Capture 2.4
Software for
VanGuard
Microscope Cameras

Instruction Manual

Content

General Introduction

Capture is a powerful software package that integrates the controlling and image processing of a microscope camera, along with measuring and counting functions.

This software allows you to control microscope cameras from different manufacturers, bringing you the flexible performance in your micro-imaging jobs.

The user-friendly interface makes is easy to set up all camera parameters

When you need to make the best uses of the potentials of your microscopes and their cameras, Capture can apply accurately the parameters you select, and it optimizes to these settings of these parameters through its user-friendly designs.

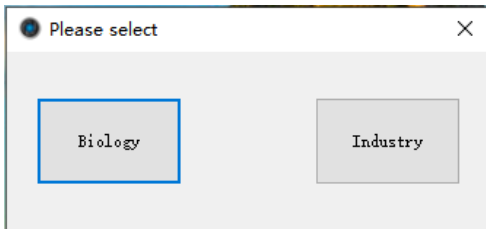
Capture enables users to set up their customized desktops according to their actual applications. When user combine the customized desktops with his customized working flows, there will be a distinct layout of the software working appearance, the user is ensured the accuracy of his experiment results no matter the software is working with multi-tasks or under multi-users circumstances.

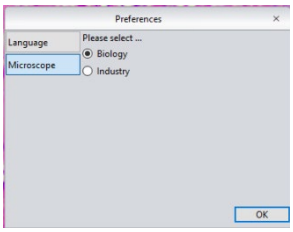
Capture achieves high quality images due to its powerful real-time calculating engine. The function of real-time stitching helps you to obtain a wide FOV image which is the result of real-time auto-images-stitching when you're moving your mechanic stage of the microscope. Real time EDF functions can offer you a combined picture of extended-depth-focusing (EDF) rapidly with less than one second.

From the users' points of view, assuring the best operating procedures, the developers of Capture refined the all-new camera operating workflow as Efficient image acquisition->Image edition->measurement->report by modularizing designs. This workflow, acts in concert with the latest image processing algorithms, greatly saves the users' operation time and then improves their working efficiency.

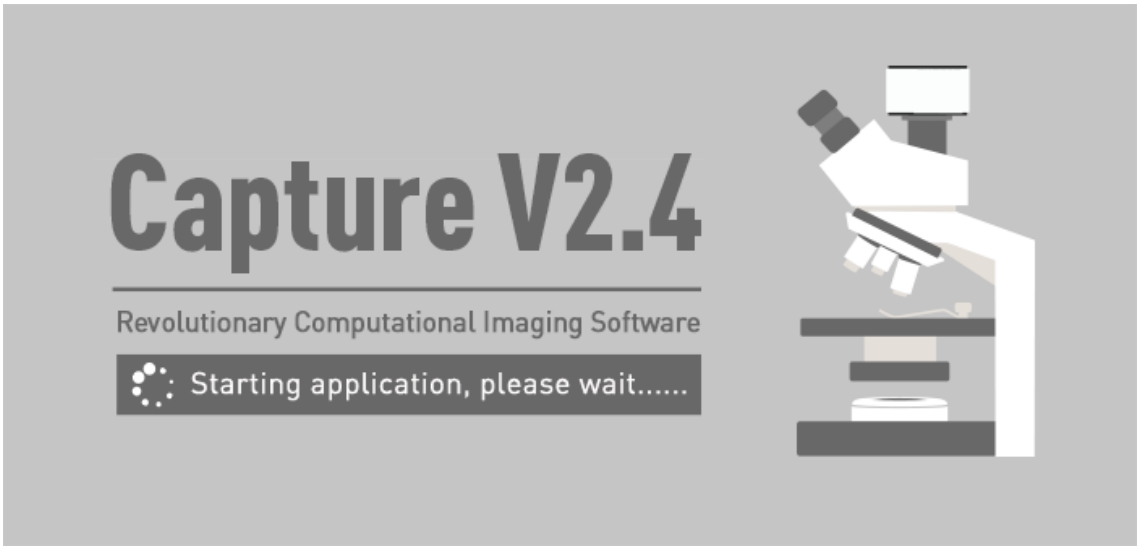
1. Starting Interface

When installing and starting up the software for the first time, the biological or industrial application option box will pop up. Select your application type to enter the software. The software will automatically optimize parameter settings based on your choice. Note: Your selection can also be switched through [Info] - [Preferences] - [Microscope] on the right upper part of menu bar.



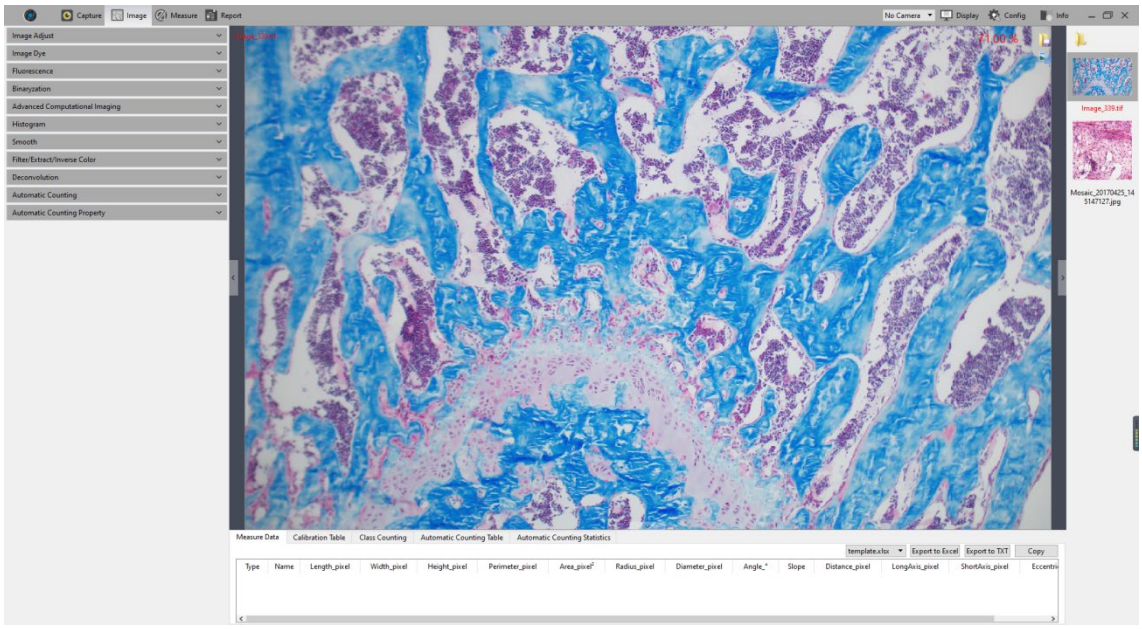


When selecting **[Biological]**, the automatic white balance is defaulted with gamma value 2.10 and the mode of exposure to the right. Click and select **[Industrial]**. Entering software, the default color temperature value is 6500K, and the software default as area white balance, and adopts the gamma value of 1.80 and middle exposure mode.



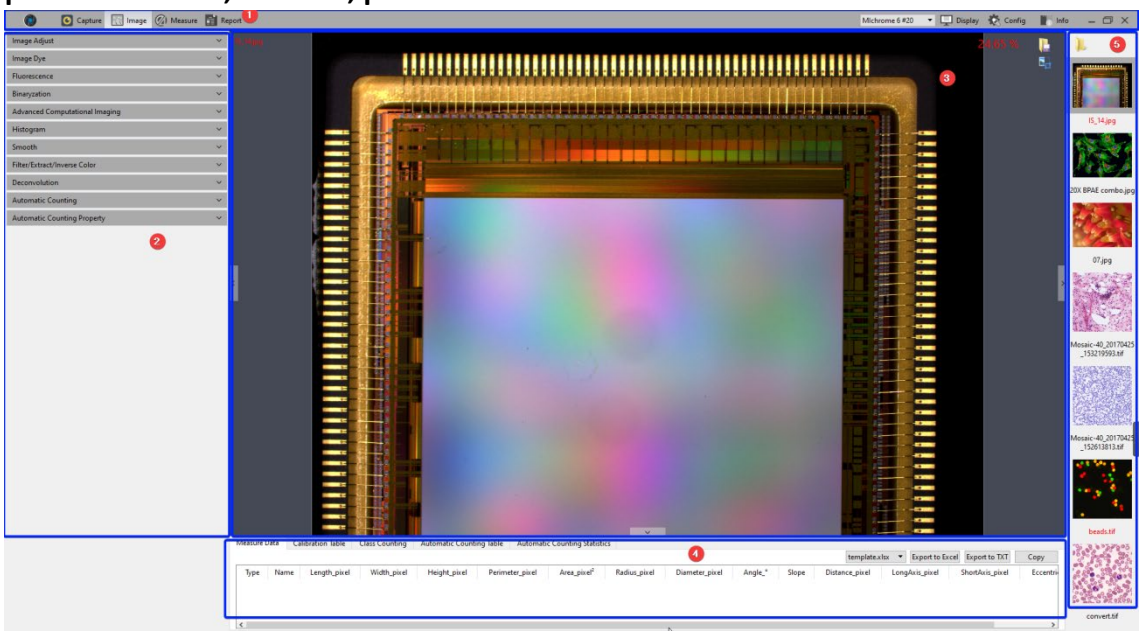
It normally takes around 10 seconds for software start-up. When there is no camera connected or an unsupported camera is connected, an error is prompted when the software is started. At this time, by clicking the button "**OK**" or closing the prompt, the software will be closed automatically.

If a camera is not connected or an unsupported camera is connected, the software only supports image processing, measurement operations and report operations.



2. Windows

The home screen of the software consists of five parts - **status bar, control bar, preview window, data bar, picture bar:**



① Status Bar

There are eight main modes in the status bar, they are **Capture / Image / Measure / Report / Camera List / Display / Config / Info.** Click on the mode and the software will switch to the related interface.

Multi-camera connection and hot-plug function, only supported by Windows system, needs to use the computer's USB3.0 port for hot swap. 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 the camera.

When the current camera is removed, it will automatically switch to another camera, or display no camera.

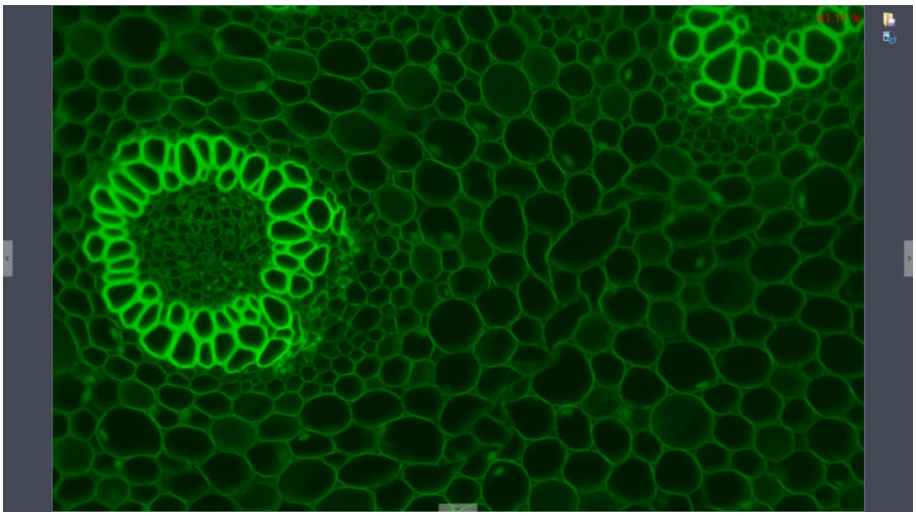
② Control Bar

All function modules supported by the camera are displayed on the left side.

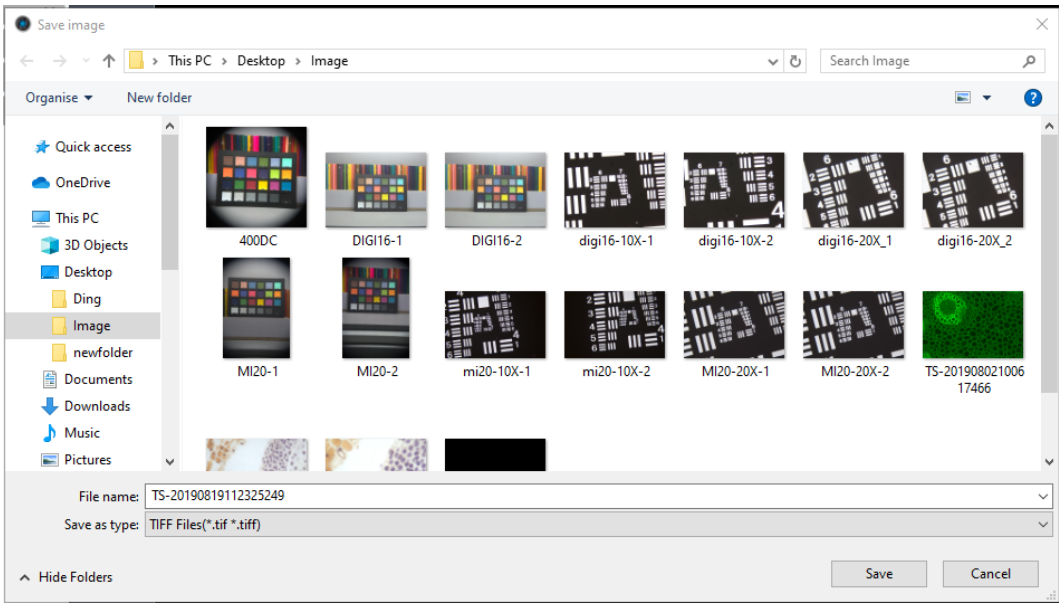
Click  button to unfold all the functions display.

Click  button to fold up all the functions display.

③Preview Window



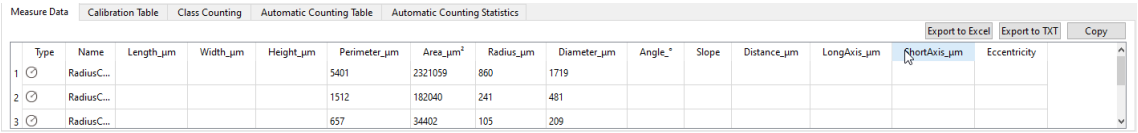
1) To display the real-time view and captured images.
2) Mouse roller can zoom out/zoom in pictures; the cursor always appears at the center of the picture.
3) Hold down the left button / right button / scroll wheel of mouse to drag the image display area.
4) Click the control button at the edge of the window: left, right, down can expand or contract the corresponding operating bar.
5) Click the  button to save the currently selected picture as another document, then the following window will pop up.



The software supports four image formats for saving: [JPG] [TIF] [PNG] [DICOM].

④ Data Bar

Displays the measurement and statistics tables.



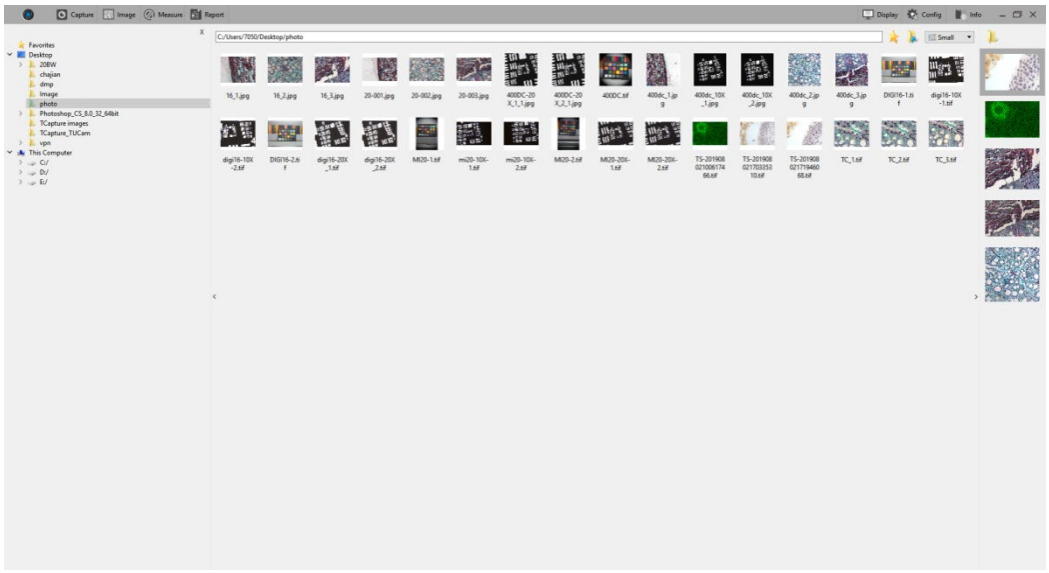
The measurement table supports the export of custom templates. For specific operations, please refer to the report chapter.

⑤ Image Bar

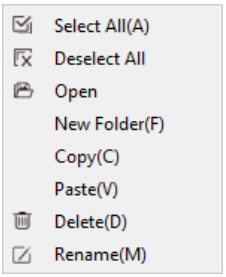
The captured pictures, videos, and video thumbnails opened through other paths are displayed on the right side of the software. Click any image to switch it to the [Image] page to adjust the parameter settings. The specific operation is as follows:

1) Click the button to locate the path of the file, select the path in which the image needs to import or open, the interface will switch to the following.

   Double clicking selected pictures can add them to the preview window on the right side.

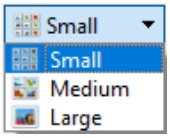


2) Right click on one of the images, the dialog box of operations will pop up as below.

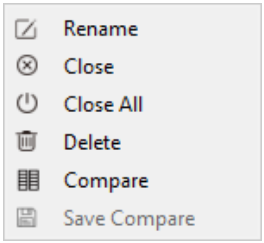


It supports [Select All (A)], [Deselect All], [Open], [New Folder (F)], [Copy (C)], [Paste (V)], [Delete (D)] and [Rename (M)]; you can use ctrl+c shortcut keys to copy images, use ctrl+v to paste it to the current folder; Select the files-saving path on the left side. Click the X button to close the 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 the next time of speedy opening.
- Click the button to return to the upper directory. Click following buttons to select picture view mode.



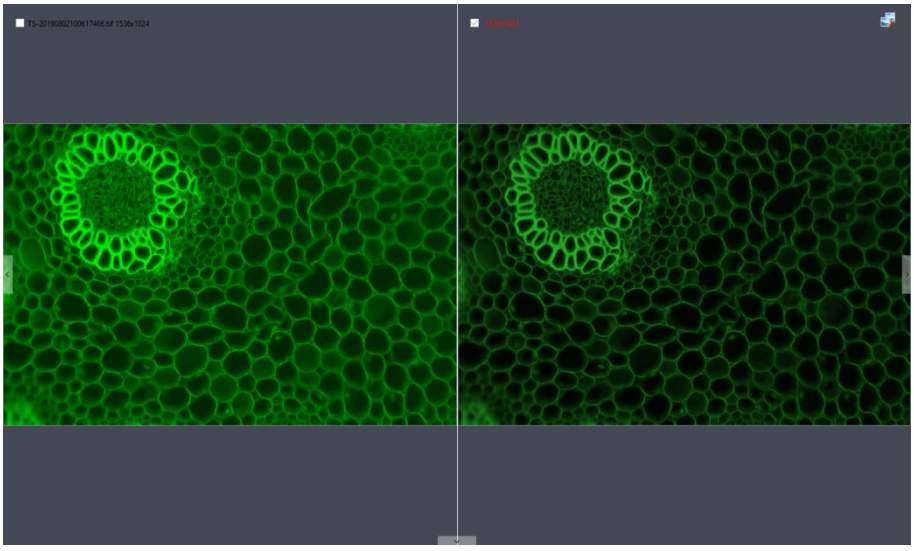
3) Right click on an image or on the blank area of the interface to pop up the operation menu, under which, [Rename], [Close], [Close All], [Delete], [Compare], and [Save Compare] operations are able to be performed.



There are two contrast modes: dynamic contrast and static contrast.

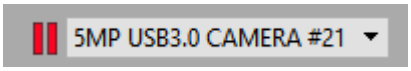
- Dynamic contrast: The contrast between the preview image and saved picture. In preview status, right clicking the picture bar will open the operation menu, then select [Contrast]. Dynamic preview picture will appear on the left side of the page, any saved picture selected on picture bar will appear on the right side, and the pictures on the right side can be replaced at any time. Click on the right upper corner to exit contrast.
- Static contrast: Contrast between two saved pictures. Selecting an image, and by right clicking picture bar, the operation menu is opened; select [Contrast], the selected picture will appear on the left side of the page. Clicking another picture on the right side of picture bar, it will appear on the right side. During static contrast, pictures on both sides can be replaced at any time: first, click the picture which needs to be replaced, and then click the picture to replace; the process will be completed.

To save contrast you can save the pictures being contrasted. The contrast effect is as follows.



⑥ Shortcut Key

In order to make operations more convenient, the software provides shortcut key functions. Specific functions are as follow:

Function	Key	Remarks
Capture	F10	Take pictures and automatically save the pictures.
Record videos	F11	Press once to record, press again to stop recording
Close all	F9	Closes the right thumbnails display. A prompt box will appear: to close all pictures, click [Yes] to take effect.
Save image as	F8	Can change the picture format or picture saving location.
Pause	F7	Pause/ Resume the preview. When the preview is paused, a pause state prompt appears on the interface, as shown in below 

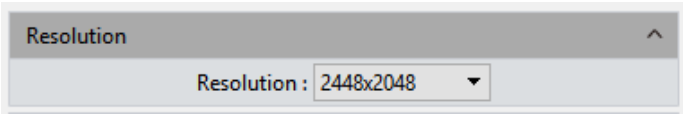
3. Capture

3.1 Capture

Click the button to capture the image of the preview interface.

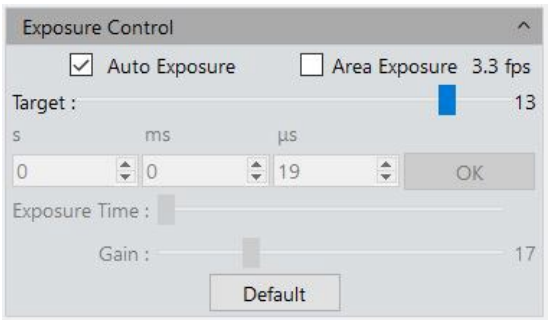
3.2 Resolution

Resolution: select the resolution for the preview.



3.3 Exposure Control

Set the exposure time of camera and then the value of real-time frame per Second (FPS) will appear.



Target Value: The adjustment of target value can change the automatic exposure brightness of the image; the target value range is 0-15.

Auto Exposure: check the box in front of the [Auto Exposure], the software automatically adjusts the exposure time according to the brightness of the image to obtain an image with appropriate brightness.

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

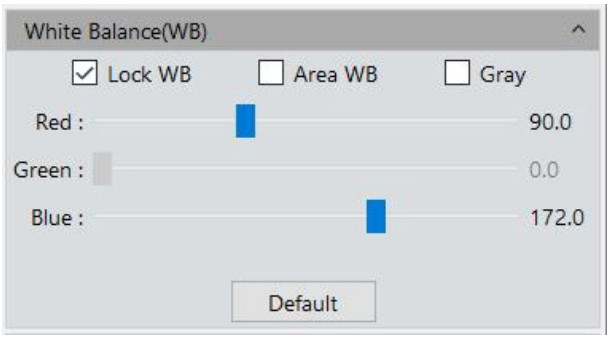
Manual Exposure: Uncheck the [Auto Exposure], system switches to [Manual Exposure] mode, user can manually input the exposure time into the blank according to his actual demands for the image, then click [OK] button to apply, or manually adjust the exposure time linearly through the slider.

Gain: User can select the most suitable gear of gain according to his specific applications and needs on images previewing. Greater gain improves the brightness but increases the noise.

Default: Click the [default] button to restore this module's parameters to the factory default ones. The default setting of exposure is the [auto exposure].

3.4 White Balance

User can adjust the parameters of white balance according to the actual light source to obtain better image effects.



White Balance: By adjusting the ratio of the three individual components of red, green and blue, the camera is able to reflect the true image color under various illuminating conditions. The default setting of the white balance of the camera is Auto-white balance. User can uncheck **[Lock White Balance]** under the environment with stable illuminating conditions, while the user can check **[Lock White Balance]** to lock the current white balance setting under unstable illuminating conditions.

Area white balance: When opening white balance options, and **[Area White Balance]** is selected, the area white balance box will pop out on the preview pictures. The size of area white balance box is adjustable. Under a stable lighting environment, move the area white balance box to any white part of the pictures, then adjust size, and check [Lock White Balance] to lock present white balance, which will make white balance calibration more accurate.

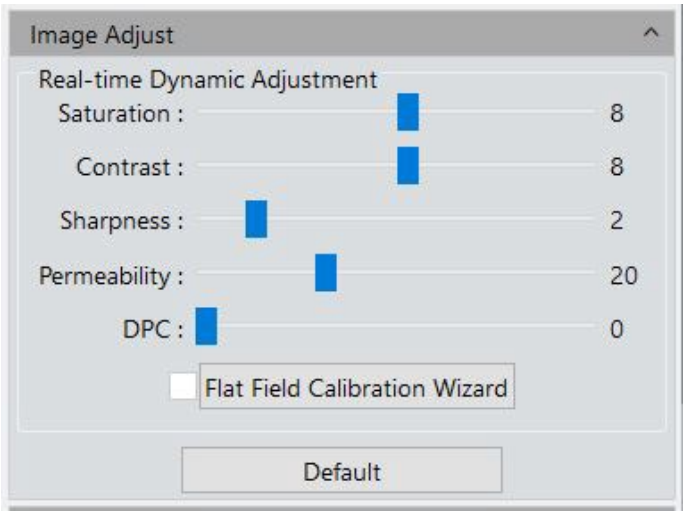
Gray: Check to convert a color image to a monochrome image.

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

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

3.5 Image Adjust

Conduct real-time dynamic adjustment of pictures by changing parameter to achieve ideal picture effect. Specific functions are as follow:



Saturation: The purity of the color, the higher the purity, the more vivid performance, the lower the purity, the bleaker of the effect, setting range is 0~255.

Contrast: The higher the contrast is, the clearer the picture is, and the brighter the color is, setting range is 0~63.

Permeability: The enhancement of pictures, setting range is 0~63.

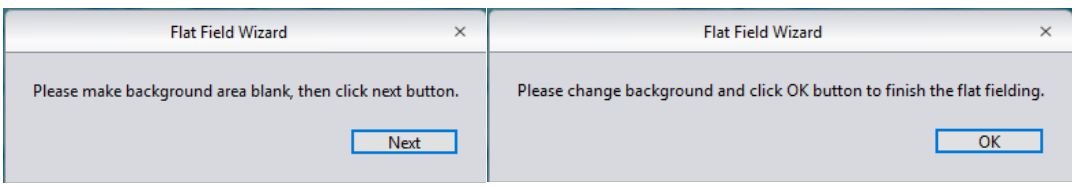
Sharpness: To improve clarity of picture edges.

DPC: Reduce image bad points, range 0-3.

Flat Field Calibration: In actual microscope applications, the images captured by the camera may be uneven or carry color patches, due to the problems of microscopes' light sources, optical path systems, or the dirty spots on the microscope eyepieces and objectives. With flat field correction, those types of defects could be effectively reduced, the imaging effects will be more uniform, and the color reproduction of the images is smoother and more realistic.

Operations:

1) Click **[Flat Field Calibration Wizard]** to move the viewing field of the camera to a blank background.
2) Click [Next] to move the first background to another new blank background, click [OK] to apply the Flat Field Calibration function.



3) 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.

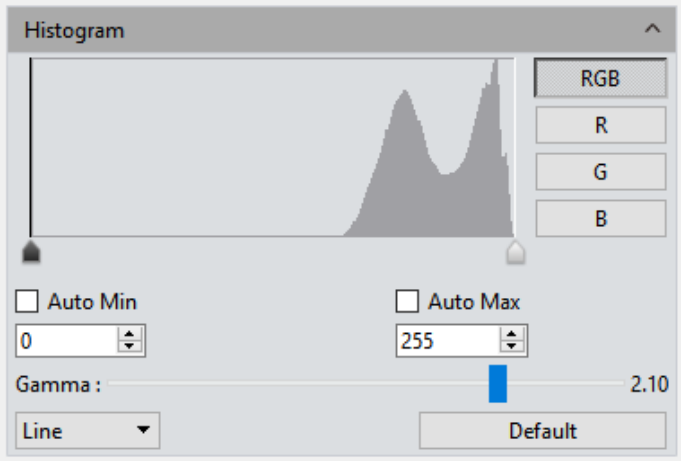
Note:

1) The Flat Field Calibration requires manually setting the exposure time, so that the image brightness will not overflow up or down, and all the pixel values are within the range from 64DN to 254DN.
2) The brightness of other areas of the two backgrounds which are used as references of correction should be almost the same except that there are some moving spots on the two backgrounds. These two backgrounds should not be those that are "significantly inconsistent".
3) To standardize the background for the flat field correction, it is recommended to use plastic, ceramic or professional white balance paper as the standard samples.
4) Flat Field Correction requires that the background it use as reference to be a blank one and the light illumination on it is uniform. The correction should be repeated if the camera or the microscope changed their lens or objective.

Default: The settings will restore to default value when you click [Default]. Contrast default is 33, saturation default value is 64, permeability default is 16, detail enhancement default is 1, and noise reduction default is 1.

3.6 Histogram

User can try the Histogram function of color level adjusting to obtain more realistic images for observation and analysis.



The color level adjusting redefines the R\G\B color levels in each channel and then re-allocates the pixel values. Adjust the color level (gradation) to increase the range of the highlighted area in the image, increase the brightness, or make the bright image darker. User can also adjust the components of the RGB channels separately to change

the image color of the corresponding channel.

Manual Color Level: User can manually adjust the image's dark tone (left gradation), the gamma and highlight brightness level (right color gradation) on the histogram to regulate the image's tones, such as the contrast, shading and image layers, then obtain the correct 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-allocate the pixel values in proportion.

Gamma: adjust the median of the color level, setting range is 0.64 to 2.55.

Histogram display: Histogram supports linear or logarithm mode.

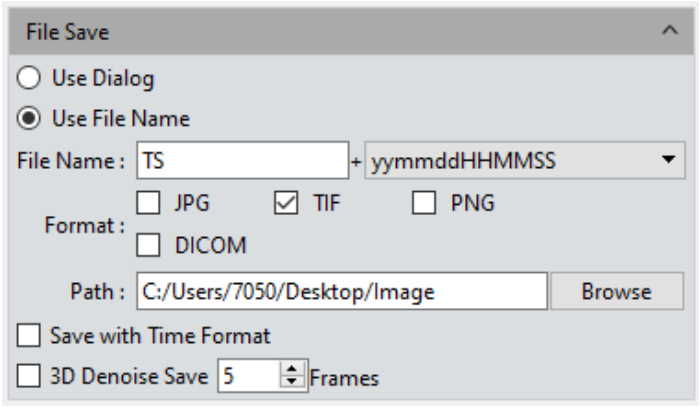
Default: Click [Default] button to restore the module's parameters to the factory default ones. The default of color level adjusting is manual, and the default gamma value is 2.10.

Note:

1) The composing and displaying of the histogram curve is the result of the software's running real-time data statistics, so some of the resources of the software will be occupied. When this module is applied, the camera frame rate may be slightly affected. When the module is ended, the data statistics are turned off and the frame rate of the camera can reach the maximum.
2) After canceling the automatic color level adjusting, the level value will be the default (0 and max).

3.7 File Save

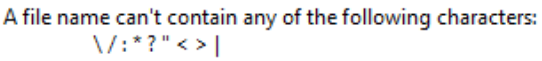
Capture the currently needed data from the real-time video data stream and record it into a selected image format for later development and analysis.



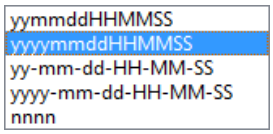
Click the button to capture a live previewing image.

Pop-up Window Saving: the saving window will be popped up after the Capture button is clicked, it supports four formats for saving pictures: JPG\TIF\PNG\DICOM.

File name: The default name of the file to be saved is "TS", which can be changed by the user. The file name cannot contain special characters \/:*?"<>| and an error message will pop up, as shown in below.



The software supports the format of "custom + time-stamp" for naming. There are five formats of time-stamp naming.



Format: The image formats could be saved as JPG\TIF\PNG\DICOM. The default format is TIF. These four image formats can be checked separately or simultaneously. The captured images in different formats will be displayed at together when their saving formats are selected to be simultaneously.

1) JPG: it is an information-losing and compressed image saving format, its image size is small, but the final quality of the image is degraded compared with the original captured image because of the image data- losing during being saved.
2) TIF: a Lossless image saving format, which can save all the data transmitted from the camera to your saving device without losing, this format is good for the saving and converting of images with high image quality requirements.
3) PNG: Portable network graphics is a lossless but compressed bit-image format that uses the way of lossless data compressing 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 requiring of clinical practices and applications.

Path: To save the image files to the folder of your choice. User can click the [Browse] button to change the saving paths. The default saving path is C:/Users/Administrator/Desktop/Image. The path cannot contain special characters \/:*?"<>|, or an error message will pop up.

Saved with time format: The capture time will be displayed in the lower right corner of the picture.

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

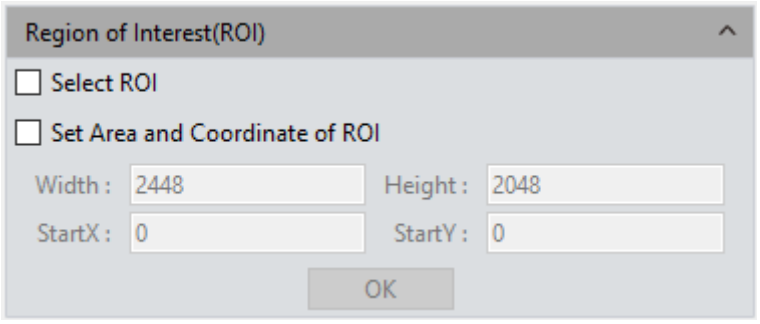
number of frames can be customized. The range is 1~99, the default is 10.

Note:

- To get 3D denoise image, 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.

3.8 ROI

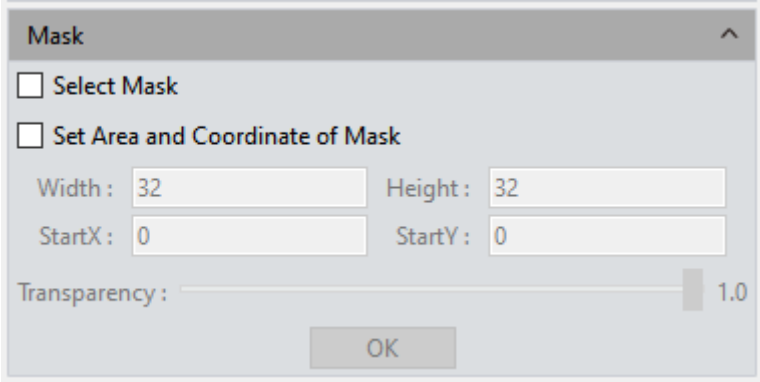
ROI (Region of interest) is an application that allows you to define a window area of interest within the detecting area of the camera sensor and allow the image information within this defined window to be read out and displayed. A smaller ROI area reduces the amount of information involved with image transferring and computer processing, which results in increased frame rate of the camera.



Select ROI: Using a computer mouse, click on the **ROI** frame, then move the mouse to define the window area of your ROI. This window area will display the coordinate value and resolution of the current running point. Click on the [√] below the cursor to apply the ROI settings.

Set Area and Coordinate of ROI: Manually enter the starting point coordinate value and the resolution size 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.

3.9 Mask



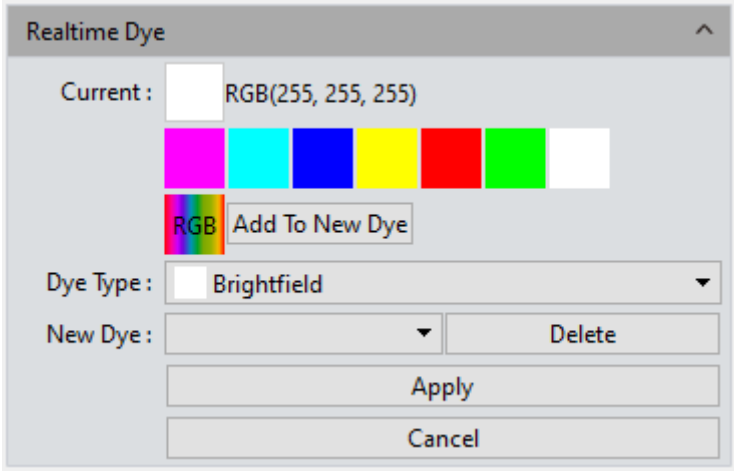
Selecting regions of cover: Using a computer mouse, move the mouse to the preview image to define the window area you would like to cover. This window area will display the coordinate value and resolution of the current running point. Click on the [√] below the cursor to apply the cover settings.

Setting the area and coordinates of the region of cover: Manually entering the starting point coordinate value and the resolution size to define the exact cover area. Enter the actual point offset position of the rectangular area as well as the width and height, then click [OK] to apply the cover settings.

Transparency: Manually select the brightness of the unselected area

3.10 Realtime Dye

This mode is generally used when taking fluorescent images with a monochrome camera. Color a monochromatic fluorescent image and take a photo to obtain a dyed image for later synthesizing a fluorescent image.



Current: This window displays the currently available colors.

Click 

to make the full color palette appear, from which, user has many more choices of color to pick.

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

Dye Type: Display seven common colors.

New Dye: Displays user-defined dye colors.

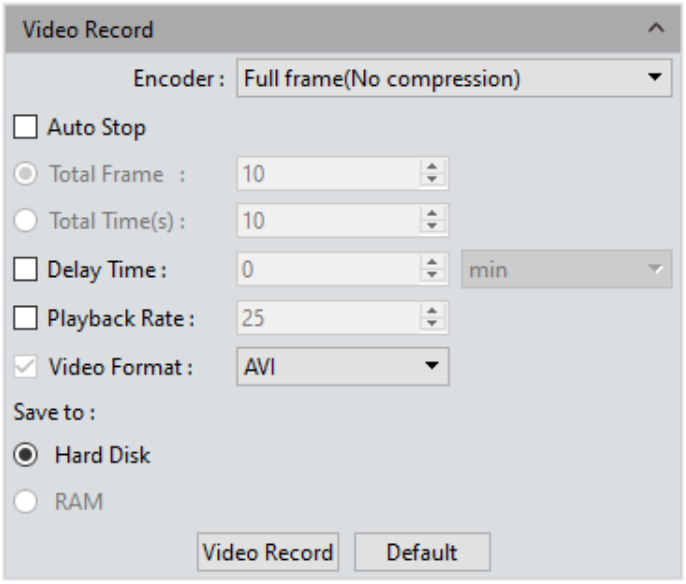
Delete: Delete the selected user-defined dye color.

Apply: Apply the selected dye color to the image.

Cancel: To cancel a certain kind of dye added through custom mode.

3.11 Video Record

Click on [Video Record] to save the image data into video formats for playing back to observe the live movements of samples.



Encoder: The software provides two compressing formats: [Full frame (No compression)] and [MPEG-4].

Total Frame: Capture images according to how many frames was set to be captured, setting range is 1~9999 frames.

Total Time(s): The length of time for capturing images, setting range is 1~9999 seconds.

Delay time: There will be a delay in capturing images based on the setting period; Time units: minutes, seconds and milliseconds; the range is 1 millisecond to 120 minutes.

Save to Hard Disk: Instant loading and writing in. The image data is being loaded and

written into the hard drive of the computer during the image capturing process. In this mode, the transmission speed from the camera to computer will reduce due to the computer's loading and writing in image data onto the hard drive, so this mode is not suitable for capturing the images of quickly changing scenes or backgrounds, but it is suitable for long-term periods of capturing.

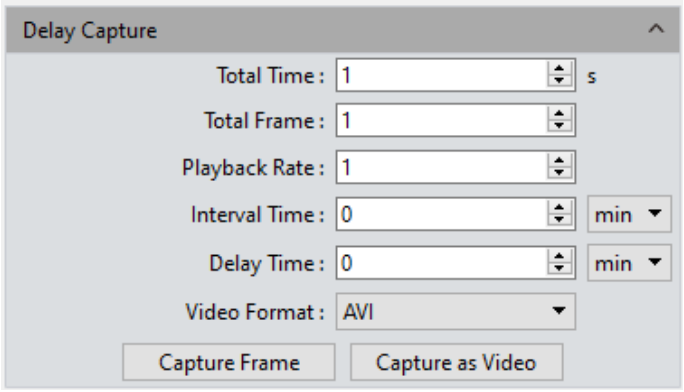
Playback Rate: Record according to the set playback frame rate

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

Save to RAM: The image data is saved in the RAM of the computer temporarily. After the image capture, all the image data is transferred to the hard drive of the computer to save. Select Save to RAM and enable the RAM to save images. The maximum numbers of images that can be saved by RAM and display will be shown. This saving mode allows the camera to maintain a high transmission speed of the images when capturing and avoid data lose due to a low transmission speed. This saving mode is limited by the volume of the computer's RAM, so it is not suitable for long-term period or huge volume of capturing.

Default: Click the [Default] button to restore the module's parameters to the factory default ones. The default saving mode is the compressed mode with full resolution frame, with the total number of frames to be 10 frames, and the total default capturing time is 10 seconds, image data default to be saved to the local hard drive.

3.12 Delay Capture



Total Time: Capture images according to set time, default is 1 second, the setting range is 1-9999s.

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

Playback Rate: Record according to the set playback frame rate, default is 25, the

setting range is 1-10000 frames.

Interval Time: Interval time for capturing every image, with unit options: minutes, seconds and milliseconds. The default is 0 minutes, and the range is 0ms-120min.

Delay time: There will be a delay in capturing images based on the set period; unit options: minutes, seconds, and milliseconds. The default is 0 minutes, and the range is 0ms-120min.

Video Format: AVI\MP4\WAM are supported, the default format is AVI.

Capture Frame: Capture and save multiple frames of images continuously according to the preset parameters; click **[Stop]** to terminate the continuous capture before the capturing task is finished.

Capture as Video: Capture multiple frames of images according to preset parameters and convert them into a movie directly. Click **[Stop]** to terminate the continuous capture before the capturing task is finished.

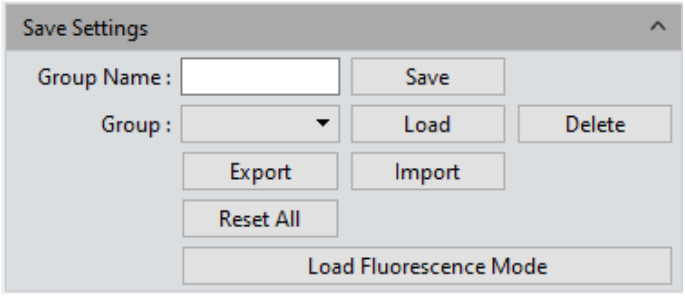
Note:

There is a quantitative relationship between the total time, the total number of frames, and the playback frame rate. The value of total time = total number of frames/playback frame rate, is rounded down.

3.13 Save Settings

This function allows you to save the experiment parameters when using the camera in different applications or platforms.

User can save and re-load the settings parameters from different experiments and then apply them to the new projects. The parameter group saver allows the users to save all the software functions and modules mentioned above.



Group Name: To name the parameter group, input the name you desire and save it; the menu will display those parameter groups which have been saved.

Save: To save the current parameters into a named parameter group file, up to 50 sets of parameters can be saved

Load: Load the parameter group to current working status.

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

Export: Save the files of the parameter groups to specified folder documents.

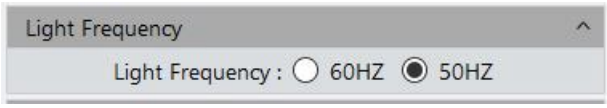
Import: To load the selected files of parameter group from the selected folder.

Reset All: Clear all parameters set by the user and restore to default settings of the software

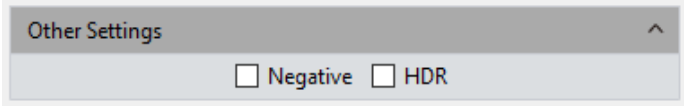
Load Fluorescence Mode: After clicking this button, the exposure mode is switched to manual exposure, the exposure time is 100ms, and the automatic level is automatically checked.

3.14 Light Frequency

Users can select the corresponding light source frequency according to the actual applications or conditions. Suitable frequency of light source is good for the normality of the live images and excludes the stroboscopic phenomenon on live images. The default light source frequency is the frequency of direct current.



3.15 Other Settings



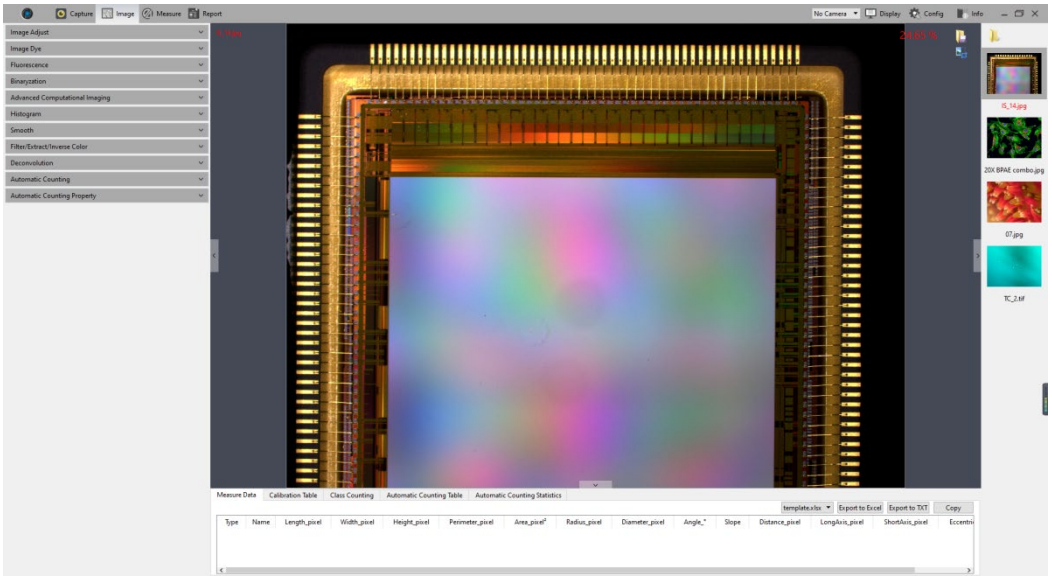
Negative: Change the color of the current image to its inverse color.

HDR: Click to achieve higher dynamic range and more image details for better image quality.

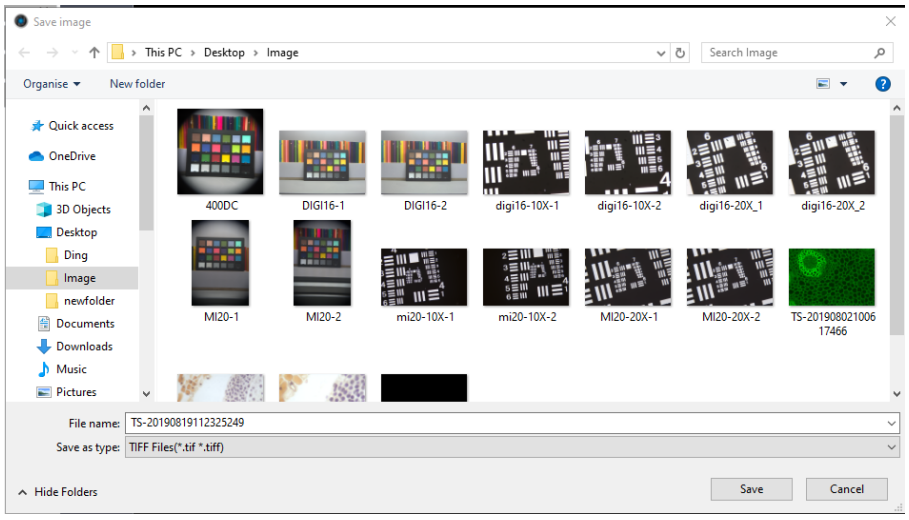
4. Image

Click  to save picture as any format of JPG\TIF\PNG\DICOM; saving window will

open as shown below.

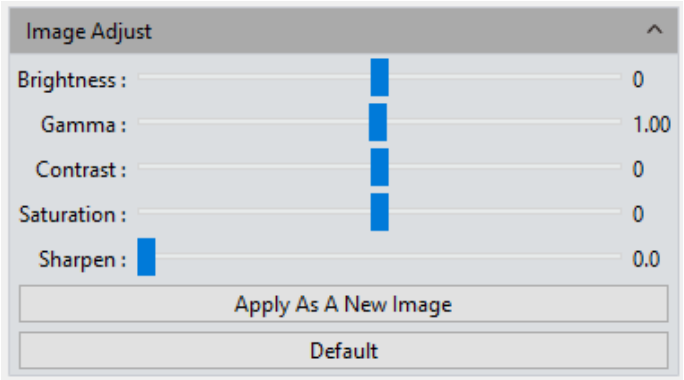


Click  screenshot button on the right upper corner of the preview window to crop picture, by selecting the interested area in preview image by clicking and dragging the mouse. Click the check mark to accept the screenshot or the X to delete. The screenshot will appear on right picture bar, click  to save current screenshot. If there is no need to save the screenshot, right click to exit crop window.



4.1 Image Adjust

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



Brightness: The brightness of the image, the default value is 0, adjusting range is -255~255.

Gamma: Adjust the color brightness of the image displayed on the monitor; 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 purity of the color, the higher value of the saturation, the brighter the color is, the default value is 0, adjusting range is -180~180.

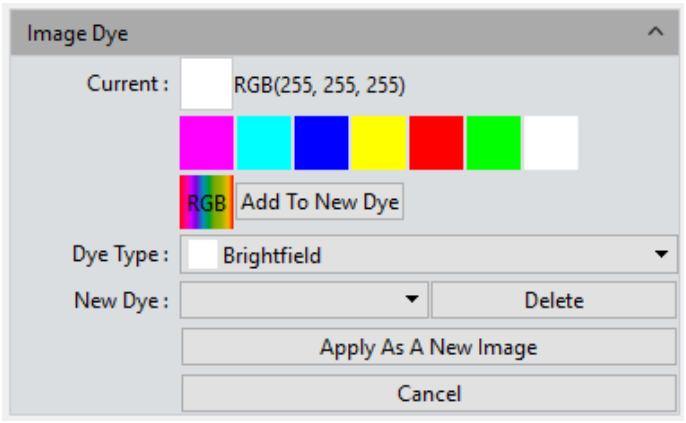
Sharpen: Focus on blurred edges of the image to improve the sharpness or focal length of a certain part of the image, leads to a more vivid color in the specific area of the image. The default value is 0, and adjusting range is 0~3.

Finishing the adjustments of the parameters for the image, click **[Apply As A New Image]**, the set parameters will be applied to the original image which then change to a new image with the adjusted characteristics. The new image will also be saved by this command.

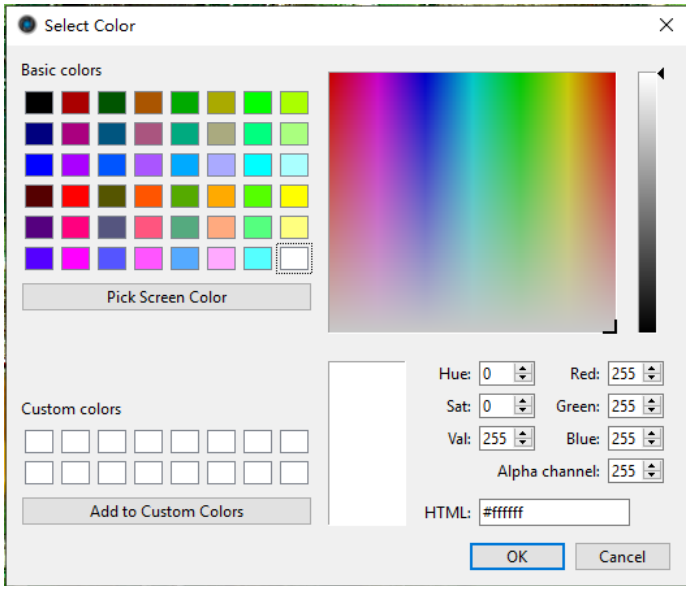
Default: Click the **[default]** button to restore the adjusted parameters to the factory default ones.

4.2 Image Dye

This function is used to add color to black-and-white pictures. Users can select color through the color editor or select corresponding fluorescent dyes. After color selection, click **[Apply As A New Image]** to apply color to the picture. Click **[Cancel]** to cancel dyeing.



Current: to show present selected dye type. Software provides seven colors usually used, click  to get the integrate palette to select more abundant colors as shown below.



Dye Type: To provide abundant colors for use; set the preferable color through right color parameter setting, click and add it to customized color to facilitate future use.

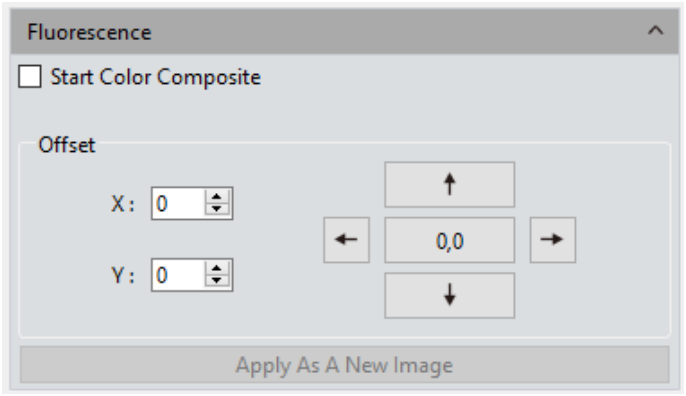
Add to New Dye: selected color on palette can be added to new dye.

Cancel: Cancel a certain kind of customized added dyes.

4.3 Fluorescence

In the researching fields of biological sciences, different fluorochromes are used to label different cell structures. A complete fluorescent cell image contains multiple areas of fluorescence which belong to different cell structures that have their own special affinity to certain fluorochromes.

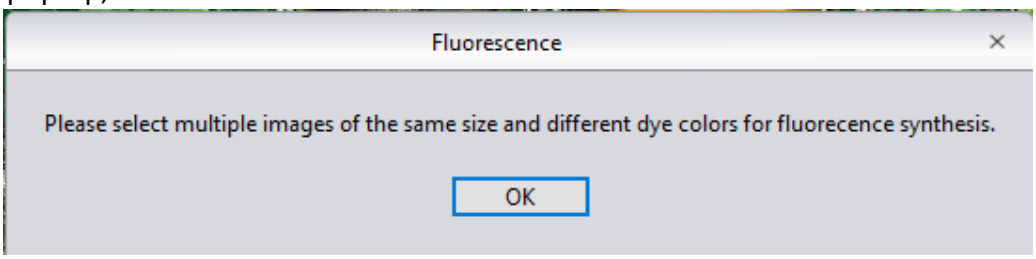
Due to the limitation of the wavelength of the emission fluorescence in the microscope turret, user can only observe one color of image each time. The specific operation is as follows:



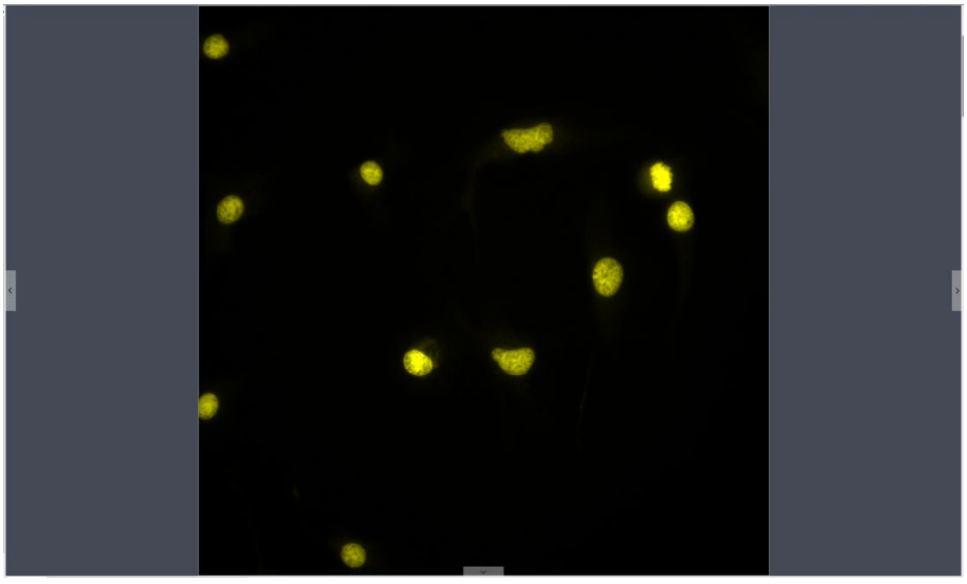
Operating Procedures:

1) Select the image which needs fluorescent channels combining from its path and open onto the window.

2) Click on **[Start Color Composite]** to select a group of images with the same observation field as the one opened before. The maximum number of images that can be combined together are 4 images. The operating directions window will pop-up, as shown below.



3) Select the original picture that needs fluorescent synthesis on right picture bar; the synthesized picture will be displayed on preview windows, as shown below.

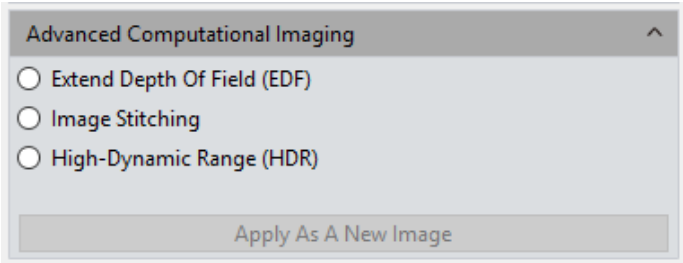


4) Click **[Apply as A New Image]** to add the combined image to the image gallery and let it display in the center of the working interface, the fluorescent combing processing finished.

Offset: The mechanical vibrations from the fluorescence filters' switching can lead to the pixel drifting of each captured single-channel image to others when they were captured individually, so it leads to the situation that these captured single-channel images are not exact under the same observation field and area, with slight drifts. Drift Correction module is able to let the user correct this pixel drifting and finally ensure all the single-channel images to be under the same observation field and area, thus results in the perfect results of multi-channels combing. One correction unit stands for one pixel, click on [0,0] to restore to the original point.

4.4 Advanced Computational Imaging

Capture software offers users with three kinds of post-processing technologies for Image packages. They allow merging a batch of captured images.



Extend Depth of Field (EDF): Pick up those images which were captured from the same observation field but not on the same focused planes, use those clear focused areas of each captured image together to merge into a new image which carries all clear focused areas in whole image.

Image Stitching: Stitch several images which have overlapping parts to one and other into a large, seamless, high-resolution image.

High-Dynamic Range (HDR): Take a batch of images with different exposure times, merge the three images which are the insufficient exposure, the moderate exposure and the excessive exposure into a new image with high dynamic range.

Operating Procedures:

1) User may select the image processing method he needs. Follow the prompts to pick the images for the selected operation. Let us take the EDF processing as an example.

2) Then click on the **[Combination]** at the bottom of the interface.

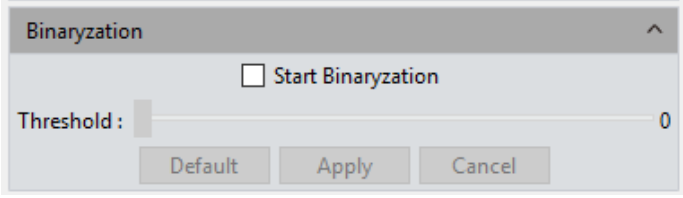
3) The combining process requires some time, the window will display the progress, for example: EDF 4/39.

4) When the combing is completed, a thumbnail of the combined image will be generated and present in the left menu bar as below.

5) Click on [Apply as A New Image] button, The new combined image will be added to the image gallery and shown in the center of the working interface and the combining process comes to ending.

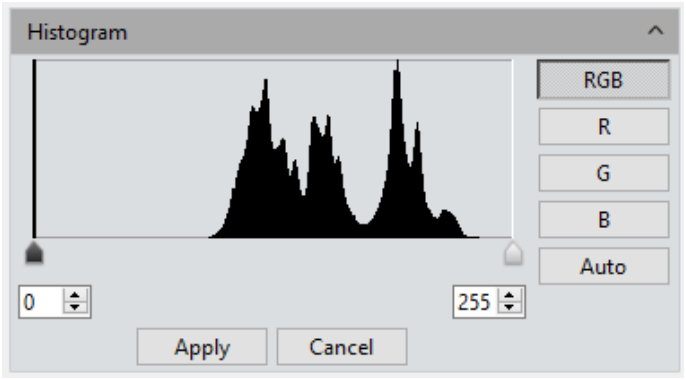
4.5 Binarization

Capture software provides user with image binarization, which sets the grayscale value of the pixels on the image from 0 to 255. It is the process of presenting the whole image with a distinct black and white effect (A binary image, which is a digital image that has only two possible values for each pixel).



4.6 Histogram

When processing images, more realistic color pictures are usually needed to use for observation and analysis. Color scale adjustment can help users to obtain better picture effect.



Color Scale Adjustment: redefine R/G/B in each path, and then proportionally redistribute the pixel value among them. The adjustment of picture's color scale can enlarge highlighted areas of the picture and brighten the picture, as well as to darken the brighter picture; the three RGB paths 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.

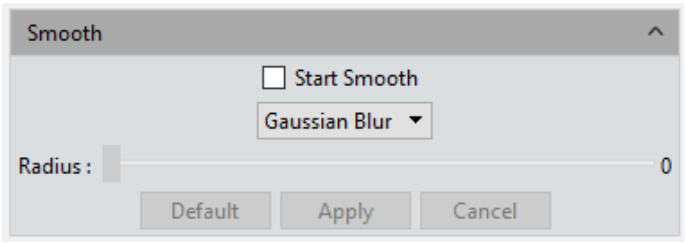
Automatic Color Scale: Check Automatic, customize the brightest and darkest pixel in each path as white and black, and then proportionally redistribute the pixel values between them.

Apply: apply current parameter setting in picture and generate a new picture. The new picture can then be saved.

Cancel: click **[cancel]** button to cancel parameter of the module.

4.7 Smooth

Capture software provides users with three image smoothing techniques for blurring images to reduce the noise and the level of detail: ①Gaussian Blur ②Box Filter ③ Median Blur, setting range is 0~30.



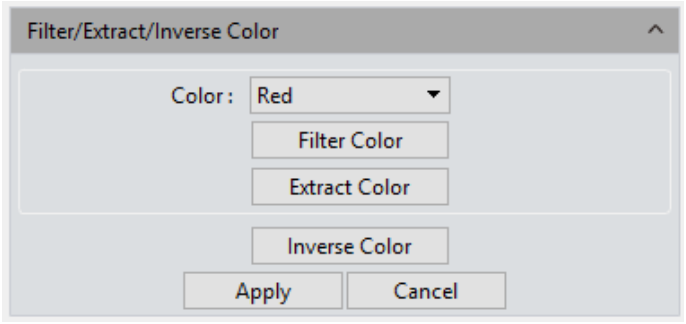
Default: Click the **[default]** button to restore the module's parameters to the factory default ones.

Radius: the bigger the radius is, the stronger the image processing ability is and the smoother the image is.

Apply: When the parameter adjustments are completed, click **[Apply]** to make the parameter settings take effect on the original image and generate a new image, the new image can be saved.

Cancel: Click the **[Cancel]** button to cancel the parameters that were modified.

4.8 Filter/Extract/Inverse Color



Color: Select Red/Green/Blue.

Filter Color: check the color level information in each channel and combine the complementary colors of the mixed colors with the base color. The combined color is always the brightest color.

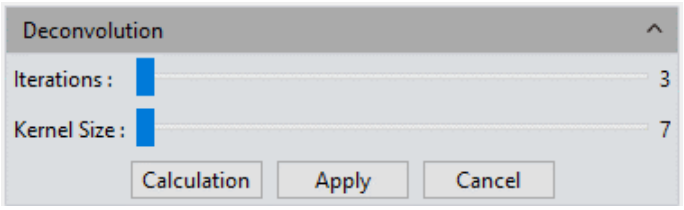
Extract Color: Extract a certain color from the RGB color group.

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

Apply: When the parameter adjustments are completed, click **[Apply]** to make the parameter settings work effects on the original image and generate a new image, the new image can be saved.

Cancel: Click the **[Cancel]** button to cancel the parameters that were modified.

4.9 Deconvolution

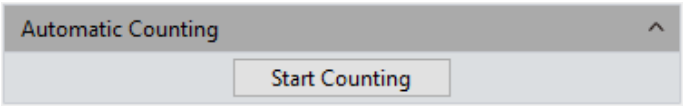


Iterations: Number of iterations.

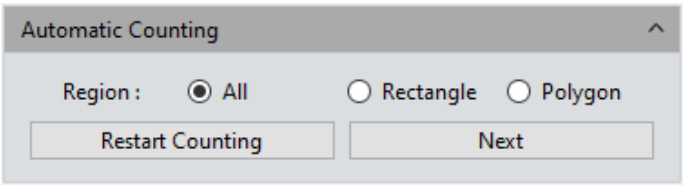
Kernel Size: Deconvolution kernel window size.

4.10 Automatic Counting

Automatic Counting setting interface as below show.



Start Counting: Click it to enter the counting process:



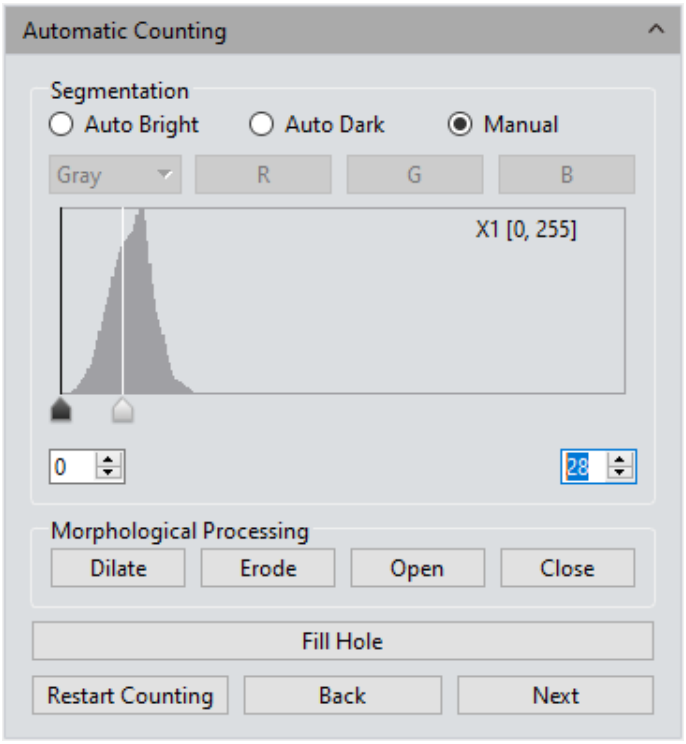
All: The counting area is the full image.

Rectangle: Left-click to select two endpoints to draw a rectangular image, and the counting area is the selected rectangular.

Polygon: Left-click multiple times to draw a polygon, double-click to end the drawing, and the count area is the selected polygon.

Restart Counting: Back to the start counting interface.

Next: Go to next step.



Auto Bright: Use algorithms to automatically segment bright objects from the dark background.

Auto Dark: Use algorithms to automatically segment dark objects from bright backgrounds.

Manual: Manual segmentation is based on the histogram distribution of the image, which can be adjusted by the two vertical lines on the left and right in the histogram, or can be adjusted directly by inputting values in the upper and lower limit edit boxes of the histogram.

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 shape of image cells. Assuming that the image is a bright cell on a dark background, clicking this item will smooth the cell boundary, separate connected cells, and remove small black holes in the cell.

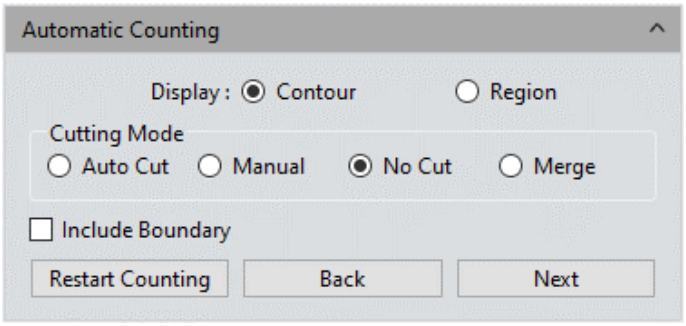
Close: Change the shape of image cells. Assuming that the image is a bright cell on a dark background, clicking this item will fill in the gap of the cell, and at the same time stretch and highlight the cell that is close to it.

Fill holes: Fill holes in image cells

Restart Counting: Back to the start of the counting interface.

Back: Back to the previous operation process.

Next: Go to next step;



Contour: Use contour lines to represent the divided cells.

Area: Use padding to represent divided cells.

Auto Cut: draw the boundary directly according to the actual contour of the divided cell.

Manual: Manually select multiple points on the interface and divide cells according to the selected points.

No Cut: Do not divide the cell.

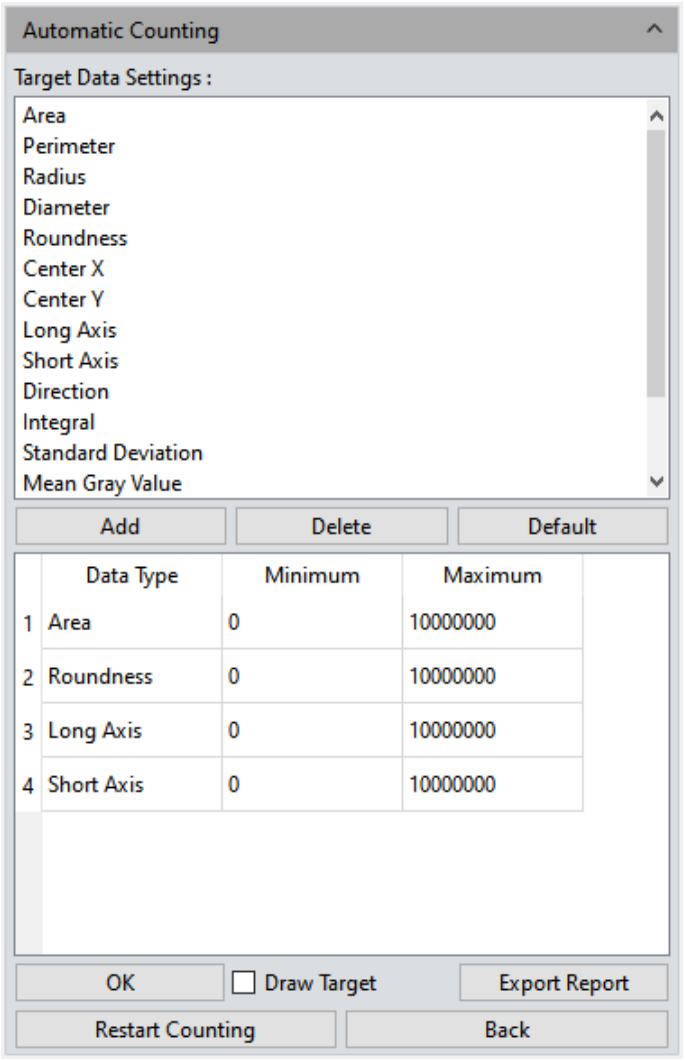
Merge: Merge separate cells into one cell.

Bound Process: When calculating the number of cells, cells with incomplete boundaries in the image will not be counted.

Restart Counting: Back to the start counting interface.

Back: Back to the previous operation process.

Next: Go to next step.



Add: Add the type of calculation to the statistical result.

Delete: Delete type of calculation.

Minimum: Set the minimum value for dividing cells, that is, cells smaller than the minimum value will not be counted.

Maximum: Set the maximum value for dividing cells, that is, cells greater than the maximum value will not be counted.

OK: Start counting cell data.

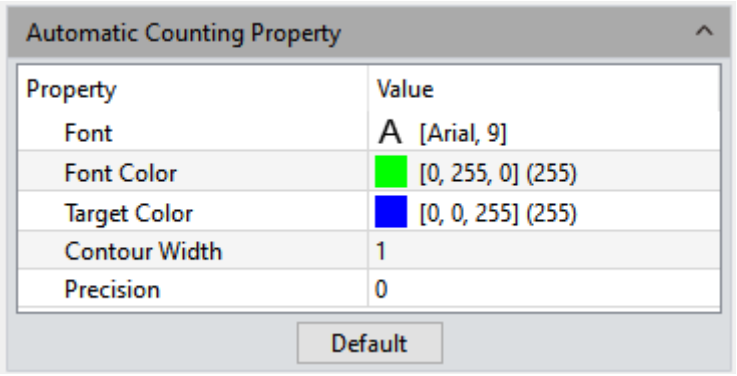
Draw Target: Check this option after the automatic counting is completed, and you can manually draw the missed cells on the interface.

Export Report: Export statistical cell data to Excel file.

Restart Counting: Back to the start of the counting interface.

Back: Back to the previous operation process.

4.11 Automatic Counting Property



Font: Set font and size, default is Arial, 9, click to bring up the font board to select the desired font.

Font Color: Set font color, default is green, click to bring up the color palette to select the desired color.

Target Color: Set cell display target color, the default is blue, select it and click to bring up the color palette to select the desired color.

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

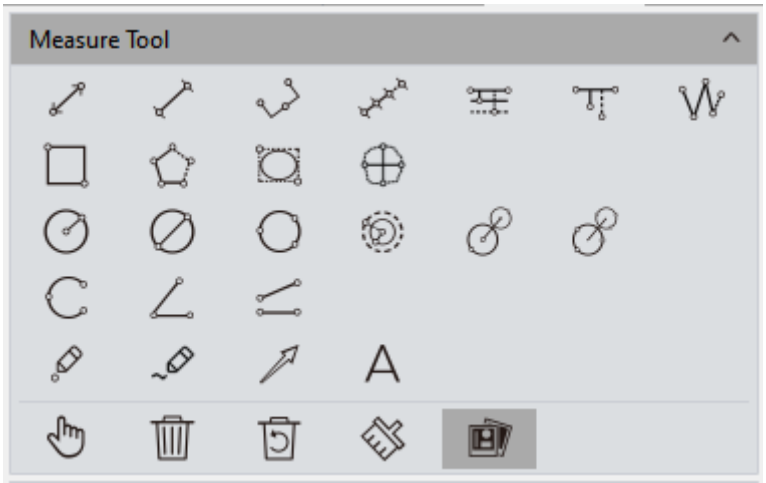
Precision: Set the number of decimal places for the maximum and minimum values. By default, 3 decimal places are standard. The range is 0~6.

5. Measure

Capture provides tools for images measuring. For example, if you want to know the distance between two points in the image, using the measurement tools, you can simply draw a line between the two points and get real-time measurement data.

Capture provides users with a rich set of measurements in image analyzing. The principle of the measuring function in Capture is based on image pixels as the basic execution unit. For example, the length of the line feature is determined by the number of pixels along the line. Pixel-level measurements can be converted to more practical units, such as millimeters(mm) or inches, using the measurement calibration module in the software and a calibration ruler.

5.1 Measure Tool



Straight Line: Draw a line segment graphic and then finish drawing with one more click, arrows at endpoints. Press [ctrl] to draw horizontal or vertical lines.

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

Three Dots Line Segment: draw graphic with three dots line segment, finish drawing when clicked 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: Draw a line segment, then left click again to draw its parallel lines, double- left-click to finish drawing.

Vertical Line: Draw a line segment, then left click again, draw its vertical line, double-

left-click to finish drawing.

Polyline: Left click, add a new line segment to the existing polyline, double- left-click to finish drawing.

Rectangle: Left click to select two endpoints to draw a rectangular, the length, width, perimeter, and area of the rectangular can be measured.

Polygon: Left click to draw the polygon multiple times, double click to finish drawing.

Ellipse: Left-click to select two endpoints to draw an elliptical graph. The perimeter, area, major axis, short axis, and eccentricity of the ellipse can be measured.

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 the theoretical circle is obtained. The value is equal to two. The difference of the secondary line segment is divided by two.

Radius Circle: Left-click to select the center of the circle, and click again to define the radius length, then click to finish drawing.

Diameter Circle: Click two times to define the two diameter endpoints separately to draw the circle, then click again to finish drawing.

3Point Circle: Click three times separately on the selected circle, and then click again to finish drawing.

Concentric Circles: Draw a circle with its radius, Click the position to be the center of the circle, then double click finish drawing.

4Point Double Circle: First click to position the center of the first circle, second click to define the radius length of the first circle. The third click to position the center of the second circle, the fourth click to define the radius length of the second circle.

6Point Double Circle: 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: Draw a curved line by taking three points on the circle, finish the drawing with the third click.

3Point Angle: the angle between two connected lines. Click to draw the endpoint and intersection point of the two lines, take the third click to finish drawing.

4Point Angle: the angle between two unconnected lines. Click to draw the endpoints of the two lines, position the intersection point and take the fourth click to finish drawing.

Dot: Dot marking or dot counting, manually count the quantity of targets or mark them. And record the XY coordinate value of the point.

Paintbrush: Draw any curve on the preview screen.

Arrow: The arrow mark is made by clicking two times.

Text: Add a text note to the image.

Select: The measured graphics or text notes on the image can be selected. When the mouse is moved to the vicinity of the graphics or texts, the mouse symbol changes  to  , you can drag or use the [Delete] button on the keyboard to delete the selected graphics and text.

Delete: To delete the drawn or measured graphs.

Back Undelete: Undo the last delete operation.

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

Combined: When saving the image, the drawn or measured graphics or texts will be attached onto the image. The default status of the software to this module is active.

Data Property: Each graphic has corresponding data type, such as **length, angle, slope, diameter, perimeter, area and etc**. Draw graphics after checking and the information will appear on pictures at the same time.

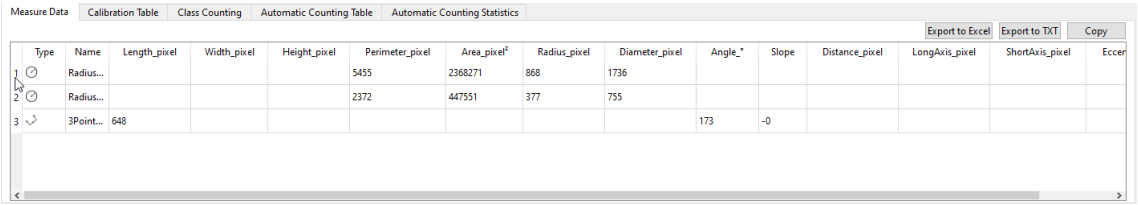
Within the status of graphics drawing, right click the mouse to quit drawing state and switch to selecting status. Click the right mouse button again to restore the drawing state.

When the mouse is in the  state, scroll the wheel to zoom in on the picture,

and hold down the mouse to drag the picture.

When the mouse is in the  state, scroll the wheel to zoom in on the image, hold down the mouse on the graph to drag the graph, and hold down the mouse on the endpoint of the graph to  change the graph.

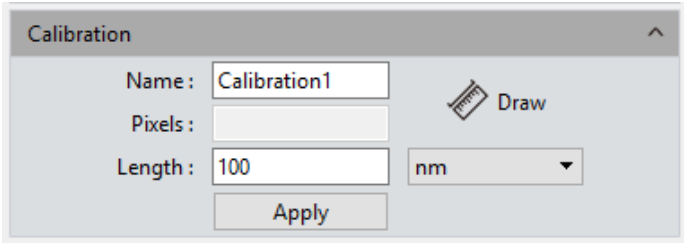
All drawing and measuring graphic data information will be saved in the measurement table. Click **[Export to Excel]** or **[Export to TXT]** to transfer the data information to EXCEL form format or TXT document format. Click **[Copy]** to copy the entire table to other places for paste.



5.2 Calibration

The calibration ruler converts the number of pixels into meaningful measurement units,

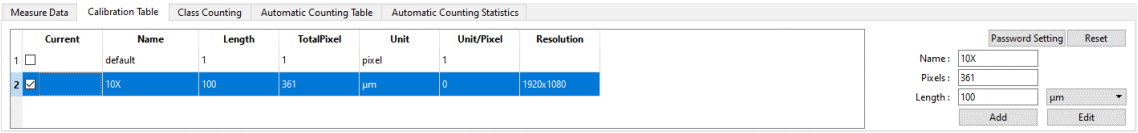
and supports conversion units of nm, um, mm, inch, 1/10inch, 1/100inch, and 1/1000inch.



Operating Procedures:

1) Click [Draw], and draw a straight line on the image, press [ctrl] to draw horizontal or vertical lines.
2) Enter the length and unit represented by the number of pixels of the straight line.
3) Enter a name for the calibration scale.
4) Click [Apply] to save and use the calibration ruler.

View/Edit Calibration Table: Users can create multiple groups of calibration scales at the same time for the different uses of multiple measuring application scenes. The calibration scales can be viewed or edited on the calibration table.

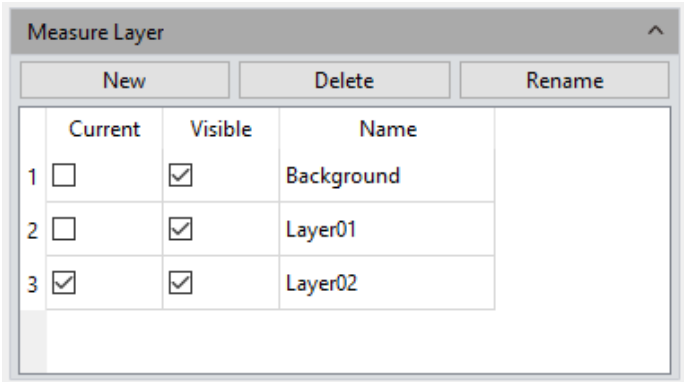


Open the calibration table, check the box under “Current” bar and select calibration ruler. The software defaulted calibration ruler should be applied to all measure projects. Selecting calibration ruler, it can be edited and added on the right side, and mouse right key can eject menu bar as well: **[Cancel]** can cancel selected calibration ruler, but the calibration ruler being applied cannot be canceled; **[Load]** can guide in previously saved calibration table; **[Save As]** can derive the whole calibration table and save it.

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

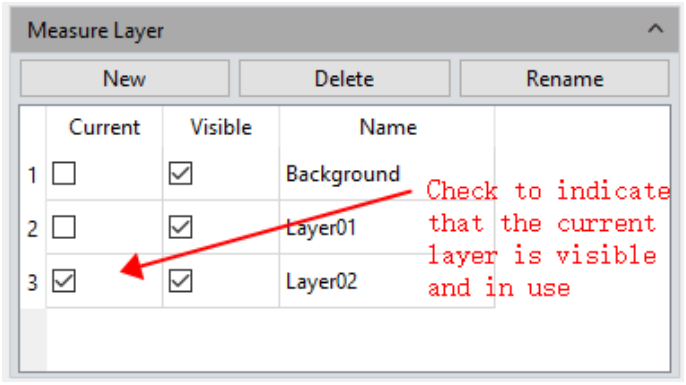
Note: Calibration processing can be performed more accurately with a micrometer. Using an incorrect calibration table will lead the measurement results to be inaccurate. Special cautions must be used to select the correct calibration table before working on images measuring.

5.3 Measure Layer



Measure Layer: Creating multiple layers on the image, user can make different measurements on different layers of the image.

This layer creating module meet the needs of a large number of image measuring and image further processing applications.



If some targets on the current image have already been measured, the layer creating function will automatically create a [Background] and named it as [Layer 01], the current measurement results will be automatically displayed in [Layer 01].

You can choose to display the measurement data from different layers or choose to view the different layers.

Click the box which the related layer belongs to under the defined window of **[Current]** to display the layer you want to preview. Click on different box to switch to different layer you want to display.

Click the box under the defined window of **[Visible]** to display the measurement results of the corresponding layer.

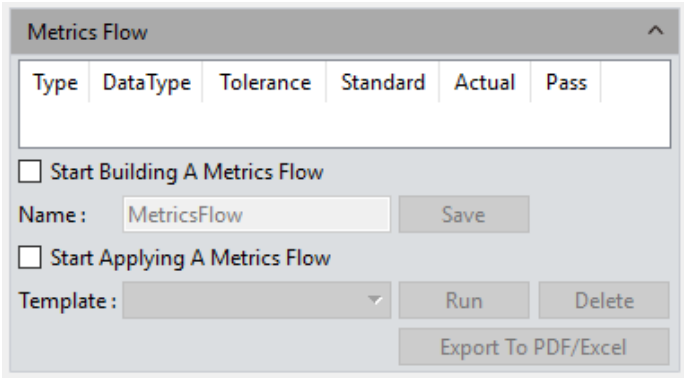
Click **[New]** to create a new layer, you can customize the new layer name. The default layer naming principle is [Layer 01], [Layer 02], [Layer 03], meaning that the layer name shows increased numbers, which related from early to later by the time the layer was created.

Click **[Delete]** to delete the selected layer.

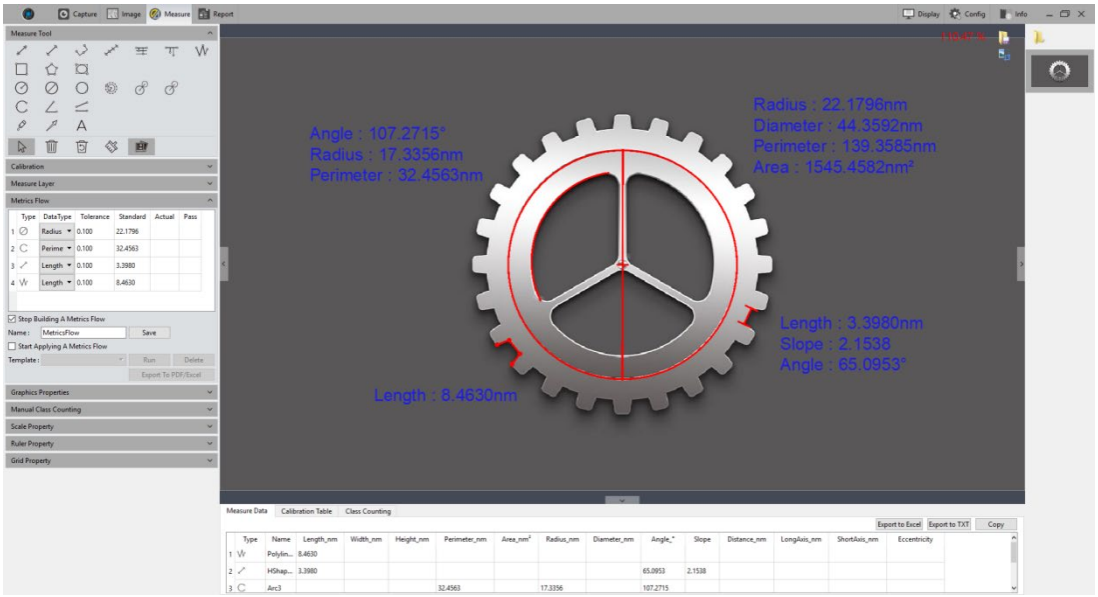
Click **[Rename]** to rename the selected layer.

5.4 Metrics Flow

Capture provides a powerful metrics flow function for convenient and semi-automatic measurements in the passing-rate detection of batches of industrial devices or parts.



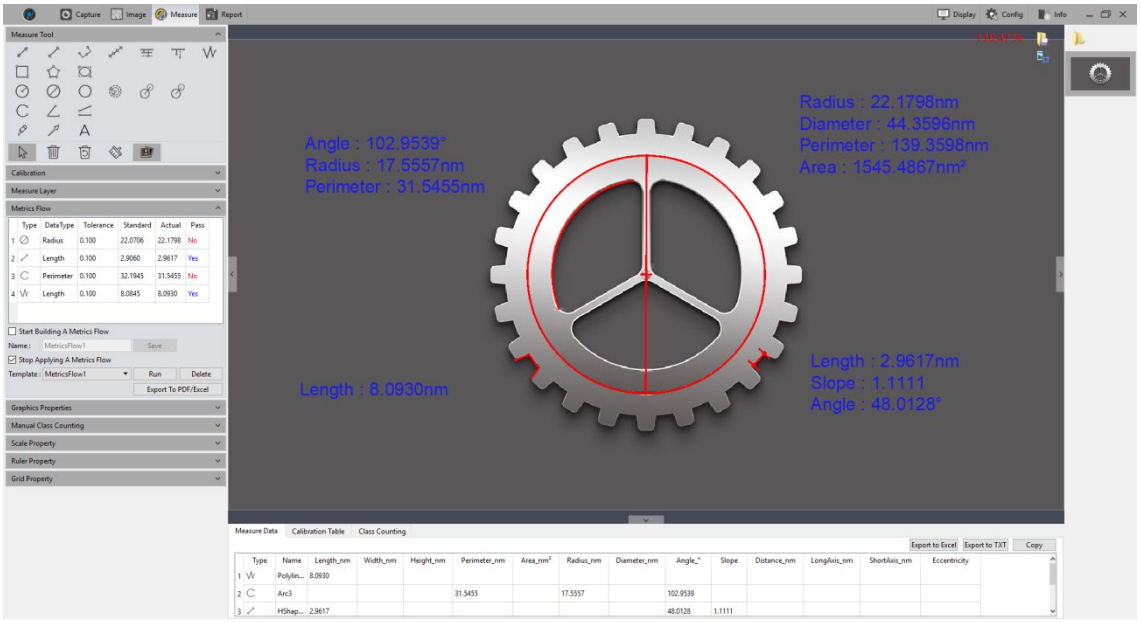
1) Open a group of the devices or parts images saved in the image gallery.
2) Select the image of the standardized sample (or we call this image as the reference image) to calibrate and set the tolerances for later measurements and detections.
3) Click **[Start Building A Metrics Flow]** to create a new metrics template.
4) Use the different measurement tools to measure or draw any of the desired shapes on the reference image opened before. The running template will record the whole measuring or drawing process and save the measuring results or drawing graphics as the reference specifications.



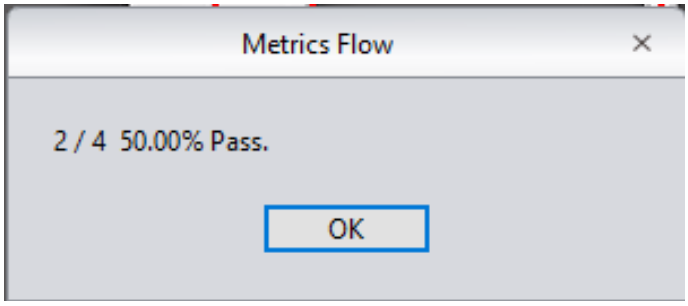
5) After setting the referencing information on the template, user can name the template, click **[Save]** to complete the setting and saving of the measurement flow template.

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

7) Select the image to be detected and apply the procedure as that on creating template.



8) After the operating of the software on the image to be detected, [Run] button will be released and a window showing the detecting results will pop up automatically.



Metrics Flow

	Type	DataType	Tolerance	Standard	Actual	Pass
1	∅	Radius	0.100	22.0706	22.1798	No
2		Length	0.100	2.9060	2.9617	Yes
3	C	Perimeter	0.100	32.1945	31.5455	No
4	W	Length	0.100	8.0845	8.0930	Yes

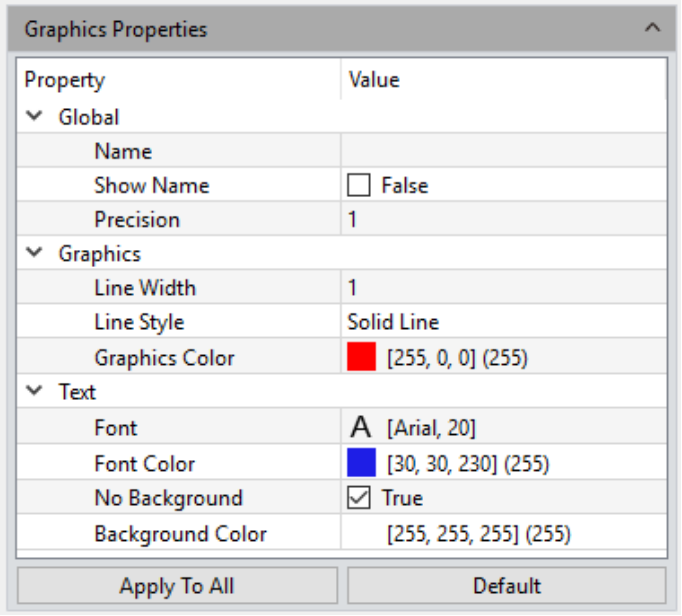
9) Click **[Export to PDF / Excel]**, to save as PDF format or export in Excel format with the detecting results.

10) Continue to click **[Run]** to select the next image need to be detected, repeat the procedures of steps 7, 8, and 9 directed above.

11) After finishing all the images need to be detected, click [Stop Applying a Metrics Flow] to stop the working of the software function of measurement flow.

5.5 Graphics Properties

Define the property of all measure tools. Specific information are as follows:



Global: Create or change a name on the blank right next to the [Name] column.

Show Name: Check if you do not need to display the name.

Precision: choose the display precision after the decimal point, the default value is 3, the range is 0~6.

Line Width: To display line width of the measurement tool currently applied on the image. The default is value 1, the range is 1~5.

Line Style: Select the styles of measurement tools currently applied on the image. The default style is the solid line, software supporting solid lines, dashed lines, dotted lines, dotted lines, and two dotted lines.

Graphics Color: choose the colors for the measurement tools applied on the image, the default color is red, colors could be chosen from […].

Font: Choose the font format for the currently applied measurement data, the default

format is [Arial 20], click on […] to choose the desired format.

Font color: Choose the color for the currently applied measurement data, the default color is blue, click on […] to select the desired color.

No Background: check or uncheck the box for True to set the background as transparent background, or with background, transparent background is the default setting.

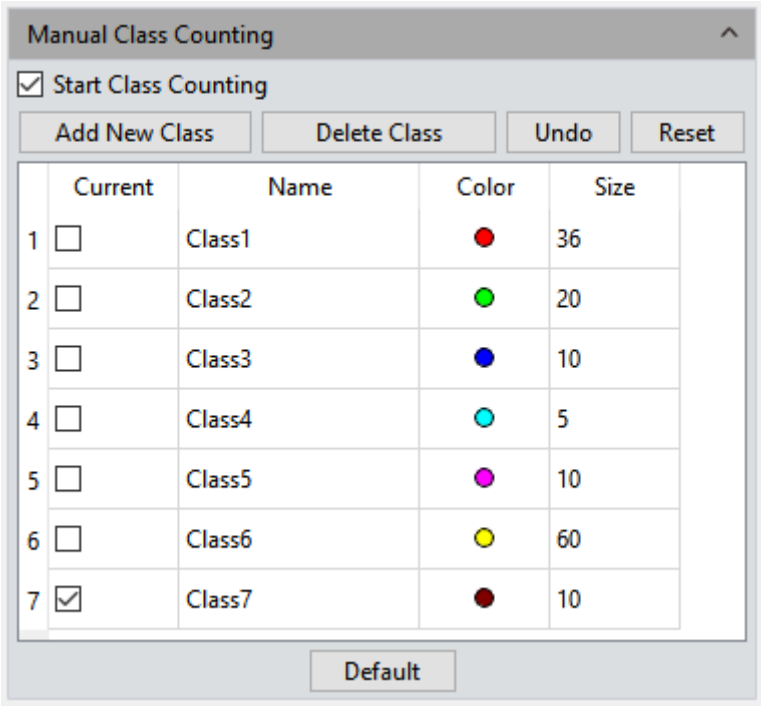
Background Color: Select the background color for the current measurement data on the image. Click out […] to choose the desired background color, the default background color is white.

Apply to All: Apply all the set parameters above to the measured graphs.

Default: Resort and apply the default parameters settings to the measured graphs.

5.6 Manual Class Counting

User can classify and count different categories of cells with the manual counter from the Capture software, there are 7 different categories available.



Class Name: Double-click the category button to name the category.

Color: Double-click  to display the palette to choose the desired color.

Size: Double-click the number to set the size of points, the default is 10, the range is 5-100.

Add New Class: Click **[Add New Class]** to create a new category.

Delete Class: Click **[Delete Class]** to delete the selected category.

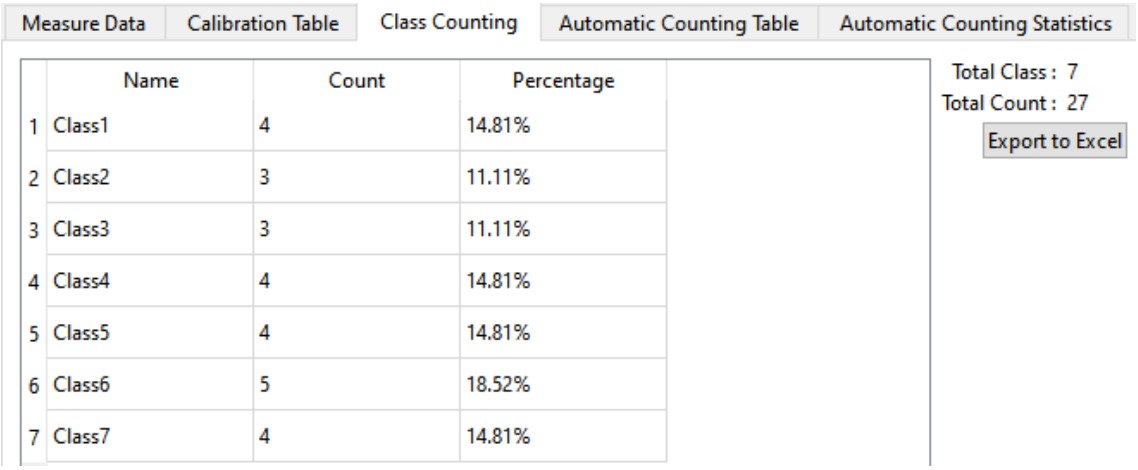
Undo: Click **[undo]** to undo the last action.

Reset: Click **[Reset]** to clear all classes and clear the counter table.

Default: Click [Default] to reset all classes' parameters, but not clear classes.

Start Class Counting: Click **[Start Class Counting]** to select a certain category, click the left mouse button on the targets on image to count. The counted results will be automatically displayed on the counting table.

After the counting with one or different categories, all the counting results data will be displayed on the counting table, select **[Export to Excel]**, and export the data to the Excel forms.



	Name	Count	Percentage
1	Class1	4	14.81%
2	Class2	3	11.11%
3	Class3	3	11.11%
4	Class4	4	14.81%
5	Class5	4	14.81%
6	Class6	5	18.52%
7	Class7	4	14.81%

5.7 Scale Property

Captures software allows the user to set the scale properties for the user's actual needs.

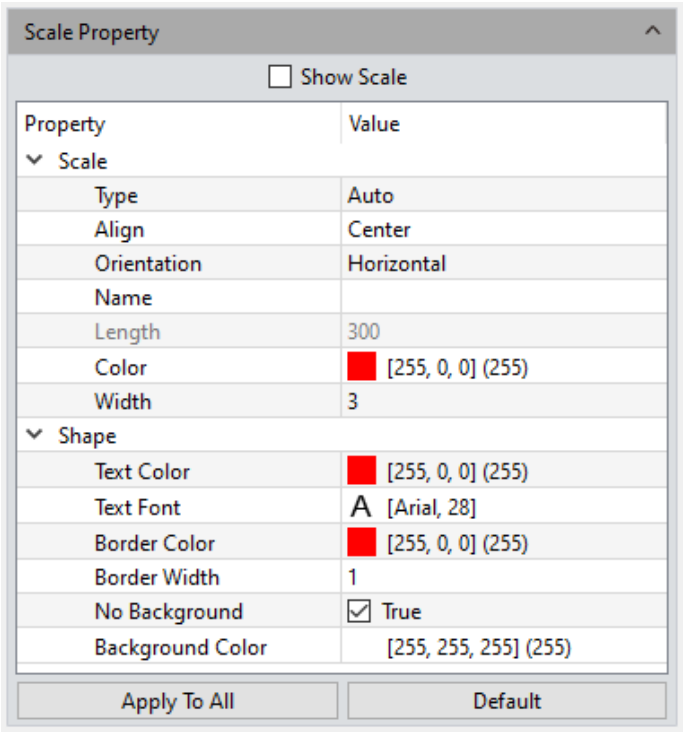
Show Scale: check on the box to display the scale on the measured image or not; the default setting is not showing the scale. If checked to show the scale, the scale will automatically be shown on the left top of the image, you can use the mouse to drag the scale to the position you desire.

Type: select the display type of the current scale, support manual and automatic, the default is automatic.

Align: Set the alignment between the current scale and the value. It supports left, center, and right alignment, and the default is center.

Orientation: Set the display direction of the current scale, support horizontal and vertical, the default is horizontal.

Name: Create name for the scale applied to the current, the default setting is blank. **Length:** The default value is 100 pixels, that is, the scale is displayed in total length of 100-unit pixels, and this value can be modified by entering new value.



Color: Choose the color for the current applied scale on the image, the default color is red, click on […] to choose the desired scale color.

Width: enter the value of width for the scale on applied the image, the default value is 5, range 1~5.

Text Color: Choose the color for text of the scale currently applied on the image, the default color is red, click on […] to select the desired color.

Text Font: Choose the font format for scale currently applied on the image, the default format is [Arial 28], click on […] to choose the desired format.

Border Color: Choose the color for the border of the scale currently applied on the image, the default color is red, click on […] to select the desired color.

Border Width: enter the value of the width of the scale currently applied on the image, the default value is 5, range 1~5.

No Background: check or uncheck the blank of True to set the background as transparent background, or with background for the scale currently applied on the image, transparent background on the scale is the default setting.

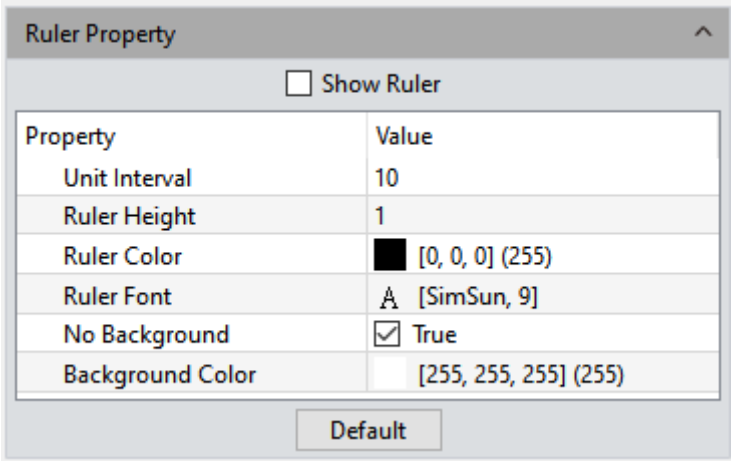
Background Color: Select the background color for scale currently applied on the image. Click on […] to choose the desired background color, the default background color is white.

Apply to All: Apply settings to all scales.

Default: Resort and apply the default parameters settings to the scale on the image.

5.8 Ruler Property

Capture software allows the user to set the crosshair properties of the image according to his actual needs.



Show Ruler: click on the blank to select to display the crosshair on the image or not; the default setting is not showing the crosshair.

Unit interval: Set current applied cross ruler interval distance on the image.

Ruler height: Set height of the currently applied cross ruler on the image.

Ruler Color: Choose the color for the current applied crosshair on the image, the default color is black, click on […] to choose the desired crosshair color.

Ruler Font: Sets the font size on crosshair.

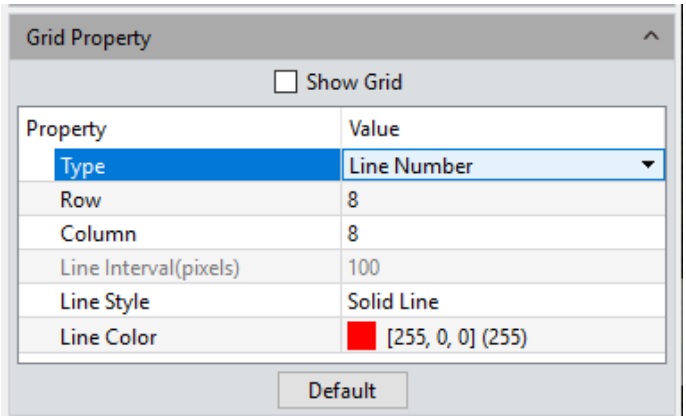
No Background: check or uncheck the blank of True to set the background as transparent background, or with background for the crosshair currently applied on the image, transparent background on the crosshair is the default setting.

Background Color: Select the background color for the crosshair currently applied on the image. Click on […] to choose the desired background color, the default background color is white.

Default: Resort and apply the default parameters settings to the crosshair on the image.

5.9 Grid Property

Captures software allows the user to set the grid properties of the image according to his actual needs.



Show Grid: click on the blank to select to display the grid on the image or not; the default setting is not showing the grid.

Type: Select the way to set the grid to apply to the current image.

Row/Column: If you choose to define the line number, you can enter the numbers of the line on rows and columns applied on the image. The default numbers of row grid and column grid are both 8.

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.

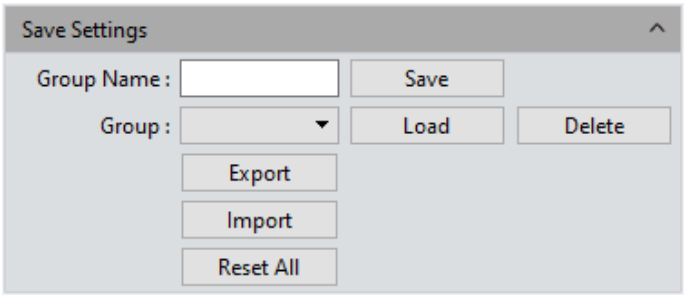
Line style: Choose the line style for the grid to apply on the image there are 5 styles of grid could be chosen from, the solid lines, dashed lines, dotted lines, dotted lines, and two dotted lines.

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.

5.10 Save Settings

Copy the parameter file and load it on other computer, which can realize the transfer of parameters across platforms and keep the user's experimental conditions as consistent as possible.



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

Save: Save settings.

Load: Load selected settings.

Delete: Delete selected settings.

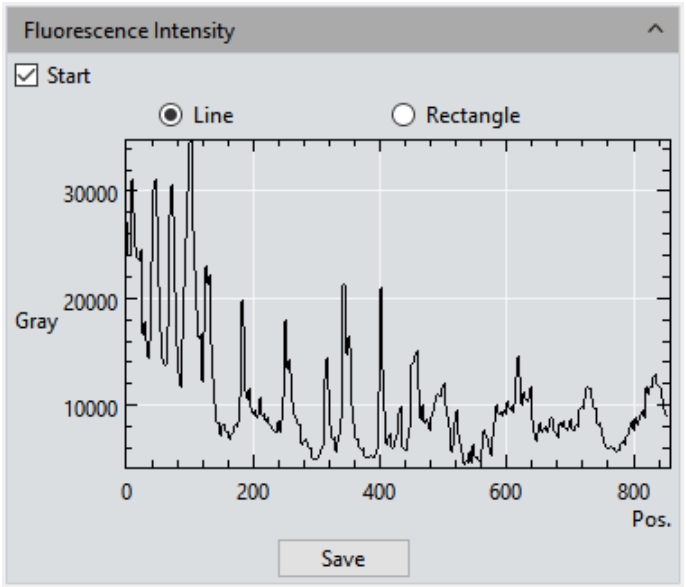
Export: Export selected settings.

Import: Import settings file into drop-down menu.

Reset All: Clear all user settings and restore to the software factory settings.

5.11 Fluorescence Intensity

Mosaic allows users to measure the gray value of the image according to actual needs, and supports both linear and rectangular methods.



Operating Procedures

1) Switch from the preview module to the measurement module, or open an image,

and click [Start] to enable the function. At this time, the measurement tool is not allowed.

2) Draw a line segment or a rectangle to measure the fluorescence intensity of the drawn area.

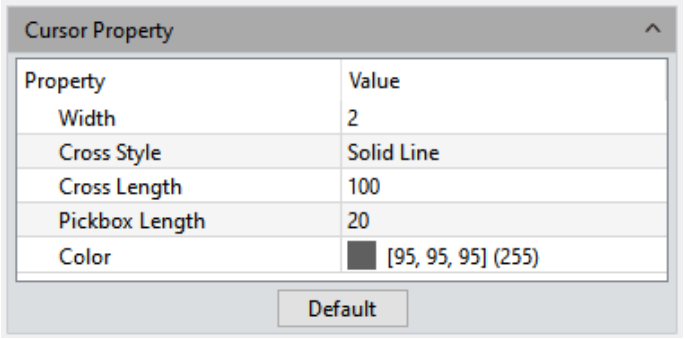
3) Click [Save] to save the current measurement data in excel format to the local disk.

Note:

- Draw a line segment graph and complete the drawing at the second click to measure the fluorescence intensity data on the straight line
- 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.

5.12 Cursor Property

The user can adjust the properties of the measurement cursor according to actual needs. The setting interface is shown below.



Width: Used to set the thickness of the cross cursor line segment, the setting range is 1~5, and the default value is 2.

Cross style: Set the line style of the cross cursor, the default is solid line, and dotted line can be selected.

Cross length: Select the length 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.

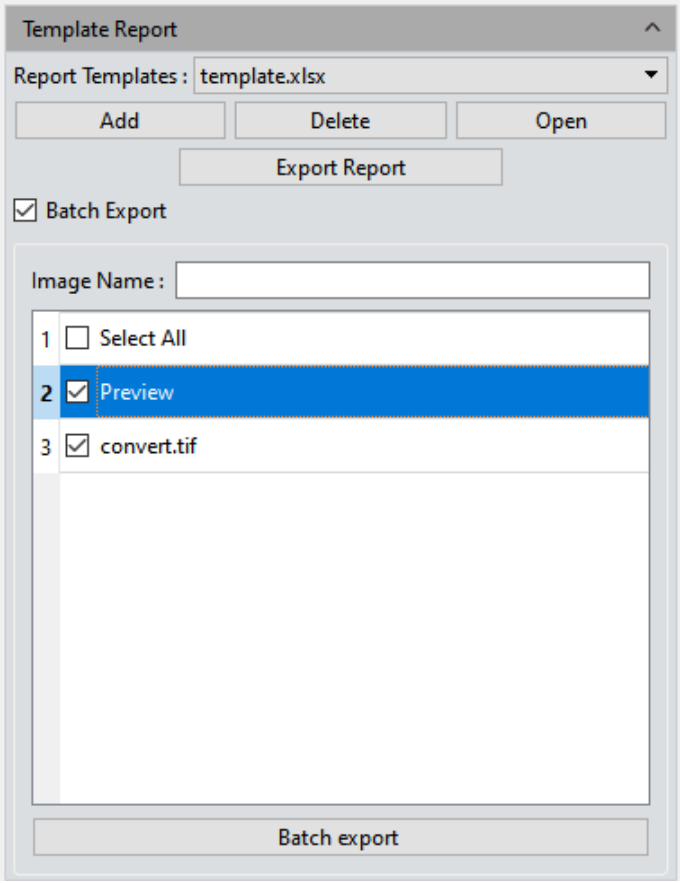
Color: Select the currently applied cross cursor on the image to adjust the line color, select it and click the color palette to select the desired color.

6. Report

Captures software provides report formats to export the measurement data to your working report documents, you can also export the report in real time when you are in preview window. In addition to the default template, a custom template is also available, and users can modify the report according to actual needs. Custom template only supports Excel format.

6.1 Template Report

The software provides functions to export custom measurement templates, measurement data modules and batch export reports.



Report Templates: Users can click on the name to select a template, and the default is the software template.

Add: Add a custom template, the custom template must be modified on the software default template, the 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.

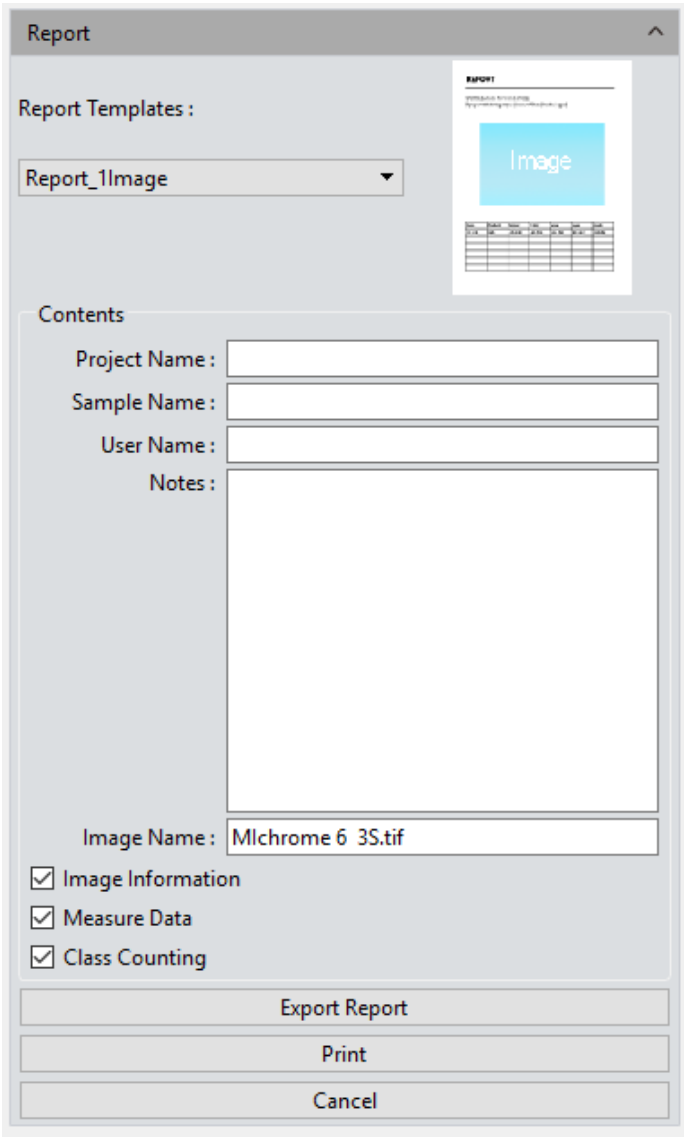
Delete: Delete the selected template.

Open: Preview the selected template.

Export Report: Export the current report, the format is Excel

Batch Export: Click [Batch Export], the user can check the names of the pictures to be exported and click [Batch Export] to export the report. The image name supports query.

6.2 Report



Report Templates: Choose your desired format of report template.

Project Name: Enter your personal name for the project you are working on, this name will show up on your working report.

Sample Name: Enter the name of your sample in this project, this name will show up on your working report.

User Name: Enter the name of the user, or conductor, or worker, or reporter.

Notes: Enter the notes, supplement information or any or the comments you need to record for this job in this working report.

Image Name: Enter the name of the image you captured before, then the image can automatically be loaded on the report.

Image information: Click on the blank to show the information of the image you just pulled out, uncheck to remove the information, the default setting is showing out the information of the image on the report.

Measure Data: In the report, display/do not display the current image measure data, default checked.

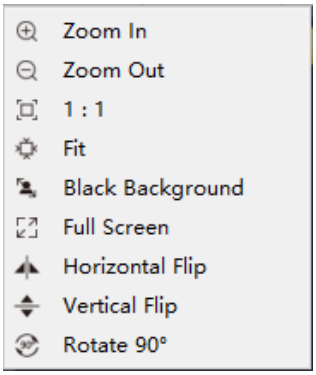
Count Table: In the report, display/do not display the current image count table, default checked.

Export Report: Export current report into a document with PDF format.

Print: Print the current report.

Cancel: Cancels this operation, it means clearing out all the report information just entered or loaded in.

7. Display



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

Zoom Out: Reduces the current image and let it display smaller than its original size.

1:1: The current displaying image is in its 1:1 original size.

Fit: Adjust the display size of the image to fit the software operating window.

Black Background: The image is in full screen and the background of the image is

default to be black. Type the [Esc] button of the computer keyboard or click on the Back-Arrow symbol on the right down corner of the screen to exit the black background mode.

Full Screen: Enable the image to be full screen. Type the [Esc] button of the computer keyboard or click on the Back-Arrow symbol on the right lower corner of the screen to exit the full screen mode.

Horizontal Flip: Horizontally mirrors the current image.

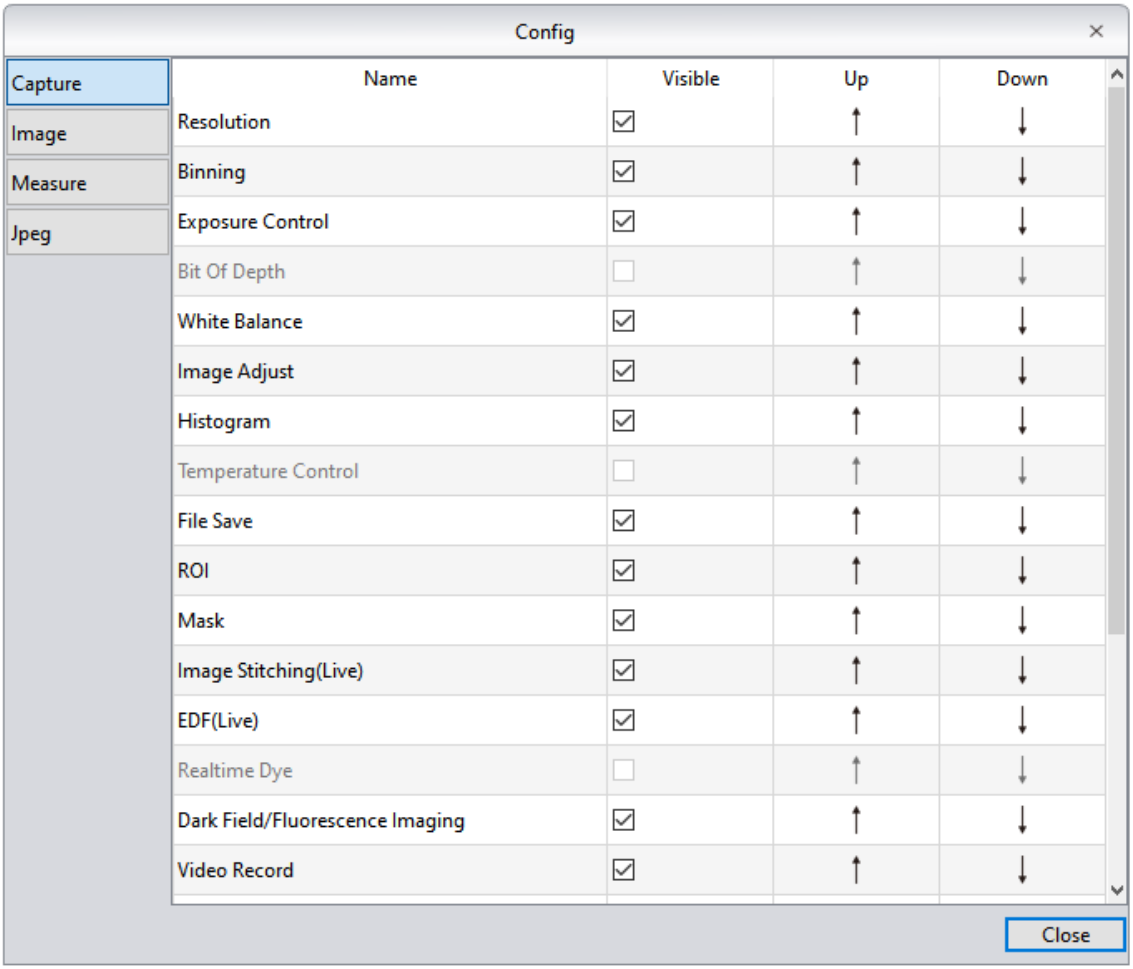
Vertical Flip: Vertically mirrors of the current image.

Rotate 90°: Rotate the current image clockwise, 90 degrees each click.

8. Config

8.1 Capture\Image\Measure

Software function modules and orders can be customized as shown below.



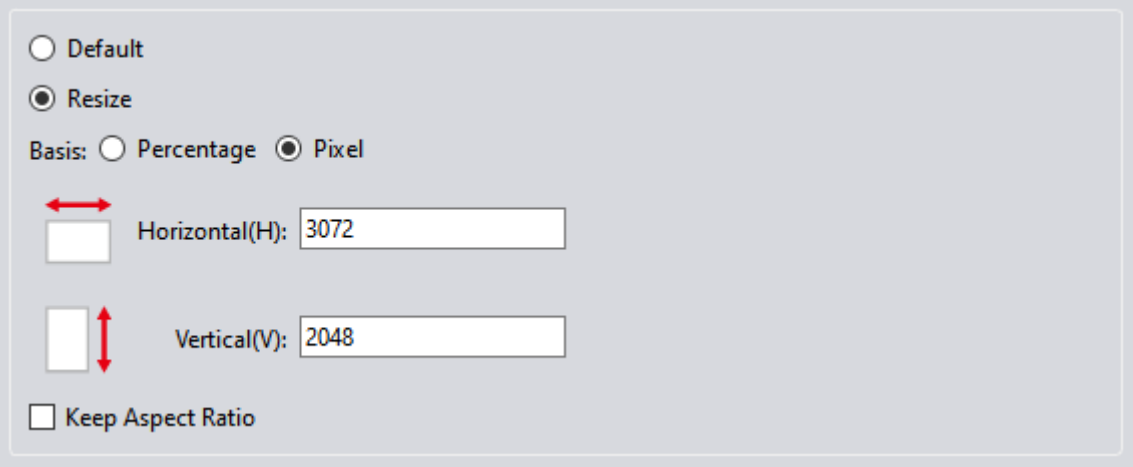
Visible: Click module to display on the software interface. Unchecking of the box next to the module means that the module will not be displayed on the interface. All modules are checked by default. This setting can be saved after the software restarts.

Up: The shown module can be moved up, and the interface layout changes accordingly to the selection.

Down: The shown module can be moved down, and the interface layout changes accordingly to the selection.

8.2 Jpeg

Capture provides Jpeg format size settings. It can be selected in the settings. When Jpeg is selected in the file saving module, the image size will be generated according to the set format when taking pictures.



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

Resize: Check the resize to adjust the image size.

Percentage/pixel: Adjust pictures according to percentage/pixel. When a percentage is selected, the adjustment range is 1-200%. When pixel is selected, the adjustment range is 4-maximum resolution.

Horizontal: Set the size of the image in the horizontal direction.

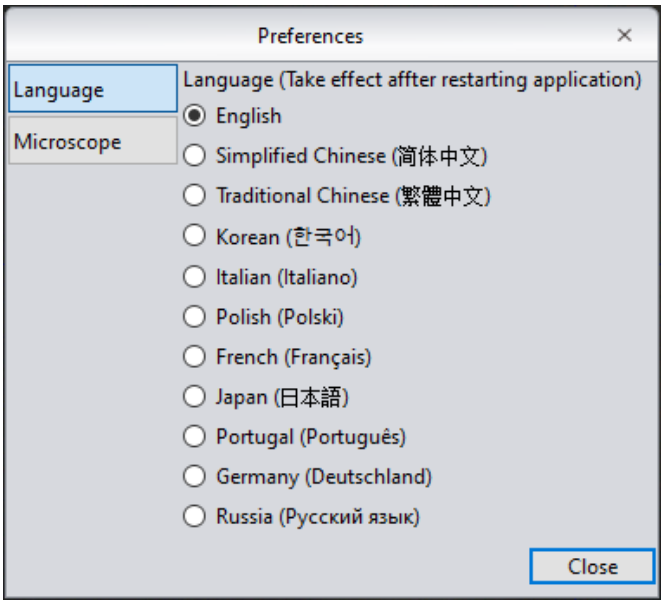
Vertical: Set the size of the image in the vertical direction.

Keep Aspect Ratio: check it to keep the image aspect ratio to prevent image distortion.

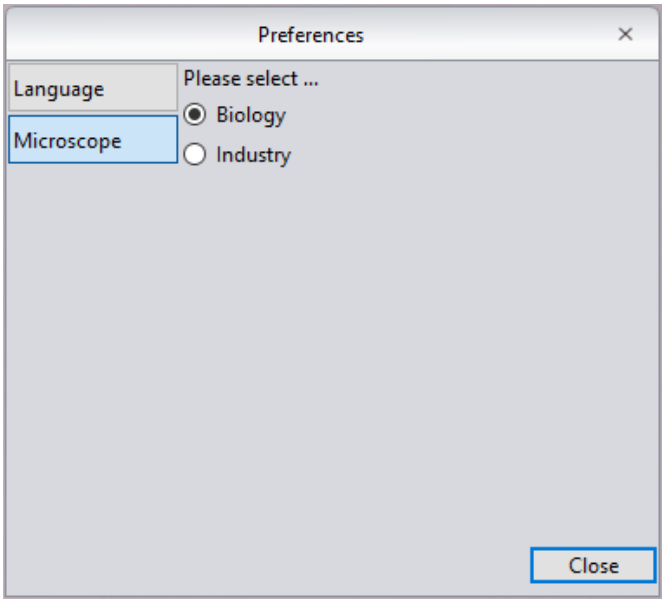
9. Info

9.1 Preferences

language: The software language can be selected. The software needs to be restarted to take the language setting into effect.



Microscope Option: To select applicable option, software will take effect after restart.

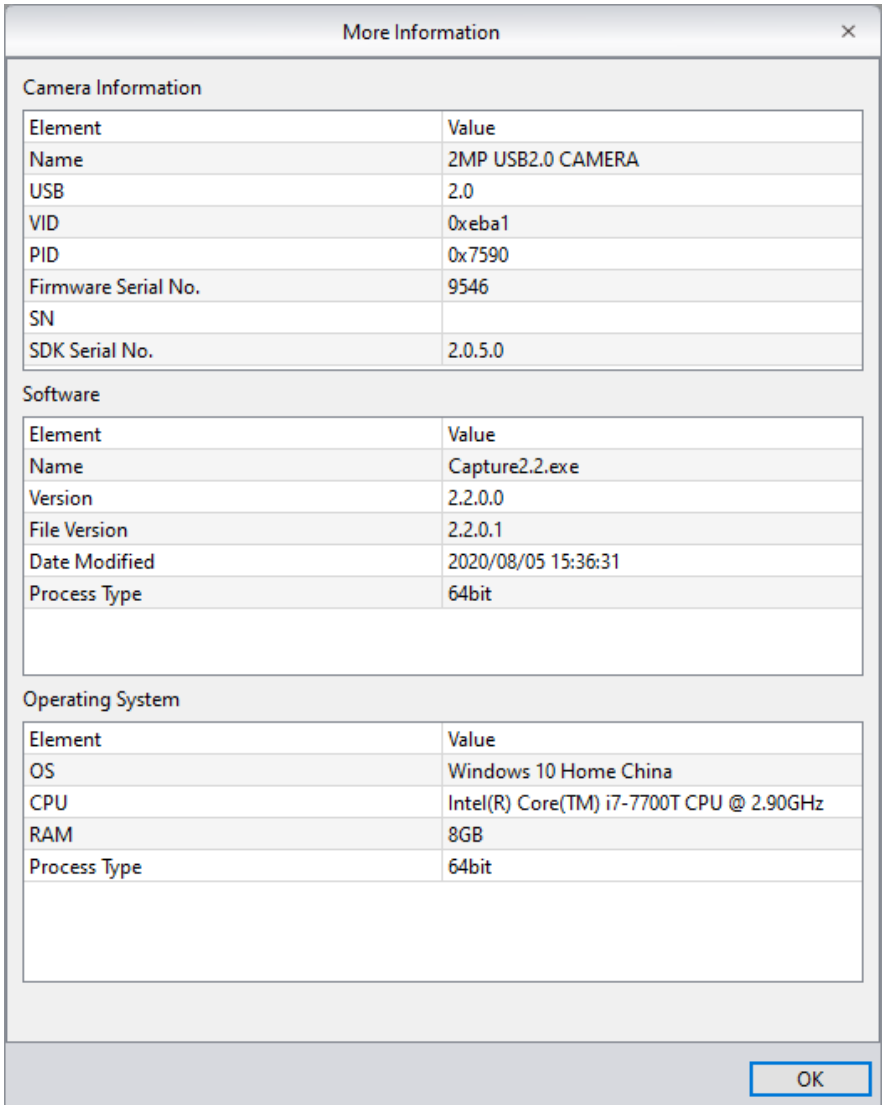


9.2 Help

The software operation instructions can be called up for the user to learn and refer.

9.3 About

Open About menu, click More information, you can get the current information of the camera, the versions of the software and the information of the operating system.



10. Customer Services

Warranty

1) When the product is under warranty, we fulfill the repairing to any damages corresponding with the warranty policies for free of charges.
2) The warranty policies are limited to the defects in manufacturing and materials of the commodity. Anthropic damage such as self-disassembling, water ingress,

dropping, and damages of natural disasters are not covered by the warranty.

To save your time, please prepare the following information in advanced:

1) Camera model and S/N (product serial number).
2) Software version number and computer system configuration information.
3) A description of the problems and any images that would help show the problem.