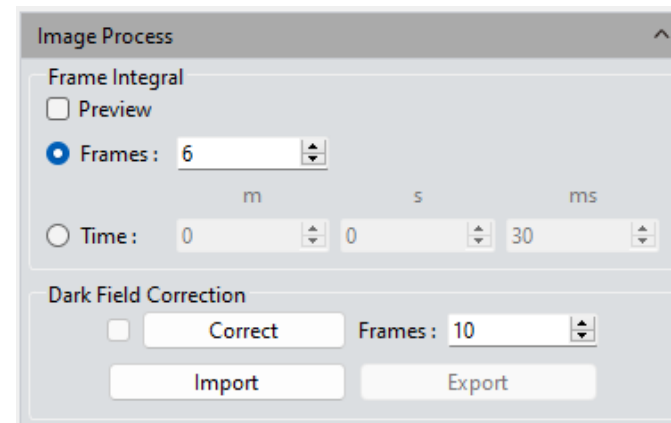
⦿ Capture

Image Process
ONLY FOR MONOCHROME CAMERA WITH COOLING

➢ **Frame Integral:** Captures continuous multi-frame images according to the settings. Integration can be previewed in real time. Integration can improve image brightness in low brightness situations.

- **Integral by Frames:** Captures and averages the selected number of frames.
- **Integral by Time:** Captures and averages all frames over selected period of time.
- **Preview:** Displays the effect of the integration settings in real time, allowing the user to make adjustments for the best results.

Note: 1) Set an appropriate number of accumulated frames or the resulting image may be too bright or distorted.

2) Frames and Time cannot be used simultaneously.

➢ **Dark Field Correction:** Corrects for variation in background non-uniformity.

- By default, Correction is disabled. It is only available only after the correction coefficients are imported and set. Once imported and set, the box is automatically checked to enable the dark field correction.
- Click the [Correct] button and follow the pop-up prompt. Click next to calculate the correction coefficient automatically.
- The default frame number is 10. Range is 1-99.
- Import and Export are to import/export correction coefficients, respectively.
- Repeat dark field correction whenever exposure time or scenes/samples are changed.
- Closing the parameter group or software will remember the frame number. Closing the software will clear the imported correction coefficient – this will need to be imported again to enable correction.

⦿ Capture

Save Settings
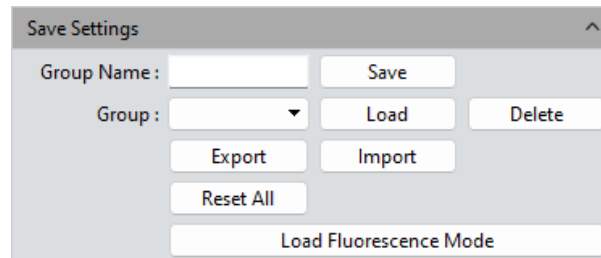
CaptaVision+ provides the ability to save and recall imaging experiment parameters, whether the camera is used for a different application or on a different platform. Camera and imaging parameters (settings) can be saved, loaded and applied to new experiments saving set up time, providing workflow efficiency and ensuring experiment process reproducibility and result generation.

All parameters mentioned previously in this manual can be saved except for flat field correction (this requires exact imaging conditions which are impossible to reproduce). Parameter groups can also be exported for use on other computers for maximum convenience to reproduce experimental conditions and generate uniform results across multiple platforms.

➢ **Group Name:** Enter the desired parameter group name in the text box and click [Save]. This is the name you want to call this collection of settings. The computer will show similar group names to avoid overwriting parameter files that have already been saved.

➢ **Save:** To save the current parameters into a named parameter group file. Up to 50 sets of parameters can be saved.

➢ **Load:** Click the drop-down arrow to view previously saved parameter files, select the parameter group for recall, then click [Load] to recall and apply those parameter settings.

➢ **Export:** Save the files of the parameter groups to another location (e.g., USB drive for import to another computer).

➢ **Import:** To load the selected files of parameter group from the selected folder.

➢ **Delete:** To delete the currently selected files of a parameter group.

➢ **Reset all:** Deletes all Parameter Groups and restores parameters to the factory default.

➢ **Load Fluorescence Mode:** After clicking this button, the exposure mode is switched to manual exposure, the exposure time is 100ms, and the automatic level is automatically checked.

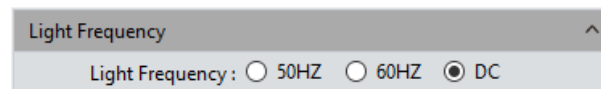# ◉ Capture

Light Frequency

The frequency of the electric current can sometimes be observed in the live image. Users can select a light source frequency that corresponds to the actual condition. This will not correct for stroboscopic phenomena seen on live images. The default light source frequency is direct current (DC).

Other Settings

➢ **Negative:** Inverts the color of the current image.

➢ **HDR:** Click to stretch the dynamic range to reveal more image detail. Use as needed for the application.

Auto Focus (only for Auto Focus camera)

➢ **Continuous Focusing:** Select the area to be focused in the preview screen. The camera will focus continuously on the selected area until it is in focus. When the focal length is changed due to movement of sample or camera, camera will automatically refocus.

➢ **One-Shot AF**: Select the area to be focused in the preview screen. The camera will focus one time on the selected area. The focus position (focal length) will stay unchanged until the user performs One-Shot AF again, or manually focuses using the microscope.

➢ **Focusing Location:** Focusing location can be manually positioned. The focus position (focal length) of camera will change according to location change.

➢ **C-Mount:** Automatically moves to the C interface position.
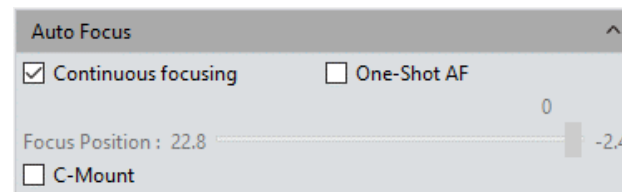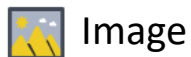
Image

Control Interface

The following image processing functions are available: Image Adjust, Image Dye, Fluorescence, Advanced Computational Imaging, Binarization, Histogram, Smooth, Filter/Extract/Inverse Color.

Click to save picture in any format of JPG\TIF\PNG\DICOM; saving window will be popped out as shown below.

Note: DICOM is not available for MacOS.

Click screenshot button on the right upper corner of the preview window to crop picture, to select the interested area in preview image with mouse, then double left click or double right click the mouse to complete screenshot. The screenshot will appear on right picture bar, click to save current screenshot. If there is no need to save the screenshot, right click to exit crop window.
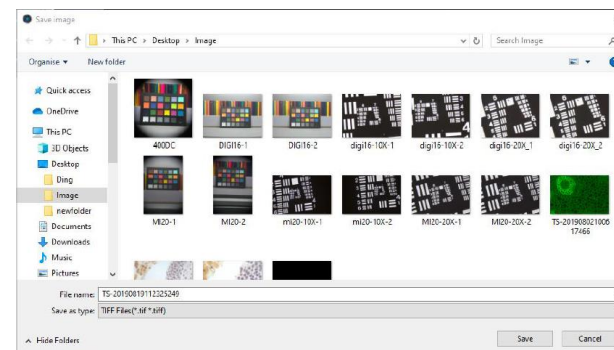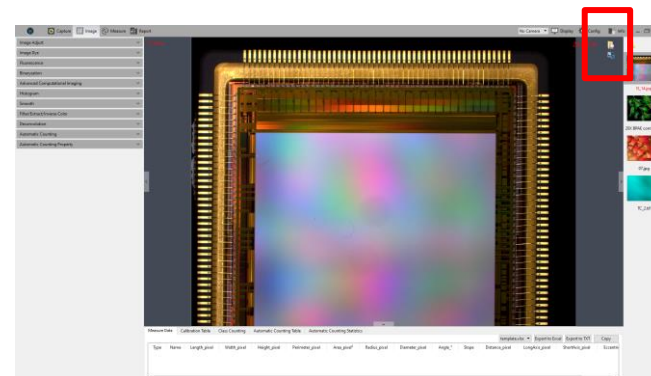
🖼️ Image

Image Adjust

Adjust the image parameters to revise the effects of the captured images

➢ **Brightness:** Allows adjustment of the image brightness, the default value is 0, adjusting range is -255~255.

➢ **Gamma:** Adjust the balance of darker and lighter regions on the monitor for bringing out details; the default value is 1.00, adjusting range is 0.01~2.00.

➢ **Contrast:** The ratio between the darkest areas and brightest areas of the image, the default value is 0, adjusting range is -80~80.

➢ **Saturation:** The intensity of color, the higher value of the saturation, the more intense the color, the default value is 0, adjusting range is -180~180.

➢ **Sharpen**: Adjusts the appearance of edges in the image to appear more in focus, may result in more vivid color in a specific area of the image. The default value is 0, and adjusting range is 0~3.

After completing the parameter adjustments for the image, Click **[Apply As A New Image]** to accept all new settings and apply them to a copy the original image – this preserves the original image. The new image should be saved with a different file name to preserve the original image (data).

➢ **Default:** Click the **[default]** button to restore the adjusted parameters to the factory default.
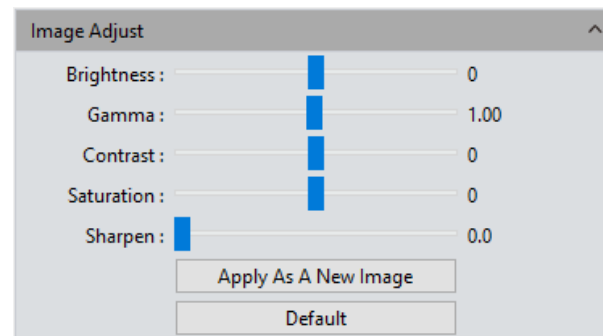
Image Adjust		∧
Brightness :		0
Gamma :		1.00
Contrast :		0
Saturation :		0
Sharpen :		0.0
Apply As A New Image		
Default		

🖼️ Image

Image Dye

Allows the user to apply color (false color or pseudo color) monochromatic images. Originating from a customer's request, a user may select the desired color (representative of a selection of dyes), click [Apply As A New Image] to apply the selected color to a copy of the original image. Click [Cancel] to cancel currently applied color.

➢ **Current:** This window displays the currently available colors that can be selected by the user. Click 🎨 to display the full color palette (Select Color) for a much broader selection of color choices. After selecting the color, click [OK] to accept the color. Refer to the discussion on Capture > Fluorescence for more detail on selecting and saving colors.

➢ **Add to New Dye:** To add selected colors on the palette into the new dyes.

➢ **Dye Type:** The user may be able to quickly select a color based on the fluorochrome used in the specimen staining process and apply that color to the monochrome image.

➢ **Cancel:** To cancel a certain kind of dyes added through custom mode.
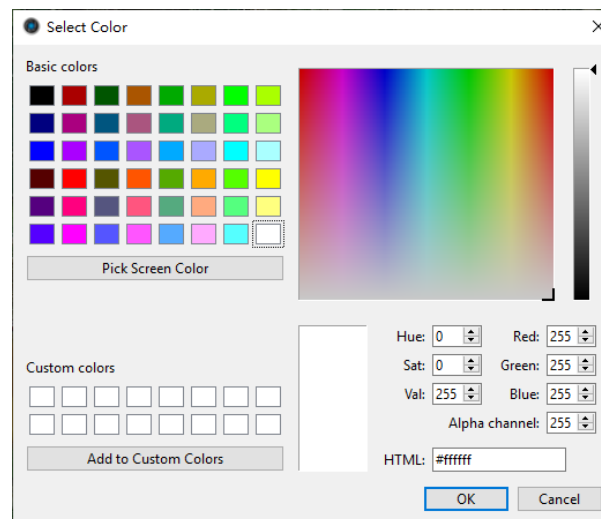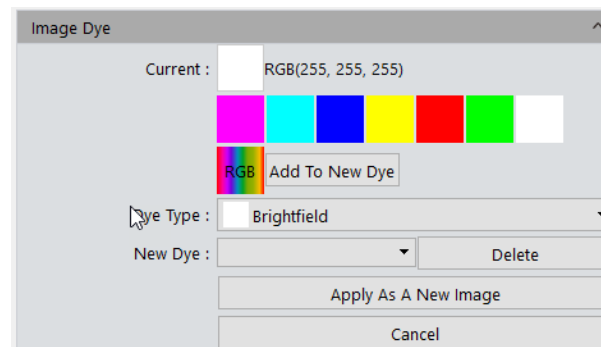
🖼 Image

Fluorescence

In the biological sciences, different fluorochromes are used to label different cell or tissue structures. Specimens may be labeled with as many as 6 or more fluorescent probes, each targeting a different structure. The complete composite image of this type of specimen shows potential relationships between the stained tissue or structures. The spectral properties of fluorescent probes and the low efficiency of color cameras don't allow all of the probes in a specimen to be imaged simultaneously in one color image. Therefore monochrome cameras (being more sensitive) are typically used, and images of the specimen with illumination (and filters; the combination may be referred to as "channels") for the different fluorescent probes are used. The Fluorescence module allows the user to combine these single channels, specific to a single fluorescent probe, into one multi-color image representative of multiple probes.

Operation:

a) Select the first fluorescence image from the directory and open it,

b) Click the box next to [Start Color Composite] to start the process. The operating directions window will be displayed, as shown in figure(1).

c) Using the image gallery on the right, check an image to select it for combining, as shown in the figure(2), then the combined image will display for you to preview, as shown in the figure(3). Select other images with the same observation field as the first. A maximum of 4 images can be combined.

d) Click [Apply As A New Image] to add the combined image to the image gallery. This new image is displayed in the center workspace of the software interface, and the fluorescence combining process is complete.

➢ **Offset**: Light traveling from the specimen to the camera can be shifted by mechanical vibrations in the microscope system, or variations in the dichroic mirror or emission filters from one filter set cube (channel) to another. This can lead to images that, when combined, don't overlap perfectly. Offset allows the user to correct any pixel drifting by adjusting the X and Y position of one image in relation to another. One correction unit stands for one pixel. Click on [0,0] to restore to the original position.
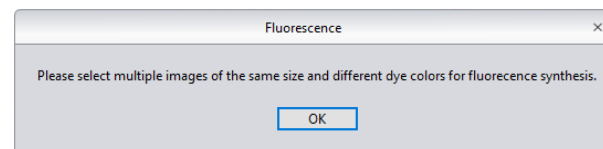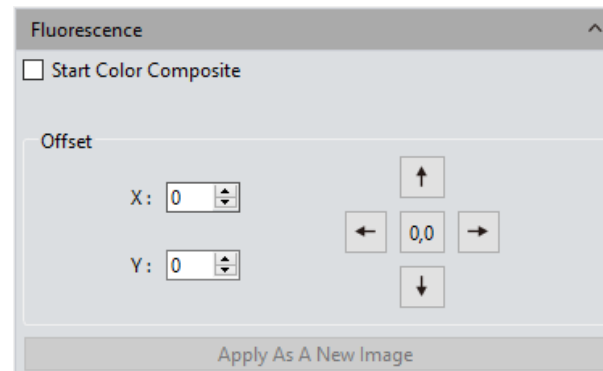
(1)
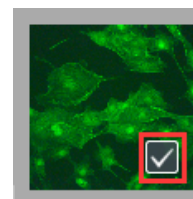
(2)
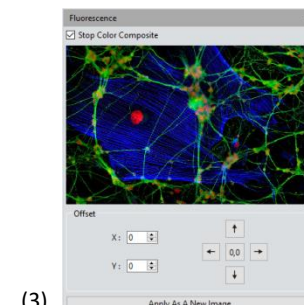
(3)

🖼️ Image

Advanced computational imaging

CaptaVision+ software offers users three advanced post-process computational image technologies that work by merging batches of images.

➢ **Extend Depth of Field (EDF):** Generates a 2-dimensional image using the in-focus detail from a focus stack (multiple focus depths) from a sample. The module automatically creates a new image from a selection of images acquired at different focus planes.

➢ **Image Stitching:** Performs stitching of images acquired at adjacent fields from the same sample. Image frames should have approximately 20-25% overlap with an adjacent image frame. The result is a large, seamless, high-resolution image.

➢ **High-Dynamic Range (HDR):** This post-processing tool creates an image that reveals more details in the sample. Basically, the module merges images acquired with different exposures (low, medium, high) into a new image with high dynamic range.

Operation:

1) Select the processing method to use by clicking the radio button next to it. A wizard function then guides the user through the process. The following describes the process using EDF as an example:

After selecting EDF, the first display window directs the user to select the images to use in this processing application, as shown in the figure(1);

2) Click on [Combination] at the bottom of the interface;

3) The process may take some time to analyze and combine the images, and the window displays the progress, for example: EDF 4/39

4) At the conclusion of the process, a thumbnail of the combined image is generated and displayed in the left menu bar, as shown in the figure(2);

5) Click [Apply As A New Image] button and the new combined image is added to the image gallery and displayed in the center workspace of the software interface, and the combing process is complete.
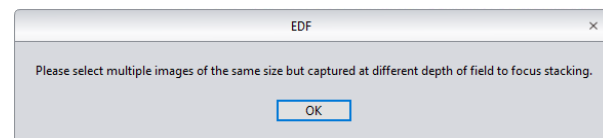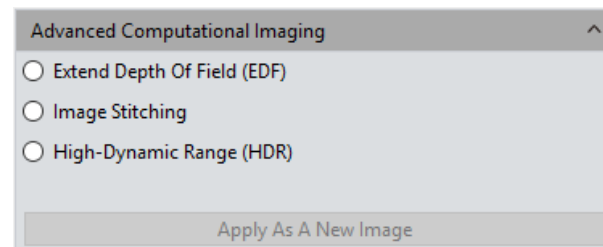
(1)

(2)

🖼️ Image

Binaryzation

CaptaVision+ software can perform image binarization in which a full color sample can be segmented and viewed as two classes according to differences in brightness. The user moves the threshold slider until the desired segmentation is observed – other features are excluded. The grayscale value of the pixels of the image range from 0 to 255, and by adjusting the threshold to observe one feature, the image is presented with a distinctive black and white effect (based on the threshold, gray levels above the threshold will appear as white, and those below will appear as black). This is often used to observe and count particles or cells.

➢ **Default:** Click the default button to restore the module's parameters to the factory default.

➢ **Apply:** After making adjustments, click [Apply] to generate a new image, the new image can be saved as desired.

➢ **Cancel:** Click the Cancel button to stop the process and exit the module.
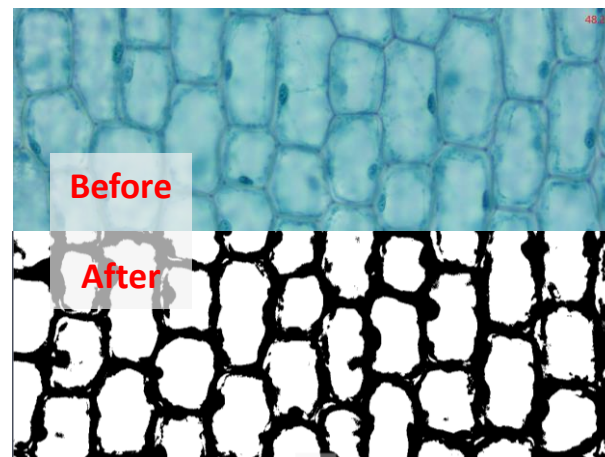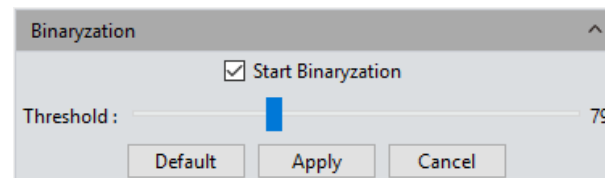
🖼 Image

Histogram

➢ **Color Scale Adjustment:** Refine R/G/B color scales separately, then proportionally redistribute the pixel value among them. The adjustment of picture's color scale may highlight features and brighten the image – it may also darken an image. Each color channel can be adjusted separately to change the color of picture in corresponding path.

➢ **Manual Color Scale:** Users can manually adjust the dark shade (left color scale), gamma and highlight brightness level (right color scale) to calibrate picture shade tone, including contrast, shade and image hierarchy, and to balance the color of the picture.

➢ **Automatic Color Scale:** Check Automatic, customize the brightest and darkest pixel in each path as white and black, and then proportionally redistribute the pixel values between them.

➢ **Apply:** Apply current parameter setting in picture and generate a new picture. The new picture can be saved as separately.

➢ **Cancel:** Click [Cancel] button to cancel parameter of the module.
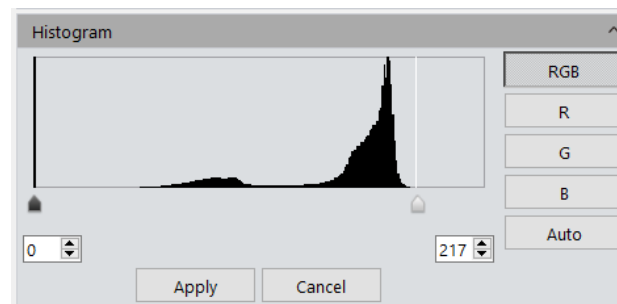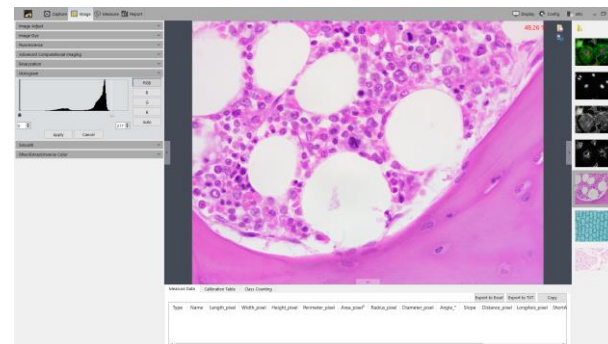
🖼️ Image

Smooth

CaptaVision+ software provides users with three image smoothing techniques for reducing the noise in images, often improving the observation of detail. These computation techniques, often called "blurring", include: ①Gaussian Blur, ②Box Filter, and ③Median Blur.

➢ **Radius:** Use the Radius slider to adjust the radius of the computational area for the selected technique. The setting range is 0~30.

➢ **Default:** Click the [default] button to restore the module's parameters to the factory default.

➢ **Apply:** After selecting the desired smoothing technique and adjusting the Radius, click [Apply] to generate a new image using those setting, and the new image can be saved as desired.

➢ **Cancel:** Click the [Cancel] button to stop the process and exit the module.
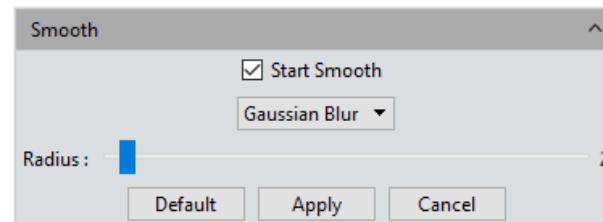
🖼️ Image

Filter/Extract/Inverse Color

CaptaVision+ software allows users with methods to Filter/Extract/Inverse Color in previously acquired still images (not videos) as needed for the application.

➢ **Color**: Select Red/Green/Blue.

➢ **Filter Color:** Can be useful to check the color level information in each channel of a color image and combine images with complementary colors. The combined image will always be brighter. The filter selectively removes the selected color from the image.

➢ **Extract Color**: Extract the certain of color from the RGB color group. Extract removes the other color channels from the image, keeping only the color that was selected.

➢ **Inverse Color**: Invert the colors in the RGB group to their complementary colors.

➢ **Apply:** After choosing the settings, click [Apply] to apply those settings to a copy of the original image and generate a new image, then save the new image as desired.

➢ **Cancel:** Click the [Cancel] button to cancel process and exit the module.
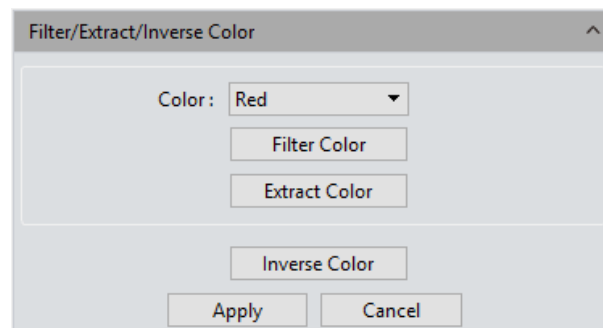
Original
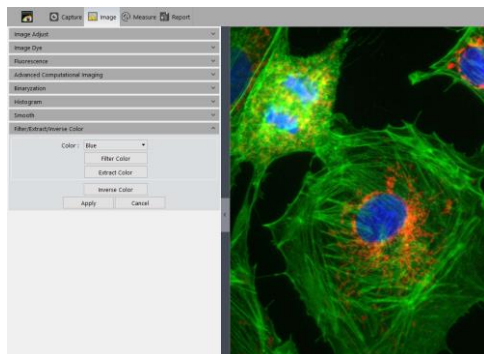
Filter Blue
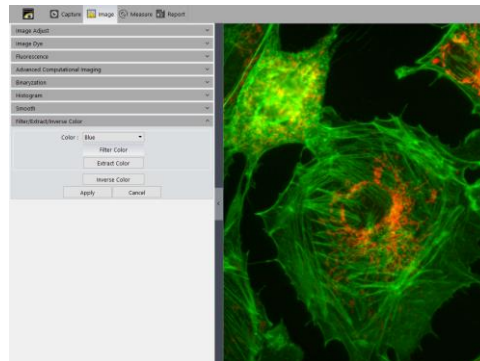
Extract Blue
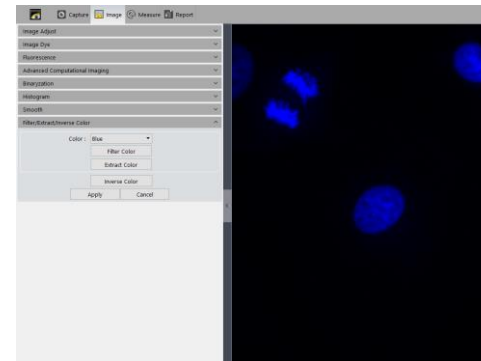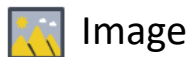
Image

Deconvolution

Deconvolution may aid in reducing the impact of artefacts in an image.

➢ **Iterations**: Choose the number of times to apply the algorithm.

➢ **Kernel Size:** Define the size of the kernel ("field of view" of the convolution) for the algorithm. A lower value uses fewer nearby pixels. A higher value extends the range.

➢ **Calculation:** After choosing the Kernel Size and the number of Iterations, click [Calculation] to see the result on the image.

➢ **Apply:** After Calculation, click [Apply] to apply the deconvolution process to the image. This cannot be undone.

➢ **Cancel:** Click [Cancel] to cancel or undo the calculation process.

Note: Be sure to click 🖫 to save the image and name it accordingly.
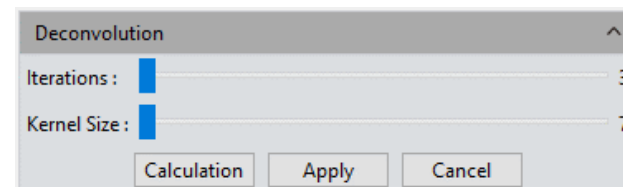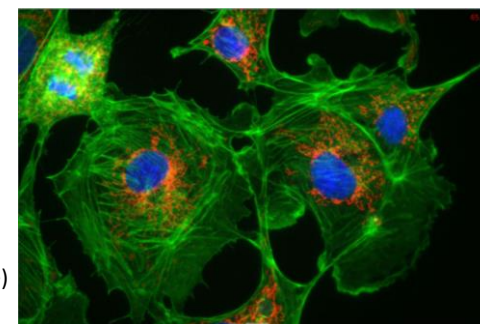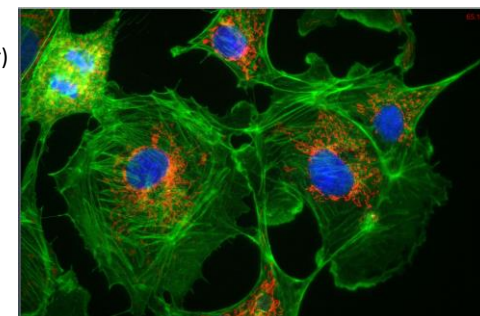
Deconvolution	^
Iterations :	3
Kernel Size :	7

Calculation   Apply   Cancel

(before)

(after)

🖼️ Image

Automatic Counting

➢ **Start Counting:** Click button to begin automatic counting mode.

➢ **Region: All:** Selects the entire image for the counting area.

➢ **Region: Rectangle:** Choose the Rectangle to define a rectangular area in the image for counting. Left-click to select two endpoints to draw a rectangular shape on the image.

➢ **Region: Polygon:** Choose Polygon to select an area that cannot be adequately selected using the Rectangle option. Left-click multiple times to place corners of a polygon on the image. Double-click to end the drawing.

➢ **Restart Counting:** Clears the region and returns to the Start Counting interface.

➢ **Next:** Advances to the next step.

Segmentation

➢**Auto Bright:** Automatically segments bright objects from the dark background.

➢ **Auto Dark:** Automatically segment dark objects from bright background.

➢ **Manual:** Manual segmentation is based on the histogram distribution of the image, which can be adjusted by dragging the two vertical lines on the left and right in the histogram, by adjusting the lower and upper limit values using the up/down arrows, or by directly entering the upper and lower limits in the boxes.

Morphological Processing

➢ **Dilate:** Change the size of the cells in the image to expand the borders of bright cells and shrink the borders of dark cells.

➢ **Erode:** Change the size of the cells in the image to expand the borders of dark cells and shrink the borders of bright cells.

➢ **Open:** Change the distinction between cells. For example with a bright cell on a dark background, clicking Open will smooth the cell boundary, separate connected cells, and remove small black holes in the cell.
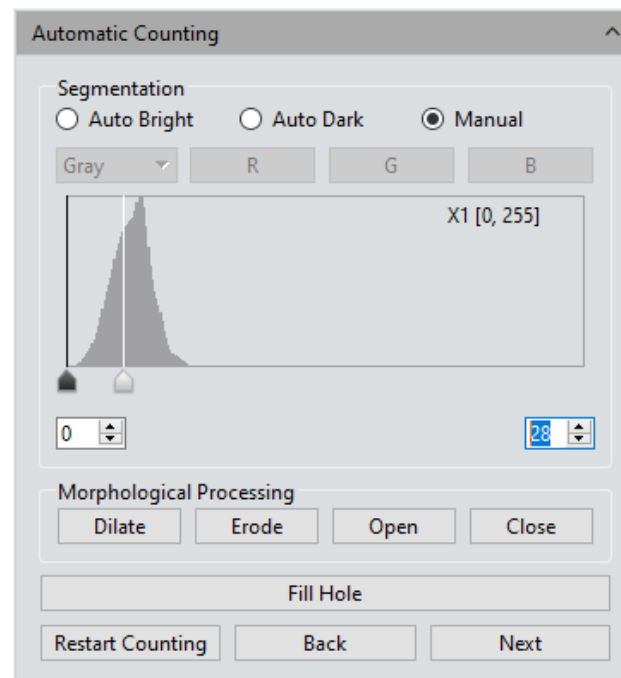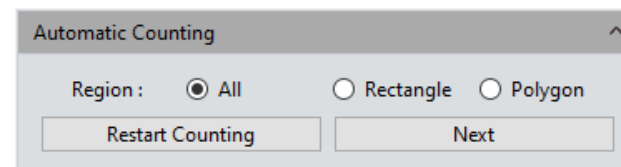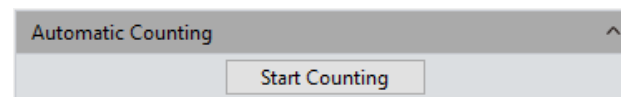
🖼️ Image

➢ **Close:** The opposite of Open above. For example with a bright cell on a dark background, clicking Close will fill the gap of a cell, and may stretch and highlight an adjacent cell.

➢ **Fill holes:** Fills holes in cells in the image.

➢ **Restart Counting:** Clears the region and returns to the Start Counting interface.

➢ **Back:** Goes back to the previous operation process.

➢ **Next:** Advances to the next step.

Display

➢ **Contour:** Use contour lines to represent the divided cells.

➢ **Region:** Use padding to represent divided cells.

Cutting Mode

➢ **Auto Cut:** Draws cell boundaries according to the contour of the cell.

➢ **Manual:** Manually select multiple points on the image to separate cells.

➢ **No Cut:** Do not divide the cells.

➢ **Merge:** Merge separate cells into one cell.

➢ **Include Boundary:** When calculating the number of cells, cells with incomplete boundaries in the image will not be counted.

➢ **Restart Counting:** Clears the region and returns to the Start Counting interface.

➢ **Back:** Goes back to the previous operation process.

➢ **Next:** Advances to the next step.
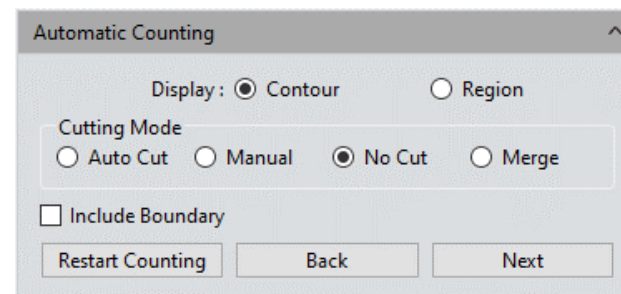
Image

Target Data Settings:

➢ **Add:** Add the type of calculation from the Target Data Settings to the statistical result.

➢ **Delete:** Remove a type of calculation.

➢ **Minimum:** Set the minimum value for each Data Type for separated cells. Cells smaller than the minimum value will not be counted.

➢ **Maximum:** Set the maximum value for each Data Type for separated cells. Cells greater than the maximum value will not be counted.

➢ **OK:** Start counting cells according to the criteria.

NOTE: Refer to the tabs below the preview window to see the results of automatic counting. The Automatic Counting Table shows the calculations according to the Target Data Settings. Default settings are Area, Roundness, Long Axis and Short Axis. Automatic Counting Statistics shows the statistical values for each of the Target Data Settings above.

➢ **Draw Target:** check this option after the automatic counting is completed. Allows you to manually draw the missed cell on the interface.

➢ **Export Report:** Export statistical cell data to Excel file. The exported data is inclusive of the Automatic Counting Table and Automatic Counting Statistics.

➢ **Restart Counting:** Clears the region and returns to the Start Counting interface.

➢ **Back:** Goes back to the previous operation process

Automatic Counting	∧
Target Data Settings :	

Area
Perimeter
Radius
Diameter
Roundness
Center X
Center Y
Long Axis
Short Axis
Direction
Integral
Standard Deviation
Mean Gray Value

Add	Delete	Default

	Data Type	Minimum	Maximum
1	Area	0.000	10000000.000
2	Roundness	0.000	10000000.000
3	Long Axis	0.000	10000000.000
4	Short Axis	0.000	10000000.000

OK	☐ Draw Target	Export Report
Restart Counting		Back

🖼️ Image

Automatic Counting Property

Adjust the properties of the text and drawings/borders in the image during Automatic Counting.

➢ **Font**: Set font and size, default is Arial, 9, click ⬚ to open the font menu to select the desired font.

➢ **Font Color:** Set font color, default is green, click ⬚ to open the color palette to select the desired color.

➢ **Target Color:** Set cell display target color, the default is blue, select it and click ⬚ to open the color palette to select the desired color.

➢ **Contour Width:** Adjust the cell display outline width, default is 1, range 1~5.

➢ **Precision:** Set the number of decimal places for the maximum and minimum values. By default, 3 decimal places are reserved. The range is 0~6.

Automatic Counting Property	
Property	**Value**
Font	A [Arial, 8]
Font Color	🟩 [0, 255, 0] (255)
Target Color	🟦 [0, 0, 255] (255)
Contour Width	1
Precision	3
Default	

Measure

Control Interface

CaptaVision+ provides tools for measuring features in images. Measurements are typically performed on saved, static images, but *CaptaVision+* allows the user to perform measurements on live previews of samples to provide real-time information of the sample. *CaptaVision+* provides a rich set of measurements for image analysis. The principle of the measurement functions is based on image pixels as the basic execution unit and, with calibration, the resulting measurements can be very accurate and repeatable. For example, the length of the line feature is determined by the number of pixels along the line, and with calibration, pixel-level measurements can be converted to more practical units such as millimeters or inches. Calibration is performed in the Calibration module.

Measure Tool

Begin all measurements by clicking the desired measure tool in the module window.

Line: Click in the image to draw a line segment graphic and complete the drawing with another click. Arrows are displayed at the endpoints.

H Shape Straight Line： Draw a line segment graphic and then finish drawing with one more click, vertical lines at endpoint.

Three Dots Line Segment: Draw graphic with three dots line segment, finish drawing when click for the third time.

Multiple Dots Line Segment: Draw graphic with multiple dots at the same direction,
single click to draw and double click to end drawing.

Parallel Line: Click in the image to draw a line segment, left click again to draw its parallel lines, then double-left-click to finish drawing.

Vertical Line: Click in the image to draw a line segment, left click again to draw its vertical line, then double-left-click to finish drawing.

Polyline: Click in the image and draw a line segment, left click again to add a new line segment to the existing polyline, then double-left-click to finish drawing.
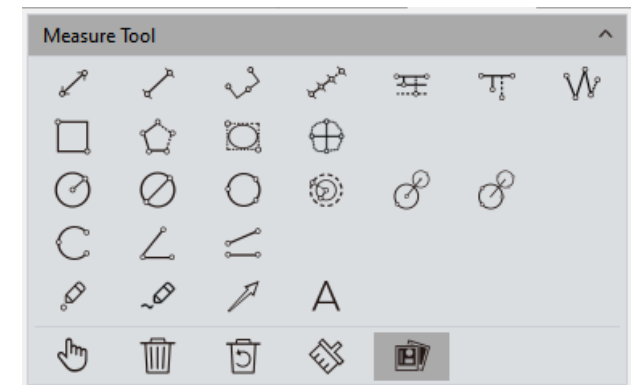
Measure

Measure Tool (continued)

Rectangle: Click in the image to start drawing, drag the shape down and to the right, then double-left-click to complete the drawing. Measurements include length, width, perimeter and area.

Polygon: Click in the image to start drawing the shape, left click to draw each additional face, then double-left-click to finish drawing.

Ellipse: Click in the image, drag the shape down and to the right, then double-left-click to finish. Measurements include perimeter, area, major axis, short axis, and eccentricity.

Roundness: Select the first and second segment passing through the center of the circle on the contour of the measured circle. After drawing, the value of the degree to which the cross section is close to a theoretical circle is obtained (closer to "0" means closer to perfect circle.

Radius Circle: Click in the image to select the center of the circle, click again to define the radius length, then click again to finish drawing.

Diameter Circle: Click in the image, drag to enlarge the circle, then click again to finish drawing.

3Point Circle: Click in the image to define one point on the perimeter, move and click to set another point, then move and click a third time to finish drawing.

Concentric Circles: Click in the image to draw the first circle with its radius, in or out and click to define the next circle, then double-click to finish drawing.

4Point Double Circle: (like drawing two radius circles) Click to position the center of the first circle, then click to define the radius of the first circle. Click again to position the center of the second circle, then click again to define the radius of the second circle.

6Point Double Circle: (like drawing two 3point circles) Click three times to select three points on the first circle, and click another three times to select the three points of the second circle, then end the drawing.

Arc: Click in the image to select the starting point, drag and click again to set the second point on the arc, then click again to finish the drawing. All 3 points will be on the arc.
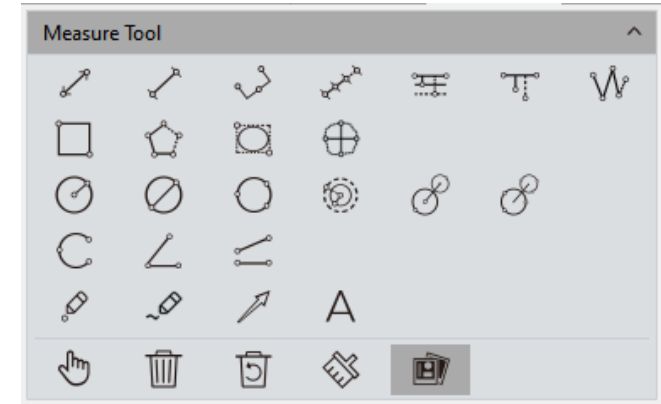
3Point Angle: Click to set the end point of one arm of the angle, click to set the vertex (inflection point), then click again after drawing the second arm and to finish drawing.

4Point Angle: Click in the image the angle between two unconnected lines. Click to draw the endpoints of the first line, then click to draw the endpoints of the second line. The software will extrapolate and determine the smallest angle between the two lines.

Dot: Click in the image where you want to place a dot e.g., for counting or to mark a feature. Displays XY coordinate of the dot.

Free Draw: Click in the image and draw line of any shape or length.

Arrow: Click in the image to start the arrow, click again to end the drawing.

Text: Click in the image and type to add a text note.

⦾ Measure

Measure Tool

Within graphics drawing mode, right-click the mouse to switch to the selecting mode. Right-click again to return to the drawing mode.

⬚ 🖑 **Select**: Click in the image window to select an object or annotation. The mouse cursor changes to 🖑 , use the 🖑 to move the object or annotation.

🗑 **Delete:** To delete the drawing, measurement or annotation.

🗑 **Undelete:** Undo the last delete operation.

🧹 **Clear All**: Delete all the drawn and measured graphics or texts on the current layers.

🗐 **Combine:** When saving the image, the drawings, measurements and annotations will be permanently added ("burned into") the image. By default, Combine is active.

➢ **Data Type**: Each graphic has its own available data types to display, such as length, perimeter, area, etc. (see example to right of the available Data Types when the Ellipse tool is selected). When drawing the graphic, the data will also display. Hover the cursor over the data display for a graphic and right-click the mouse to display the Data Type options to choose to display for that graphic.

When the mouse is in the ⬚ state, use the mouse scroll wheel to zoom in/out on the image. Hold down the left mouse button to drag/reposition the drawn graphic or annotation. Position the cursor on an endpoint of a graphic 🖑 , then click and drag to change the shape or size of the graphic.

When the mouse is in the 🖑 state, use the mouse scroll wheel to zoom in/out on the image. Place the cursor on a graphic and click and drag to move the image. Position the cursor on an endpoint of a graphic, then click and drag to change the shape or size of the graphic.

All drawing and measurement graphic data will be added to the measurement table. Click [Export to Excel] or [Export to TXT] to transfer the data information to EXCEL form format or TXT document format. Click [Copy] to copy the entire table for pasting into another document.

ⓩ Measure

Calibration

When performing calibrations, it is recommended to use a stage micrometer or other device with standardized measurement markings.

➢ **Create a calibration table:** Saves a series of measurements used to convert the number of pixels into standard units of measure. Click **[Draw]**, draw a straight line on the image (press [ctrl] to draw horizontal or vertical lines). If using a stage micrometer, begin on the left side of the micrometer, click on the left edge of a tick mark and, for maximum accuracy, drag the line to the far right of the images, then click on the left edge of another tick mark (see figure(1)). Enter the actual **Length** of the object in the image. Enter a logical **Name** for the calibration measurement (e.g., "10x" for a measurement with a 10x objective), confirm the unit of measure, then finally, click **[Apply]** to accept the entries and save the calibration.

Note: Acceptable units of measure: nm, µm, mm, inch, 1/10inch, 1/100inch, 1/1000inch.

➢ **View/Edit Calibration Table:** Multiple groups of calibrations can be created to facilitate measurements under different application scenarios. The individual calibrations can be viewed and edited in the calibration table as shown in the figure (2).

➢ To change to a different calibration (e.g., after changing objective magnification), click in the checkbox in the [Current] column next to the desired calibration, then apply this calibration to new measurements on images acquired at that magnification.

➢ Select a calibration in the table and right-click to open the file options window (see figure (3)). Click **[Delete]** to delete the selected calibration – the currently active (checked) calibration cannot be deleted while active. Click **[Load]** to locate and import a previously saved calibration table. Click **[Save As]** to save and export the entire calibration table with an assigned name for future recall and loading.

Resolution is the preview resolution of the new calibration ruler. Switching the resolution, calibration ruler and measurement data will be automatically converted.

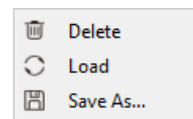Note: Calibration processing can be performed more accurately with a micrometer. Using an incorrect calibration table will cause inaccurate measurements. Special attention must be used to select the correct calibration table before making measurements on images.
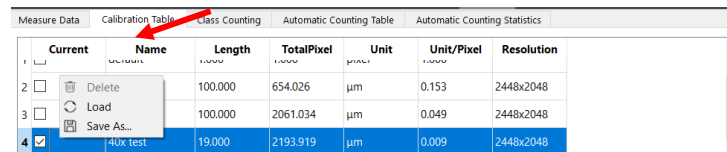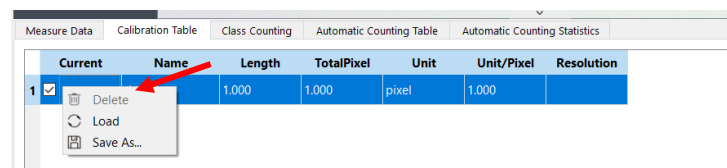
(1)

(2)

(3)
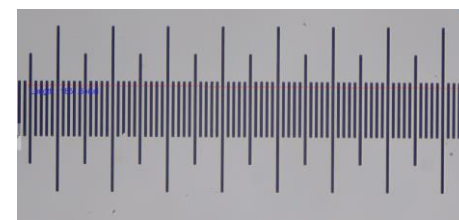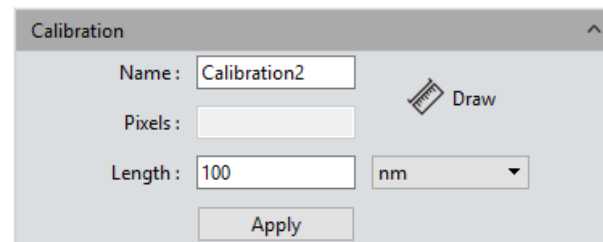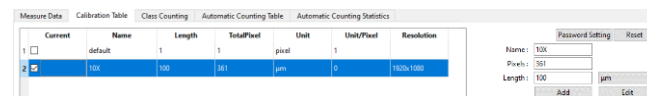
⊘ Measure

Calibration

Calibrations can be easily exported and imported in case of changing computers or for use on identical imaging configurations.

1. After calibrating the camera for the objectives, click on any of the calibrations in the calibration table to activate it (it will appear highlighted in blue). Right-click the mouse and choose "Save As"..

2. Choose the location where the calibration file will be saved and click "Save". The file will be saved as type ".ini".

3. To import the calibration file, navigate to the Calibration Table in the Measurement section of CaptaVision+, and click on the default calibration to activate it (it will be highlighted in blue). Right-click the mouse and choose "Load".

4. In the pop-up window, navigate to the location where the calibration file was saved. The dialog window will filter to show only ".ini" files.

5. Select the calibration file to import and click "Open".

6. Confirm that the calibrations have been loaded into the table.
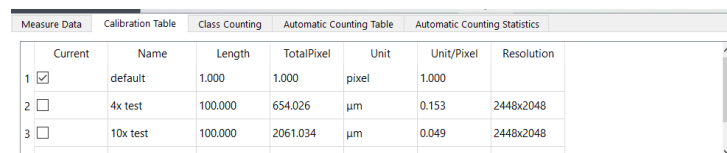
NOTE: It is NOT RECOMMEMDED to use the same calibration data between microscopes and cameras. Despite microscopes and cameras similarities and even identical configurations, minor variations in magnification are present, thereby invalidating the calibrations if used on instruments other than on which the calibrations were first measured.

🖉 Measure

Measure Layer

➢ Multiple layers can be created on the image allowing multiple measurement approaches to be created, applied or shown individually or in multiples.
This layer creation module meets the needs of many image measuring and image processing applications by allowing quick access to measurements depending upon the image, magnification or application.

Once a measurement has been made, the layer creation function automatically assigns the original image without measurements as "Background", then names the measurement layer as "Layer 01", which will show the corresponding measurement results.

Click the checkbox in the [Current] column to activate a layer for measurement. Measurements made on that layer will be associated with that layer.

Measurement data from different layers may be displayed individually by layer or by multiple layers. Click the checkboxes in the [Visible] column of the layers you wish to display.

Click **[New]** to create a new layer. The default layer naming convention is to augment the suffix of the layer by 1 as "Layer 01", "Layer 02", "Layer 03", and so on.

Rename a layer two ways. When a layer is Current, click the [Rename] button and enter the desired name for the layer. If a layer is not Current, click the layer name in the [Name] column (it will highlight in blue), click [Rename] and enter the desired name for that layer.

Click **[Delete]** to delete the selected (checked) layer.
Click **[Rename]** to rename the selected (checked) layer or selected layer name.
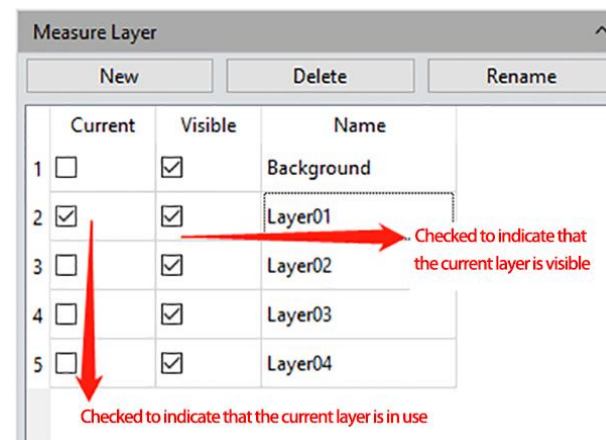
◉ Measure

Metrics Flow

The Metrics Flow feature of *CaptaVision+* provides powerful, semi-automated measurements especially for pass-fail quality inspection of devices or parts in industrial manufacturing environments. Metrics Flow adds convenience and improves speed and accuracy of inspection.

1) Open a group of device or part images saved in the image gallery.

2) Select the image of the standard sample to calibrate and set the tolerances for later measurements and observations; this will be called the reference image in this manual.

3) Click **[Start Building A Metrics Flow]** checkbox to create a new metrics template.

4) Use the various measurement and annotation tools to measure or draw any desired shape(s) on the reference image previously opened. The software will record the entire measuring process and save the measurement results or drawn graphics as the reference specifications, as shown in figure (1).

5) After recording the reference measurements and annotations on the template, assign a name to the template and click **[Save]**.

6) Click **[Start Applying A Metrics Flow]**, select the created template, click the **[Run]** button to apply the template, click **[Delete]** to delete the template.

7) Select the image for inspection/observation and follow the steps as when creating the template. Draw the first measurement. The Metrics Flow will automatically advance to the next measurement tool. Continue until every measurement in the flow has been made.

8) After the software applies the template, the **[Run]** button will be released and a window showing the results is displayed, as shown in figures (2) (3).

9) Click **[Export to PDF/Excel]** to save the results in PDF format or export in Excel format with the detecting results.

10) Continue to click [Run] and select other images for inspection/observation, then repeat steps 7, 8, and 9 as above.

11) After finished analyzing all the images, click **[Stop Applying A Metrics Flow]** to stop the Metrics Flow process.


(1)

(2)   (3)

Measure
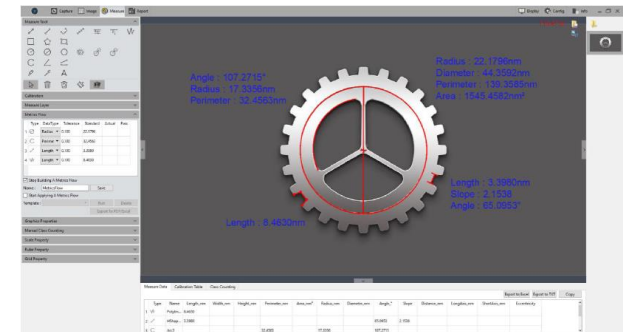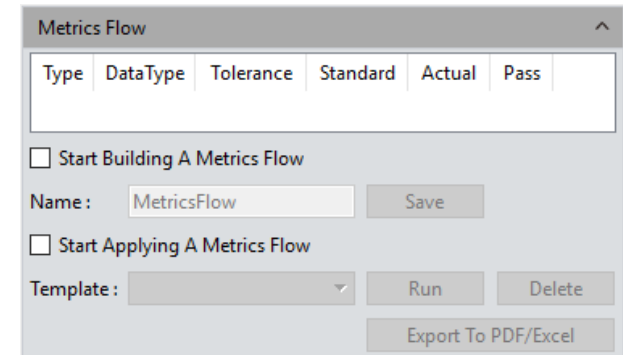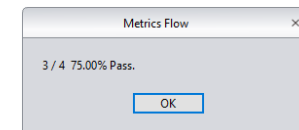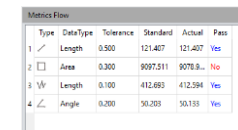
Graphics Properties

CaptaVision+ allows users to manage and adjust graphics properties for their application.

➢ Create or change a name in the blank text field in the Value column next to the **Name** row.

➢ **Show Name:** Check the False checkbox if you do NOT want the Name to be displayed.

➢ **Precision**: Choose the precision (characters after the decimal point) of any values being displayed. The default value is 3, the range is 0~6.

➢ **Line Width:** Adjust the width of the current measurement tools on the image. The default is value 1, the range is 1~5.

➢ **Line Style:** Select the line style of the current measurement tools on the image. The default style is a solid line. Other available styles are dashed lines, dotted lines, and double dotted lines.

➢ **Graphics Color:** Select the color of the lines of the measurement tools on the image. The default color is red; other colors can be chosen by clicking the color box and then the [...] button.

➢ **Font:** Choose the text font for the current measurement data. The default format is [Arial, 20]. Click the "A" in the Font:Value field to select another font and/or size.

➢ **Font color:** Choose the color for the current measurement data on the image. The default color is blue; other colors can be chosen by clicking the color box and then the [...] button.

➢ **No Background:** Check or uncheck the checkbox next to True. Checked box = transparent (no) background; unchecked box = with background. Transparent background is the default setting.

➢ **Background Color**: Select the background color for the current measurement data on the image. Click the color area and then the [...] button to choose the desired background color, the default background color is white.

➢ **Apply to All:** Apply all the graphics properties to the measurement graphics.

➢ **Default:** Revert to and apply the default graphics settings.

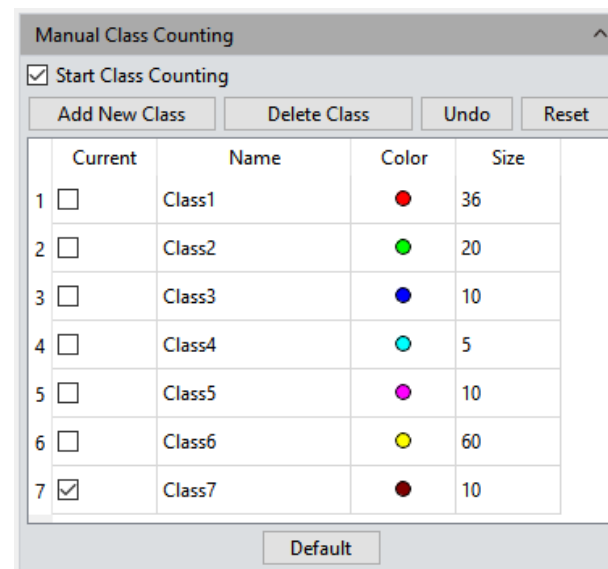| Property	Value
⌄ Global	
Name	
Show Name	☐ False
Precision	1
⌄ Graphics	
Line Width	1
Line Style	Solid Line
Graphics Color	■ [255, 0, 0] (255)
⌄ Text	
Font	A [Arial, 20]
Font Color	■ [30, 30, 230] (255)
No Background	☑ True
Background Color	[255, 255, 255] (255)
Apply To All	Default

Measure

Manual Class Counting

The Manual Class Counting function allows the user to manually count objects in the sample (e.g., cells) based on a feature or detail. Multiple features (Classes) may be specified based on color, morphology, etc. as needed for the user's application. Up to seven classes are possible.

➢ **Name:** Double-click the category button (e.g., Class1) to name the category.

➢ **Color:** Double-click the color dot in the Color column to select another color for the class.

➢ Size: Double-click the number to set the size of points. Default is 10; range is 1-500.

➢ Click **[Add New Class]** to create a new class.

➢ Click **[Delete Class]** to remove a class from the lists.

➢ Click **[Undo]** to undo the last action.

➢ Click **[Clear All]** to clear all classes in the table in one click.

➢ Click the **[Start Class Counting]** checkbox to select a class to use, then left-click the mouse on targets in the image to count. The counted results are automatically displayed in the class counting table, as shown in figure(1) and figure(2).
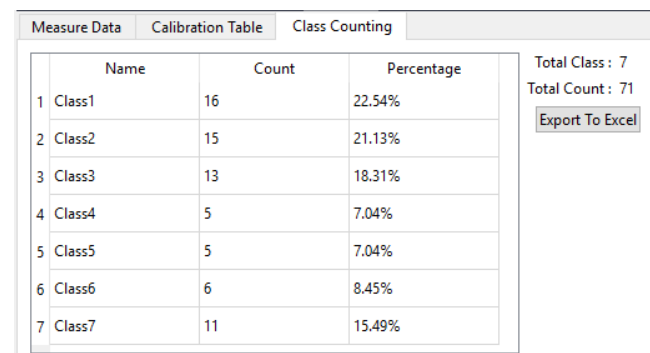
After counting is finished with one or more classes, the counting results are displayed in the counting table. Export the data by selecting **[Export to Excel]** (see figure(2)), then choose the destination in which to save the file.

(1)

(2)

Measure

Scale Property

CaptaVison+ allows users to set the scale properties based on need or application.

➢ **Show Scale:** Click the checkbox to display the scale bar on the image. The default setting is to NOT display the scale bar. When displayed, the scale bar will automatically be placed in the top-left of the image. Use the mouse to drag the scale bar to another position anywhere on the image.

➢ **Type:** Select Manual or Automatic display type. The default is automatic.

➢Click on the Value side to open dropdown list to choose Auto or Manual

➢ **Align:** Sets alignment of the value to the scale. Choose left, center, and right alignment. Default is center.

➢ **Orientation:** Set the display direction of the current scale. Choose horizontal or vertical. Default is horizontal.

➢ **Name:** Create name for the scale in the current image. The default setting is blank.

➢ **Length:** The default value is 100 units, according to the calibration file selected. After choosing Manual for the Type (see above), the Length value can be modified by entering new value.

➢ **Color:** Choose the line color for the current scale bar on the image. The default color is red; other colors can be chosen by clicking the color box.

➢ **Width:** Adjust the width of scale bar on the image. The default is value 1, the range is 1~5.

➢ **Text Color**: Choose the color for the current scale bar on the image. The default color is red; other colors can be chosen by clicking the color box.

➢ **Text Font:** Choose the text font for the current scale bar. The default format is [Arial, 28]. Click the "A" in the Font:Value field to select another font and/or size.

➢ **Border Color**: Choose the color for border of the scale currently displayed on the image. The default color is red; other colors can be chosen by clicking the color box.

➢ **Border Width:** Adjust the width of the border surrounding the scale. The default value is 5, range 1~5.

➢ **No Background: :** Check or uncheck the checkbox next to True. Checked box = transparent (no) background; unchecked box = with background. Transparent background is the default setting.

Background Color: Select the background color for the scale on the image. The default color is white; click the color box to choose another background color.

➢ **Apply to All:** Apply settings to all scales

➢ **Default:** Revert to and apply the default settings for the scale on the image.

Measure

Ruler Property

CaptaVision+ allows users to set the ruler properties according to need or application.

➢ **Show Ruler:** Click the checkbox to display the crosshair-style ruler on the image. The default setting is unchecked to not display the crosshair.

➢ **Unit Interval:** Set and apply cross-ruler interval distance on the image.

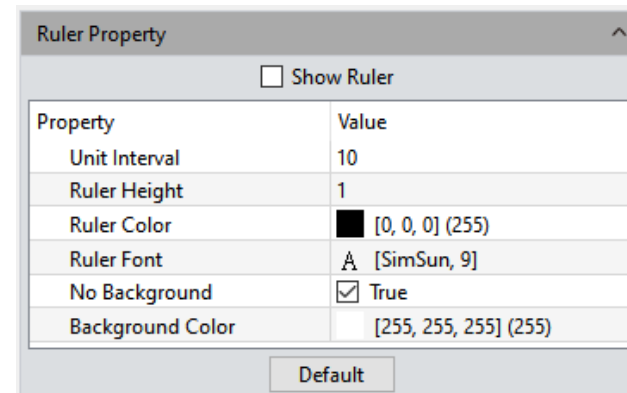➢ **Ruler Height:** Set and apply height of the cross-ruler on the image.

➢ **Ruler Color:** Choose the color for the current crosshair on the image. The default color is black; other color options are available by clicking the color box.

➢ **Ruler Font:** Set the font and font size for the crosshair.

➢ **No Background:** Uncheck the checkbox for a transparent background. Check the checkbox to apply a background to the ruler. The default setting is a transparent background.

➢ **Background Color**: Select the background color for the current ruler displayed on the image. Click the color box to choose another background color. The default background color is white.

➢ **Default:** Revert to and apply the default ruler settings.

Ruler Property	˄
☐ Show Ruler	

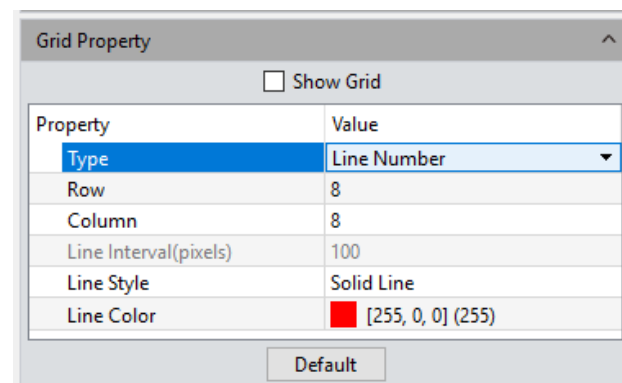| Property	Value
Unit Interval	10
Ruler Height	1
Ruler Color	■ [0, 0, 0] (255)
Ruler Font	A [SimSun, 9]
No Background	☑ True
Background Color	[255, 255, 255] (255)

Default

Measure

Grid Property

CaptaVision+ allows users to set the grid properties on the image according to need or application. The grid is simply a series of vertical and horizontal lines dividing the image into rows and columns.

➢ **Show Grid:** Check the Show Grid checkbox to display the grid on the image. The default setting is to NOT show the grid.

➢ **Type:** Select the way to define the grid to apply to the current image, either by Line Number or Line Interval.

➢ **Row/Column:** When Type is defined as Line Number, enter the number of horizontal (row) lines and vertical (column) lines to show on the image. The default is 8 for each.

➢ **Line Interval :** If you choose to define the grid by the line interval, you can enter the number of grids you need into the blank of Line Interval, the default number of line interval is 100.

➢ **Line style:** Choose the line style for the grid to apply on the image there are 5 styles of grid could be chosen from, the solid lines, dashed lines, dotted lines, dotted lines, and two dotted lines.

➢ **Line Color:** Choose the color for the grid to apply on the image, the default color is red, Click on [...] to choose the desired grid color.

➢ **Default:** Resort and apply the default parameters settings to the grid on the image.

Measure
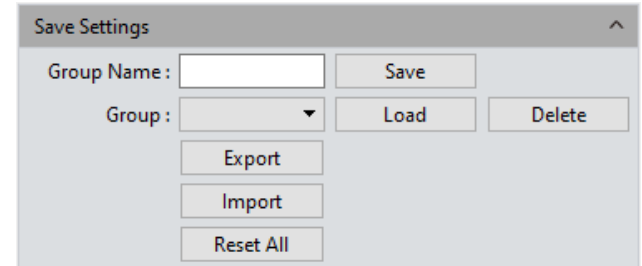
Save Settings

Copy the parameter file and load it on another computer. By transferring parameters between platforms and imaging systems, the user's experimental conditions are kept as consistent as possible.

➢ **Group Name:** Set the parameter name, it can also be viewed and loaded through the drop-down menu.

➢ **Save:** Click **[Save]** to save the settings.

➢ **Load:** Click **[Load]** to load the selected settings Group into CaptaVision+.

➢ **Delete:** Click **[Delete]** to permanently remove the selected settings file.

➢ **Export:** Click **[Export]** the selected settings file.

➢ **Import:** Click **[Import]** to add a saved settings file into the Group drop-down menu.

➢ **Reset All:** Clear all user settings and restore to the software factory settings
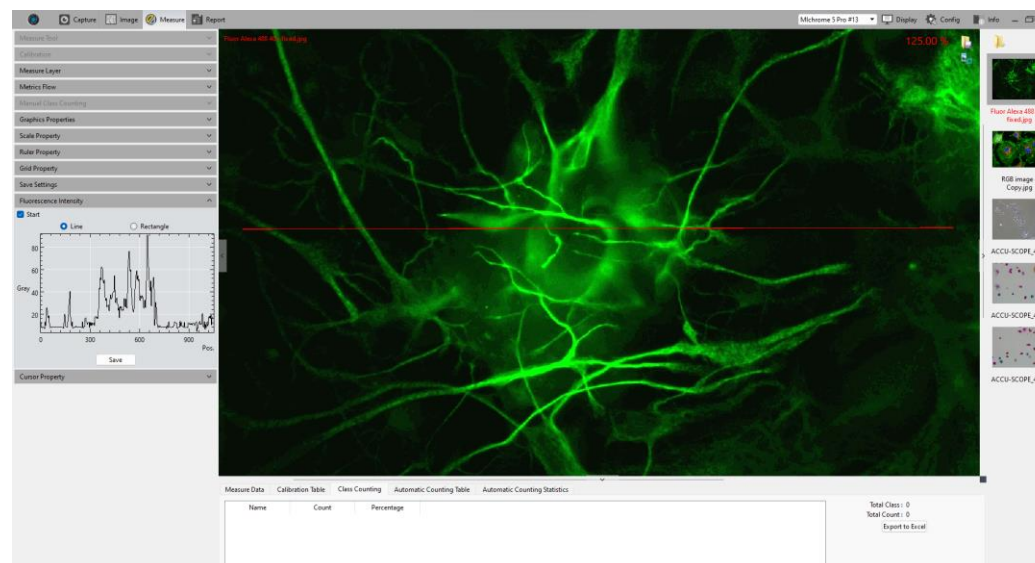
Measure

Fluorescence Intensity

CaptaVision+ allows users to measure the gray value of the image using a line or rectangle.

➤ Switch from the preview mode to measurement mode, or open an image, and check [Start] to enable the function. Uncheck [Start] to reset.

➤ Select Line or Rectangle for the shape from which to measure gray values.

➤ Draw a line or rectangle to select the area for gray value measurement. Left-click the mouse to set the starting point. Drag the mouse to draw the line or rectangle. Left-click the mouse again to stop drawing and display the fluorescence intensity in the chart.

➤ Click [Save] to save the current measurement data in Excel format to the local hard drive.

Note:
- Draw a line across the image and complete the drawing with a second click. A plot of fluorescence intensity across the line will be displayed.
- To draw a rectangle, left-click to select two endpoints to draw a rectangle graph, which can measure the average fluorescence intensity data of each column of pixels within the rectangle.
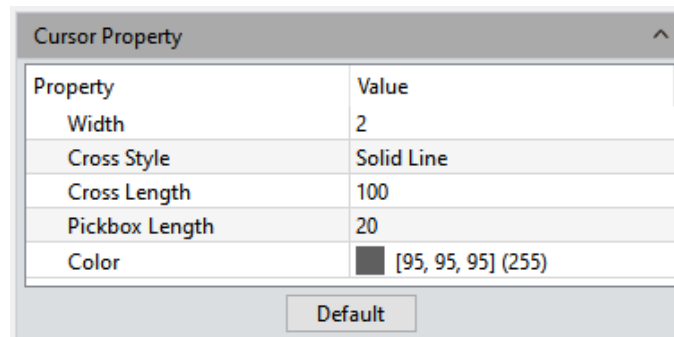
Measure

Cursor Property

The user can adjust the properties of the measurement cursor based on need or preference. The setting interface is shown to the right.

➢ **Width:** Sets the thickness of the cross cursor line segment. Setting range is 1~5, and the default value is 2.

➢ **Cross Style:** Set the line style of the cross cursor. Choose either solid or dotted line. The default is solid line.

➢ **Cross Length:** Select the length (in pixels) of the cross cursor currently displayed on the image. The default is 100.

➢ **Pickbox Length:** Select the width and length of the cross cursor that is currently displayed on the image, the default is 20 pixels.

➢ **Color:** Select the line color of the currently applied cross cursor on the image. Click the color box to open a dialog box with a color palette to select the desired color.

| Cursor Property	^
Property	**Value**
Width	2
Cross Style	Solid Line
Cross Length	100
Pickbox Length	20
Color	[95, 95, 95] (255)

Default

📊 Report

CaptaVision+ provides report formats to export measurement data to working report documents. Reports can also be exported in real time when in the preview window. Custom templates allow users to modify the report for specific needs and are only supported in Excel format.

Template Report

Use to export custom measurement templates, measurement data modules and batch export reports.

➤ **Report Templates:** Choose the desired report template from the dropdown list.

➤ **Add:** Add a custom template. The custom template must be modified from the default template and the final template format is Excel. The default template is in the [templates] file under the software installation path. Use the # identifier to indicate the content that needs to be displayed. When the ## identifier appears, it means that the header of the data table is hidden.

➤ **Delete:** Delete the selected template.

➤ **Open:** Preview the selected template.

➤ **Export Report:** Export the current report, the format is Excel.

➤ **Batch Export:** Check [Batch Export], the user can select the pictures to be exported, then click **[Batch Export]** to export the report. The image name are searchable.
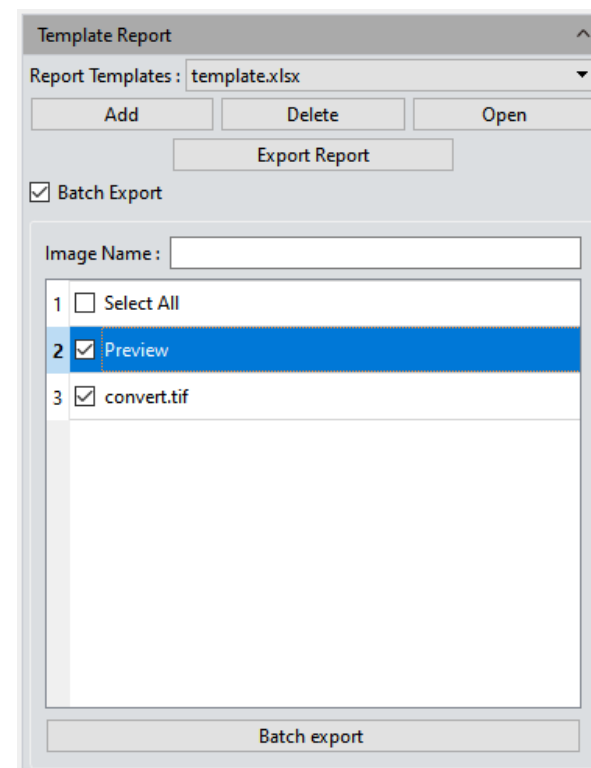
Report

CaptaVision+ provides user the convenience to export measurement data as a report document.

➢ **Report Templates:** Choose the desired report template.

➢ **Project Name:** Enter a customized name for the project. This name will appear on the report.

➢ **Sample Name:** Enter the name of the sample in this project. This name will appear on the report.

➢ **User Name:** Enter the name of the user or operator.

➢ **Notes:** Enter any notes that provide context, supplement and detail for the project.

➢ **Image Name**: Enter the file name of the image referenced in this report. The image can the be automatically loaded into the report.

➢ **Image information:** Click the Image Information checkbox to show information of the image selected above. Uncheck the checkbox to hide the image information.

➢ **Measure Data:** Click the checkbox to display and include in the report the measurement data table for the selected image.

➢ **Class Counting**: Click the checkbox to display and include in the report the class counting table for the selected image.

➢ **Export Report:** Export current report into a PDF document.

➢ **Print:** Print the current report.

➢ **Cancel:** Cancels the report creation operation. All entries are cleared.

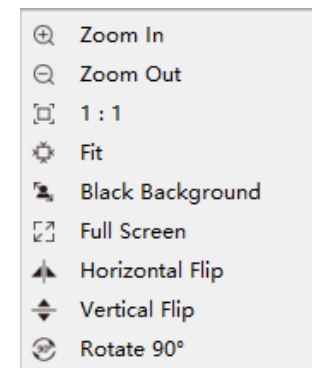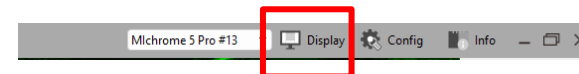# 🖥️ Display

➢ **Zoom In:** Magnify the current image and display it larger than its original size.

➢ **Zoom Out:** Reduces the current image and displays it smaller than its original size.

➢ **1:1:** Displays the image in its 1:1 original size.

➢ **Fit:** Adjusts the display size of the image to fit the software operating window.

➢ **Black Background:** The image will be display in full screen and the background of the image is black. Press [Esc] button of the computer keyboard or click on the Back Arrow symbol ↩ on the lower right corner of the software window to exit the black background mode.

➢ **Full Screen:** Displays the image in a full screen. Press the [Esc] button of the computer keyboard or click on the Back Arrow symbol ↩ on the lower right corner of the software window to exit the full screen mode.

➢ **Horizontal Flip:** Flips the current image horizontally, like a mirror (not rotation).

➢ **Vertical Flip:** Flips the current image vertically, like a mirror (not rotation).

➢ **Rotate 90° :** Rotates the current image clockwise 90° degrees with each click.

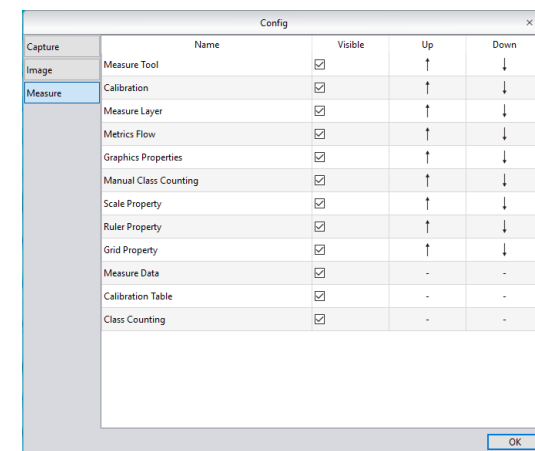# ⚙️ Config
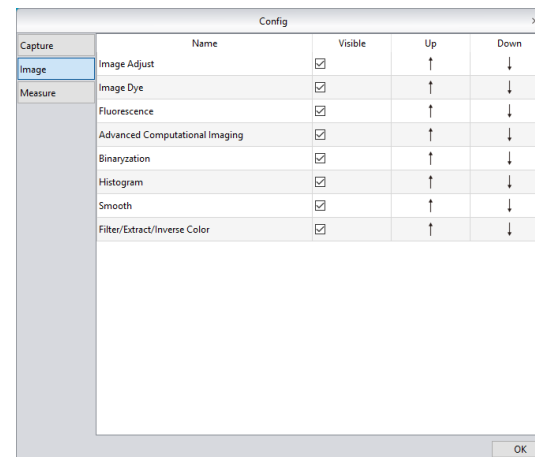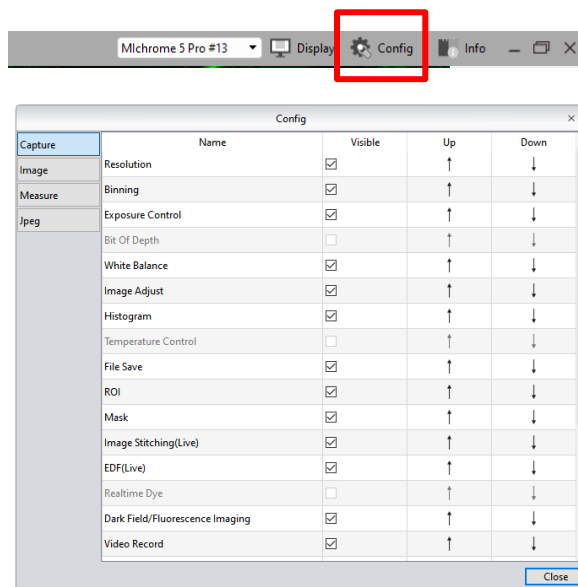
Capture / Image / Measure

Use Config to show/hide and order software functions

➢ **Visible:** Use the checkboxes in the Visible column to show or hide a function module in the software interface. A checked box indicates that the module will be visible. All modules are checked by default. Use this function to hide modules that are not used.

➢ **Up:** Click the up arrow to move the module up in the list of modules displayed in the software interface.

➢ **Down:** Click the down arrow to move the module down in the list of modules displayed in the software interface.

⚙ Config

JPEG

Jpeg image format size can be preset in CaptaVision+. When Jpeg is selected as the image type in the file saving function, the image size will be generated according to the set format when taking pictures.

Default: When Default is selected, the generated image keeps the current camera image resolution.

➢ **Resize:** When selected, image dimensions can be specified by the user.

➢ **Percentage:** Choose Percentage to adjust image dimensions using a percentage of the original image dimensions.

➢ **Pixel:** Choose Pixel to specify the number of pixels in the horizontal and vertical dimensions of the image.

➢ **Horizontal:** Enter the desired size of the image in the horizontal (X) dimension.

➢ **Vertical:** Enter the desired size of the image in the vertical (Y) dimension.

➢ **Keep Aspect Ratio:** To prevent image distortion, check the Keep Aspect Ratio box to lock the aspect ratio of the image when setting the size.

Info

Preferences

➢ **Language:** Select the preferred software language. The software must be restarted to take the language setting into effect.

➢ **Microscope:**

* **Biological.** The default is to use automatic white balance with gamma value 2.10 and the mode of exposure to the right.

* **Industrial.** The default color temperature value is set to 6500K. CaptaVision+ is set to use area white balance with a gamma value of 1.80 and middle exposure mode.

The software will need to be restarted for any changes to Preferences to take effect.

Help

The Help feature displays the software instruction manual for reference.

About

The About dialog displays more information about the software and operating environment. Information may include the connected camera model and operating status, the software version and operating system information.
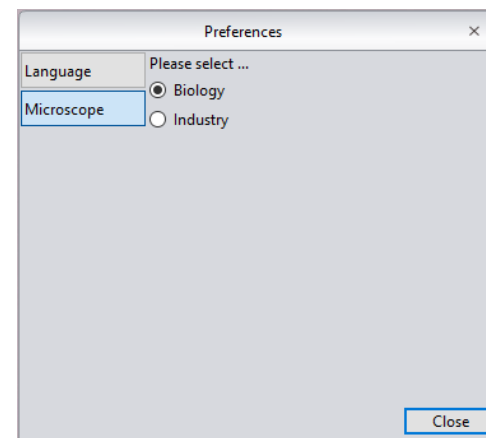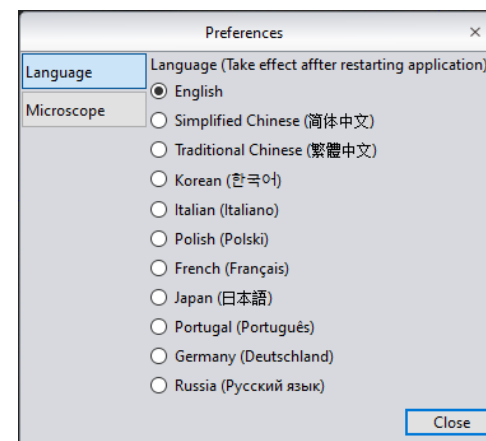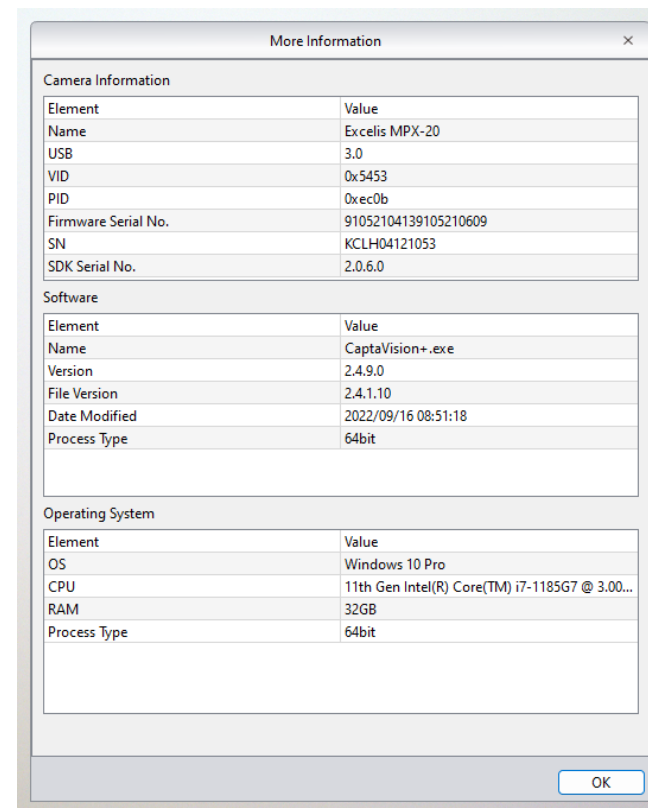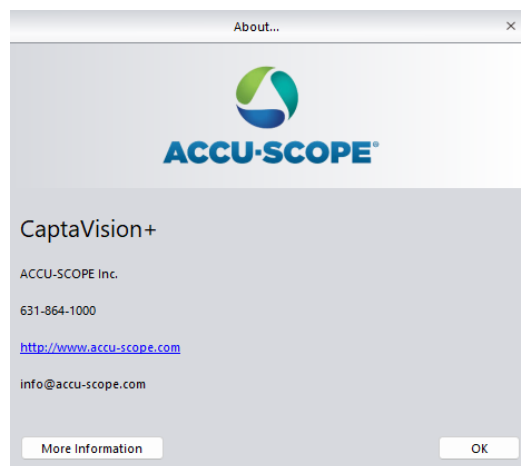
Info

About

The About dialog displays more information about the software and operating environment. Information may include the connected camera model and operating status, the software version and operating system information.

Limited Warranty

Digital Cameras for Microscopy

This digital camera is warranted to be free from defects in material and workmanship for a period of one (1) year from the date of invoice to the original (end user) purchaser.

This warranty does not cover damage caused in-transit, damage caused by misuse, neglect, abuse or damage resulting from either improper servicing or modification by other then ACCU-SCOPE or UNITRON approved service personnel. This warranty does not cover any routine maintenance work or any other work that is reasonably expected to be performed by the purchaser. No responsibility is assumed for unsatisfactory operating performance due to environmental conditions such as humidity, dust, corrosive chemicals, deposition of oil or other foreign matter, spillage or other conditions beyond the control of ACCU-SCOPE Inc. This warranty expressly excludes any liability by ACCU-SCOPE INC. and UNITRON Ltd for consequential loss or damage on only grounds, such as (but not limited to) the non-availability to the End User of the product(s) under warranty or the need to repair work processes.

All items returned for warranty repair must be sent freight prepaid and insured to ACCU-SCOPE INC., or UNITRON Ltd., 73 Mall Drive, Commack, NY 11725 – USA. All warranty repairs will be returned freight prepaid to any destination within the Continental United States of America. Charges for repairs shipped back outside this region are the responsibility of the individual/company returning the merchandise for repair.

To save your time and expedite service, please prepare the following information in advance:

1. Camera model and S/N (product serial number).
2. Software version number and computer system configuration information.
3. As much detail as possible including a description of the problem(s) and any images help to illustrate the issue.

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