

M-SHOT

User Manual

MShot Image Analysis System V1.1

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1 Open the M-shot imaging door

1.1 Introduction

1.1.1 Writing purpose

It is applicable to all users of the software and provides detailed operation instructions.

1.1.2 Background

With the development of face recognition intelligent technology, the development of image acquisition and processing software has become the focus of all parties. In the field of micro imaging, image processing software involving intelligent and information technology is more and more urgently needed, especially the great progress of micro scientific research, such as depth of field, splicing, fluorescence processing, which is difficult to observe accurately under the eyepiece vision, M-shot image analysis system adapts to the current development trend, optimizes the camera effect and adds functions based on the original software.

1.1.3 Reference terms

The MShot Image Analysis System (msany) is the latest camera control and image optimization software of Mshot Optical Technology Co., Ltd. It mainly uses the computer to control the camera to collect the image and video source, and presents the effect of synthesizing, measuring and transforming the collected image through the software, which makes it easy to collect and optimize the image. It is mainly used in medical micro imaging, industrial detection, fluorescence imaging and other fields. It is fully compatible with the camera model developed by MSHOT company and the DirectShow device of windows system. It can be used across multiple platforms and has powerful functions, providing convenience for the development of fluorescence imaging field.

The logo for Mshot, featuring the word "Mshot" in a stylized blue font with a white crosshair-like symbol integrated into the letter 'o'.

Run Surrounding

Software:

Microsoft .NET Framework platform



Hardware:

CPU: Intel core 2 duo E2140 above

Memory: 4GB above



Hard disk: 160GB above

Available OS

Microsoft Windows:

32 bit Windows 7, Windows 8, Windows 10;

64 bit Windows 7, Windows 8, Windows 10;

Available language

Standard language package: 1.Simplified Chinese 2.English

Acceptable customize other languages 1.Complex Chinese 2. German 3. Japanese 4.Russia 5.France

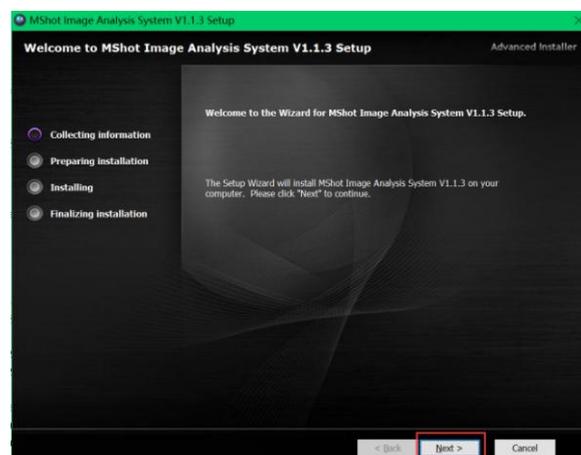
6. Italian

2 Imaging system installation

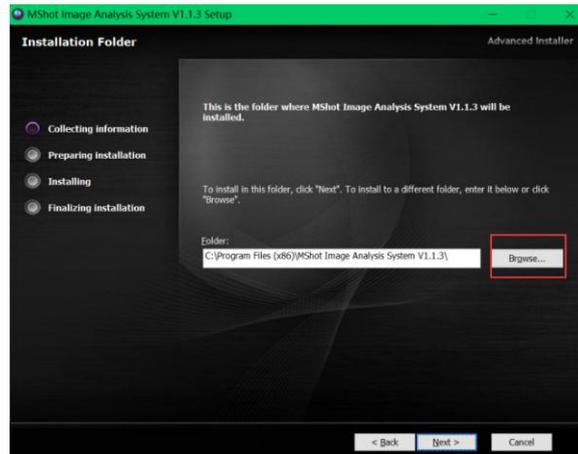
Find software program  MShot Image Analysis System 1.1.3_EN and driver file in coming CD with camera, copy to PC.

Open driver file to find 'installer.exe' , double left click the installer to install driver.

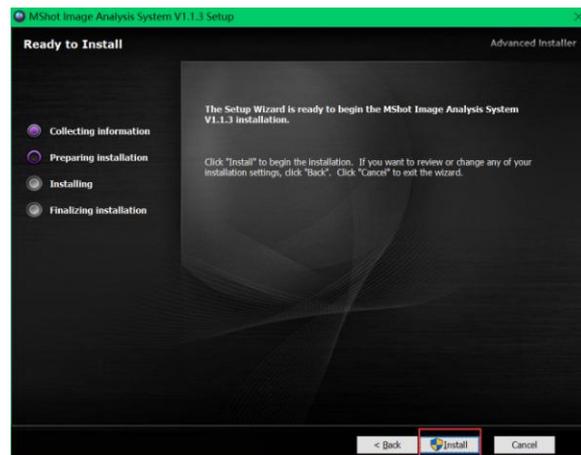
After successful install camera matched driver. Double click software program  to install the software according to Popup windows tips.



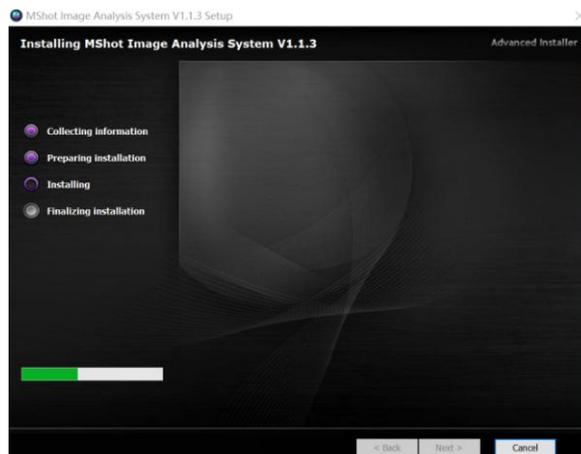
Click 'Next' to process installation.



Choose file you want to save the installed program or just save to default file.



Click 'Install' and wait it to install. If PC has security software to ask for authority, please allow to install the software.



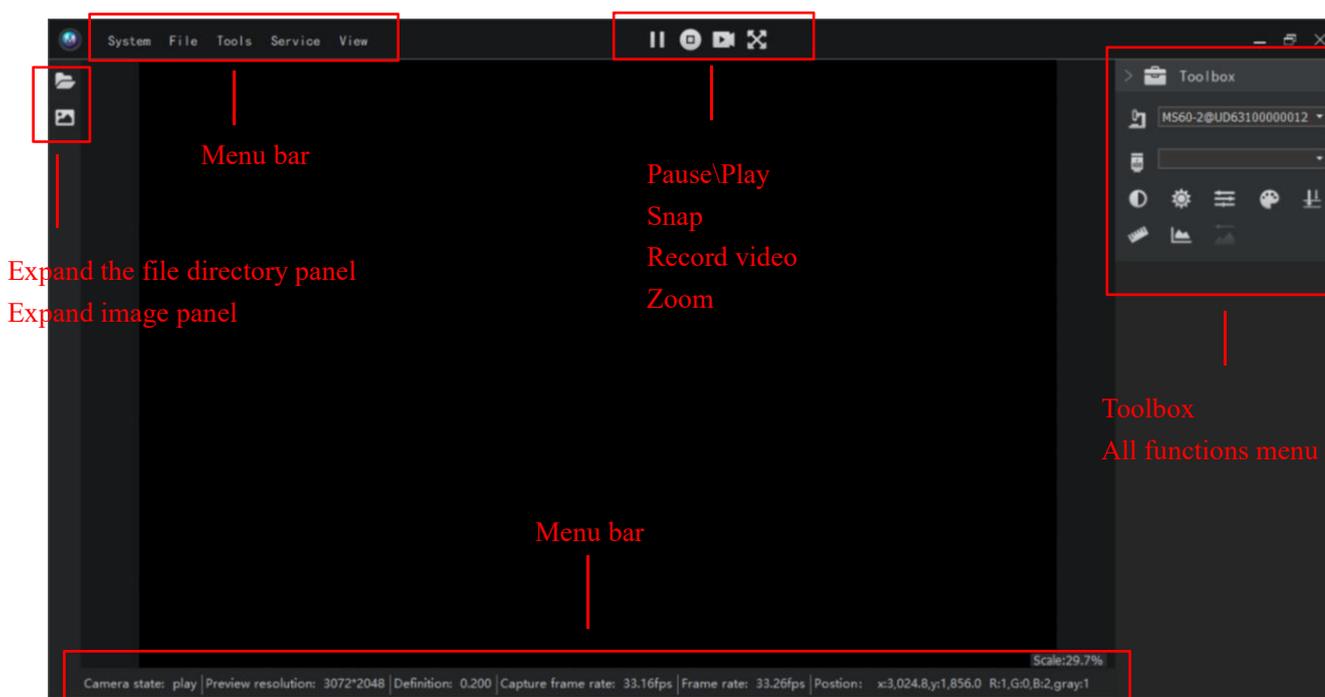
Click 'Finish' to finish installing software and get the icon  in PC desktop.



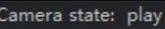
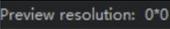
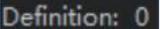
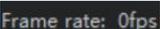
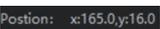
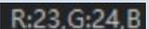
3 Enter microscope imaging world

3.1 Start the software

After successful installing the software, left double click the software icon  in PC desktop, software will be run and show UI.



● Status bar introduction

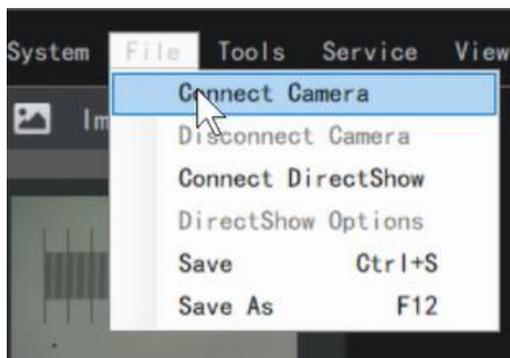
Name	Icon	Function
Dust bin		Located under the image library, use to delete the selected image and information
RGB Channel		Under the image library, modify the static image to single channel mode
Run Status		Show current camera working status, Play  : image in time view , Pause  : static image view
Preview resolution		Resolution under current preview status
Definition		Definition under current preview status
Capture frame rate		Frame rate when capture image
Process frame rate		Frame rate under preview
Position		Mouse pointed position
RGB		RGB value of mouse pointed position
Zoom radio		Show current image and default size zoom radio

3.2 Open camera (Connect Directshow device)

Click 'File > Connect camera' in turn, and M-shot will automatically detect the camera driver software installed on the computer, and initialize the camera to display the current image in the preview window. After the detection, all the detected camera models will be added to the camera list of toolbox '' in the form of submenu. Click to switch the camera, initialize the camera, and display a dynamic picture of the preview window.

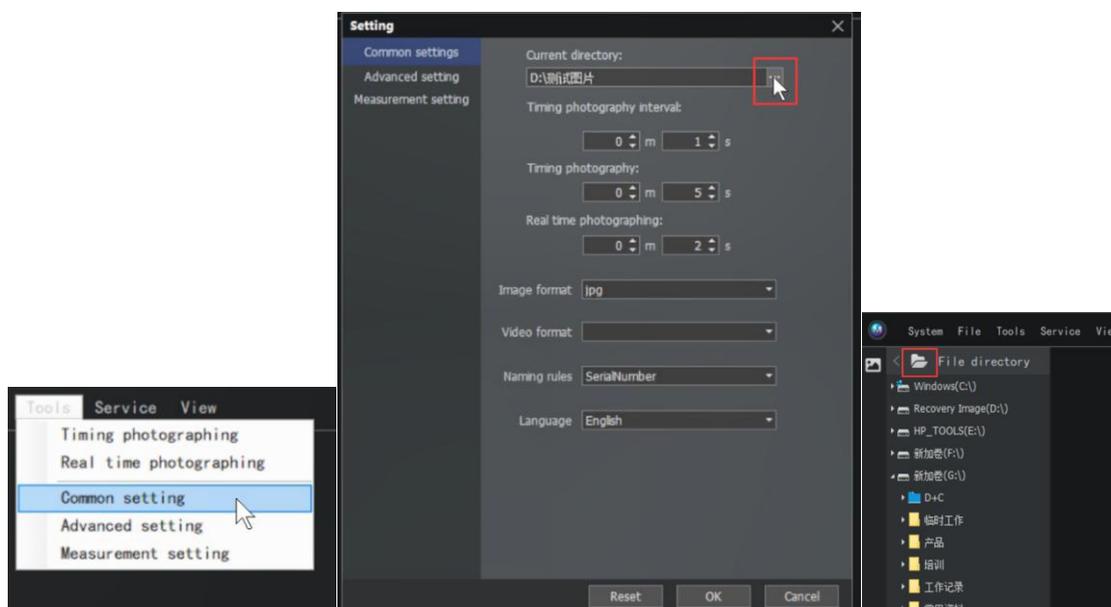
Note: M-shot support connecting the same item camera synchronously, order by camera series number.

If do not use camera manufactured by M-shot, click 'File> Connect Directshow device' in turn, and M-shot will automatically detect available camera for the Directshow, and initialize the preview window.



3.3 Select photo directory

Click 'Tools > common settings' in turn, click '...' in the current directory to select the file directory or build a new folder to select, or expand the file directory panel '...' and double-click the selected file name.



3.3.1 Select catalogue

Double click the file directory name to select the folder, and the folder will turn blue

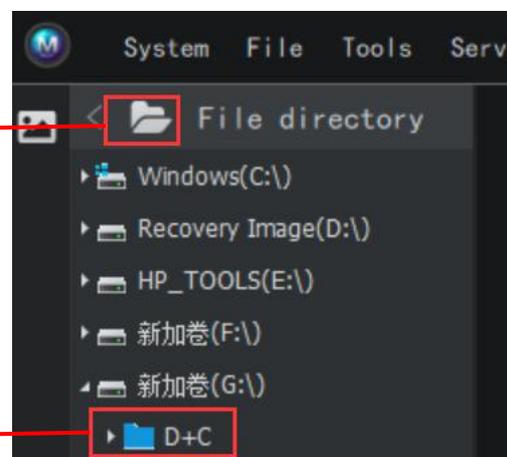
3.3.2 Expand directory

If you select a file under a folder, click '...' to expand directory

3.3.3 Pack up contents panel

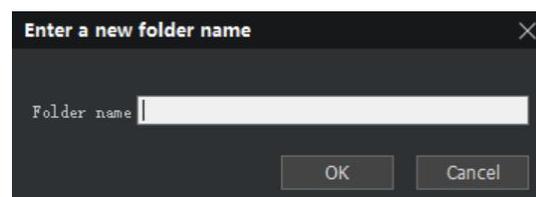
Click '←' to pack up the contents panel

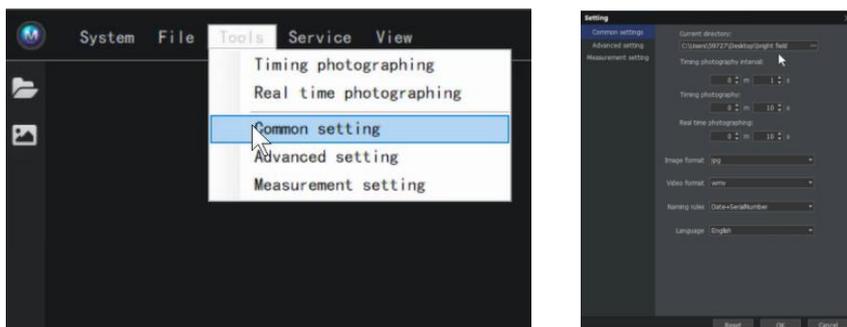
Unfold catalogue tree



3.3.4 New folder

Click and expand the '...' file menu under 'File directory' to add new folder. Click and open to input folder name, click 【OK】 to add new folder. Close or click 【Cancel】 to cancel setting. Also can add new folder in common setting.





3.3.5 Open/delete image

Double click the selected folder and click ‘’ to expand the image list. You can see the image thumbnail under the selected folder in the image panel list. Double click the image to open it. Double click the image name to rename it. Select the image and click ‘’ in the image panel to delete the image.



3.4 Photograph

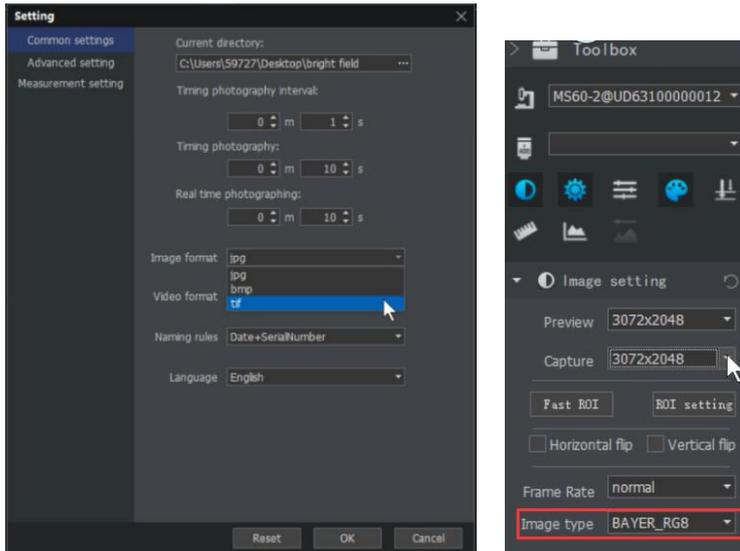
3.4.1 Single frame photography

Click the ‘’ icon above the preview window of the system interface to take a single frame photo. The picture format and naming rules for taking photos can be selected through "Tools > common settings".

Note: the image saving formats supported by m-shot include TIF, BMP and jpg. TIF format pictures are uncompressed pictures, which can be taken and saved up to 16 bits.

To switch image types, click toolbox panel ‘’ -> image settings ‘’ -> image types

Note: bmp format picture is not compressed picture, only 8-bit picture shooting is supported. The image in jpg format is a compressed image with a compression ratio of 75%. Under the reset parameter, the default is jpg format.



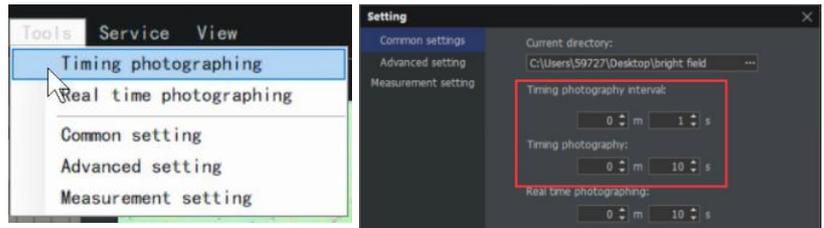
3.4.2 Timing photographing:

Click 'Tools' > 'Common settings' in the menu bar to set the timing time and interval time.

The time interval for taking pictures is set. The step value of seconds is 0.1 seconds, and the step value of minutes is 1 minute. You can use the '← →' on the keyboard to make accurate adjustment.

All timing photographing step value are 1.

After setting the photographing time and the photographing interval, select save file, click 'Tools' - > 'Time photographing' in the menu bar, and the software system will save the photographing in the specified directory.



3.4.3 Real time photographing

Click 'Tools' - > 'Common settings' to set the real time photographing. The step value is 1s.

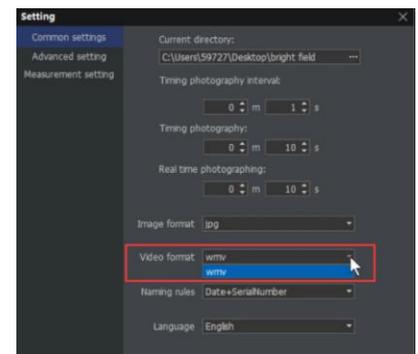
The number of real-time photos is (real-time time * processing frame rate), and the processing frame rate is displayed in the status bar. After setting the real-time duration, select the save file, click 'tools' - > 'real time photographing' in the menu bar, the software system saves the photographing in memory, and then writes it to the specified directory of the disk.

3.5 Video function

Click ' [play icon] [record icon] 1:1 ' at the top of the preview window

of the system interface to record, and click ' [stop icon] ', to stop recording. The video format is WMV, which supports Microsoft's own player.

The video duration is the recording time, and the step value is 1s.



The video format is WMV, which supports Microsoft's own player.

3.6 Image naming

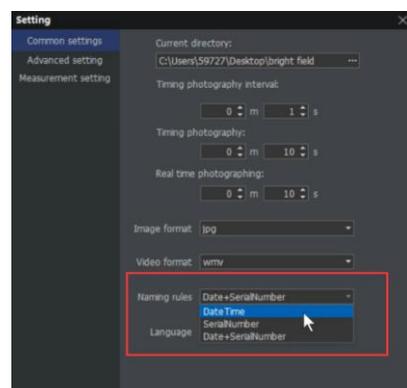
M-shot provides three naming rules of auto customs naming (time, series number, date+serial number).

Note: the default naming is valid for both photographing and video recording.

The time is 24 hours. For example, the first picture taken at 9:31:19 am on September 7, 2018 is named 20180907093119072.

Serial number from '1,2,3...' Sort.

Note: in case of reset, the time rule is the naming rule by default.



3.7 Save

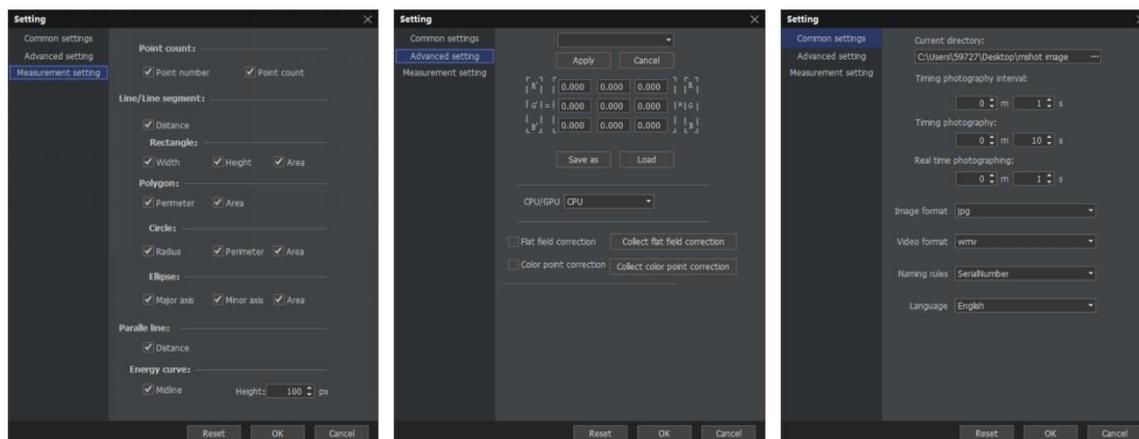
Click 'File' -> 'save' in the menu bar to save the preview image. If the dynamic picture, save the file according to the photographing resolution. In addition, save the file according to the resolution of the preview window (static image save according to the original resolution)!

Click menu bar 'File' -> 'Save as', popup windows for save as, default image format is according to setting in tools, it is available of three types image format, and rename.

Note: double click below renamed image to revise image name.

3.8 Setting interface description

Open the menu bar 'Tools' > 'Common settings' to open the Common settings, Advanced setting and Measurement setting.



● Setting interface function introduction

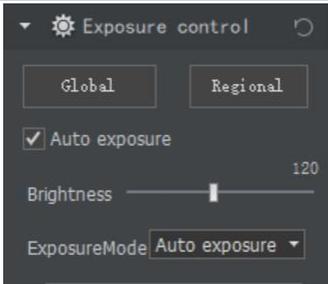
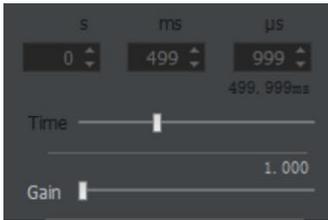
Function	Description
Common setting	Set the time scheme of real-time photographing and timing photographing, set the format and naming rules of photo taking and video recording, and select the software language
Advanced setting	Set the color correction value, select the equipment accelerator, start the flat field correction to collect the correction

information	
Measurement setting	Select the number of clicks, and process the numerical formula displayed after the drawing of the measuring tool and the display of the text description
Reset	Returns the set value to the default value.
OK	Confirm option modification
Cancel	Cancel the set operation and close the parameter setting window

4 Function module

4.1 Exposure control

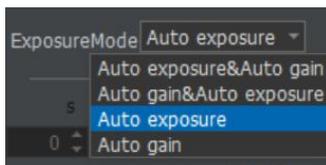
Single click right tool box ‘’ to expand toolbox panel -> Exposure control’’.

Function description	Control panel identification	Initialization settings recommendation
<p>Auto exposure : The software automatically adjusts the exposure time according to the set brightness (based on the camera, the exposure time and gain are limited by the maximum value).</p> <p>Target brightness : It is the brightness of the picture. After checking auto exposure, the brightness of the target can be adjusted. Observe the picture adjustment lever to the customized brightness.</p> <p>Global exposure: The overall brightness of the whole picture reaches the target brightness.</p> <p>Regional exposure: After clicking, the mouse changes to a cross shape in the video area of the video window. You can select any area in the video window, which is mainly used to make the selected target area reach the set target brightness. It can be used to observe the details of the brightness of the selected area, select the dark area can improve the brightness of the whole picture. Select bright area can make it darker and details more obviously.</p> <p>Time:Time to receive light for the chip</p> <p>Gain:The brightness of the image signal transmission data is adjusted by controlling the</p>	 	<ol style="list-style-type: none"> 1. Ordinary users are advised to select auto exposure mode, set the target brightness, so that the brightness can reach your visual comfort. After the external light source changes, the software will automatically restore the image adjustment to the set target brightness value. 2. It is generally recommended to adjust by Auto exposure & Auto gain or auto exposure mode. The gain is adjusted by amplifying the image signal to increase the interference of electrical signal. (increase the gain value and increase the brightness and noise synchronously). 3. High configuration users can use manual exposure mode to customize advanced settings for exposure time and gain, as shown in the table below. At this time, the target brightness adjustment lever is not available.
		

electrical signal. (increase noise).

Available Exposure mode of Auto exposure

- Auto exposure & Auto gain (Exposure first)
- Auto gain & Auto exposure (Gain first)
- Auto exposure (The gain can be adjusted manually, and the exposure time can be adjusted automatically to make the picture reach the target brightness)
- Auto gain (The exposure time can be adjusted manually, and the gain can be adjusted automatically to make the picture reach the target brightness)



Invert select auto exposure enter into manual exposure mode

Exposure time setting

The second, millisecond and microsecond in the icon are the exposure time settings. (the setting of the value and the adjustment of the pull rod can be adjusted by using the left and right direction keys on the keyboard.)

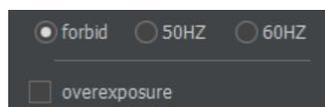
Uncheck auto exposure to enter manual exposure mode, when auto exposure & auto gain is checked, the exposure time and gain cannot be adjusted. But here you can view the current exposure time.

Select auto exposure for exposure mode to customize the gain value. Select auto gain to customize the exposure value.



Advanced users are advised to use manual exposure mode to customize advanced settings for exposure time and gain. Advanced users can set the exposure time accurately by inputting the value manually or adjusting the exposure time lever to control the brightness of the captured image. When and only when the image and light source brightness have reached the maximum value and still do not meet the imaging requirements, pull the gain lever until the image brightness meets the requirements.

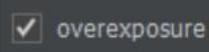
Anti stroboscopic: This function can eliminate the image stroboscopic phenomenon caused by different countries and regions or different light source frequencies. Please select according to the power characteristics you use.

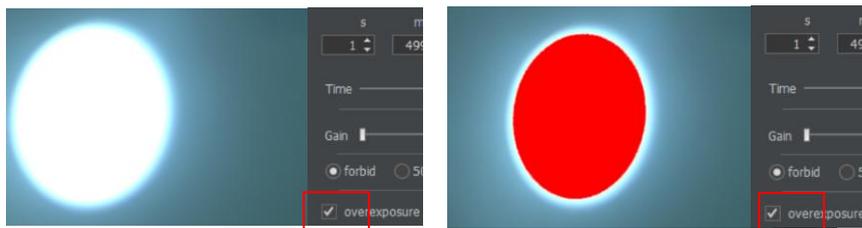


Direct current: DC driven bulb

Overexposure: Mark the overexposure area red.

The alternating current in China is 50Hz. If indoor incandescent lamp is used as camera light source, 50Hz power frequency is generally selected. (Note: at this time, the exposure time can only be increased or decreased by an integral multiple of 10. If 60Hz is used, the exposure time can only be increased or decreased by an integral multiple of 8.33.)

Select  to mark overexposure area and processing brightness adjustment. Overexposure performance:



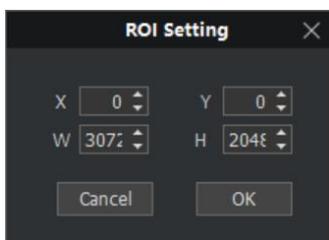
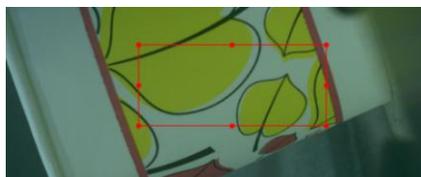
4.2 Image settings

Click right side tool box  to expand toolbox panel > image settings .

Function description	Control panel identification	Initialization settings recommendation
<p>Preview resolution: Set real-time Dynamic windows resolution.</p> <p>Capture resolution: Set image capture resolution</p>		<p>Preview: Select a smaller resolution similar to the display window resolution for preview, and you can get a faster frame rate.</p> <p>Capture resolution: Select the maximum resolution to achieve the best photo effect of the camera.</p>

Area image capture tool:

Click **Quick ROI**, mouse changes to a cross shaped box, press and hold the left mouse button to select some areas in the upper box of the preview window, release the left mouse button to preview the window to display the image after box selection; cancel to stop ROI setting.



Click ROI setting to open ROI setting input box; manually input the origin coordinate and length and width of the area selected in the box. Click OK to get the box selection area with the origin coordinate as the origin of XY axis, width as the width of matrix and height as the height of matrix.

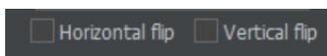
(Note: ROI setting value must not be greater than preview resolution, e.g.: if preview resolution is a * A1, X + width is less than or equal to A1, Y + height is less than or equal to A1).

Click 'Cancel' to quit ROI setting

Click  to quit

Flip settings

Flip horizontally: if the image of the dynamic preview window is horizontally opposite to what you expect, select the box.



Flip vertically: if the vertical direction of the dynamic preview window is opposite to the expected direction, select the box.

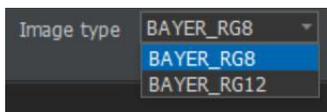
1. After setting, the frame rate of dynamic display will be reduced.
2. If the image has angle deviation on the horizontal plane, you can try to rotate the camera installation position (adjust the imaging direction according to the chip) to debug.

Frame rate: it is the display frame rate of dynamic preview, which is normal by default.

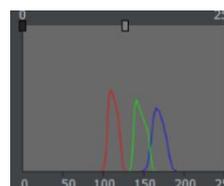
Image type: the bits saved in each pixel channel during image saving. There are two formats.

BAYER_RG8 is a single byte image of 8-bit data type.

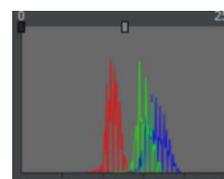
BAYER_RG12 is a 12 bit data type image. (only TIF format image supports image saving of 12 bit data type)



1. The color details of the image saved as 12 bit data type are more abundant. However, it will reduce the frame rate, which is suitable for image preservation requiring rich color details. It can be viewed through histogram.



12 bit data histogram



8 bit data histogram

It can be compared that the image details are more abundant and the transition is smooth.

4.3 Image processing

Click right side tool box  to expand tool box panel>image processing ,

Function description

Control panel identification

Initialization settings recommendation

Image setting

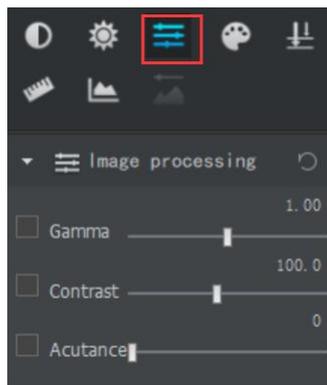
Select the box in front of the function to adjust the value of the function.

Gamma: change the brightness of the whole image, pull the adjusting rod to the left to reduce the gamma value, and pull the adjusting rod to the right to increase the gamma value.

Contrast: improve the brightness contrast of the whole image. Pull the adjusting rod to the left to reduce the contrast, and pull the adjusting rod to the right to improve the contrast.

Sharpness: improve the sharpness of the whole image change, pull the adjusting rod to the left to reduce the sharpness, and pull the adjusting rod to the right to increase the sharpness.

(it can be synchronized and precisely adjusted by the direction key ←→ of the keyboard)



When the halogen lamp / LED lamp with non natural light is used for lighting.

Default:

Gama: It is suggested to adjust to 1.00

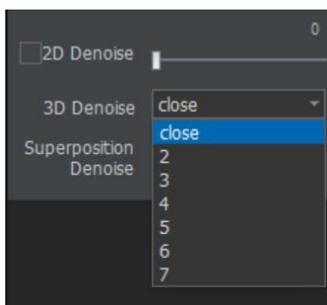
Contrast: it is recommended to adjust to the range of 100-120.

Sharpness: it is recommended to adjust to 0

2D noise reduction: it can optimize the image and eliminate the noise. The value can be adjusted synchronously and accurately by pulling the direction key of the adjusting lever or keyboard ←→. Left and right key operation .

3D noise reduction: reduce the interference of weak signal image, automatically filter out noise, make the image more pure and delicate

Overlay noise reduction: keep low exposure and bright picture



3D noise reduction: color separation during preview, software slowing down, effective when taking photos

3D noise reduction box drop-down selection number, indicating

The superimposed noise reduction box can be used for fluorescence imaging to make the picture bright

4.4 Color control

Click right side tool box  to expand tool box panel > color setting 

Function description	Control panel identification	Initialization settings recommendation
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Color control

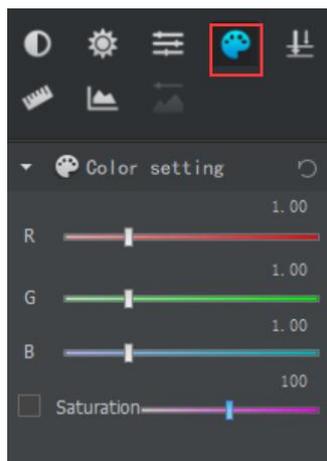
R \ G \ B gain: pull the adjustment lever to increase the image RGB gain value. The default value is 1

Pull the adjusting rod to the left to lower R \ G \ B, and pull the adjusting rod to the right to increase R \ G \ B.

Saturation: select the saturation box. After selecting, you can adjust the image saturation by pulling the adjustment lever. The higher the saturation, the brighter it will be. The saturation is small and the image is not obvious. Default value 100.

Pull the adjusting rod to the left to reduce the saturation, and pull the adjusting rod to the right to increase the saturation.

(it can be synchronized and precisely adjusted by the direction key $\leftarrow \rightarrow$ of the keyboard).



When using halogen lamp with non natural light \ LED lamp for lighting:

Saturation and R \ G \ B use default parameters

Picture white balance

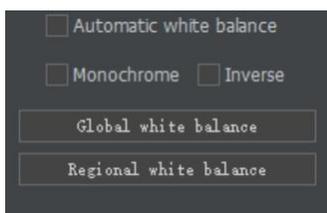
Monochrome: convert the color picture of preview window to black and white picture, which can improve the processing efficiency of picture. Select OK.

Inverse color: reverses the RGB value of each pixel in the image, ($R = 255 - R$). Select OK.

Automatic white balance: check to confirm and apply the matrix to affect the overall color of the screen, and the overall white balance will be adjusted automatically.

Global white balance: picture white balance.

Area white balance: select the mouse to change to a cross shaped box to select a picture. After the box is selected, the area white balance is adjusted for color temperature.



Getting started users recommend using automatic white balance.

The global white balance needs to adjust the picture to a blank background for white balance, and the regional white balance can be achieved by directly selecting the white area in the image

If there are special requirements, color temperature can be corrected by regional white balance.

4.5 Fluorescence processing

Click right side tool box '📦' to expand tool box panel > fluorescence processing '🔍',

Function description

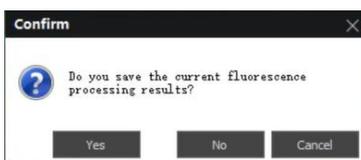
Control panel identification

Initialization settings recommendation

Fluorescence processing

In the case of fluorescence is not obvious, display effect under the superposition of fluorescence brightness can achieve better visual effect.

Click '⬇️', to take photo, the image list can display the fluorescence processed image, which can be compatible with 3 to 5 pictures, and the color brightness of each channel of the synthesized image remains unchanged. Click '⬆️' after synthesis to save.



Click OK to save

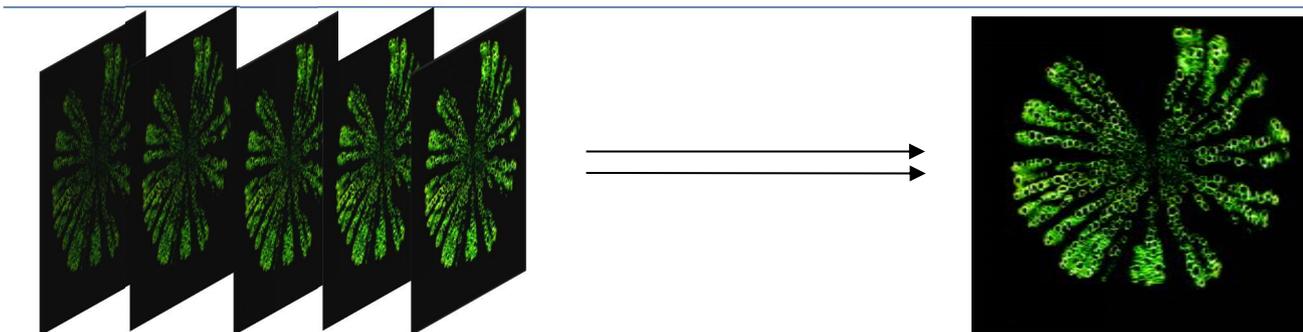
When the halogen lamp / LED lamp with non natural light is used for lighting.

Default:

Gamma value: it is recommended to adjust to 1.00

Contrast: it is recommended to adjust to the range of 100-120

Sharpness: it is recommended to adjust to 0



4.6 Measurement

Click right side tool box '📏' to expand tool box panel > measurement '📏',

Note: to save the measurement picture, it is necessary to ensure that the preview resolution and photo resolution set in the image settings are consistent in advance.

Function description	Control panel identification	Initialization settings recommendation
<p>Measurement setting tools</p> <p>1 text; 2 point count; 3 line segment; 4 free cut; 5. Rectangle; 6. Polygon; 7. Angle measurement; 8. Ellipse; 9. Circle at center + radius; 10. Circle at two points; 11. Circle at three points; 12. Parallel line; 13. Arrow; 14. Scale; 15. Energy curve</p>	<p style="text-align: center;">Measurement tools</p>	<p>After drawing the figure, you can select the figure to adjust the font size, line width, length and angle units of the figure in real time.</p> <p>When drawing the measurement image, it is necessary to ensure that the preview resolution is the same as the photographing resolution, otherwise the data cannot be saved.</p> <p>Be careful! If you change the resolution when drawing a measurement, all drawing shapes are cleared by default.</p>

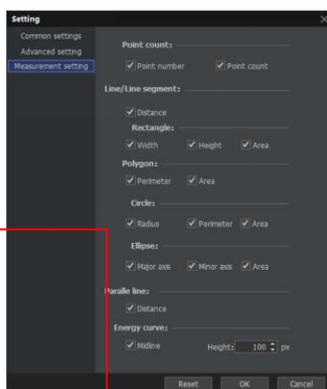
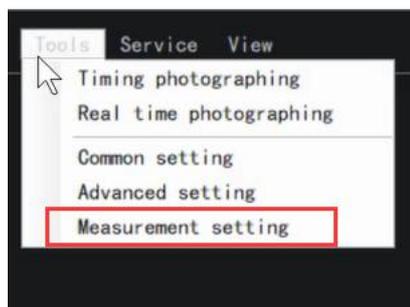
Survey tools include commonly used 2D plane drawing segments. When measuring, click to draw the drawing or select the drawing to select

the measuring area.

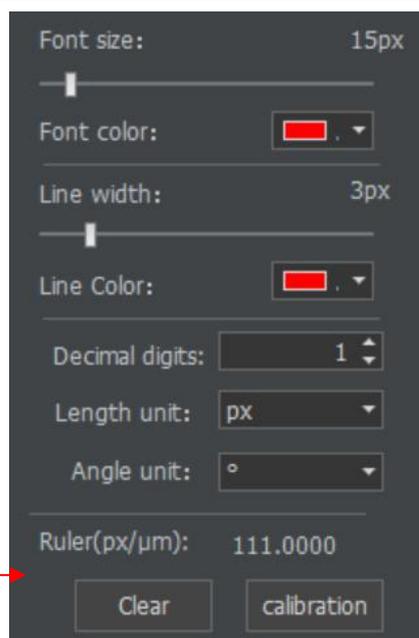
For the measurement figures to be deleted, you can select them and use [delete] on the keyboard to delete them. Or click 'Clear' to clear all the measurement figures at one time.

You can click 'Take photo' or click 'File' > 'Save' or 'Save as' to save after measurement.

The information displayed when the measurement tool is drawn can be designed through the menu bar 'Tools' > 'Measurement setting'.



Measurement setting

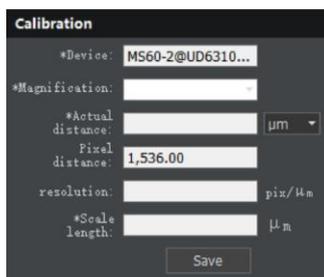


Calibration (Calibration setting)

1. Show the image of stage micrometer (optional accessory) to software (can use real-time imaging or captured images), and select 'Calibration' in measurement module.

2. Enter the objective magnification of the current picture in the pop-up calibration dialog box (for example, if the micrometer scale picture is taken under 10x objective, the magnification can be named 10x), the actual distance is the length of the standard you want to select (each small grid here represents 10 μ m, the accuracy of different scales is different, the data should be clear before calibration), and as many choices as possible can be observed To reduce the error. The pixel distance and resolution will automatically generate parameters after calibration. At this time, no modification is made, and the scale length can be input as required.

At this time, a red line segment will appear on the software. Move the mouse cross to the beginning and end of the line segment, and the



Calibration parameters setting



Calibration line segment



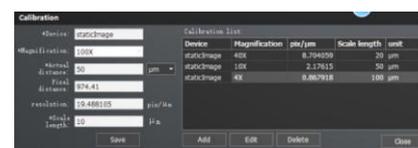
Calibration standard entrance



Magnification display

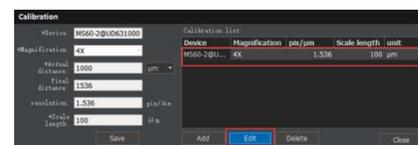
It is necessary to select the correct magnification to match the actual situation. Generally, the magnification and actual distance of the camera are set according to the camera model.

Click 'Save' after setting.



Modify: select the ruler to be modified, and set the scale length value by clicking modify

【Calibration】.



Delete the calibration. Select the pop up ruler, click 【Delete】 in the calibration window, and then click OK.

mouse will change to , to pull the beginning and end of the line segment to the actual length (if the actual length is 100 μ m, the pull length will be 10 cells).



1. Click 'Save' > 'Add', switch to the next objective, and calibrate the corresponding objectives in the same way. After all objectives are calibrated, the measuring tools can be used.

When need to display the current camera magnification and inserted scale image, it can click the calibration of the measurement module for setting - > click , insert - > click the calibration and input the value with * to complete the calibration. The value of the current ruler is displayed.

After setting, the set camera magnification can be displayed on the toolbox panel. If you select it, you can directly click , to insert the scale.

● Measurement tools function description

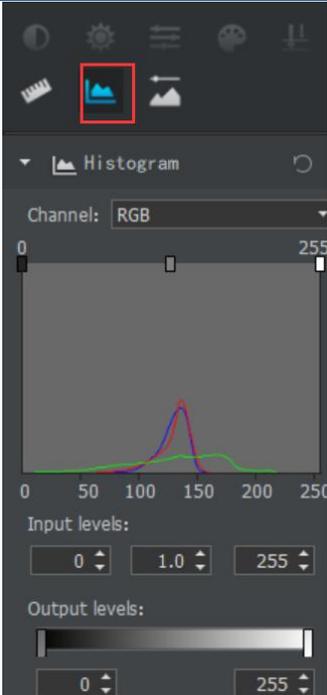
Functions	Icon	Description
Text		Click to select, the icon will turn blue, and the mouse will turn to a cross. Select the location of the text to be added in the image, and then the text mark content box will pop up. You can input the mark content as required, and select the font size and color on the right.
Point count		Click to select, the icon will turn blue, the mouse will turn to cross, manually click the sample to be calculated, the system will automatically number it, and right click to confirm after counting manually. Point count options can be set in 'Tools' > 'Measurement setting'.
Line segment		Click to select, the icon will turn blue, and the mouse will turn to a cross. It can be used to measure the distance of a straight line. Pull the distance to be measured, and the measured length will be displayed.
Free curve		Click to select, the icon will turn blue and the mouse will turn to a cross. You can draw a polyline to measure the distance. Right click to confirm and display the measured length after pulling.
Rectangle		Click to select, the icon will turn blue, and the mouse will turn to a cross. Pull the rectangle to be measured to display the area, width and height. The parameter display options can be modified in 'Tools' > 'Measurement setting'.
Polygon		Click to select, the icon will turn blue, the mouse will turn to cross, pull the polygon to be measured, right-click to confirm to display the area and perimeter, and the parameter display options can be modified in 'Tools' > 'Measurement setting'.
Angle measurement		Click to select, the icon will turn blue, the mouse will turn to cross, and the angle to be measured will be displayed after pulling.
Ellipse		Click to select, the icon will turn blue, and the mouse will turn to a cross. After pulling the ellipse to be measured, the long axis, short axis and area will be displayed. The parameter display options can be modified in 'Tools' >

		'Measurement setting'.
Center of circle + Radius circle		Click to select, the icon will turn blue and the mouse will turn to a cross. Draw a circle through the center and radius to display the radius, area and perimeter. The parameter display options can be modified in 'Tools' > 'Measurement setting'.
Two points circle		Click to select, the icon will turn blue, and the mouse will turn to a cross. Draw a circle through three points to display the radius, area and perimeter. The parameter display options can be modified in 'Tools' > 'Measurement setting'.
Three points circle		Click to select the three-point circle, the icon will turn blue, and the mouse will turn to a cross. Draw the circle through three points to display the radius, area and perimeter. The parameter display options can be modified in 'Tools' > 'Measurement setting'.
Parallel lines		Click to select, the icon will turn blue, the mouse will turn to cross, draw two parallel lines and display the distance between them. The parameter display options can be modified in 'Tools' > 'Measurement setting'.
Arrow		Click to select, the icon will turn blue, and the mouse will turn to a cross for indication and marking.
Scale		Click the scale bar, the scale bar will appear on the screen, and the position of the scale bar can be dragged. It is recommended to use after calibration.
Energy curve		Click to select, the icon will turn blue, the mouse will turn to cross, pull the required area to display the energy curve. High curve and brightness.

Note: the above measuring tools are recommended to be used after software calibration.

4.7 Histogram

Click right side tool box  to expand tool box panel > Histogram .

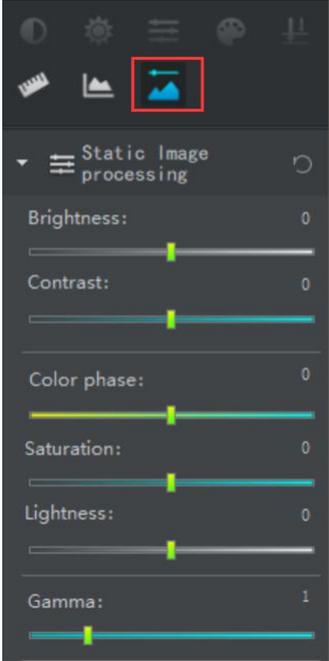
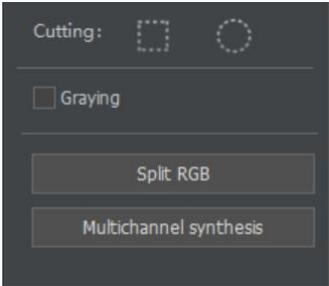
Function description	Control panel identification	Initialization settings recommendation
<p>Histogram</p> <p>Histogram can be used to view the distribution of the number of pixels under each luminance level of 0-255. Histogram is the display of photo exposure, showing the distribution of hue. According to the histogram drawn by these values, the exposure effect can be preliminarily determined. Visually see whether the image has rich highlights, overexposure or full dark details.</p> <p>Abscissa: brightness (value range: 0-255)</p> <p>Ordinate: the total number of pixels of brightness corresponding to the abscissa.</p> <p>Input color scale: middle color scale.</p> <p>Output color scale: change the overall brightness of the picture.</p> <p>Pull the left and right bars of the histogram (input the value accurately in the input color scale) to adjust the brightness range of the input color scale. You can select different color channels or three channels for</p>		<p>Generally, the middle color scale is set to 1 for adjustment. It can adjust the brightness of the whole picture synchronously.</p> <p>Adjust the left pull rod: adjust the brightness of the minimum value. The pixel point on the left of the original pull rod is 0, showing black effect, its value bigger, brightness darker and contrast increased.</p> <p>Adjust the brightness of the right pull rod, adjust the brightness of the maximum value. The pixel point on the right of the original pull rod is 255, showing bright signal, its value smaller, image signal brighter.</p> <p>Pull the left pull rod to the right, the darker the gray pixel is, and the right pull rod to the left, white pixels are whiter.</p>

brightness adjustment.

Output color scale: pull the adjusting block to adjust the brightness of the whole image, and input the value manually to set accurately.

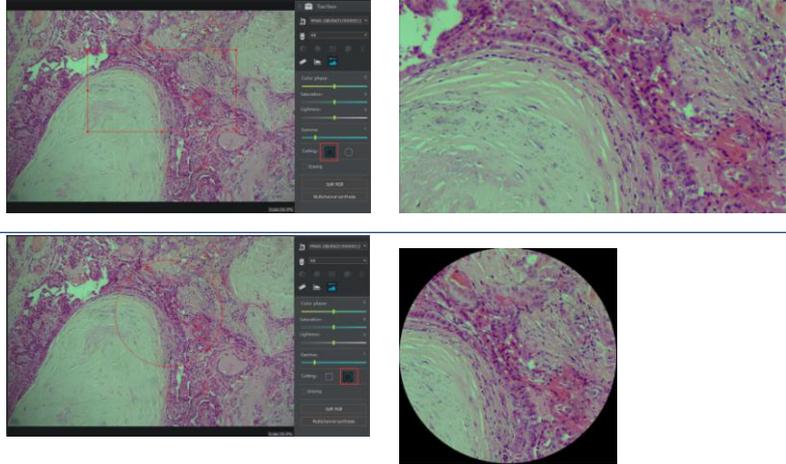
4.8 Static image processing

Click right side tool box ‘’ to expand tool box panel > static image processing ‘’.

Function description	Control panel identification	Initialization settings recommendation
<p>Static image processing</p> <p>Use this module only when still images are open</p> <p>Brightness: adjust the pull rod to the right and the image will be bright; adjust the pull rod to the left and the image will be dark.</p> <p>Contrast: adjust the pull rod to the right to increase the contrast; adjust the pull rod to the left to reduce the contrast.</p> <p>Hue: adjust the pull rod, hue adjustment, color change.</p> <p>Saturation: adjust the pull rod to the left, and the saturation increases.</p> <p>Brightness: adjust the pull rod to the left, the image will be bright, adjust the pull rod to the right, and the image will be dark.</p> <p>Gamma value: adjust the pull rod to the left, the image becomes bright, adjust the pull rod to the right, and the image becomes dark.</p>		<p>Default value:</p> <p>Brightness, contrast and hue are 0;</p> <p>Saturation and lightness are 0; gamma value is 1</p>
<p>Other settings</p> <p>Clipping: double click to open the still image, click the clipping of the still image processing, and select the clipped image shape.</p> <p>Graying: converts a color image to a black and white image.</p> <p>RGB splitting: double click to select the picture to be split in the left picture library, and click RGB splitting to complete the image RGB channel separation.</p> <p>Multi channel synthesis: synthesize images of different colors: click multi-channel synthesis, double-click the image to be synthesized in the left</p>		<p>Clipping: it can highlight the key areas in the static image and enlarge the image.</p> <p>Multichannel synthesis is mainly used for the synthesis of fluorescence imaging.</p>

picture library, and then complete the image synthesis.

Image cutting



5 Advanced function setting

5.1 Color matrix

Color balance can be corrected by color matrix. Setting path: menu bar 'Tools' -> 'Advanced settings' to input.

Based on the correction calculation of the original RGB value of the original image, a new value is obtained, which is the corrected value.

5.1.1 turn on the camera and carry out area white balance for the dynamic image to be corrected.

By clicking the drop-down list, you can select the matrix with positive color or customize it.

After correcting the matrix, click 'Apply', and then click 'OK' of parameter setting.

After the region white balance of the image, the correction image can be obtained.

If you want to save the previous settings, you can click 'Save as' to save the set custom matrix. Click 'Load' to apply the previously set matrix list for selection.

Matrix computation:

$$R1 = a11 * R + a12 * G + a13 * B$$

$$G1 = a21 * R + a22 * G + a23 * B$$

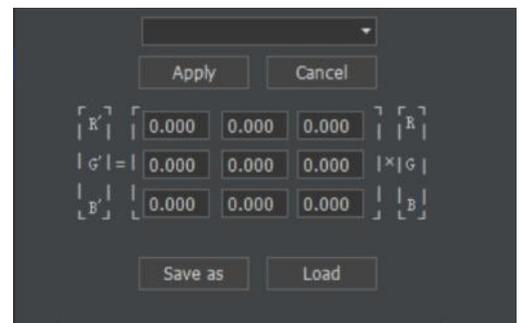
$$B1 = a31 * R + a32 * G + a33 * B$$

RGB is the R, G, B value of the original image, R1 G1 B1 is the corrected value after application.

Matrix a11 a12 a13

a21 a22 a23

a31 a32 a33



Input the value and click apply to confirm that you can see the image after color balance.

5.2 Flat field correction

Flat field correction: the interference of uneven color distribution in the picture can be eliminated through flat field correction, which needs to be corrected under the background of all white.

5.3 Color point correction

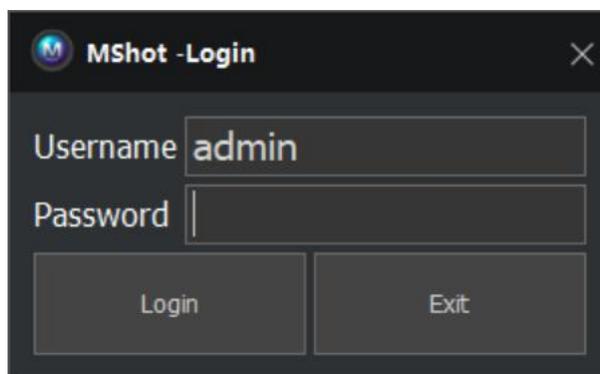
Flat field correction: the interference of uneven color distribution in the picture can be eliminated through flat field correction, which needs to be corrected under the background of all white.

Color spot correction: due to the scattering of light in the picture, part of the color spots will be seen in the enlarged image, which will affect the clarity and reducibility of the image. Color spot correction can cancel the color spots in the picture.

6 User login and management

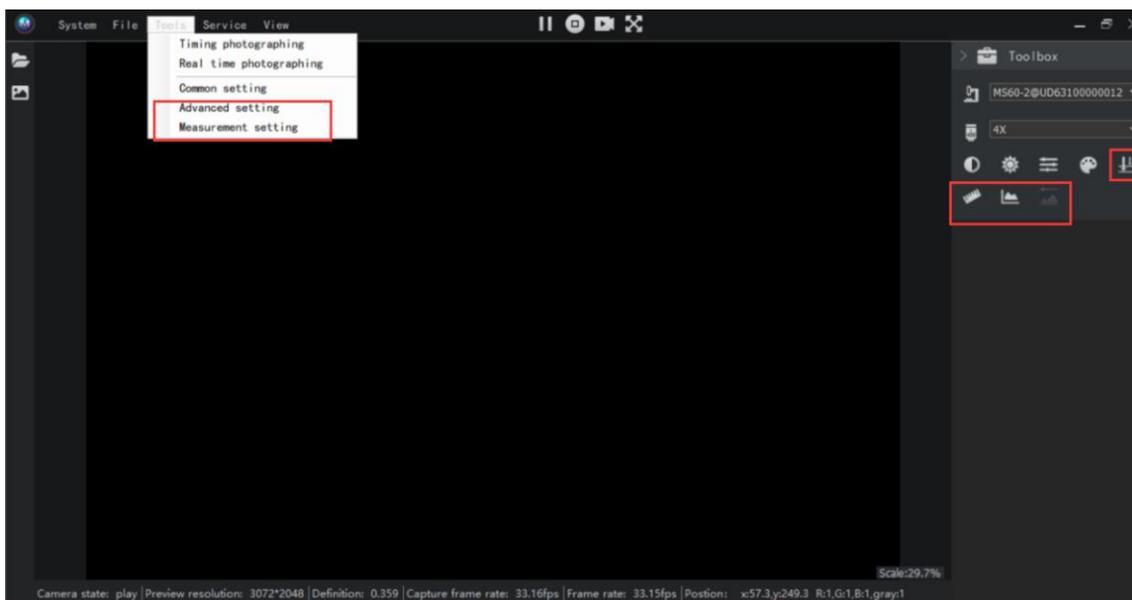
6.1 Login system

The system login requires account password. According to the specified permissions, it can be divided into ordinary users and administrator users, with different account passwords assigned, and permissions assigned to maintain the rights and interests of enterprises and users.



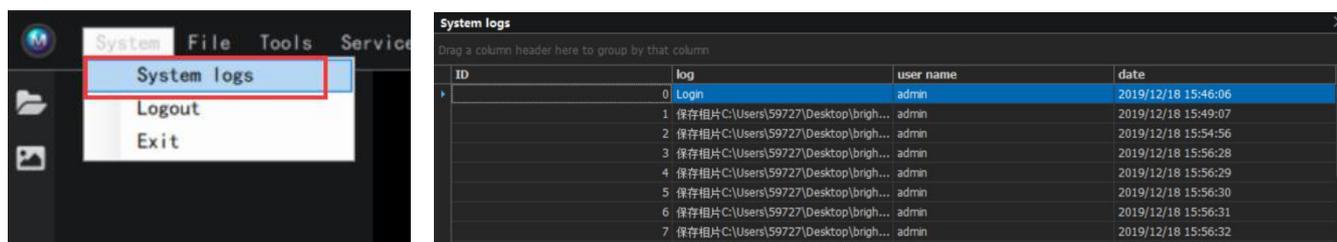
Ordinary users can use basic operations such as photographing (timed photographing, real-time photographing), video recording, etc., and can set exposure control, image setting, image processing, color control. Static images cannot be manipulated.

Compared with the ordinary users, when the administrator authorized users add advanced settings and measurement display settings, the function module adds measurement, fluorescence processing, histogram, and static image processing functions.



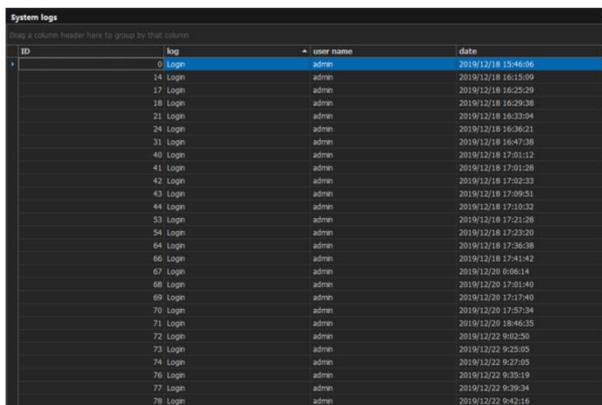
6.2 Control and manage users

Click menu bar 'System' -> 'System logs' as management



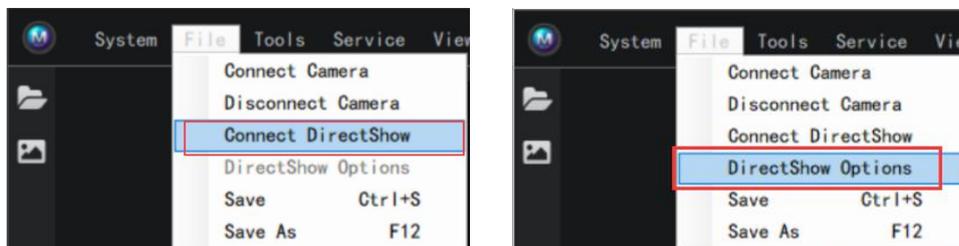
7 System log

Click 'System' -> 'System log' in the menu bar to enter the system log. The system log can be used to record the system login and photo taking operations, so that the user can view the main operations and obtain important information.



8 Connecting other device (Directshow interface)

The DirectShow parameter settings are determined by the camera used, taking the front camera provided with the computer as an example. Click 'File' in the menu bar -> 'Connect DirectShow' device.



Camera PC property



DirectShow Interface parameter setting function description

Parameter setting	Function	Adjustment range
Brightness	Adjust the brightness of the camera's internal picture	
Contrast	Adjust the brightness level of the image	
Gamma	Auxiliary brightness and contrast adjustment	
Tone	Tone size adjustment	
Saturation	Saturation and brightness of screen color	
Sharpness	Provide image segmentation edge	
Anti flicker	Set the anti stroboscopic of 50Hz \ 60Hz	

Video	Performance bias of video display
Default value	Click recovery
Confirm	Confirm revision
Apply (A)	Click Apply after modification to apply the modification

9 Help

9.1 About

View software version information

9.2 Full screen display

Menu bar 'tool' -> full screen display, play the current imaging interface in full screen, and exit with ESC key

