LABOMED®

Pixel Pro 3.2

User Manual

To ensure proper use of this instrument as well as to avoid injury while operating instrument, understanding this manual completely before use is highly recommended.

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General Introduction

PixelPro is a powerful software package integrating controls for micro-imaging cameras, imaging calculation, image processing, and a measuring and counting work flow, allowing the user to enjoy an improved operating experience.

PixelPro can drive and control cameras installed on microscopes from different manufacturers, helping to bring the user the best performance for micro-imaging tasks.

When a user needs to make the best use of a microscope and its cameras' potential, PixelPro can accurately adjust all the parameters you select, and optimizes the settings of these parameters through its user-friendly interface.

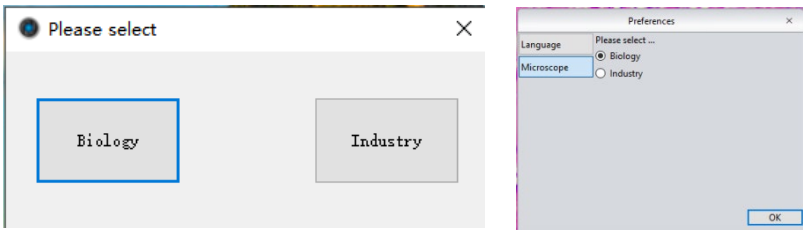
PixelPro enables the user to set up customized configurations according to their actual applications. When a user combines customized configurations with customized work flows, the software presents a personalized working layout, ensuring accuracy for the user's experiment results whether the software is being used for multiple tasks or by multiple users.

PixelPro achieves superior quality images due to its powerful real-time calculating engine. The real-time image stitching function helps the user to obtain a super wide FOV image from the mechanical motion of the microscope. Real-time extended-depth-focusing (EDF) functions can offer the user a combined picture in less than one second.

In order to achieve the best operating procedures from a user's point of view, the developers of PixelPro have refined the all-new camera operating work flow 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 user operation time, and improves working efficiency.

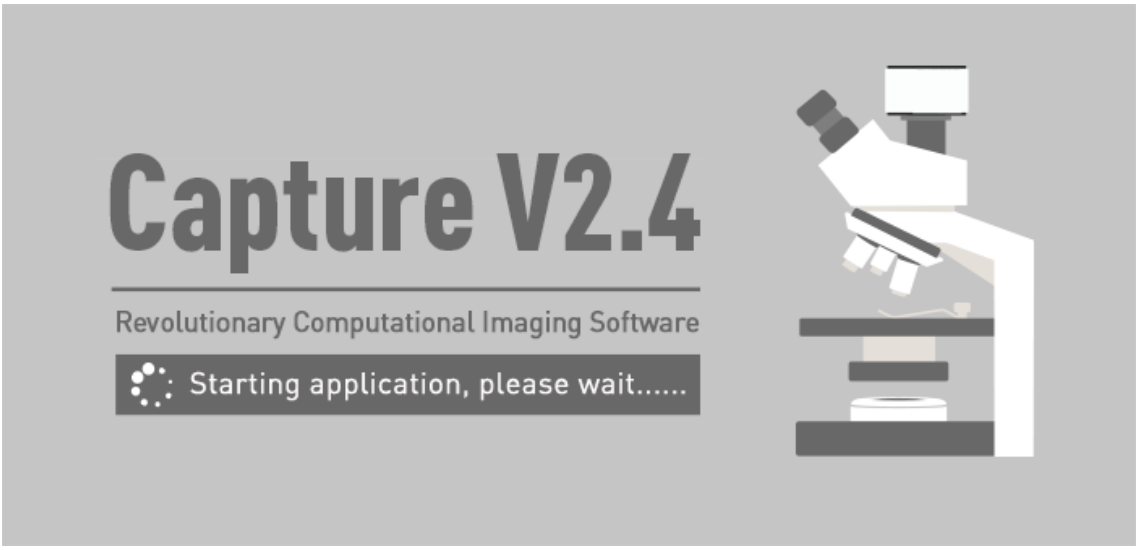
1. Starting Interface

When installing and starting up the software for the first time, the biological or industrial application option box will pop up. The software will automatically optimize parameter settings based on user choice. While using the software, the application option can also be switched through [Information] - [Options] - [Microscope] on the right upper part of the menu bar.



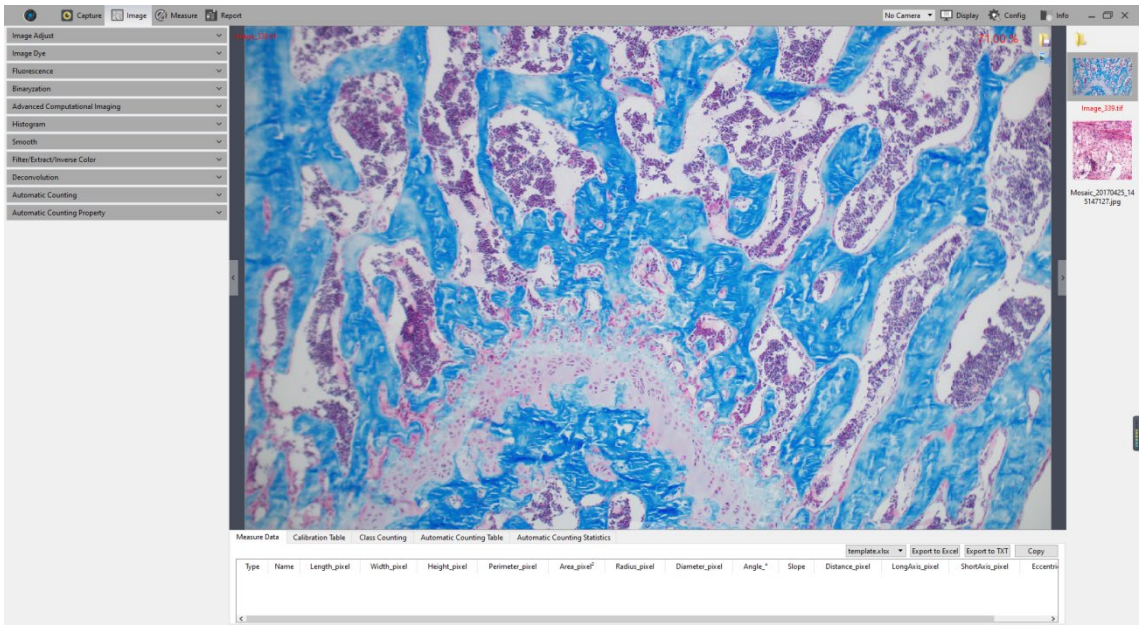
[Biological]: At software installation, automatic white balance defaults to a gamma value of 2.10 and the exposure mode to the right.

[Industrial]: At software installation, the default color temperature value is 6500K, area white balance defaults to auto, sets the gamma value to 1.80 and exposure mode to middle.



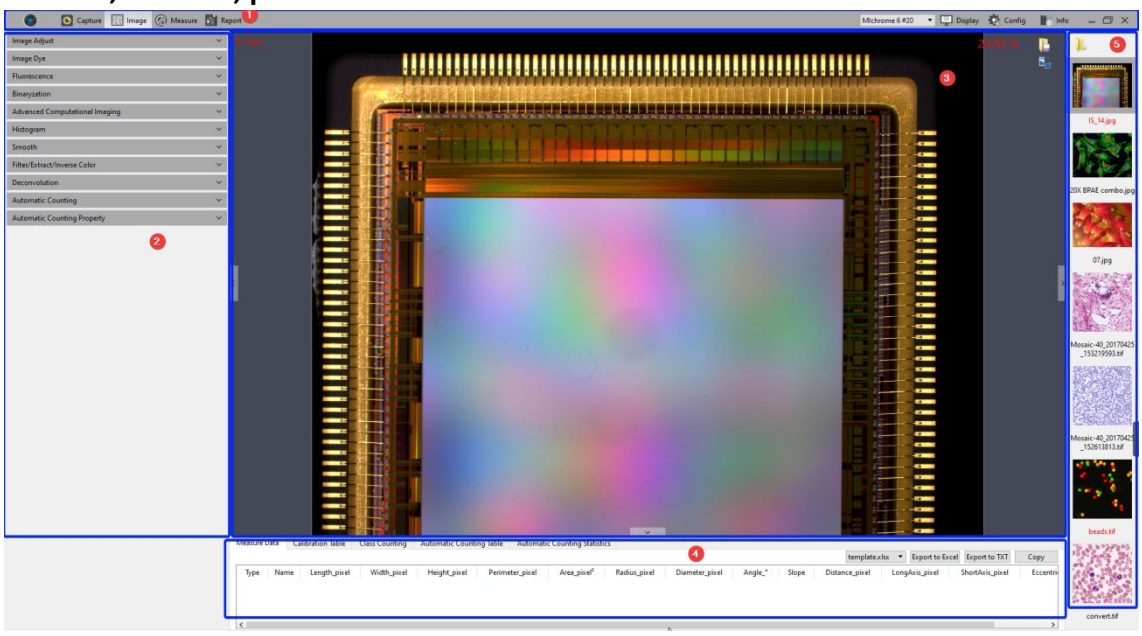
It normally takes around 10 seconds for the software to start up. Some cameras will take longer to start up, such as the FL-20BW, which will generally take about 20 seconds to start up.

If no camera is connected, or an unsupported camera is connected, an error dialog pops up when the software is started. Clicking “OK” or closing the prompt automatically exits the program.



2. Windows

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



① Status Bar

There are seven main modules in the status bar: **Capture / Image / Measure / Report / Camera List / Display / Config / Info.** Clicking on a module switches the program to related interface.

Multi-camera connection and hot-plug functions are supported on Windows systems only. Using USB3.0 ports for hot swap is strongly recommended, and do not connect or disconnect cameras while the camera list is being refreshed.

In the camera list, all recognized camera models are displayed. Click a 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 Mac version.

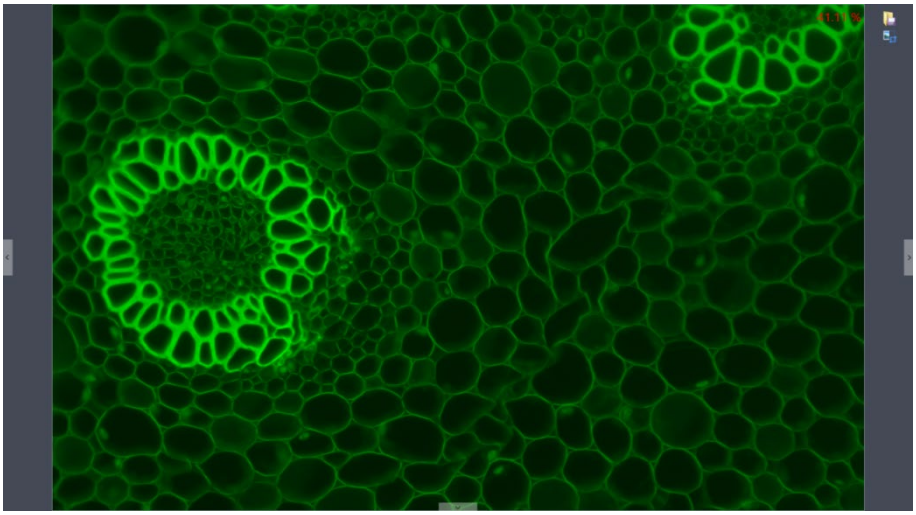
② Control Bar

All function modules supported by the camera are displayed on the left side. Click on a module's status bar button to check detailed functions.

Click the button to display all functions.

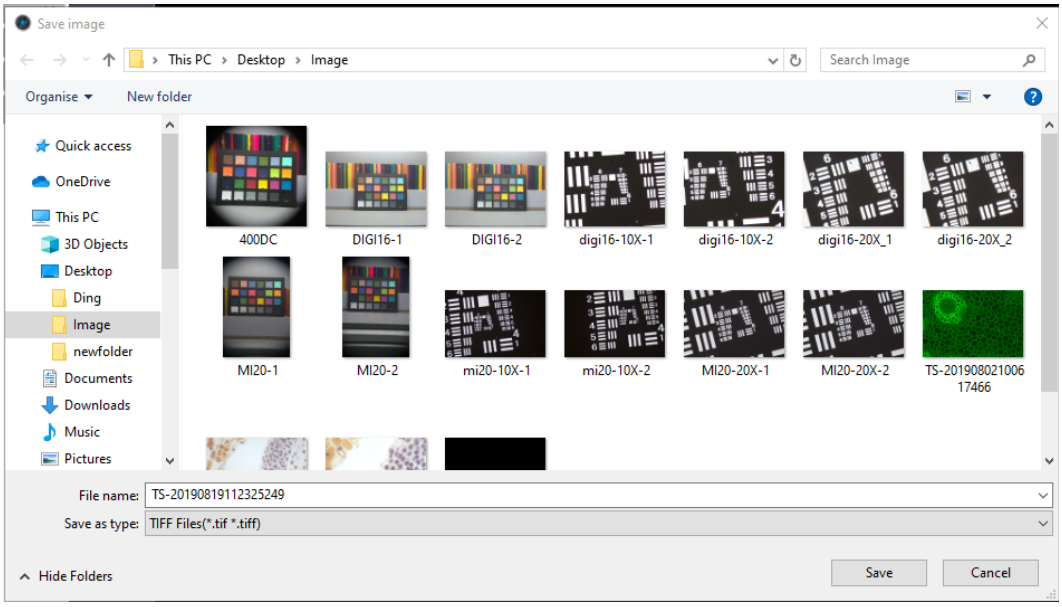
Click the button to collapse all functions.

③Preview Window



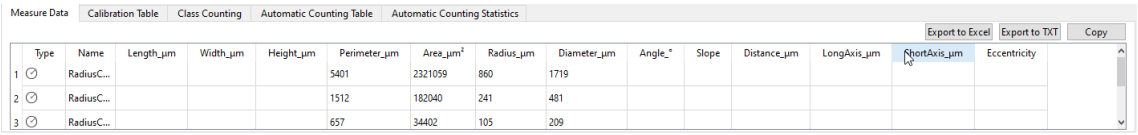
1) Displays a real-time view and captured images.
2) Mouse wheel to zoom out/zoom in on pictures; the cursor always appears at the center of the picture.
3) Hold down the left button / right button / scroll wheel of mouse to drag the image display area.
4) Click the control button at the edge of the window. Left, right, and down expands or contracts the corresponding operating bar.
5) Click the button to save the currently selected picture. The following window

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



④ Data Bar

Shows measurement and statistics tables.



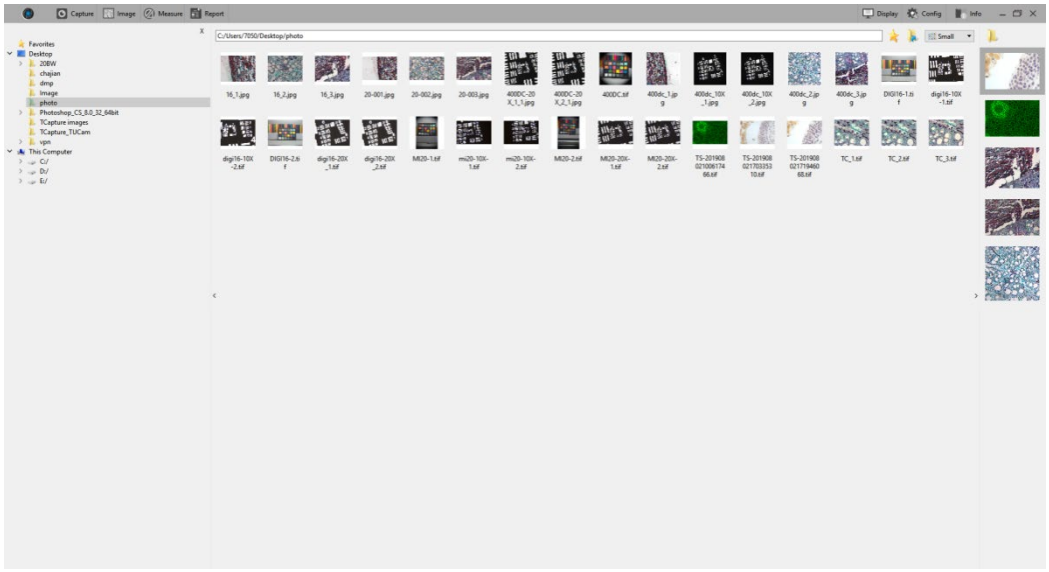
The measurement table supports exporting custom templates. For specific operations, please refer to the report chapter.

⑤ Image Bar

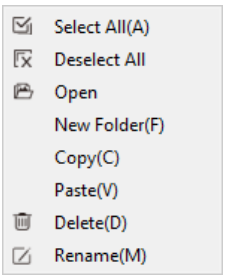
Thumbnails of pictures and videos captured or opened from other locations are displayed on the right side of the main window. Thumbnails are listed in descending order by time from top to bottom. Clicking any image switches to its [Image] page in order to adjust the parameter settings. The specific operation is as follows:

1) Click the button to locate a file to import or open. Navigate to the location where the desired image is saved in the interface below.

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

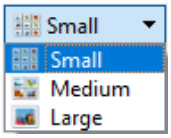


2) Right click on an image. The context menu of possible operations will appear as shown below.

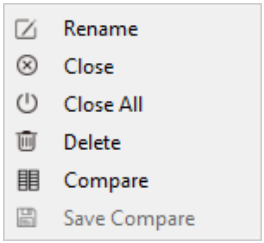


Available commands are [Select All (A)], [Cancel All], [Open], [New Folder (F)], [Copy (C)], [Paste (V)], [Delete (D)] and [Rename (M)]; the user can use ctrl+c shortcut keys to copy images, ctrl+v to paste it to the current folder. Select the file save location on the left side. Click the X button to close the window.

- The save location and all the images under this path will display on the right side of the window .
- Click the button to add the current save location to the favorites folder for quick access .
- Click the button to return to the next higher directory. Select a picture view mode with the following options .

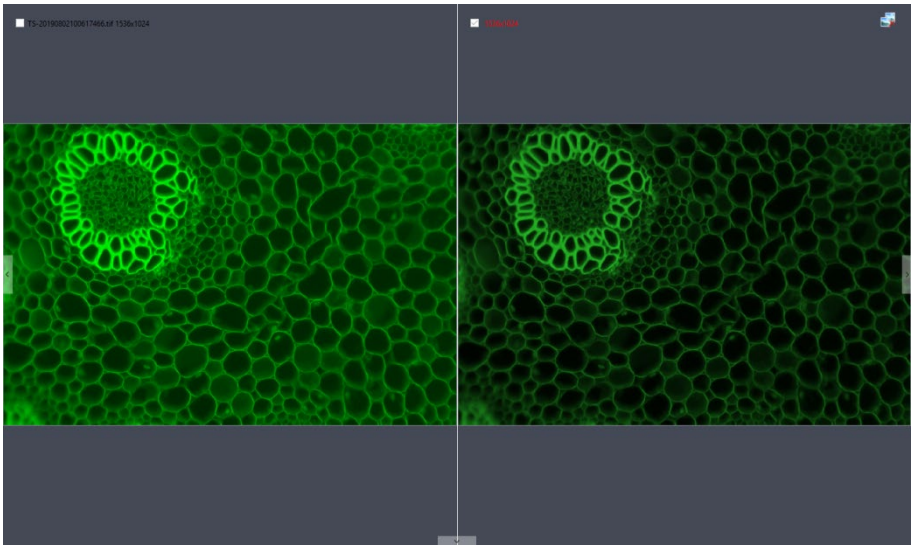


3) Right-click on an image or on an empty area of the interface to pop up the operation menu, under which the [Rename], [Close], [Close All], [Delete All], [Delete], [Compare], and [Save Compare] operations are available.



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

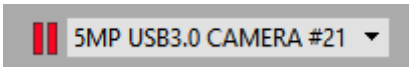
- Dynamic contrast: Contrast between a preview image and a saved picture. In preview status, right-click the picture bar to pop up the operation menu, then select [Contrast]. A dynamic preview picture will appear on the left side of the page; any saved picture selected in the picture bar will appear on the right side, and the pictures on the right side can be replaced at any time. Click on the upper right corner to exit contrast.
- Static contrast: Contrast between two saved pictures. Select an image, then right-click the picture bar to pop up the operation menu; select [Contrast] to open the selected picture on the left side of the page. Clicking another picture on the right side of picture bar will open it on the right side. During static contrast, the picture on either side can be replaced at any time: first, click the picture which needs to be replaced, and then click the new picture.
- Save contrast saves the pictures being contrasted. The contrast effect is as follows .



⑥ Shortcut Key

For the user's convenience, the software provides shortcut key functions. Specific functions are as follows :

Function	Key	Remarks

Capture	F10	Takes pictures and automatically saves the pictures taken.
Record videos	F11	Press once to record. Press again to stop recording.
Close all	F9	Stops displaying thumbnails on the right side. A prompt dialog appears asking whether to close all pictures. Click [Yes] to confirm.
Save image as	F8	Change the picture format or picture save path.
Pause	F7	Pause/ Resume the preview. When the preview is paused, a pause state prompt appears on the interface, as shown below. 

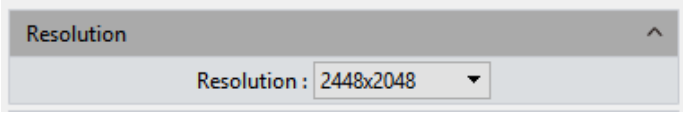
3. Capture

3.1 Capture

Click the button to capture the image shown in the preview interface. Supports rapid-fire capture.

3.2 Resolution

Resolution: Selects the preview image resolution.



Note:

- The High Speed binning resolution of the Monochrome Cooling camera can increase the frame rate.
- The compressed resolution of the HDMI series will increase the frame rate, but will also increase CPU usage.

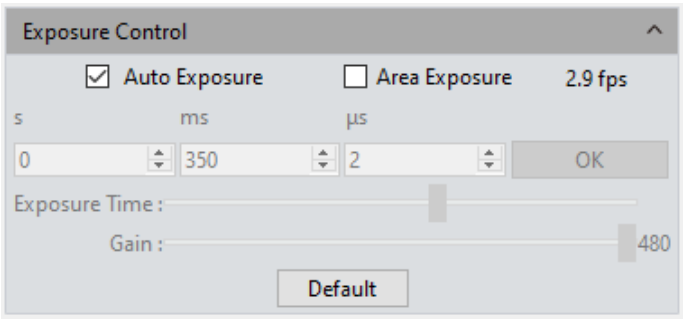
3.3 Binning

Binning: Binning mode can improve image sensitivity. Increasing the value increases the sensitivity.

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.

3.4 Exposure Control

Set the exposure time of the camera. The value of real-time frames per second (FPS) is displayed.



Target Value: The adjustment target value can change the automatic exposure brightness of the image. The target value range for USB3.0 series is from 10 to 245; for USB2.0 series and HDMI series, from 0 to 15.

Auto Exposure: When the [Auto Exposure] box is checked, the software automatically adjusts exposure time to obtain an image with appropriate brightness.

Area Exposure: When the [Area Exposure] box is checked, the software automatically adjusts the exposure time according to the image brightness in the area.

Manual Exposure: If the [Auto Exposure] box is not checked, the system switches to [Manual Exposure] mode, where the user can manually input the exposure time according to image requirements. Click the [OK] button to apply, or manually adjust the exposure time with the slider.

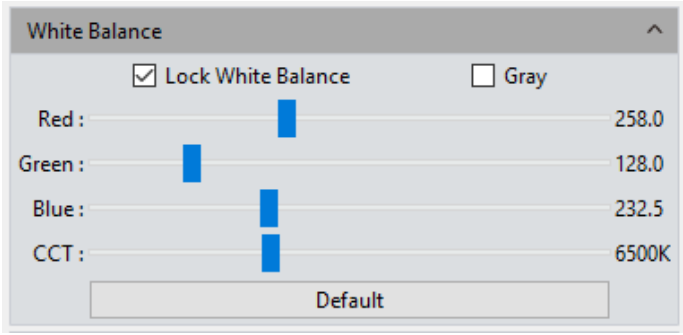
Gain: The user can select the most suitable amount of gain according to specific applications and needs upon previewing images. Higher gain improves image brightness, but also increases noise.

Default: Click the [Default] button to restore this module's parameters to factory settings.

The default setting for exposure is [Auto Exposure].

3.5 White Balance

The user can adjust white balance parameters according to the current 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 illumination conditions. The default setting for camera white balance of the camera is Auto-white balance. The user can uncheck **[Lock White Balance]** for environments with stable illuminating conditions, or check **[Lock White Balance]** to lock the current white balance setting for use in variable illuminating conditions.

Area white balance: In biology mode, when opening white balance options, and **[Area White Balance]** is selected, the area white balance box will appear for the preview pictures. In industrial mode, when opening white balance options, the area white balance box will appear for preview pictures. The size of the area white balance box is adjustable. Under stable lighting conditions, move the area white balance box to any white part of the picture, then adjust its size, and check [Lock White Balance] to lock in the current white balance, which will make white balance calibration more accurate.

Gray: Check to convert a color image to a monochrome (grayscale) image.

Red, Green, and Blue (Gain): Manually adjust the gain values of the red, green, and blue channels for a suitable white balance effect. Values range from 0 to 683.

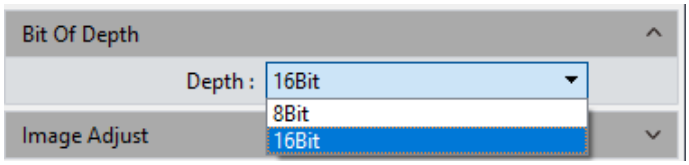
Close Color Temperature (CCT): The current close color temperature can be achieved by adjusting the three gains above for Red, Green and Blue channels. It can also be manually adjusted and matched to the close color temperature according to the current illuminating environment. The method detailed above of calibrating white balance will allow the user to achieve the correct color temperature more accurately. Setting ranges from 2000K to 15000K.

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

settings. The default setting for white balance is **[Auto-white balance]**.

3.6 Bit Depth (only for Monochrome Cooling camera)

The preview image displayed by default is an 8-bit data image. PixelPro allows the user to select 8 or 16-bit data as required by the user's specific needs .

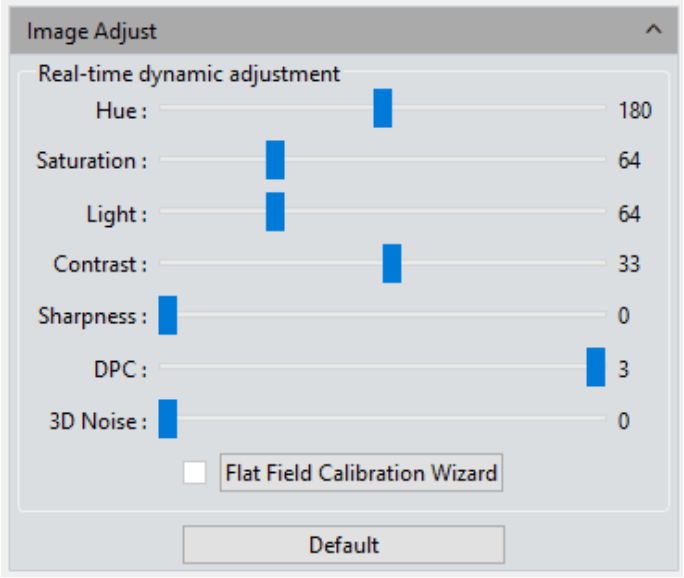


Notes:

- The default bit depth of Monochrome Cooling camera is 16 bits.
- The default bit depth of USB3.0 color camera is 8 bits.
- The bit depth of USB2.0 camera is 8 bits only; 16 bits is not supported.

3.7 Image Adjust

Conduct real-time dynamic adjustment of pictures by changing parameters to achieve ideal picture effects. Specific functions are as follows:



Hue: The shade of the color. Adjustment ranges from 0 to 360.

Saturation: The purity of the color. Higher saturation yields more vivid colors; lower saturation yields grayer colors. Setting ranges from 0 to 255.

Light: The brightness and darkness of the image. Setting ranges from 0 to 255.

Contrast: Higher contrast yields a clearer picture with brighter colors. Setting ranges from 0 to 63.

Sharpness: Improves clarity of picture edges.

DPC: Reduces image bad points. Ranges from 0 to 3. 3 is default for FL-20.

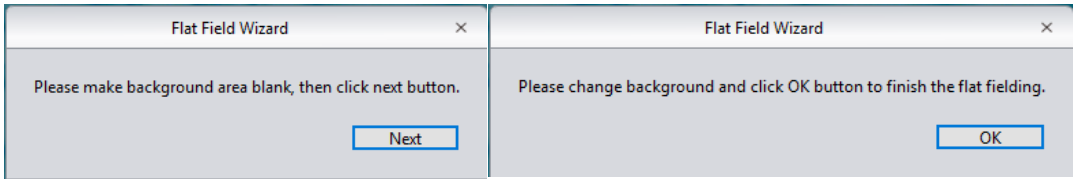
Black level: Adjusts gray value of dark field backgrounds. Ranges from 0 to 255. Default value is 12, for Monochrome Cooling camera only.

3D noise reduction: Takes the average from adjacent frames of a picture and automatically filters out non-overlapping information, so as to obtain a cleaner and clearer picture. The number of frames can be customized. Ranges from 0 to 5 for Fl-20. Defaults to 3.

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

Operations:

1) Click **[Flat Field Calibration Wizard]**. Move the viewing field of the camera to a blank background, as shown in the right figure (1). Click [Next].
2) Move the first background to a new blank background. Click [OK] to apply the Flat Field Calibration function, as shown in the right figure (2).



3) Click [☑] to uncheck and exit the flat field correction mode. Check the box to re-apply flat field corrections without repeating the wizard procedure.

Notes:

1) Flat Field Calibration requires manually setting the exposure time, such that the image is not too bright or too dark, and all the pixel values are within the range of 64DN to 254DN.
2) The brightness of the two reference backgrounds for calibration should be almost the same except for some variable spots. These two backgrounds should not be “significantly inconsistent.”

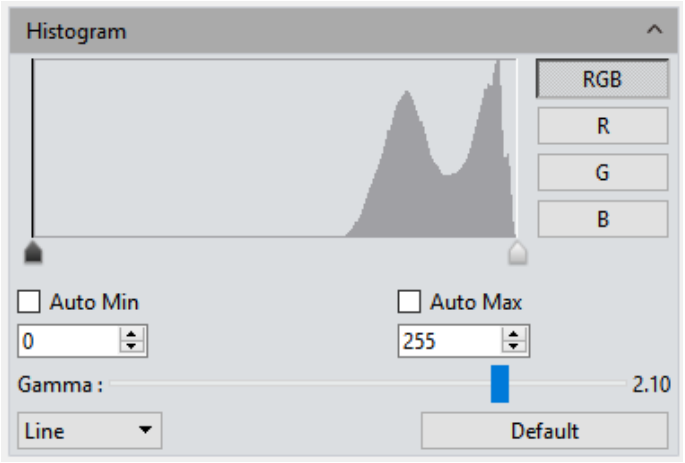
3) To standardize the background for flat field correction, it is recommended to use plastic, ceramic or professional white balance paper as the standard samples.

4) Flat Field Calibration requires that the background it uses as reference to be blank and illumination on it to be uniform. Calibration should be run again if the camera lens or the microscope objective is changed.

Default: Settings will restore to default values when [Default] is clicked. Color tune default is 180, contrast default is 33, saturation default is 64, image enhancement save defaults to unchecked, detail enhancement default is 1, and noise reduction default is 1.

3.8 Histogram

The user may perform adjustments to color levels to obtain more realistic images for observation and analysis.



Color level adjustment means redefining the R/G/B color levels in each channel and then re-allocating pixel values. Adjust color levels (gradations) to increase or decrease the range of the selected area in the image, tuning it to brighter or darker values. The user can also adjust the individual components of the three RGB channels separately to change the image color via the corresponding channel(s).

Manual Color Level: The user can manually adjust the image's dark tone (left gradation), gamma. and highlight brightness level (right color gradation) on the histogram to regulate the image's tones, such as contrast, shading and image layers, to obtain the correct balance for the whole image.

Auto Color Level: Check [Auto Min] and [Auto Max] to automatically set the brightest and darkest pixels in each channel to white and black, and proportionally re-allocate pixel values between them.

Gamma: Adjusts the median of color levels. Setting ranges from 0.64 to 2.55.

Histogram display: Histogram supports linear or logarithmic mode.

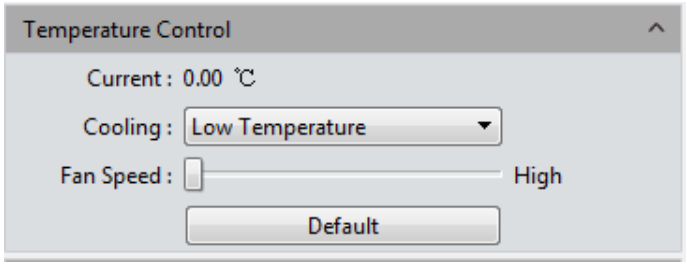
Default: Click the [Default] button to restore the module's parameters to factory defaults. Color level adjusting defaults to manual, and the default gamma value is 2.10.

Notes:

1) Calculating and displaying the histogram curve takes up some system resources, due to running data statistics in real time. When this module is applied, camera frame rate may drop slightly. Once the module finishes working, data statistics calculation resources are freed up and the camera rate can reach its maximum again.
2) After canceling automatic color level adjusting, level values will be set to defaults (0 and max).

3.9 Temperature Control (only for Cooling camera)

The software supports temperature adjustments by cooling cameras; noise reduction can be achieved by reducing the working temperature of the picture sensor .



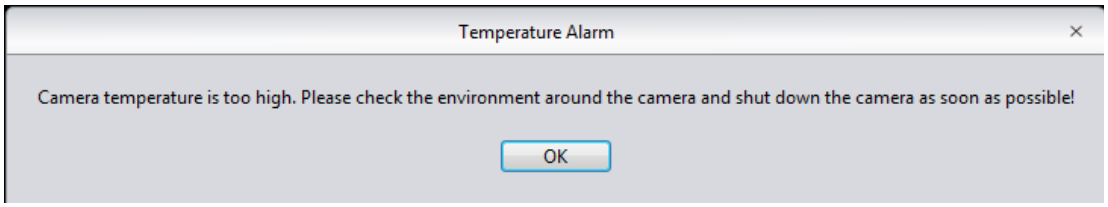
Current: Displays the current camera temperature.

Refrigeration: Three options – normal temperature, 0°, and low temperature – are available.

Fan Speed: Controls the fan speed. Monochrome Cooling camera supports three speeds: High (default), Medium and Low. Color Cooling camera supports six speeds; default is 3. Low speeds can reduce noise, but heat dissipation is slightly less effective.

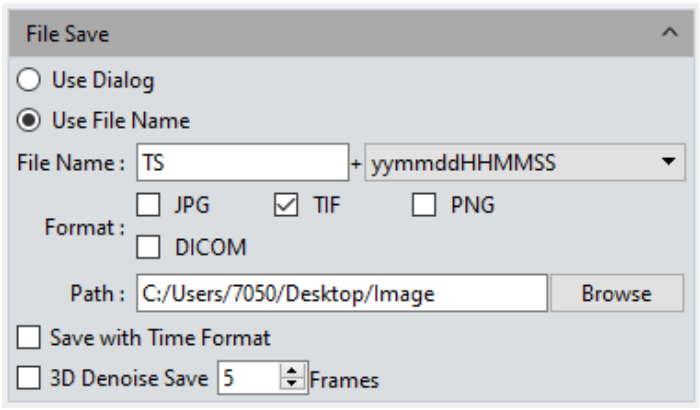
Default: Resets current parameters to factory defaults. “Low temperature” refrigeration is default.

Note: If the camera (Monochrome Cooling camera only) supports the high temperature warning function and the external environment temperature is too high, the program will display the following temperature warning prompt message and the indicator light on the camera will begin flashing red.



3.10 File Save

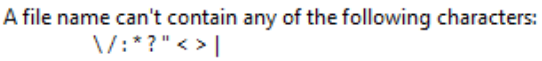
PixelPro takes data from the real-time video data stream and records it in image format for later development and analysis.



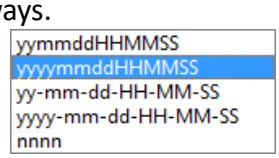
Click the button to capture a live preview image.

Save Dialog Window: The file save window appears when the Capture button is clicked. Five file formats for saving pictures are supported: JPG, TIF, PNG, DICOM, and MPTIF. MPTIFF is only supported on Dhyana 400DC. DICOM and MPTIF are not supported in the Mac version.

File name: The file to be saved is named "TS" by default, but the user can give the file any desired name. The file name cannot contain the following special characters: \/:*?"<>|. If the user attempts to enter any of these special characters, an error message will appear, as shown below.



The program supports custom time stamps for automatic naming. Time stamps can be formatted in the following five ways.



Format: The image may be saved as JPG, TIF, PNG, or DICOM files. The default format is TIF. These four image formats can be checked individually or simultaneously. The captured images saved in different formats will be displayed together when multiple

formats are selected simultaneously.

1) JPG: A lossy, compressed image format. Its image size is small, but the final quality of the image is low compared with the original captured image.
2) TIF: A lossless image format, which can save all the data transmitted from camera to saving device without losing data. This format is good for saving and converting images with high image quality requirements.
3) PNG: Portable Network Graphics is a lossless but compressed bit-image format that uses a lossless data compression algorithm derived from LZ77 with a high compression ratio and a small file size.
4) DICOM: Digital Imaging and Communications in Medicine, an international standard format for medical images and related information. It defines a medical image format that can be used for data exchange and meets the requirements of clinical practices and applications.

Path: Save image files to a particular folder. The user can click the [Browse] button to change save paths. The default save location is C:/Users/Administrator/Desktop/Image. The path cannot contain the following special characters: \/:*?"<>|. If the user attempts to enter special characters, an error message will appear.

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

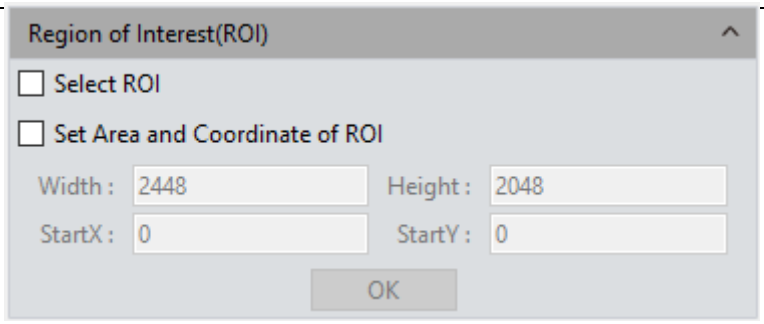
3D Denoise Save: Obtains low-noise images by acquiring and comparing image data from several consecutive frames, and filtering out non-overlapping information. The number of frames can be customized. The range is from 1 to 99; the default is 10.

Notes:

- Saving a 3D denoise image will take longer than saving a normal image.
- 3D Denoise Save is only suitable for capturing static images.
- 3D noise reduction has no effect on video recording.

3.11 ROI

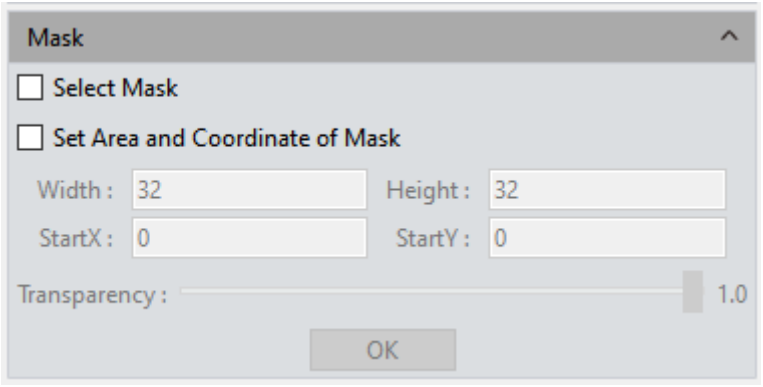
ROI (Region of Interest) is a function that allows the user to define a specific area in a window within the effective and sensitive detecting field of the camera sensor, and restrict image information within this defined window to be read out and displayed. A smaller ROI reduces the amount of information and tasks of image transferring and computer processing, which results in an increased frame rate for the camera.



Select ROI: Use a computer mouse. Check this box, then click and drag within the image preview to define the window area of the ROI. This window area displays the coordinate values and resolution of the current running task. Click on the [√] below the cursor to apply the ROI settings.

Set Area and Coordinates of ROI: Manually enter the starting point coordinate values and the resolution size to define an exact ROI area. Enter the point offset position of the rectangular area from the top left corner of the image, as well as the width and height, then click **[OK]** to apply the ROI settings.

3.12 Mask



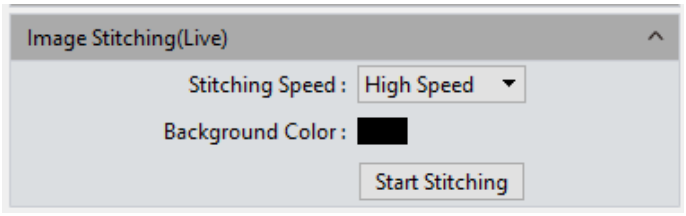
Select Masking Area: Use a computer mouse. Click and drag within the image preview to define the window area to be masked. This window area will display the coordinate values and resolution of the current running task. Click on the [√] below the cursor to apply the mask settings.

Set Masking Area and Coordinates: Manually enter the starting point coordinate values and resolution size to define an exact masking area. Enter the 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 brightness of the unmasked area.

3.13 Image Stitching (Live)

The **real-time image stitching** function joins several individual images with overlapping features of parts of the specimen or sample, combining them into a single image showing the whole of the specimen.

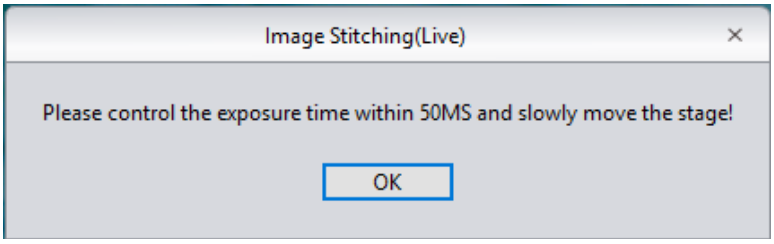


Stitching Speed: Two options: High Speed and High Quality. Default is High Speed.

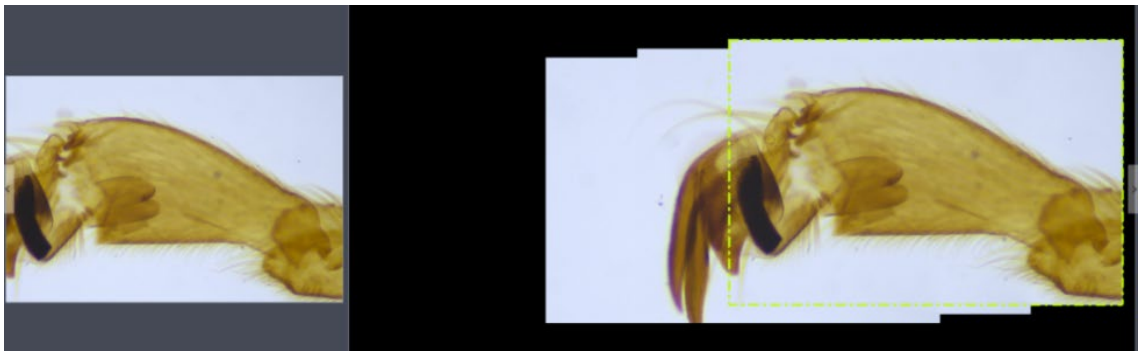
Background Color: The default background color of ignored areas on the stitched image is black, but can be customized. Click on to select the desired color in the palette. The color takes effect once stitching is completed.

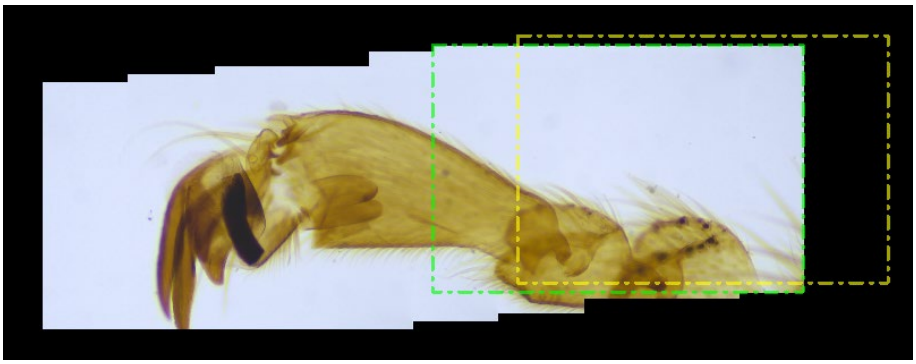
Operating Procedures

1) Clicking **[Start Stitching]**. The following prompt appears.



2) Move the sample across the stage to image other areas, and move no more than 3/4 of the image at a time. As long as the navigation display frame in the stitching window is green, each time the sample is moved, the program will stitch on one additional image.





3) If the navigation display frame is red, it means that the stitching area has been exceeded and stitching cannot be performed. The sample needs to be moved back to a location near the last stitching area.

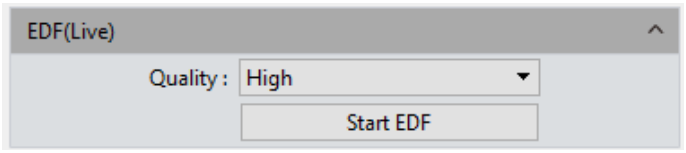
4) Click **[Stop Stitching]** to end stitching. A composited stitched image will be generated in the image gallery.

Notes:

1) It is recommended to conduct a white balance correction and flat field correction before starting the stitching to ensure the best quality images.
2) Since the stitched images are large in size and will likely occupy a massive amount of computer memory, once the process of stitching takes up 75% of available computer memory, the stitching module will stop working automatically. It is recommended to perform image stitching operations on a computer with sufficient memory.
3) 32-bit computer operating systems do not support dynamic image stitching.

3.14 EDF (Live)

EDF makes it possible to stack and merge the images acquired by the microscope with different focus planes or positions on a given thick specimen or sample. The new stacked and merged image can thus present a clear, fully formed specimen or sample with complete information.



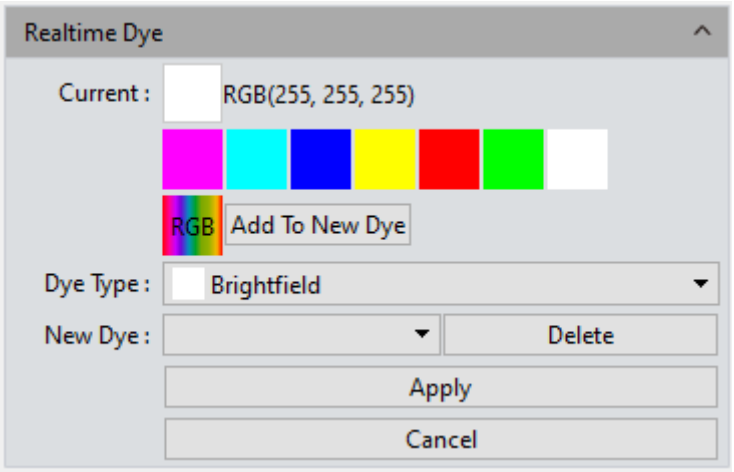
Quality: The higher the quality level of the new image requires, the longer it will take to merge its constituent images.

Operating Procedure

1) Click the **[Start EDF]** button to start the extended depth of field operation.
2) Slowly turn the focus fine-tuning knob of the microscope to move the focus plane through the objective. The program merges the plane images in real time and displays the clearest possible live image.
3) Click the **[Stop EDF]** to end the stacking and merging process. A new merged Image, including all depth focusing information, will be generated in the image gallery.

3.15 Realtime Dye

This module is generally used when taking fluorograms with a monochrome camera to colorize monochromatic fluorescent images, and take a photo to obtain a dyed image for later synthesizing into a complete fluorescent image.



Current: This window displays currently available colors.

Click to open the full color palette. The user has many more choices of color.

Add to New Dyes: Adds selected colors to the dye color selection palette.

Dye Type: Displays one of seven common colors.

New Dye: Displays user-defined dye colors.

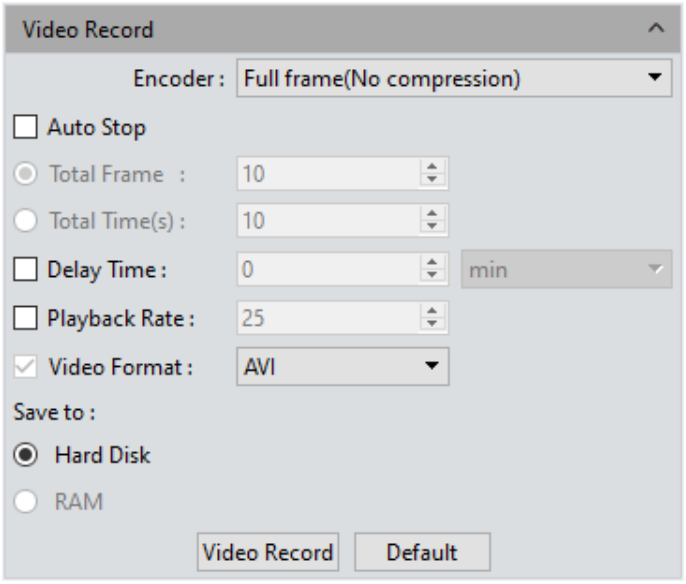
Delete: Deletes the currently selected user-defined dye color.

Apply: Applies the selected dye color to the image.

Cancel: Stops applying any dyes added through custom mode.

3.16 Video Record

Click on [Video Record] to save image data into video formats for playing back to observe the process of a sample's live movements.



Encoder: The program provides two compression formats: [Full frame (No compression)] and [MPEG-4]. The video sizes generated by different compression formats can vary, and the user may choose either format according to the needs of each task.

Total Frame: Captures images according to how many frames were set to be captured. Setting ranges from 1 to 9999 frames.

Total Time(s): The length of time spent capturing images based on how long the time is set to. Setting ranges from 1 to 9999 seconds.

Delay time: Introduces a delay before capturing images. Three time unit options: minutes, seconds and milliseconds. Setting ranges from 1 millisecond to 120 minutes.

Playback Rate: Records according to the set playback frame rate.

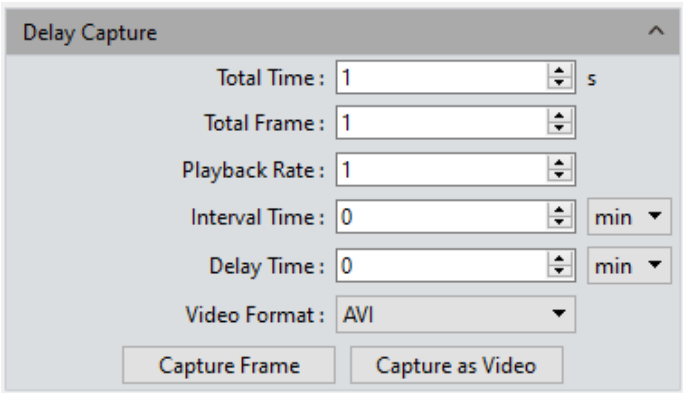
Video Format: AVI, MP4, and WMA are supported. The default format is AVI.

Save to Hard Disk: Immediately writes the video to disk. The image data is written to the hard drive during the image capturing process. In this mode, transmission speed from camera to computer will be reduced due to the computer writing image data to its hard drive, so this mode is not suitable for capturing images of quickly changing scenes or backgrounds; it is better suited for long periods of capturing.

Save to RAM: Image data is temporarily saved in RAM; then, after image capturing is complete, all the image data is transferred to the hard drive. Select Save to RAM and enable RAM to save images. The maximum number of images that can be saved in RAM will be shown. This saving mode allows the camera to maintain a high transmission speed of the images when capturing and avoids data loss due to low transmission speed. This saving mode is limited by the volume of the computer's RAM, so it is not suitable for long-duration or high-quantity volumes of image capturing.

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

3.17 Delay Capture



Total Time: Captures images for the duration selected. Default is 1s. Setting ranges from 1 to 9999 seconds.

Total Frame: Captures the specified quantity of frames . Default is 10 frames. Setting ranges from 1 to 9999 frames.

Playback Rate: Records according to the specified playback frame rate. Default is 25. Setting ranges from 1 to 10000 frames.

Interval Time: Interval time for capturing images in one of three time unit options:

minutes, seconds, and milliseconds. Default is 0 minutes. Setting ranges from 0ms to 120min.

Delay time: Introduces a delay before capturing images in one of three time unit options: minutes, seconds and milliseconds. Default is 0 minutes. Setting ranges from 0ms to 120min.

Video Format: AVI, MP4, and WAM are supported. Default format is AVI.

Capture Frame: Begins capturing images according to the parameters set and saves each frame as an individual image. Click **[Stop]** to terminate the capturing task early.

Capture as Video: Begins capturing images according to the parameters set

and convert them into a video directly. Click **[Stop]** to terminate the capturing task early.

MPTIF: When a Dhyana 400DC is connected, it supports saving images in MPTIF format. If both TIF and MPTIF formats are selected, only MPTIF format images will be generated.

Note:

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

3.18 Trigger (only for Monochrome Cooling camera)

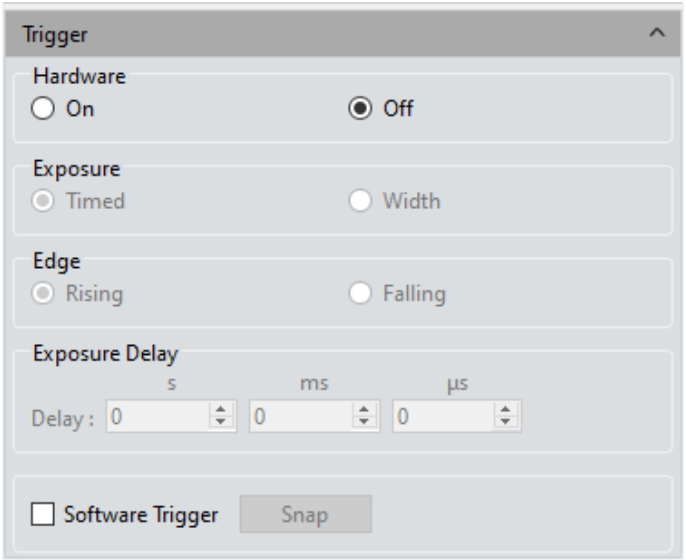
There are two output modes for image output: frame mode and stream mode.

Frame mode: Waits for an external trigger before outputting single images. Hardware trigger mode and software trigger mode are available.

Flow mode: Captures a continuous real-time preview of images without requiring a trigger and embeds image data in the stream .

Hardware Off: Indicates that the hardware trigger mode is off at this time, and the camera is always taking pictures.

Hardware On: Turns on the hardware trigger and enters standard trigger mode. The camera will wait for a trigger and no picture taking will be carried out. The camera will take pictures only when a trigger signal is received.



There are several configuration modules:

1) Exposure:

   Timed: Exposure time is set by the program.

   Pulse width: Exposure time is set by input level width.

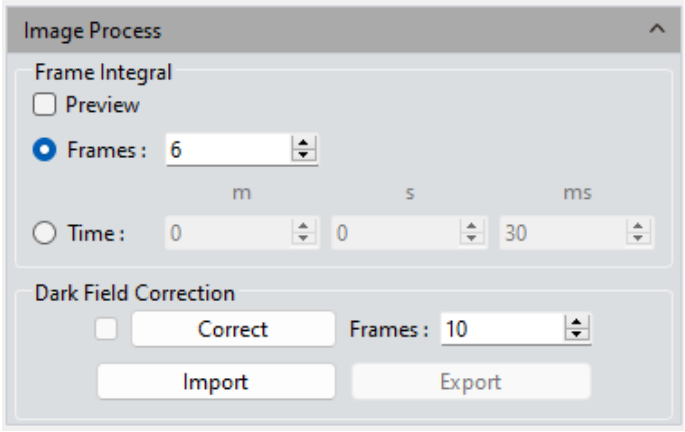
2) Edge:

   Rising edge: indicates that the trigger signal is valid for rising edge.

   Falling edge: indicates that the trigger signal is valid for falling edge.

3) Exposure Delay: Introduces a delay between receiving a trigger signal and taking a picture.

3.19 Image Process (only for Monochrome Cooling camera)



Frame Integration: Captures continuous multi-frame images according to specified parameters, combines multi-frame data into one image, and previews integration effect in real time.

1) Integration by frames: combine the specified number of frames into one picture.
2) Integration by time: combine all frames taken during the specified time interval into one picture. The number of frames is the integration time interval divided by the exposure time.
3) Integration Preview: display the integrated image in real time in advance on the screen according to the specified parameters, adjust to best effect, and then take the picture.

Integrated photographing can improve the brightness of low-brightness images and

obtain a better imaging effect.

Notes:

1) An appropriate number of accumulated frames should be set for integrated photographing, otherwise the image brightness will be too high and distortion will occur.
2) “Integration frame number” and “integration time length” cannot be enabled at the same time.

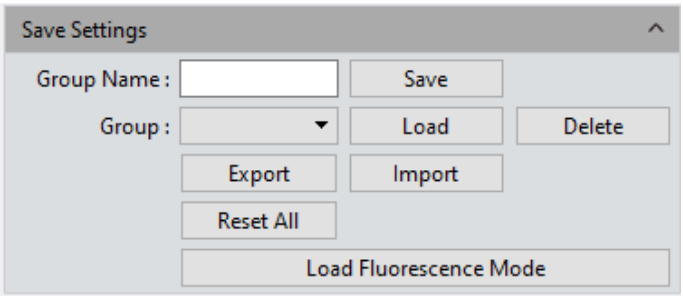
Dark Field Correction: Solves the problem of chip edge light and background disuniformity.

1) Dark Field Correction becomes available only after importing images to be corrected. The function can be turned off by unchecking the box afterward.
2) Click the [Correct] button and follow the prompt. Click next to calculate the correction coefficient automatically.
3) Number of frames ranges from 1 to 99. Default is 10.
4) Import and export are import and export correction factors, respectively.
5) Dark field correction should be performed for different exposure times and scenes, as needed.
6) The module remembers the frame number setting from one session to the next, but not correction status or coefficient.

3.20 Save Settings

The program allows managing groups of experiment parameters for the user’s convenience in using the camera in different applications or platforms.

The user can save and re-load set parameters from different experiment statuses and then apply them to new experiment projects. This function will save the user time, improve working efficiency and ensure reproducibility of experiment results. The parameter group saver allows the user to save all the software functions and modules mentioned above (with the exception of the flat field correction module).



Parameter group files are cross-platform compatible, ensuring the user's experiment conditions are as uniform as possible.

Group Name: Gives the parameter group a user-defined name. The drop-down menu will display other parameter groups which have been saved or loaded.

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

Load: Loads the parameter group to current working status.

Delete: Deletes the currently selected parameter group files.

Export: Saves parameter group files to a specified folder.

Import: Loads selected parameter group files from a specified folder.

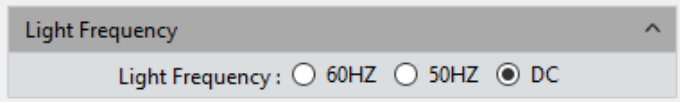
Reset All: Restores factory default settings and removes all parameter group files made and saved by the user from the Group menu.

Load Fluorescence Mode: Switches exposure mode to manual, sets exposure time to 100ms, and checks the automatic level.

3.21 Light Frequency

The user can select an appropriate light source frequency according to current experiment requirements. A suitable light source frequency is good for normalizing live images and prevents a strobing effect.

The default light source frequency is direct current.

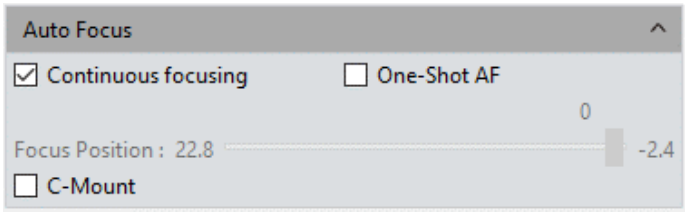


3.22 Other Settings

Negative: Inverts the current image colors .

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

3.23 Auto Focus (only for Auto Focus camera)



Continuous Focusing: Select focus area in preview screen. Camera will conduct continuous focusing on the selected area until it's completely clear. When the focal length is changed due to moving the sample or camera, the camera will automatically adjust the focal length to ensure a clear picture.

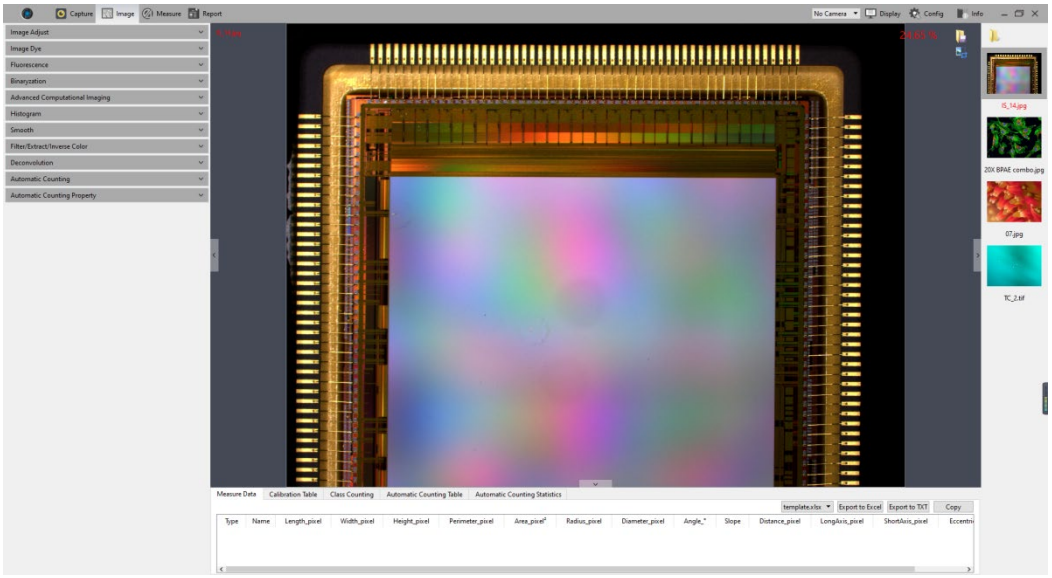
One-Shot AF: Select focus area in preview screen. Camera will conduct one-time focusing on selected area. After focusing is complete, focal length will stay unchanged when sample or camera is moved. A new focus area must be selected to change focal length.

Focusing Location: Allows the user to adjust focus area manually; focal length will change to suit.

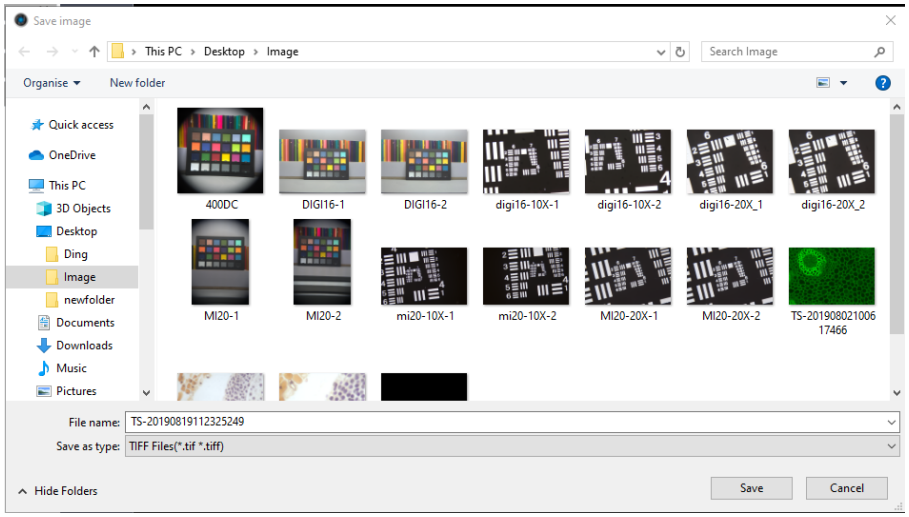
C-Mount: Automatically moves to the C interface position

4. Image

Click to save images in JPG, TIF, PNG, or DICOM format. A window will appear as shown below.

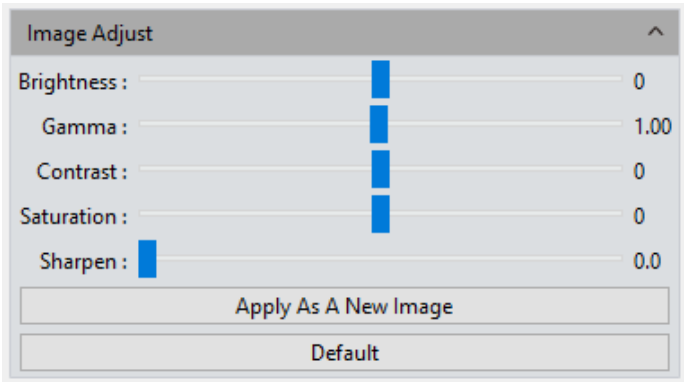


Click the screenshot button upper right corner of the preview window to crop the picture. Select the desired area in the preview image with the mouse, then double left click or double right-click to complete the screenshot. The screenshot will appear in the picture bar to the right. Click to save the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



4.1 Image Adjust

Adjusts image parameters to revise the effects of captured images.



Brightness: The brightness of the image. Default value is 0. Adjustment ranges from –255 to 255.

Gamma: Adjusts the brightness of the image displayed on the monitor. Default value is 1.00. Adjustment ranges from 0.01 to 2.00.

Contrast: The ratio between the darkest and brightest areas of the image. Default value is 0. Adjustment ranges from –80 to 80.

Saturation: The purity of the color. Set higher values for more intense colors. Default value is 0. Adjustment ranges from –180 to 180180.

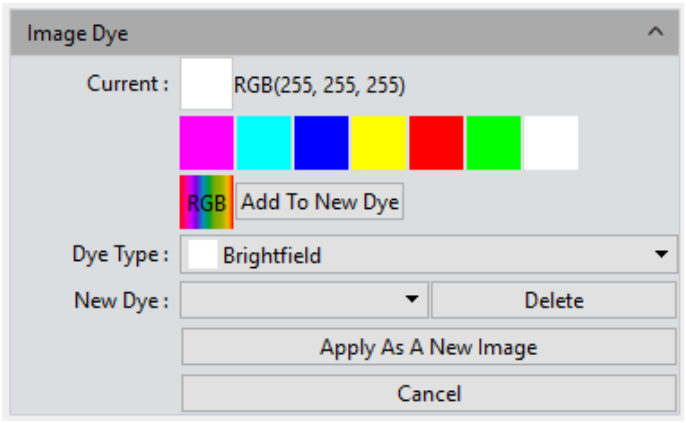
Sharpen: Simulates adjusting focal length on blurred edges of the image, leading to a more vivid color in the specified area of the image. Default value is 0. Adjustment ranges from 0 to 3.

To finalize the parameter adjustments for the image, click **[Apply as a New Image]**. The set parameters will be applied to the original image and saved as a new image.

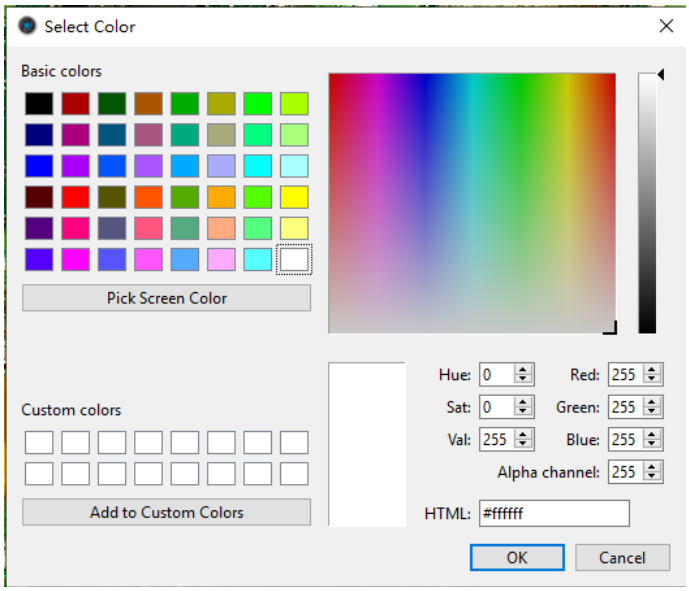
Default: Click the **[Default]** button to restore all parameters to factory defaults.

4.2 Image Dye

Monochrome images must be colorized first. The user can select colors from the color editor and corresponding fluorescent dyes. After color selection, click **[Apply as a New Image]** colors to the picture, to obtain a realistic color picture closely corresponding to that observed under a microscope. Click **[Cancel]** to cancel dyeing.



Current: Shows the currently selected dye type. The program provides seven commonly used colors. Click to open the color selection palette shown below.



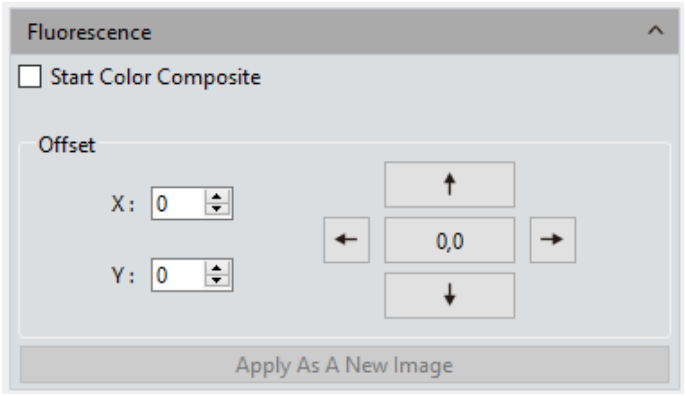
Dye Type: Right-click to add custom colors to color groups future use.

Add to New Dye: Adds the selected color on the palette as a new dye.

Cancel: Cancels adding custom colors to dyes.

4.3 Fluorescence

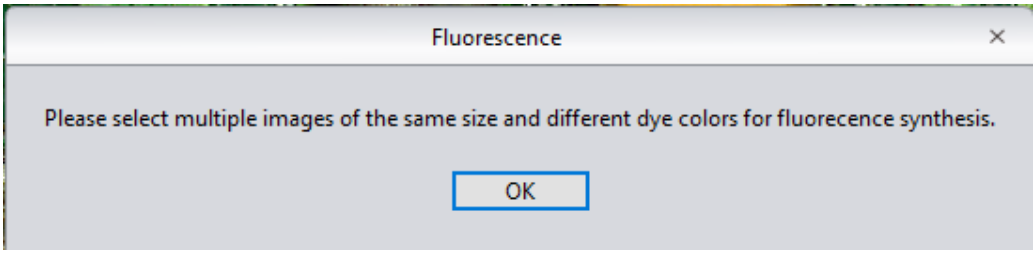
In biological-related science research fields, different fluorochromes are used to label different cell structures. A complete fluorescent cell image contains multiple fluorescent areas corresponding to different cell structures, which have their own special affinity to certain fluorochromes. Due to the limitations of fluorescence wavelength emissions in the microscope turret, the user can only observe one color at a time. Specific settings are as follows:



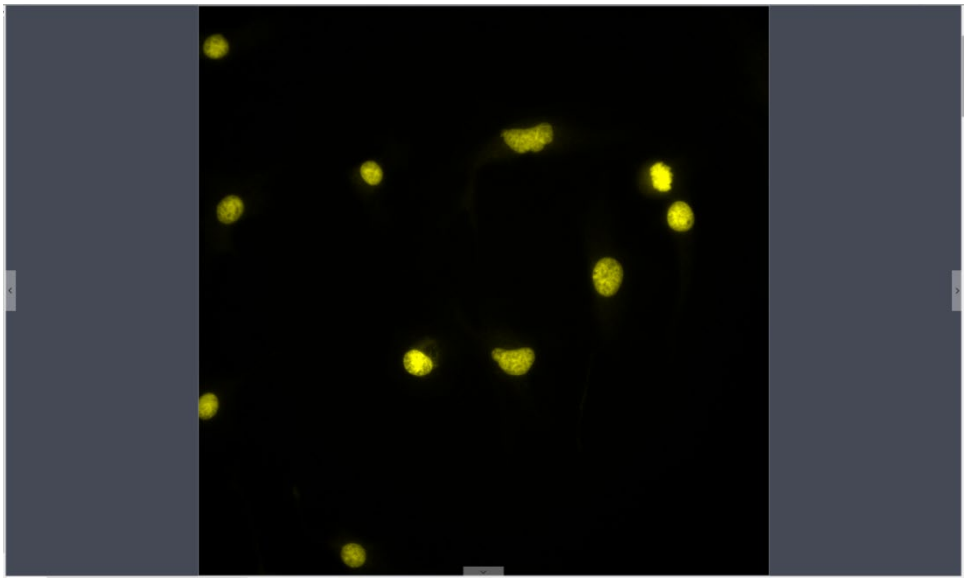
Operating Procedure:

1) Open the image which needs combined fluorescent channels in the preview window.

2) Check **[Start Color Composite]** to select a group of images with the same observation field as the one already open. A maximum of 4 images can be selected to combine together. An instructional dialog window appears as shown below.



3) Select the original image requiring fluorescence synthesis from the right picture bar; the synthesized image will be displayed in the preview windows, as shown below.



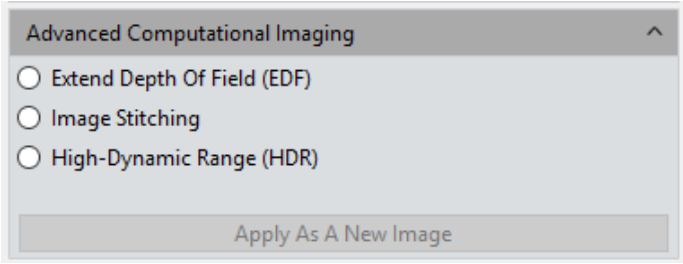
4) Click **[Apply as a New Image]** to add the combined image to the image gallery and display it in the preview window. The fluorescence combining process is then finished.

Offset: Mechanical vibrations from the motion of switching fluorescence filters can

potentially lead to pixel drift from one captured single-channel image to another, such that these captured single-channel images are not exactly aligned under the same observation field and area. The Drift Correction module allows the user to correct this pixel drift and ensure all single-channel images under the exact same observation field and area are properly aligned, resulting in perfect multi-channel combining. One correction unit stands for one pixel. Click on [0,0] to reset positioning to the center.

4.4 Advanced Computational Imaging

PixelPro offers the user three kinds of post-processing technologies for image collections. They work by merging batches of captured images.



Extended Depth of Field (EDF): Takes clearly focused areas from each of multiple images captured within the same observation field but not at the same focus planes, and merges them into a new image which has clearly focused areas throughout the whole image.

Image Stitching: Stitches several images with overlapping parts into a single large, seamless, high-resolution image.

High-Dynamic Range (HDR): Takes a batch of images with different exposure times, selects three images — one underexposed, one overexposed, and one moderately exposed — and merges them into one new image with a high dynamic range.

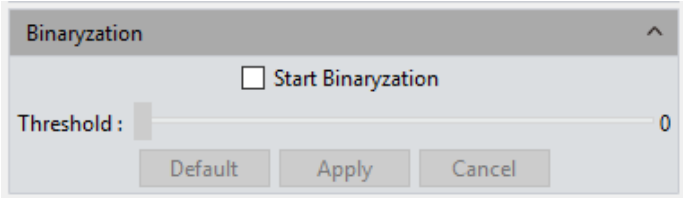
Operating Procedure:

1) The user may select the image processing method required. Select multiple images with the wizard. For example, using EDF processing:
2) Click on **[Combination]** at the bottom of the interface.
3) The combining process begins. The window will display a progress counter, for example: EDF 4/39.
4) When the combining process is complete, a thumbnail of the combined image will be generated and presented in the left menu bar, as shown below .

5) Click the [Apply as a New Image] button. The new combined image will be added to the image gallery and shown in the preview window. The combining process is then complete.

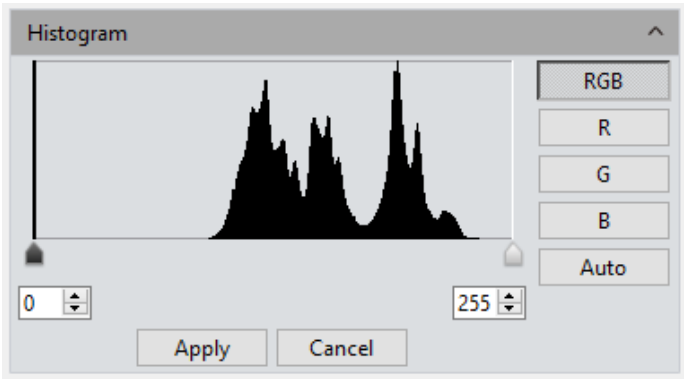
4.5 Binarization

PixelPro provides image binarization, which sets the value of the pixels on a grayscale image to either 0 or 255 based on a user-defined threshold. This process renders the whole image in a distinct black and white format (a binary image, which is a digital image that has only two possible values for each pixel).



4.6 Histogram

When handling pictures, more realistic colors are usually needed for observation and analysis. Adjusting the color scale can help the user to obtain improved picture effects, as shown in the following picture.



Color Scale Adjustment: Redefines R/G/B in each channel, and then proportionally redistributes pixel values between them. Adjusting the color scale of a picture can enhance highlighted areas and brighten the whole picture, as well as darken too-bright pictures; each channel can be adjusted separately.

Manual Color Scale: Using the histogram, the user can manually adjust shadow (left color scale), gamma, and highlight levels (right color scale) to calibrate picture tone, including contrast, shade and image hierarchy, and to balance the color of the picture.

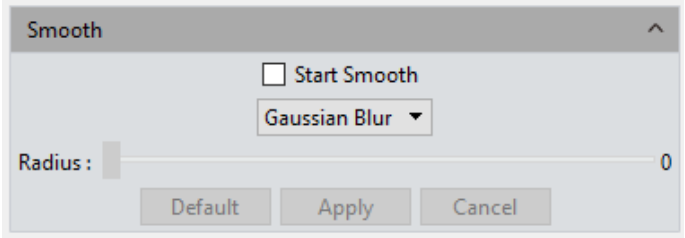
Automatic Color Scale: Click [Auto] to set the brightest and darkest pixel in each channel as white and black, respectively, and then proportionally redistribute the pixel values between them .

Apply: Applies current parameter settings to the picture and generates a new image. The new image can be saved separately.

Cancel: Click the **[Cancel]** button to dismiss the module dialog.

4.7 Smooth

PixelPro provides the user with three image smoothing techniques for blurring images to reduce noise and level of detail: ①Gaussian Blur ②Box Filter ③Median Blur. Setting ranges from 0 to 30.



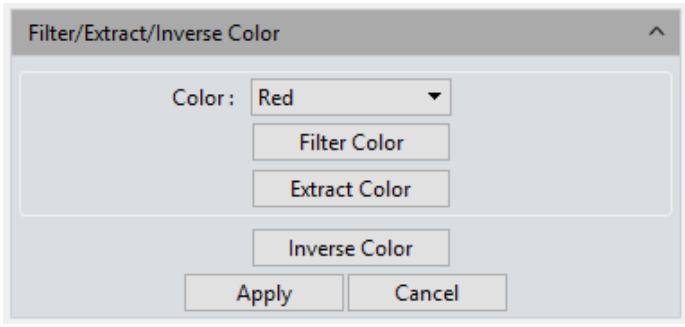
Radius: A larger radius increases the image processing effect and results in a smoother image.

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

Apply: When parameters are adjusted to desired values, click **[Apply]** to make the parameter settings take effect on the original image and generate a new image. The new image can be saved to other paths or documents.

Cancel: Click the **[Cancel]** button to dismiss the module dialog.

4.8 Filter/Extract/Inverse Color



Color: Select Red/Green/Blue.

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

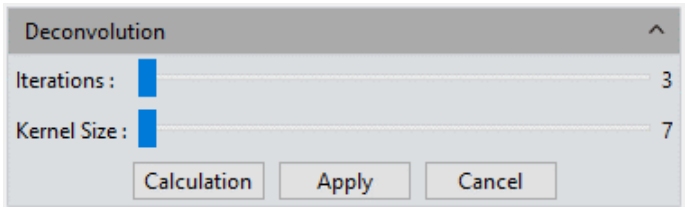
Extract Color: Extract the selected color from the RGB color group.

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

Apply: When 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 to other paths or documents.

Cancel: Click the **[Cancel]** button to dismiss the module dialog.

4.9 Deconvolution



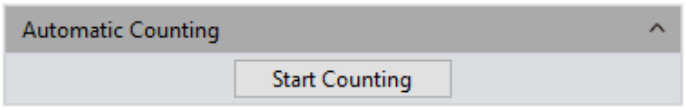
Iterations: Number of iterations.

Kernel Size: Deconvolution kernel window size.

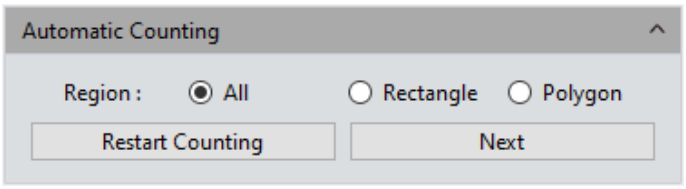
Note: This function is not supported on the Mac version.

4.10 Automatic Counting

The Automatic Counting setting interface is shown below.



Start Counting: Click to enter the counting process.



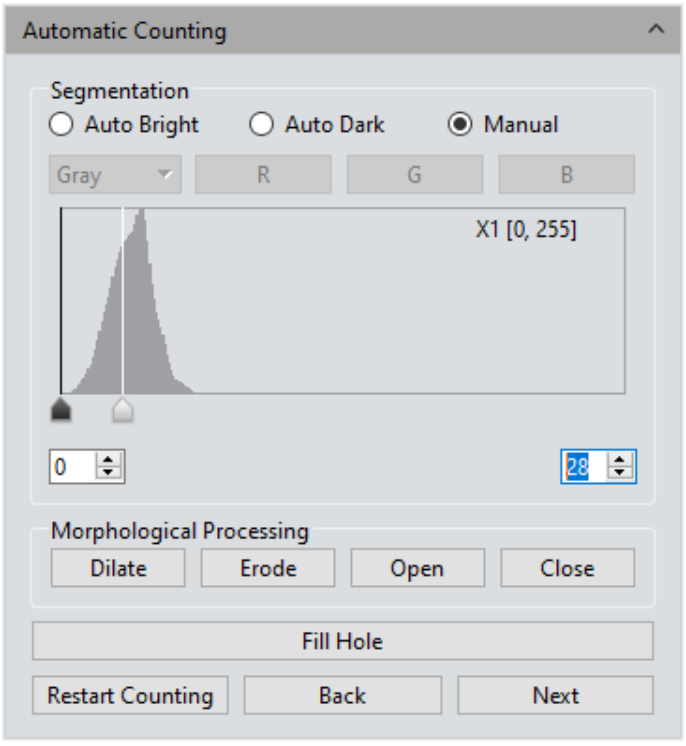
All: The counting area is the full image.

Rectangle: Left-click to diagonally opposite corners of a rectangular area. The counting area is the selected rectangle.

Polygon: Left-click multiple times to draw a polygon. Double-click to end drawing. The counting area is the selected polygon.

Restart Counting: Returns to the Start Counting interface.

Next: Go to next step.



Auto Bright: Uses algorithms to automatically separate bright objects from a dark background.

Auto Dark: Uses algorithms to automatically separate dark objects from a bright background.

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

Dilate: Expands the borders of bright cells and shrinks the borders of dark cells in the image.

Erode: Expands the borders of dark cells and shrinks the borders of bright cells in the image.

Open: Changes the shape of cells in the image. For example, if the image is of a bright cell on a dark background, this function will smooth the cell boundary, separate connected cells, and remove small black holes in the cell.

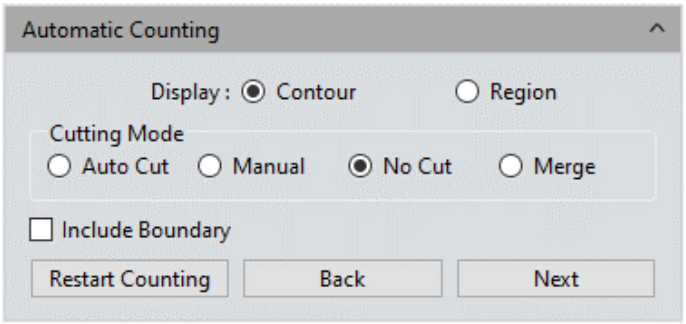
Close: Change the shape of cells in the image. For example, if the image is of a bright cell on a dark background, this function will fill in gaps in the cell, and stretch and highlight cells near it.

Fill holes: Fill holes in image cells.

Restart Counting: Returns to the Start Counting interface.

Back: Returns to the previous operation process.

Next: Go to next step.



Contour: Uses contour lines to represent separated cells.

Area: Uses padding to represent separated cells.

Auto Cut: Draws boundaries directly onto the actual contour of separated cells.

Manual: Allows manual selection of multiple points on the interface, and separates cells according to the selected points.

No Cut: Do not separate cells.

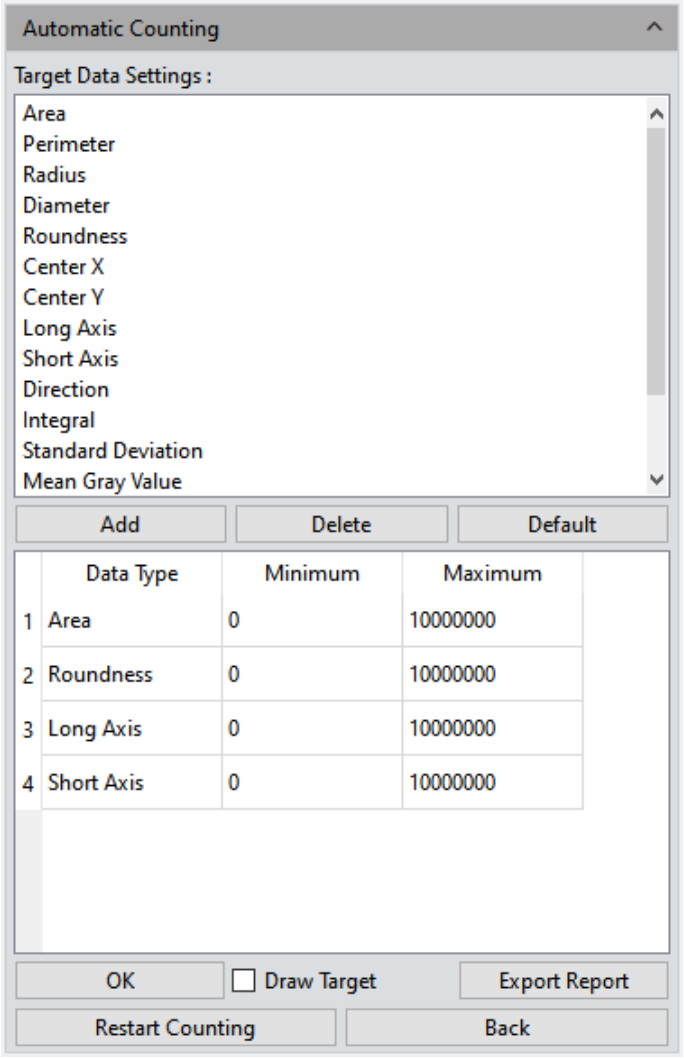
Merge: Merges separate cells into one cell.

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

Restart Counting: Returns to the Start Counting interface.

Back: Return to the previous operation process.

Next: Go to next step.



Add: Adds the selected calculation type to the statistical table in the lower pane.

Delete: Deletes the selected calculation type from the lower pane.

Minimum: Sets the minimum value for counting cells; cells smaller than the minimum value will not be counted.

Maximum: Sets the maximum value for counting cells; cells larger than the maximum value will not be counted.

OK: Starts counting cell data.

Draw Target: Check this option after automatic counting is complete, then manually

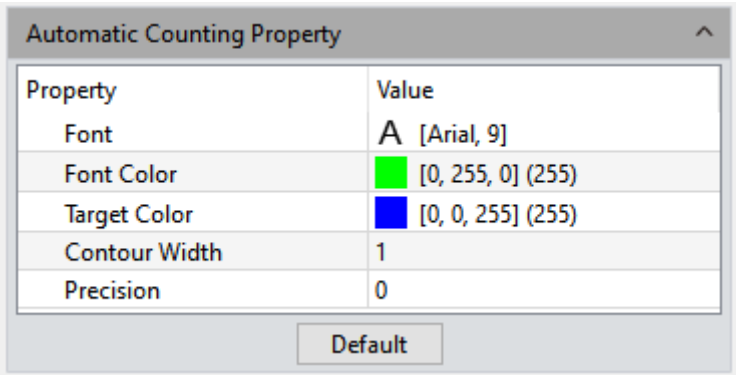
draw any missed cells on the interface.

Export Report: Exports statistical cell data to an Excel file.

Restart Counting: Returns to the Start Counting interface.

Back: Returns to the previous operation process.

4.11 Automatic Counting Property



Font: Sets font and size. Default is Arial 9 point. Click to open the font selection menu.

Font Color: Sets font color. Default is green. Click to open the color selection palette.

Target Color: Sets cell display target color. Default is blue. Click to open the color selection palette.

Contour Width: Adjusts the cell display outline width. Default is 1. Setting ranges from 1 to 5.

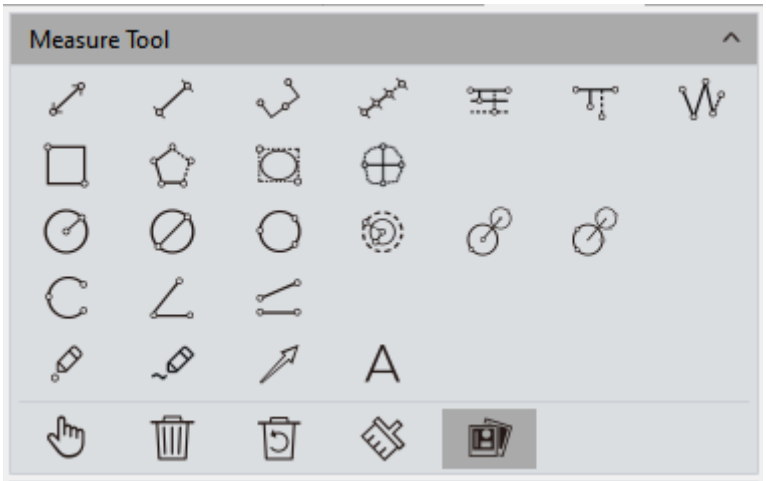
Precision: Sets the number of significant decimal places for maximum and minimum values. By default, 3 decimal places are reserved. Setting ranges from 0 to 6.

5. Measure

PixelPro provides tools for measuring distances in the image. For example, if the user wants to know the distance between two points in the image, using the measurement tools, simply drawing a line between the two points gets real-time measurement data.

PixelPro provides the user with a rich set of measurement tools for image analysis. PixelPro uses image pixels as the basic unit of measurement. 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 program and the calibration ruler.

5.1 Measure Tool



Straight Line: Draws a line segment graphic with arrows at each endpoint. Hold [ctrl] to draw horizontal or vertical lines.

H Shape Straight Line: Draws a line segment with a short perpendicular line at each endpoint.

Three Dots Line Segment: Draws three dots connected by line segments. Third click completes the drawing.

Multiple Dots Line Segment: Draws a line segment defined by multiple dots. Single click adds a new point on the line. Double left-click completes the drawing.

Parallel Line: Draws a line segment, then draws additional lines parallel to it with left click. Double left-click completes the drawing.

Vertical Line: Draws a line segment, then draws vertical lines extending from it with left

click. Double left-click completes the drawing.

Polyline: Left click adds new line segments to the existing polyline. Double left-click completes the drawing .

Rectangle: Draws an orthographic rectangle. The length, width, perimeter and area of the rectangle can be measured.

Polygon: Left-click multiple times to set the number of sides of a regular polygon. Double left-click sets the size of the polygon and completes the drawing.

Ellipse: Draws an orthographic ellipse, similar to drawing a rectangle. The perimeter, area, major axis, minor axis, and eccentricity of the ellipse can be measured.

Roundness: Calculates the roundness of a circle based on two line segments with endpoints on the circumference of a measured circle. Both line segments should pass through the same center. The true roundness value of the circumference of the circle is obtained. The value is equal to one-half of the difference between the two line segments.

Radius Circle: Draws a circle by selecting the position of its center and any point on its circumference. Left click completes the drawing.

Diameter Circle: Draws a circle by selecting the two endpoints of its diameter. Left click completes the drawing.

3-Point Circle: Draws a circle by selecting any three points on its circumference. Left click completes the drawing.

Concentric Circles: Draws a circle by its radius. Click to set the radius of a second circle concentric to the first. Double click completes the drawing.

4-Point Double Circle: The first click positions the center of the first circle; the second click defines the radius length of the first circle. The third click positions the center of the second circle; the fourth click defines the radius length of the second circle.

6-Point Double Circle: Click three times to select three points on the first circle, then click another three times to select the three points of the second circle and complete the drawing.

Arc: Draw a curved line by selecting three points on the arc. The third click completes the drawing.

3-Point Angle: Measures the angle between two connected lines. Click to draw the endpoint and intersection point of the two lines. The third click completes the drawing.

4-Point Angle: Measures the angle between two unconnected lines. Click to draw the endpoints of the two lines. The fourth click completes the drawing.

Dot: Dot marking or dot counting. Manually counts or marks the quantity of targets. Also records the XY coordinate value of the point.

Paintbrush: Draws a freehand curve on the preview screen.

Arrow: Draws a pointer arrow with two clicks.

Text: Adds a text note to the image.

Select: Graphics or text notes drawn on the image can be selected. When the cursor, moved to the vicinity of graphics or text, changes from to , the element can be dragged to a new position or deleted by pressing [Delete].

Delete: Deletes drawn or measured graphics.

Undelete: Undo the last delete operation.

Clear All: Removes all drawn and measured graphics or text on the current layer.

Combine: When saving the image, the drawn or measured graphics or text will be baked onto the image. Otherwise, measured graphics or texts remain editable when the image is opened again. The default state of this function is active.

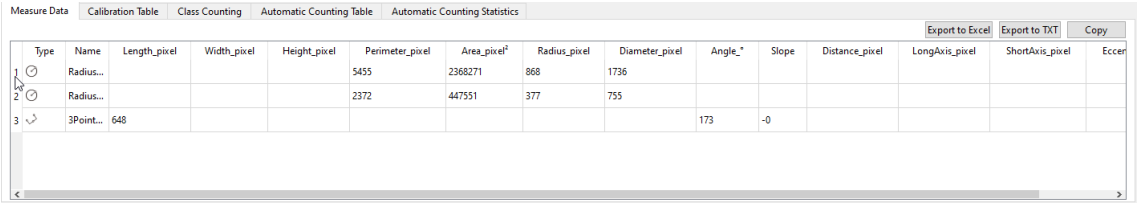
Data Property: Each graphic has a corresponding data type, such as **length, angle, slope, diameter, perimeter, area, etc**. Graphics drawn after checking and their associated information will appear on pictures at the same time.

Right click to toggle between drawing and selection modes.

When the mouse is in the state, scroll the wheel to zoom in/out, and hold down the mouse wheel button to drag the picture.

When the mouse is in the state, scroll the wheel to zoom in/out, hold down the mouse wheel button on a graphic to drag the graphic, and hold down the mouse wheel button on the endpoint of a graphic to edit the graphic.

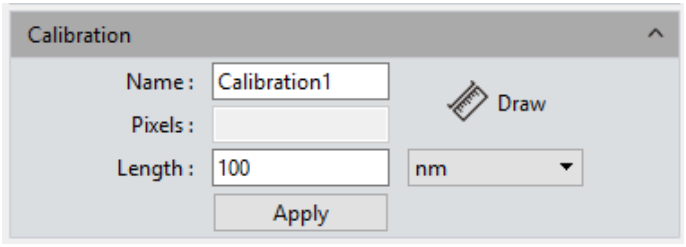
All drawing and measuring graphic data information will be saved in the measurement table. Click **[Export to Excel]** or **[Export to TXT]** to save data information in EXCEL form format or TXT document format. Click **[Copy]** to copy the entire table to the clipboard for pasting elsewhere.



5.2 Calibration

The calibration ruler converts the number of pixels into meaningful measurement units, and supports conversion units of nm, µm, mm, inch, 1/10 inch, 1/100 inch, and 1/1000

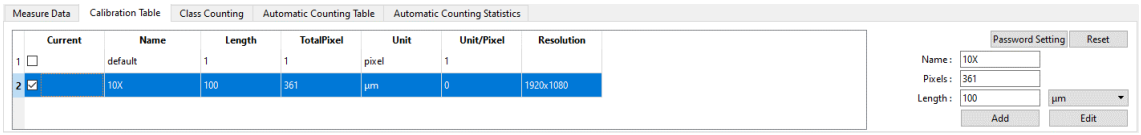
inch.



Operating Procedure:

1) Click [Draw] and draw a straight line on the image. Hold [ctrl] to draw horizontal or vertical lines.
2) Enter the length and units 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: The user can create and switch among multiple groups of calibration scales for different measuring applications. The calibration scales can be viewed or edited on the calibration table.

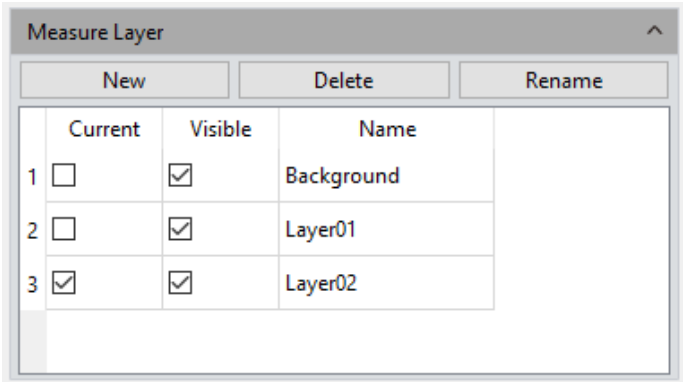


Open the calibration table, check the box in the “Current” column and select the desired calibration ruler. The software default calibration ruler should be applied to all measurement projects. Selected calibration rulers can be edited and added on the right side. Right click to bring up a context menu: **[Cancel]** cancels the selected calibration ruler, but the calibration ruler being applied cannot be canceled; **[Load]** loads previously saved calibration tables; **[Save As]** calculates the whole calibration table and saves it.

Resolution is the preview resolution of the new calibration ruler. Changing the resolution, calibration ruler and measurement data will automatically update to the new resolution.

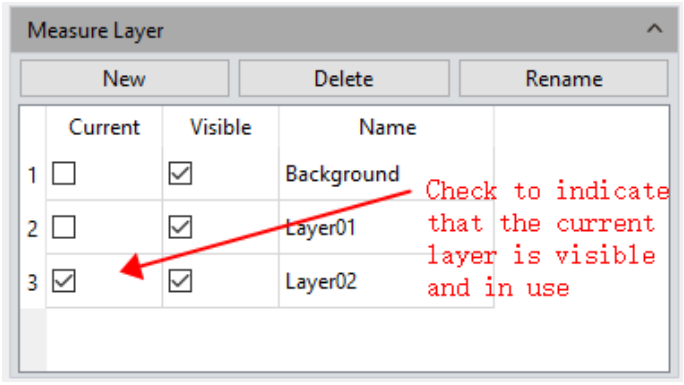
Note: Calibration can be performed more accurately with a micrometer. Using an incorrect calibration table will lead to incorrect measurement results. Special caution must be taken to select the correct calibration table before working on image measurements.

5.3 Measure Layer



Measure Layer: The user can create multiple layers on the image and make different measurements on different layers.

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



If some targets on the current image have already been measured, the layer creating function will automatically create a [Background] layer for those existing measurements and display the new measurements on [Layer 01].

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

The user can choose which measurement layers are visible by checking the corresponding box in the **[Current]** column. Only one box in this column can be checked at a time.

Check a box under the **[Visible]** column to display the measurement results of the corresponding layer. Any and all boxes in this column can be checked at a time.

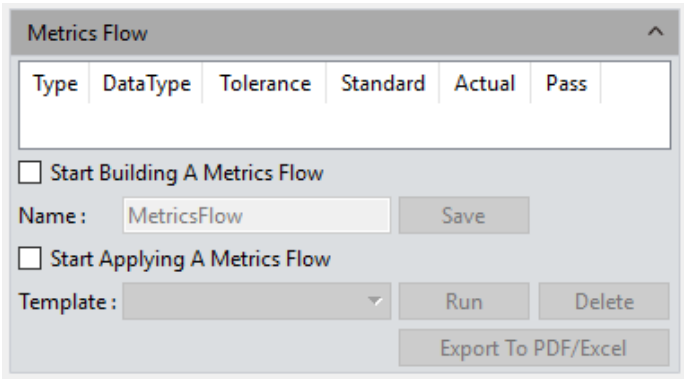
New: Creates and names a new layer. The default layer naming pattern is [Layer NN], where NN is an incrementing two-digit number.

Delete: Deletes the selected layer.

Rename: Renames the selected layer.

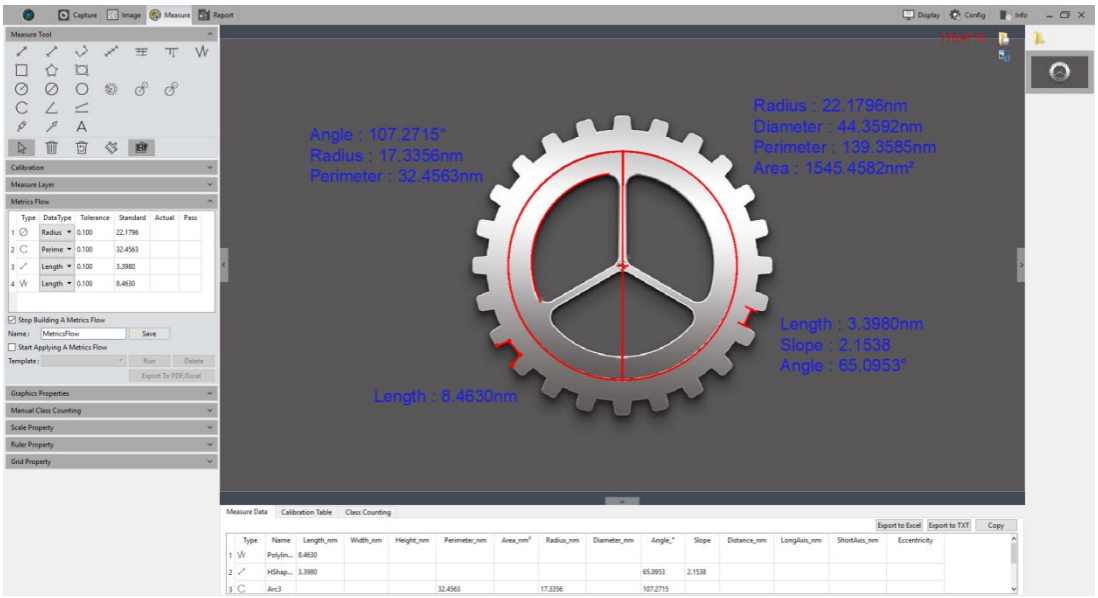
5.4 Metrics Flow

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



Operating Procedure:

1) Open a group of device or part images saved in the image gallery.
2) Select the image of the standardized sample (the “reference image”) to calibrate and set the tolerances for later measurements and detections .
3) Check **[Start Building a Metrics Flow]** to create a new metrics template.
4) Use the different measurement tools to measure or draw any desired shapes on the reference image. The template will record the measuring or drawing process and save the measurement results or drawing graphics as reference specifications.

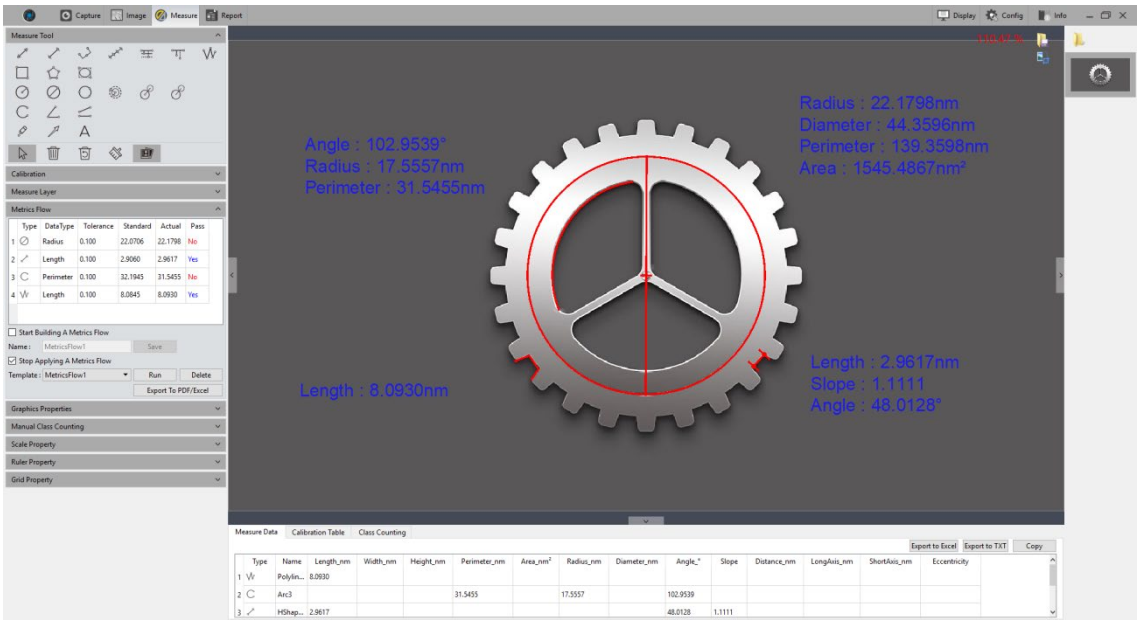


5) After recording reference information on the template, the user can give the

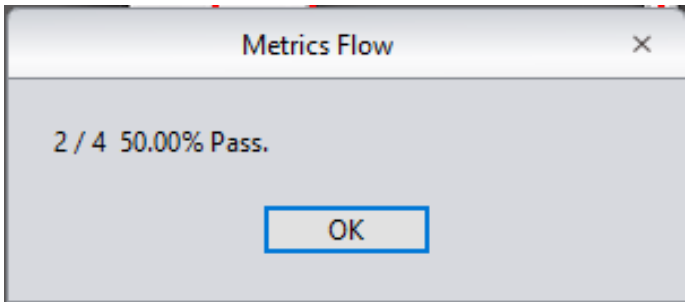
template a name. **[Save]** completes recording and saves the measurement flow template.

6) Click **[Start Applying A Metrics Flow]**, select the created template, then click **[Run]** to apply the template. Click **[Delete]** to delete the template if it is no longer needed.

7) Select the first image to be detected and compared to the template .



8) After image detection and comparison against the selected template is complete, the **[Run]** button becomes available again and a window showing the detection results pops 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

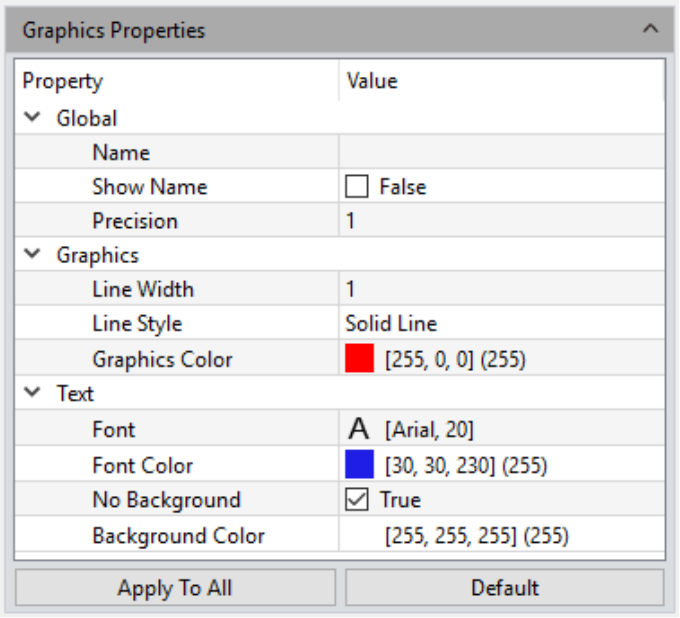
9) Click **[Export to PDF / Excel]** to save detection results in PDF or Excel format.

10) Click **[Run]** to select the next image to be detected. Repeat steps 7 through 9 above for each image to be compared against the reference image.

11) After all images to be detected have been processed, click **[Stop Applying a Metrics Flow]** to stop the measurement flow module.

5.5 Graphics Properties

Define the property of all measuring tools. Specific properties are as follows:



Name: Creates or edits the name of a graphics property group.

Show Name: Check if the property group name does not need to be displayed.

Precision: Determines significant digits for display precision. Default value is 3. Setting ranges from 0 to 6.

Line Width: Sets the display line width of the measurement tool currently applied on the image. Default value is 1. Setting ranges from 1 to 5.

Line Style: Selects the line style for the measurement tools currently applied on the image. The default style is solid. Line style options are solid line, dashed line, dotted line, dash-dot line and two-dot line.

Graphics Color: Sets the color for measurement graphics displayed on the image. The default color is red. Click the color swatch to open the color selection palette.

Font: Sets the font and size for the measurement graphics displayed on the image. Default is Arial, 20 point. Click on the font name to choose the desired font and size.

Font color: Sets the font color for the currently applied measurement data. Default

color is blue. Click on the color swatch to select the desired color.

No Background: True is checked by default to set the text background as transparent. Uncheck to enable the Background Color option below.

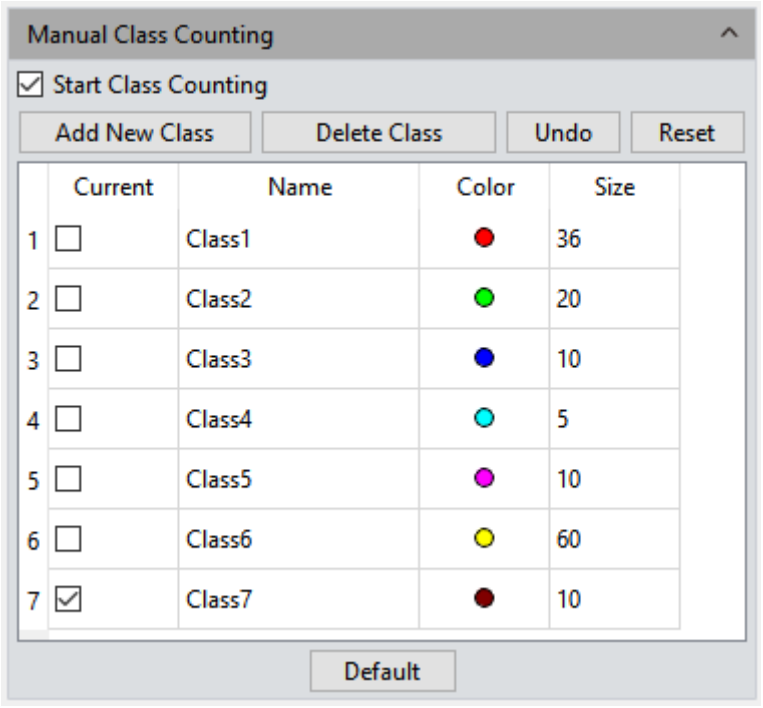
Background Color: Sets the text background color for measurement graphics displayed on the image. Default color is white. Click the color swatch to choose the desired background color.

Apply to All: Apply all parameters set above to measurement graphics displayed on the image.

Default: Revert and apply the default parameter settings to measurement graphics displayed on the image.

5.6 Manual Class Counting

The user can classify and count different categories of cells with the manual counter in PixelPro. There are 7 different categories available .



Name: Customizes the category name. Double-click to edit.

Color: Double-click to display the color selection palette.

Size: Double-click the number to set the font size in points. Default is 10. Setting ranges from 5 to 100.

Add New Class: Creates a new category.

Delete Class: Deletes the selected category.

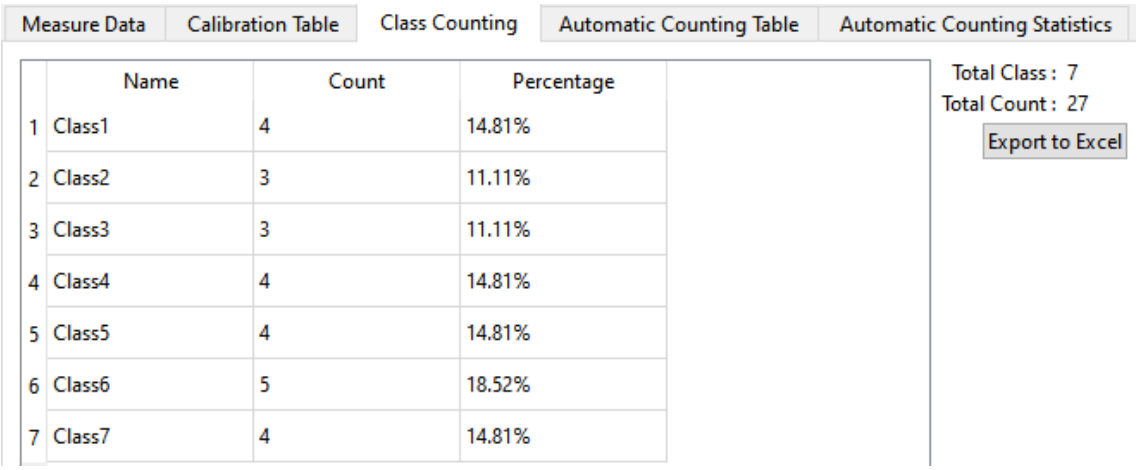
Undo: Undoes the last action.

Reset: Clears all classes and the counter table.

Default: Resets parameters for all classes without clearing them.

Start Class Counting: Select a category, then left click on the targets in the image to count. Count results will be automatically displayed on the data table.

After counting with one or more categories, all counting results will be displayed on the counting table. Click **[Export to Excel]** to save data in Excel format.



	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

PixelPro allows the user to customize scale properties.

Show Scale: Displays the scale on the measured image when checked. Default setting is off. Scale will automatically be positioned at the top left of the image, and can be dragged to any desired position.

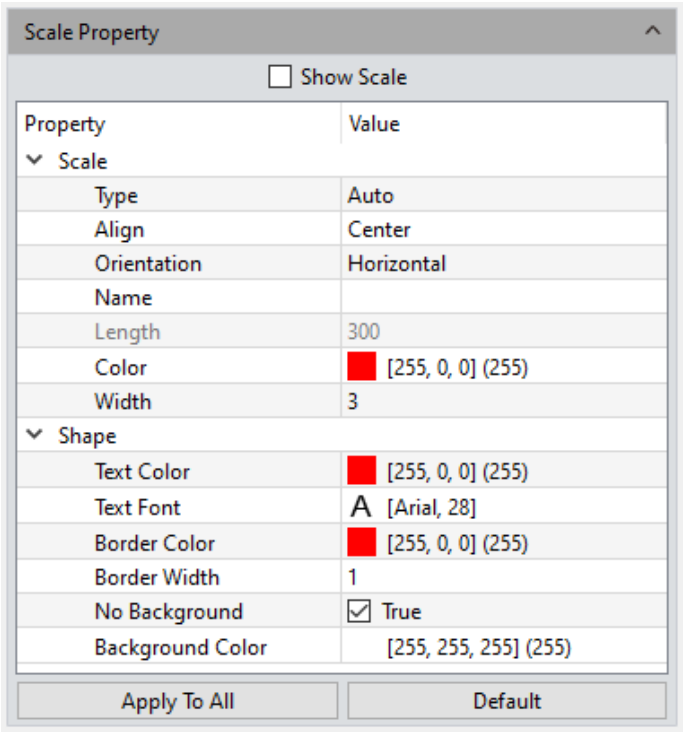
Type: Toggles manual or automatic display of the current scale. Default value is automatic.

Align: Sets the alignment between the current scale and the value. Options are left, center, and right alignment. Default value is center.

Orientation: Toggles horizontal or vertical display direction of the current scale. Default value is horizontal.

Name: Gives the scale applied to the current image a custom name. This field is not pre-filled by default.

Length: The space, in 100-pixel increments, within which the scale is displayed. Default value is 100.



Color: Sets the color for the current scale. Default color is red. Click the color swatch to open the color selection palette.

Width: Sets the width value for the scale applied on the image. Default value is 5. Setting ranges from 1 to 5.

Text Color: Sets the color for text of the current scale. Default color is red. Click the color swatch to open the color selection palette.

Text Font: Sets the font for text of the current scale. Default font is Arial, 28 point. Click on the font name to choose the desired font and size.

Border Color: Sets the border color of the current scale. Default color is red. Click the color swatch to open the color selection palette.

Border Width: Sets the border thickness for the current scale. Default value is 5. Setting ranges from 1 to 5.

No Background: True is checked by default to set the current scale background as transparent. Uncheck to enable the Background Color option below.

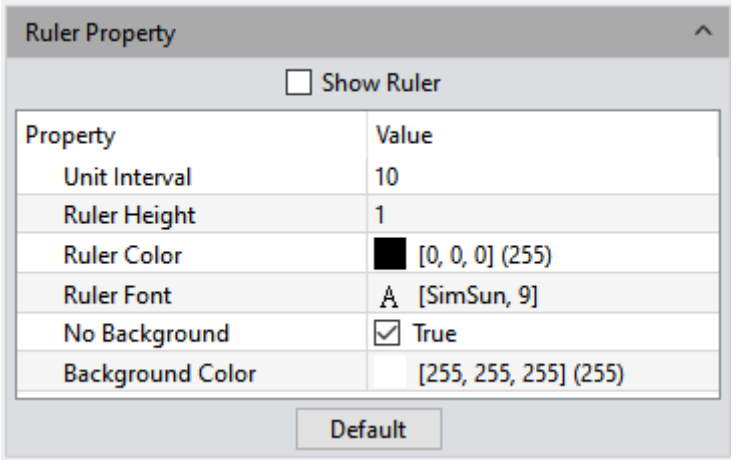
Background Color: Sets the background color for the current scale. Default color is white. Click the color swatch to open the color selection palette.

Apply to All: Apply settings to all scales.

Default: Revert and apply the default parameter settings to the current scale.

5.8 Ruler Property

PixelPro allows the user to customize the crosshair properties of the current image.



Show Ruler: Check this box to display crosshairs on the image. Default state is off.

Unit interval: Sets interval distance for currently applied crosshairs.

Ruler height: Sets height of currently applied crosshairs.

Ruler Color: Sets color for currently applied crosshairs. Default color is black. Click the color swatch to open the color selection palette .

Ruler Font: Sets font and size of crosshair labels.

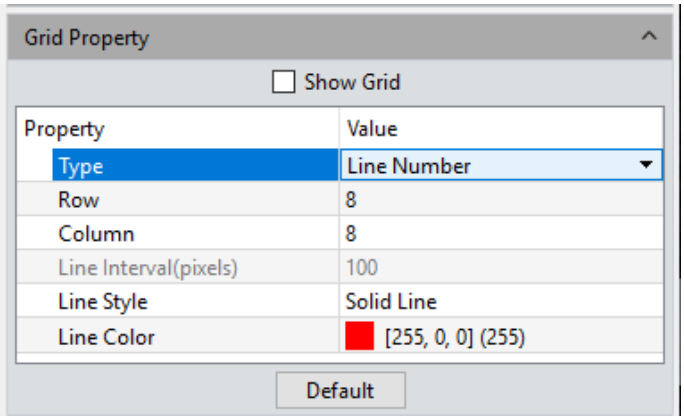
No Background: True is checked by default to set the label background as transparent. Uncheck to enable the Background Color property below.

Background Color: Sets background color for currently applied crosshair labels. Default background color is white. Click the color swatch to open the color selection palette.

Default: Revert and apply default parameter settings to currently applied crosshairs.

5.9 Grid Property

PixelPro allows the user to customize the grid properties of the image .



Show Grid: Check to display a grid on the image. This setting is off by default.

Type: Selects the style of grid to apply to the current image.

Row/Column: If the line number grid type is selected, these two settings define the quantity of rows and columns applied to the image. The default value for both rows and columns is 8.

Line Interval: If the line interval grid type is selected, enter the number of desired Line Intervals in this field. The default value is 100.

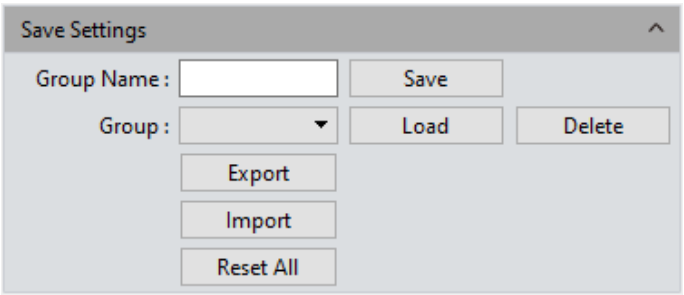
Line style: Sets the line style for the grid applied to the image. The default style is solid. Line style options are solid line, dashed line, dotted line, dash-dot line and two-dot line.

Line Color: Sets the color for the grid lines applied to the image. The default color is red. Click the color swatch to open the color selection palette.

Default: Revert and apply the default parameters settings to the grid on the image.

5.10 Save Settings

Exports the parameter file for loading on another computer. Transferring parameters across platforms keeps the user's experimental conditions as consistent as possible..



Group Name: Sets the parameter group name. It can also be viewed and loaded from the drop-down menu.

Save: Saves settings.

Load: Loads selected settings.

Delete: Deletes selected settings.

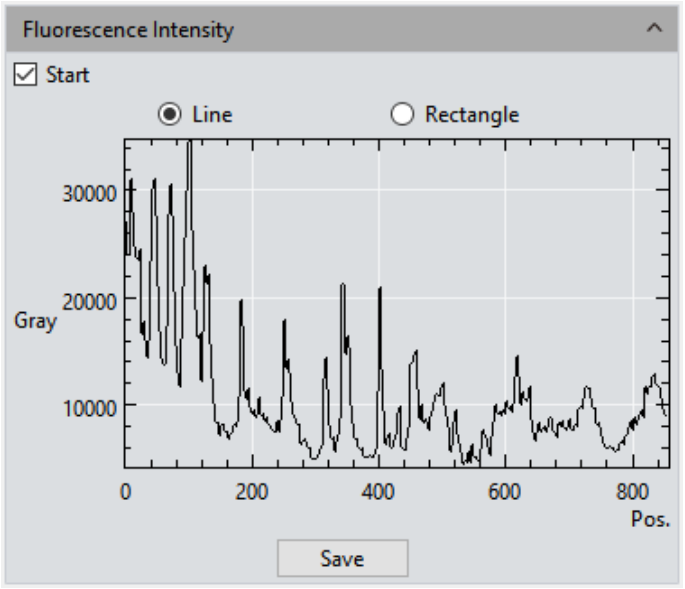
Export: Exports selected settings.

Import: Imports settings file into drop-down menu.

Reset All: Clears all user settings and reverts to factory settings.

5.11 Fluorescence Intensity

Mosaic allows the user to measure the gray value of an image, and supports both linear and rectangular methods.



Operating Procedure:

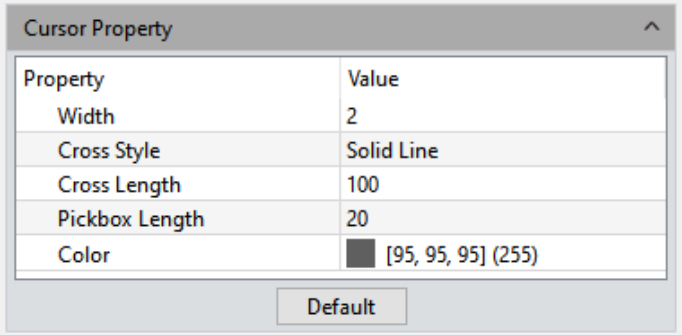
1) Switch from the preview module to the measurement module, or open an image, and check **[Start]** to enable the function. The measurement tool does not display, but functions as expected.
2) Draw a line segment or a rectangle to measure the fluorescence intensity of the selected area.
3) Click **[Save]** to save the current measurement data in Excel format to the local disk.

Notes:

- Draw a line segment to measure the fluorescence intensity along the straight line.
- Draw a rectangle to measure the average fluorescence intensity of each column of pixels within the rectangle.

5.12 Cursor Property

The user can customize the properties of the measurement cursor. The setting interface is shown below.



Width: Sets the thickness of the crosshair line segments. Default value is 2. Setting ranges from 1 to 5.

Cross style: Sets the line style of the crosshairs. Options are solid (default) or dotted line.

Cross length: Sets the length in pixels of the crosshairs currently displayed on the image. Default value is 100.

Pickbox length: Sets the width and height of the crosshair center currently displayed on the image. Default value is 20.

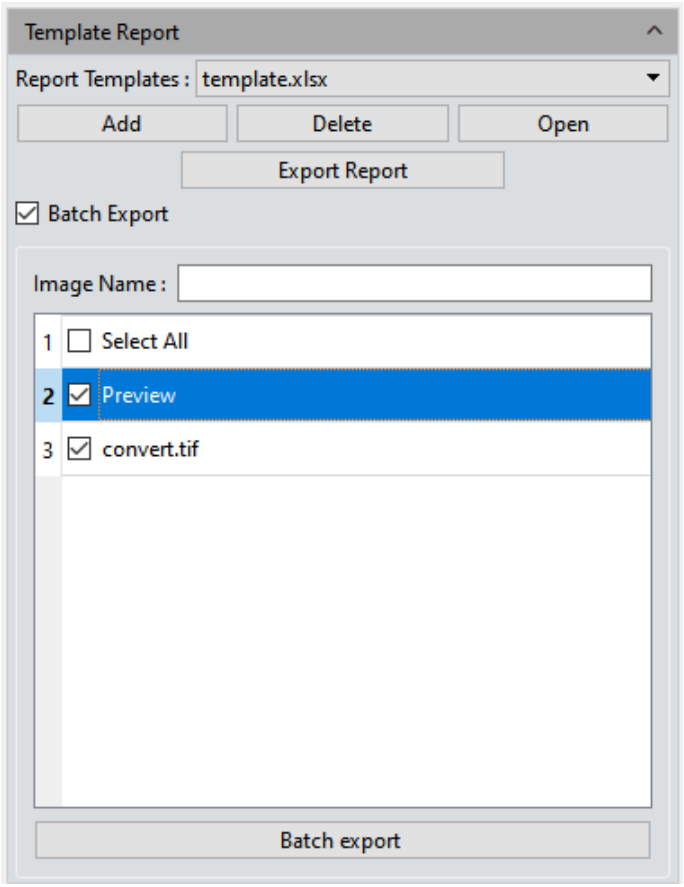
Color: Sets the crosshair line color. Click the color swatch to open the color selection palette.

6. Report

PixelPro provides report formats to export measurement data to the user's working report documents. Reports can also be exported in real time while in the preview window. In addition to the default template, a custom template is also available, and the user can customize the report. The custom template only supports Excel format.

6.1 Template Report

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



Report Templates: Selects a template from the drop-down menu. The default PixelPro template is pre-selected.

Add: Adds a custom template. Custom templates must be based on the software default template. The default template is the *templates* file in the software installation path. Use the # identifier to indicate content that needs to be displayed. Where the ## identifier appears, it means that the header of the data table is hidden.

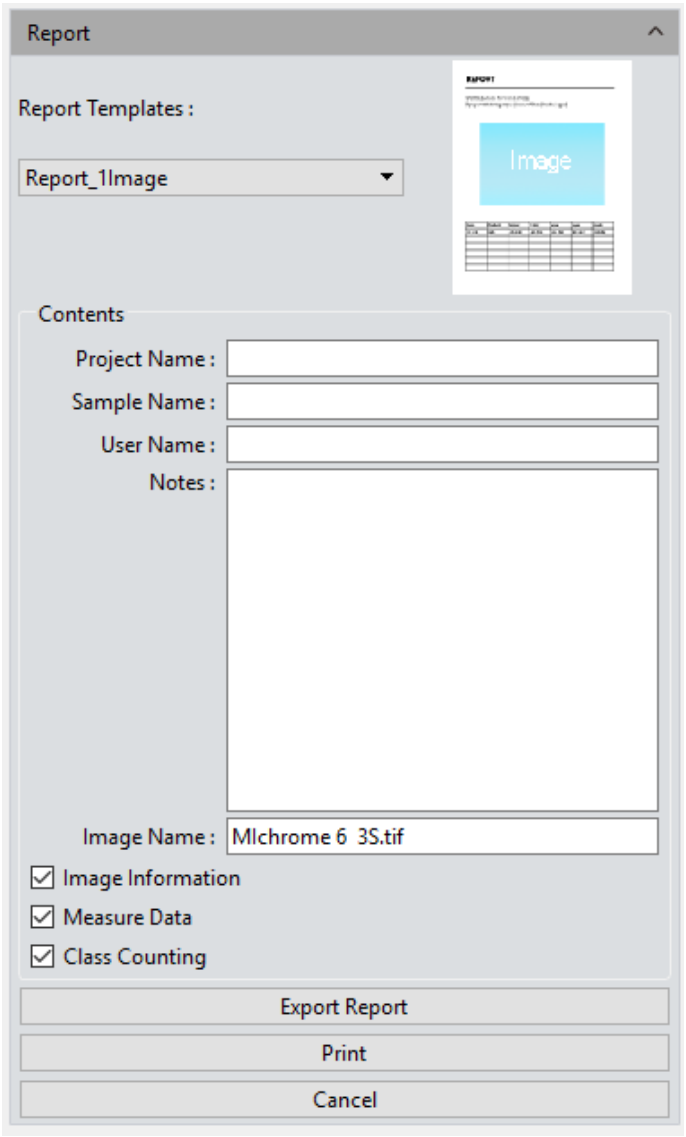
Delete: Deletes selected template.

Open: Previews selected template.

Export Report: Exports the current report to Excel format.

Batch Export: When [Batch Export] is checked, the user can select 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: Sets the desired report template format.

Project Name: Identifies the current project. This custom will show up on the working report.

Sample Name: Identifies samples or parts. This custom name will show up on the working report.

User Name: The name of the user, director, worker, or reporter.

Notes: Records any notes, supplemental information or comments relevant for this job in the working report.

Image Name: Names a captured image. The image can be automatically loaded on the report.

Image Information: Hides or displays information on the image included in the report.

This option is on by default.

Measure Data: Hides or displays measurement data for the image included in the report. This option is on by default.

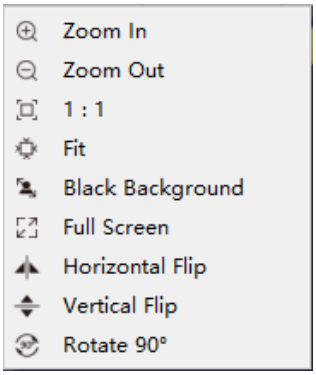
Count Table: Hides or displays the count table for the image included in the report. This option is on by default.

Export Report: Exports the current report to a PDF document.

Print: Prints the current report.

Cancel: Cancels this operation. Clears out all report information entered or loaded in.

7. Display



Zoom In: Magnifies the current image and displays it larger than its original size.

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

1:1: Sets the currently displayed image to its original size.

Fit: Adjusts the image zoom level to fit the preview window.

Black Background: Displays the image in full screen with a black background and hides all other interface elements. Press [Esc] or click the Back-Arrow button in the lower the right corner of the screen to exit black background mode.

Full Screen: Displays the image in full screen with no interface elements. Press [Esc] or click the Back-Arrow button in the lower right corner of the screen to exit full screen mode.

Horizontal Flip: Horizontally mirrors the current image.

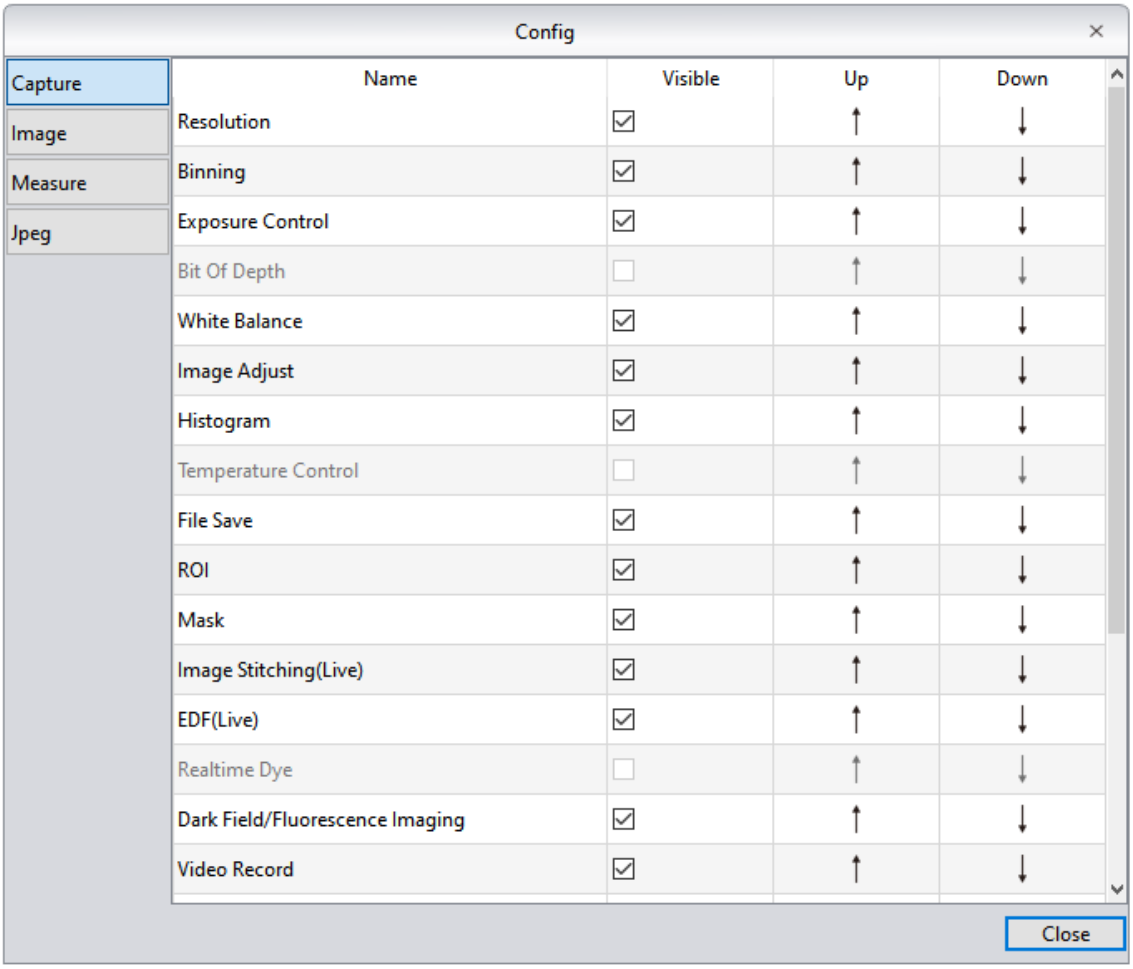
Vertical Flip: Vertically mirrors of the current image.

Rotate 90°: Rotates the current image 90° clockwise.

8. Config

8.1 Capture/Image/Measure

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



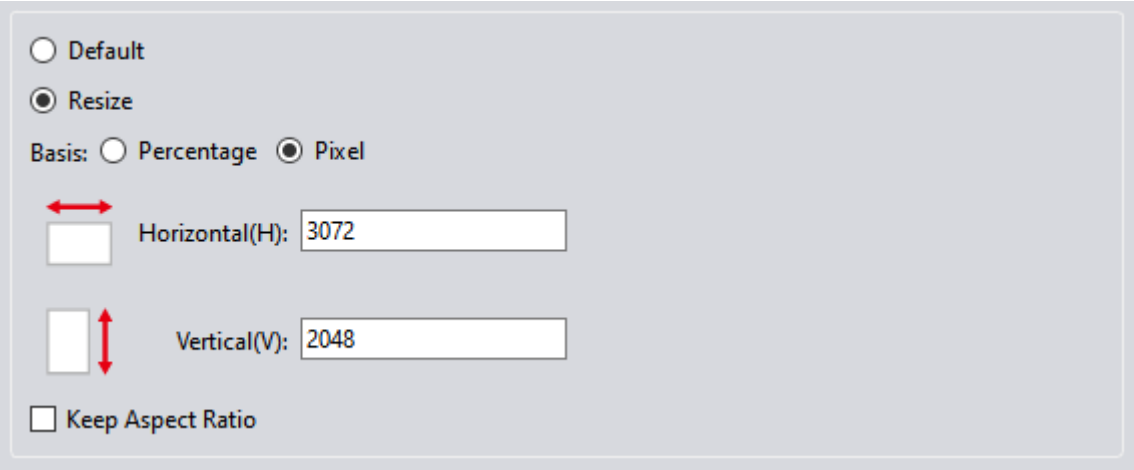
Visible: Check a module to display it in the software interface. Unchecked modules will not be displayed in the interface. All modules are checked by default. The program remembers this setting between sessions.

Up: Moves the selected module up one place in the list. The interface layout updates accordingly.

Down: Moves the selected module down one place in the list. The interface layout updates accordingly.

8.2 Jpeg

PixelPro provides customizable Jpeg format size settings. When Jpeg is selected in the file saving module, the image size will be generated according to the following settings.



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

Resize: Adjusts the image size to the following specifications.

Percentage/pixel: Adjusts image size to the specified percentage/pixel value. Settings for percentage range from 1% to 200%. Settings for pixel range from 4 to maximum resolution.

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

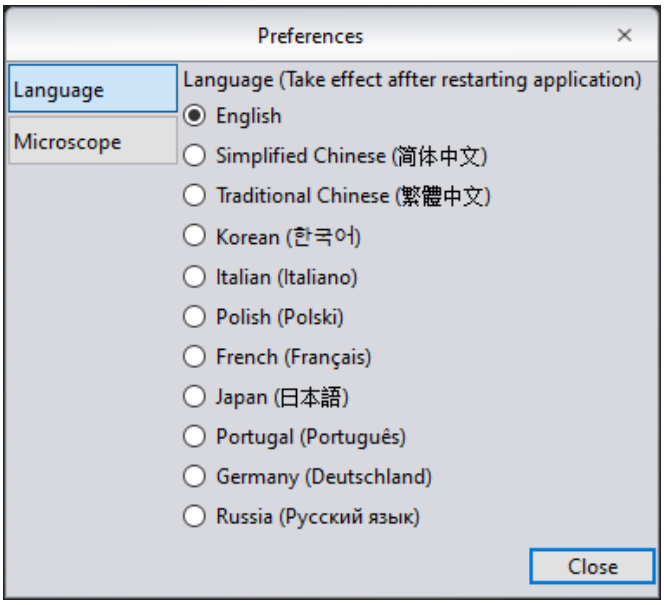
Vertical: Sets the size of the image in the vertical direction.

Keep Aspect Ratio: When checked, maintains image aspect ratio to prevent distortion.

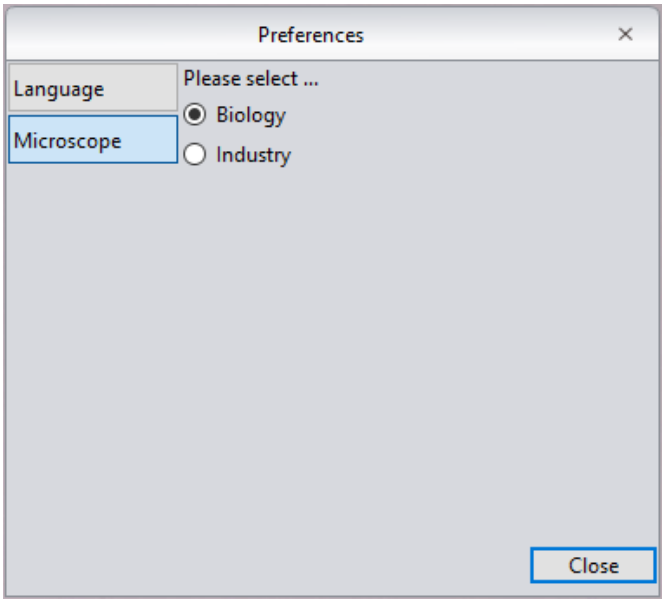
9. Info

9.1 Preferences

Language: Selects the program interface language. The program must be restarted to apply the language setting.



Microscope Option: Toggles between microscope applications after initial selection at program start-up. The program must be restarted before this setting takes effect.

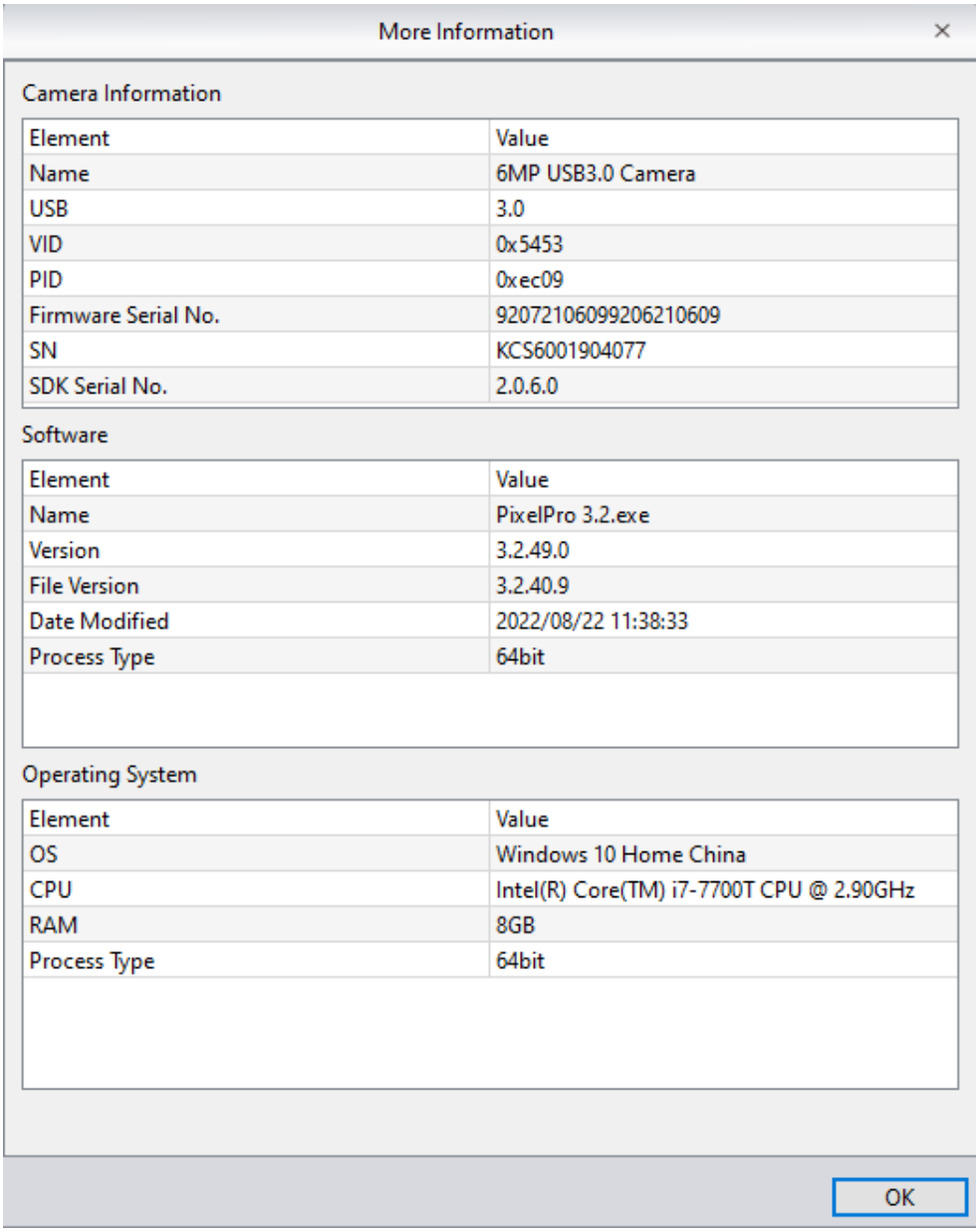


9.2 Help

View the program operating instructions for reference by the user.

9.3 About

Click More information to view details about the camera, the current software version and operating system information.



10. Customer Service

Warranty

1) When the product is under warranty, we will fulfill repairs for any damages corresponding with the warranty policies free of charge.

2) The warranty policies are limited to defects in manufacturing and materials. Any damage caused by the user, such as disassembly, liquid damage, or impact, or by natural disasters is not covered by the warranty.

PixelPro 3.2 Instruction Manual

To save time, please have the following information ready:

1) Camera model and S/N (product serial number).
2) Software version number and computer system configuration information.
3) As many details as possible of the problem and images to help detail the problem.

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