

ARTRAY NIR Camera · UV Camera
2D Measurement & Filing Software
Art Measure for TNIR/SWIR
Manual

ARTRAY

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1. Introduction

Thank you for purchasing Art Measure for TNIR/SWIR.

This booklet explains how to operating instructions Art Measure for TNIR/SWIR.

Regarding explanations for the hardware, please refer to our other booklets or contact our sales representatives.

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Program names, system names, CPU names in the booklet are registered trademark by each maker.

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2. Instructions for Cameras

You need to install the device driver for the first time only.

For how to install the device driver, refer to "2.1 Device driver installation".

Make sure to use the standard USB port of the PC, not the expansion type such as PCI type.

[Recommended System Requirements]

●CPU

The driver of this camera is applicable to computer architecture "x86" or "amd64".

The specification of CPU effects directly the imaging process speed, therefore it is highly recommended to utilize a high-end CPU if possible.

●Memory

In the viewer software, there is a data buffer which can store 4 to 8 frames.

Therefore, it is necessary to keep spare space at least for 8 frames in the memory.

It is highly recommended to keep enough memory space especially when using high resolution camera.

●OS

This camera is applicable only to the architecture of Windows NT (32bit/64bit).

Standard functions are confirmed with OS after Windows 7.

In addition, it is recommended to use Windows 10.

2.1. Device driver installation

The procedure from the initial installation to using the camera is as follows.

1. Connect the AC adapter that came with your camera. Once connected, the camera will turn on. A camera without an AC adapter will turn on when connected to a PC with a USB cable.
2. Connect the camera and PC with a USB cable.
3. Insert the CD-ROM into your PC.
4. Install the device driver.
5. Install the viewer software.
6. Launch the viewer software.

The corresponding device driver is different depending on the model, please check the table below.

InGaAs Camera

Model Name	Device driver
ARTCAM-990SWIR-TEC	USB3-T2
ARTCAM-990SWIR	
ARTCAM-130SWIR	
ARTCAM-991SWIR-TEC	
ARTCAM-991SWIR	
ARTCAM-991SWIR-WOM	ARTCAM-991SWIR-WOM
ARTCAM-131TNIR-TEC	USB3-T2
ARTCAM-131TNIR	
ARTCAM-032TNIR	
ARTCAM-009TNIR	
ARTCAM-031TNIR	ARTCAM-031TNIR
ARTCAM-008TNIR	ARTCAM-008TNIR
ARTCAM-0016TNIR-TEC	ARTCAM-0016TNIR
ARTCAM-0016TNIR	

CMOS Camera

Model Name	Device driver
ARTCAM-130XQE-WOM	ARTCAM-130XQE-WOM
ARTCAM-092XQE-WOM	ARTCAM-092XQE-WOM

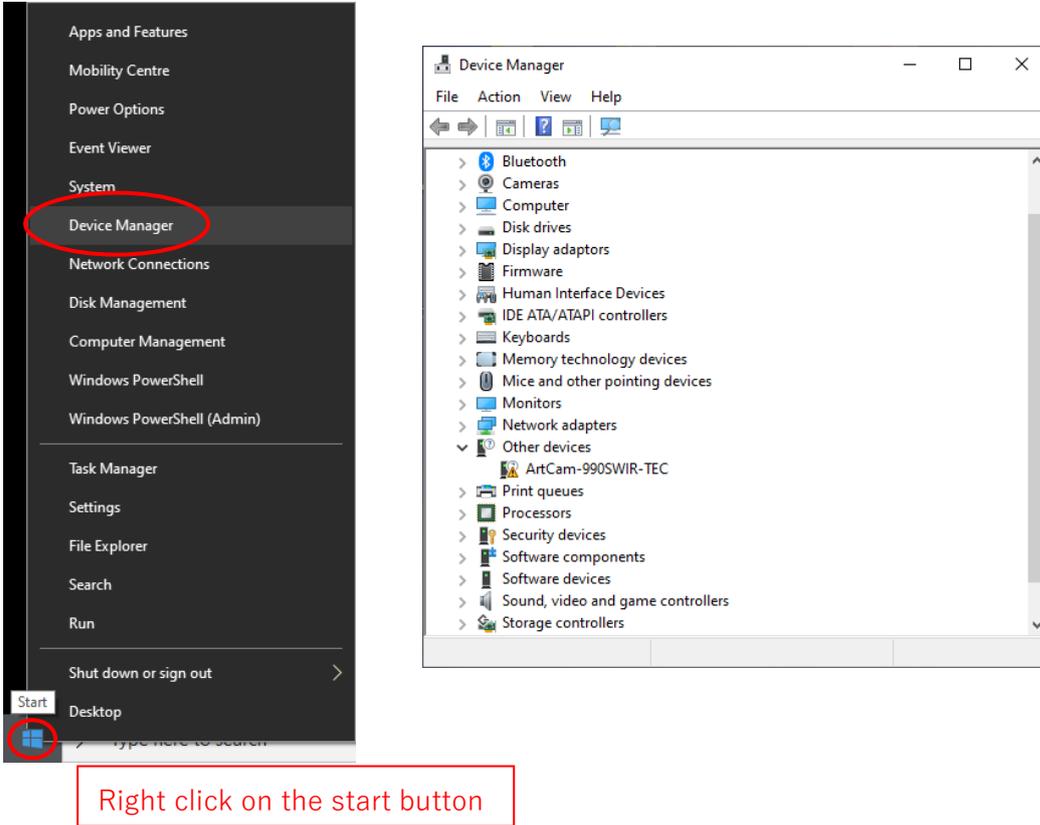
UV Camera

Model Name	Device driver
ARTCAM-2020UV-USB3	USB3-T2
ARTCAM-130UV-WOM	ARTCAM-130UV-WOM
ARTCAM-092UV-WOM	ARTCAM-092UV-WOM

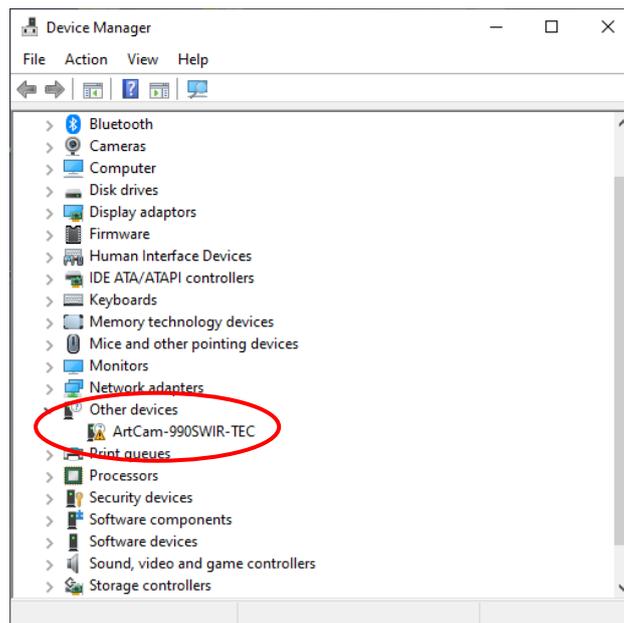
Installation procedure

The following is an example of installing ARTCAM-990SWIR-TEC on Windows 10 (64bit).

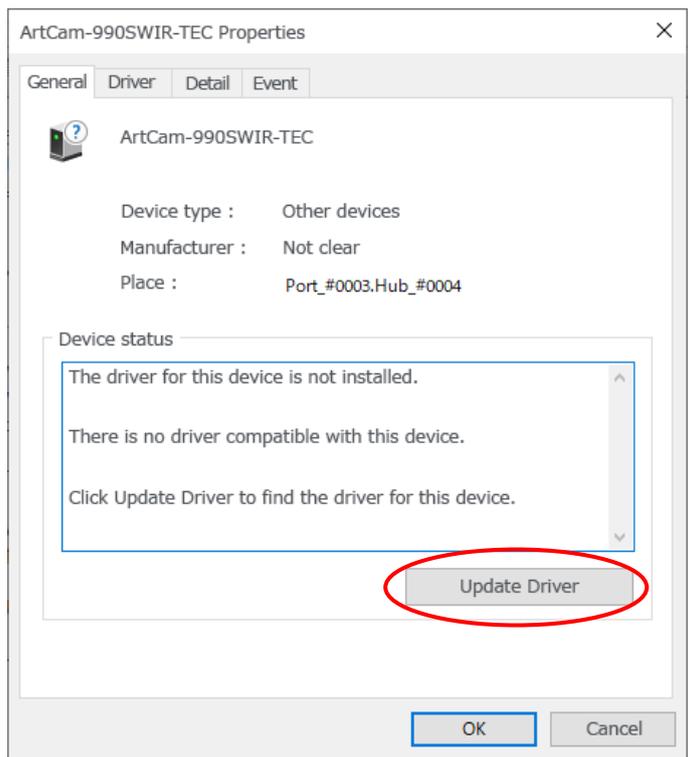
1. Insert the attached CD-ROM into your PC.
2. Connect the camera to the USB port on your PC and display Device Manager.
Display method : Right click on the start button → Click "Device Manager"



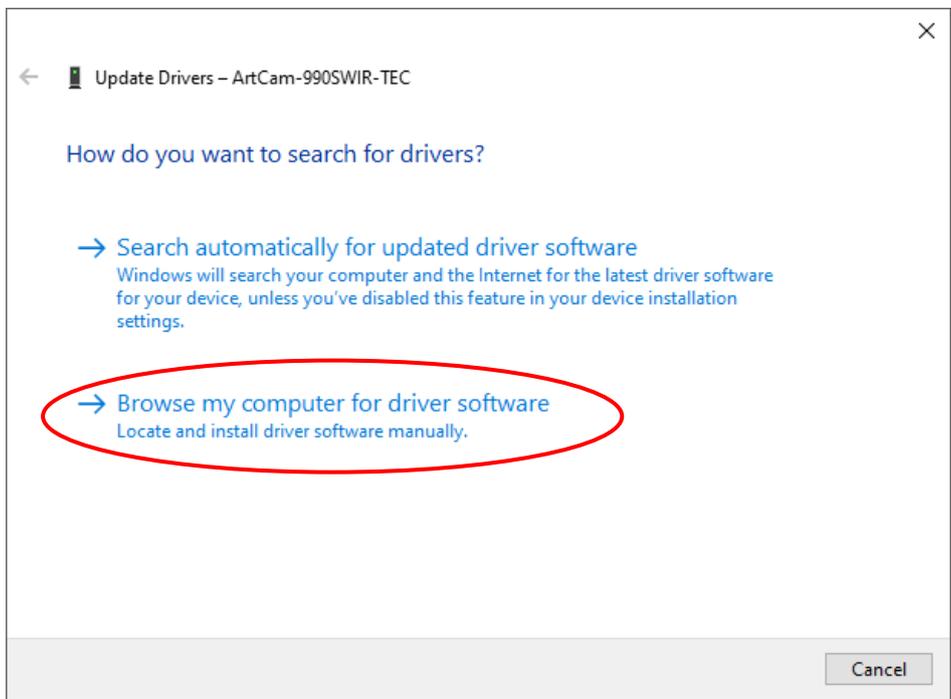
3. Double-click "Other devices" → "ArtCam-990SWIR-TEC" in Device Manager.



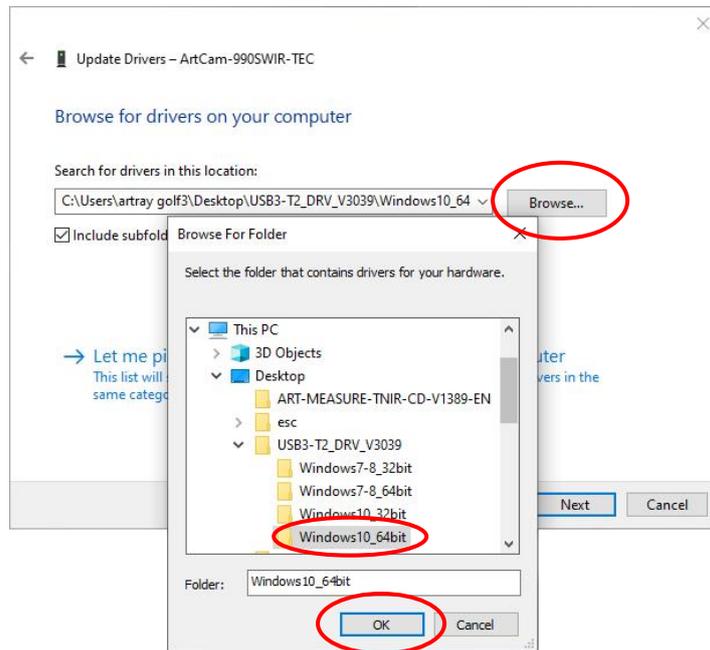
4. When the following screen is displayed, click "Update Driver".



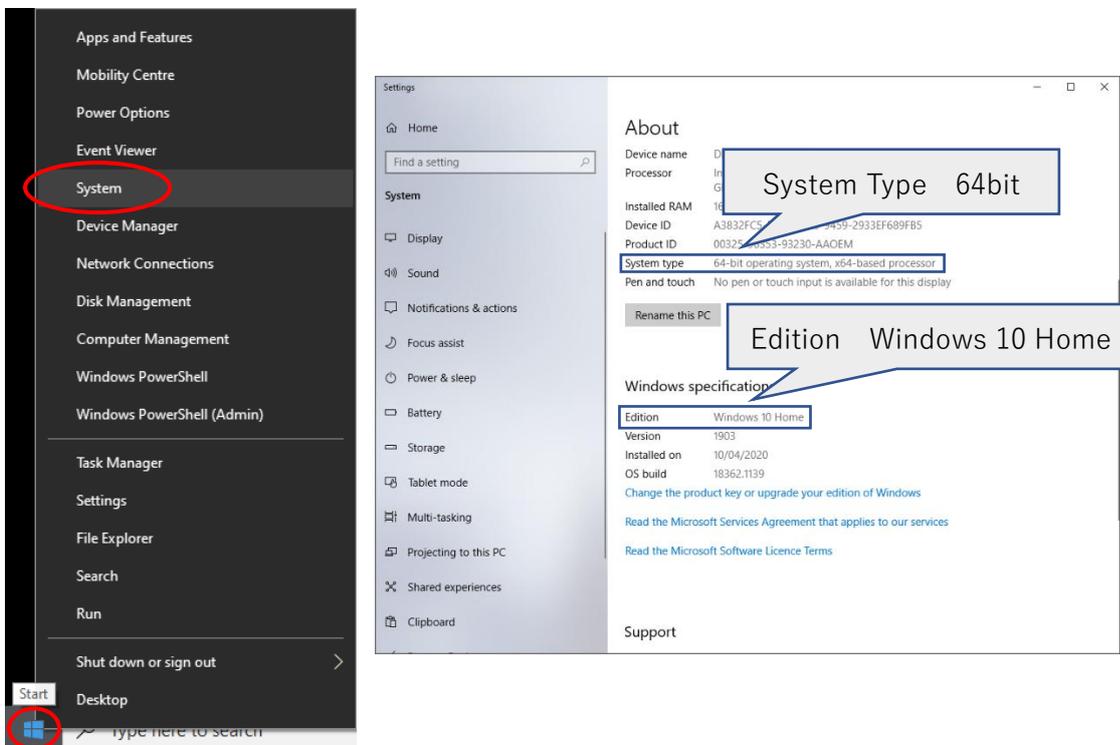
5. When the following screen is displayed, click "Browse my computer for driver software".



6. Click "Browse" from the screen below, and select "Drivers" inside the attached CD-ROM → Select the corresponding OS from the folder of model which is compatible → Click "OK"

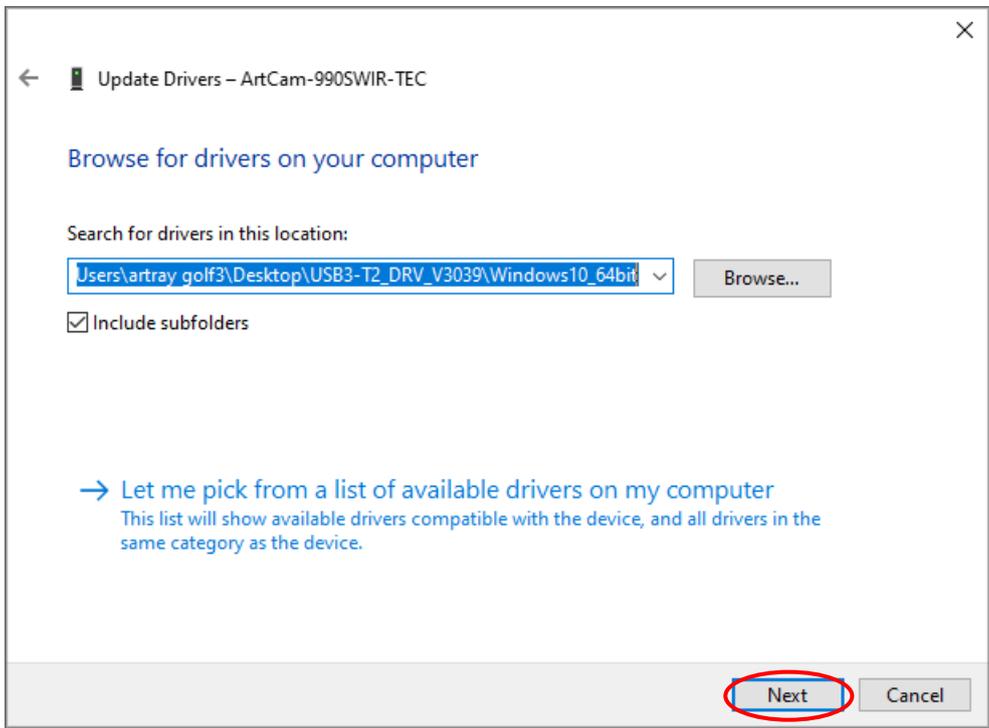


※How to check the supported OS : Right click on the start button → Click "System"

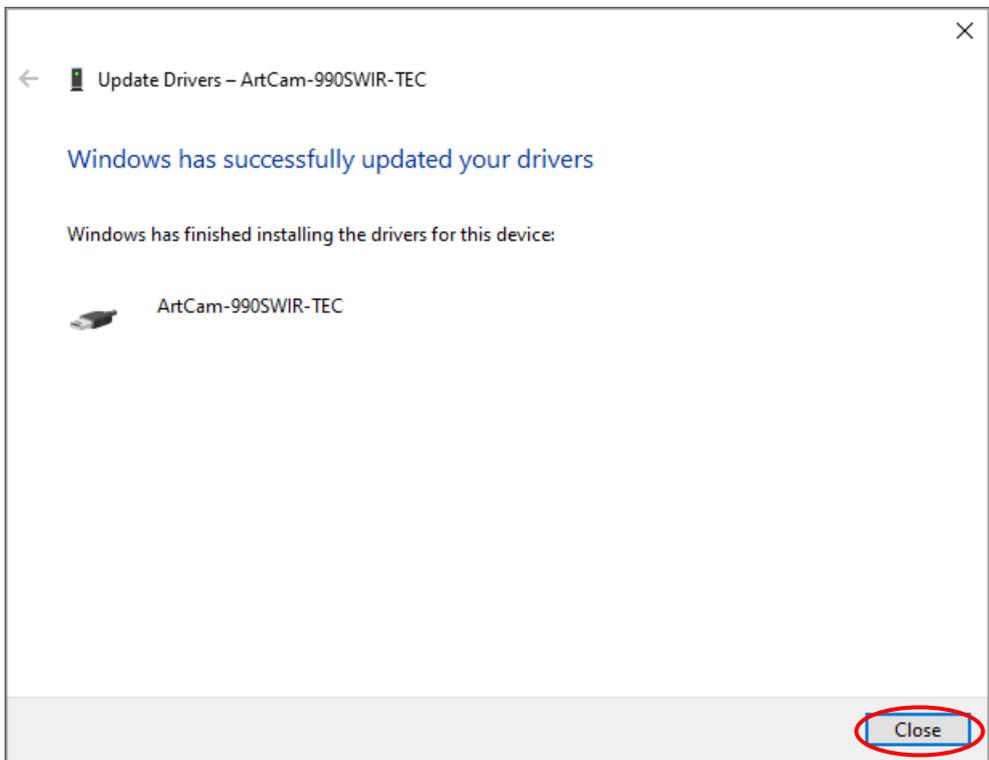


Right click on the start button

7. After selecting the supported OS folder, click "Next" → The installation will be performed.
※ A message confirming to trust the manufacturer will be displayed only on the first time, please click "Yes" to proceed.



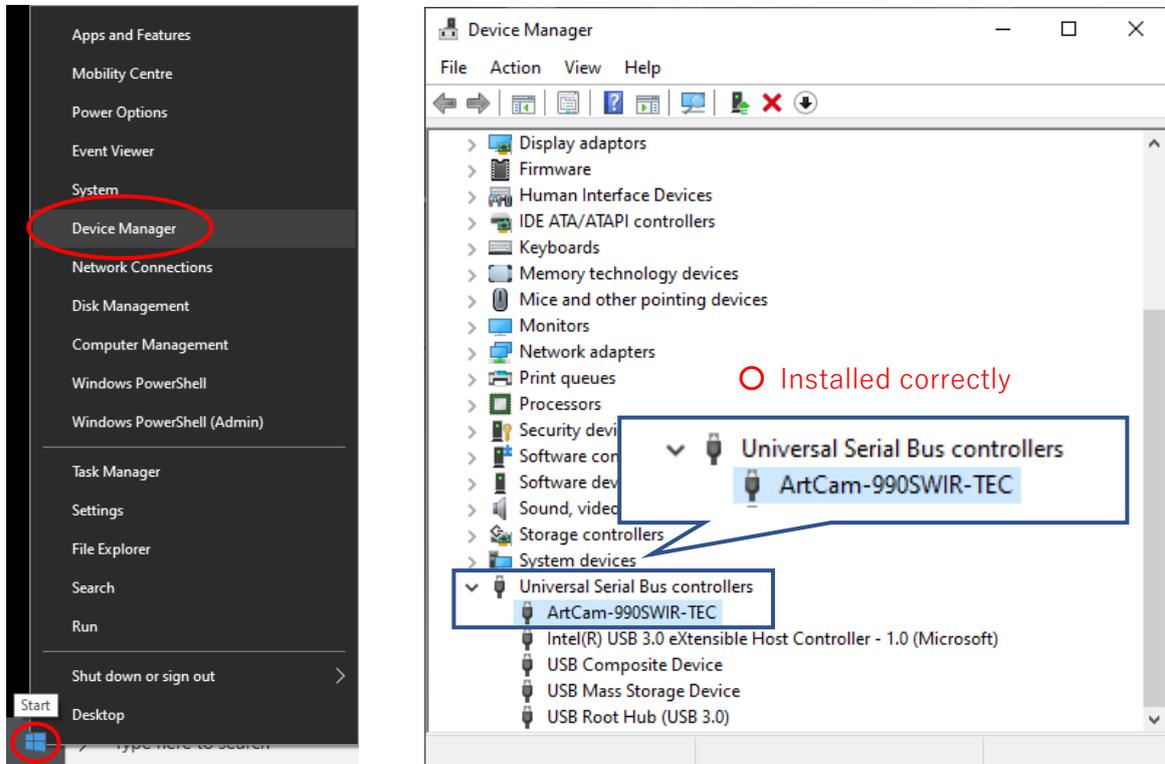
8. When the following screen is displayed, click "Close". The device driver installation completes.



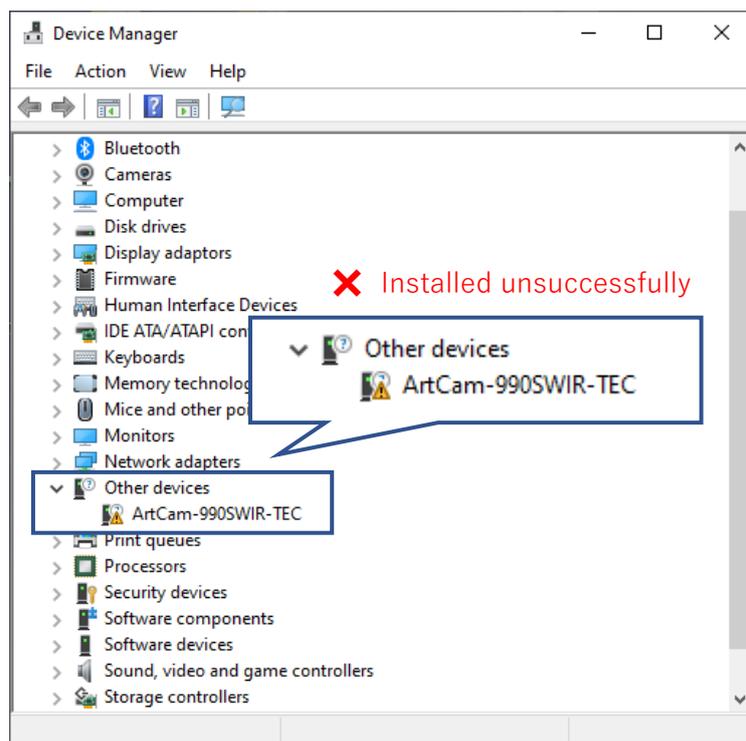
2.2. Confirming whether the camera is recognized by the PC

If the device driver is already installed, the model name will be displayed in Device Manager when the camera is connected to the PC, and  (the mark indicates error) will not be displayed.

※Display method : Right click on the start button → Click "Device Manager"



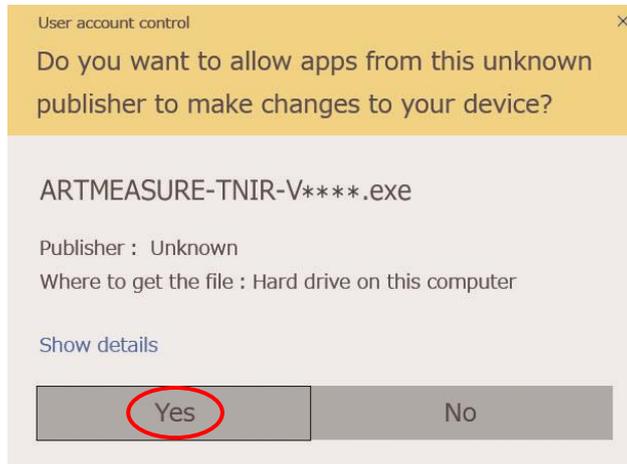
Right click on the start button



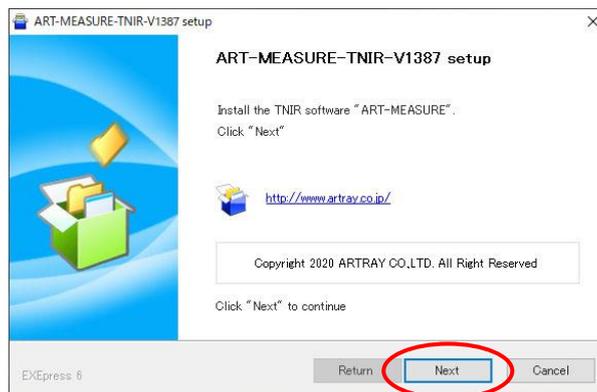
3. Installation of viewer software

Install Art Measure for the camera from the CD-ROM.

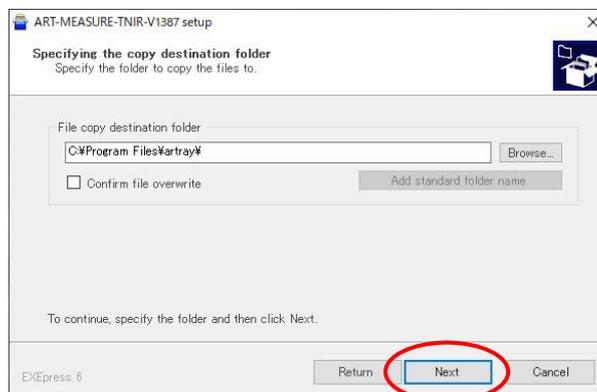
1. Double-click "ART MEASURE-TNIR-V ****. exe" from the CD-ROM.
Click "Yes" when the following screen is displayed.



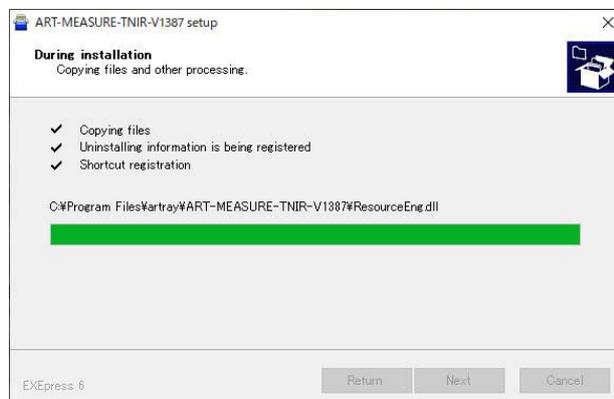
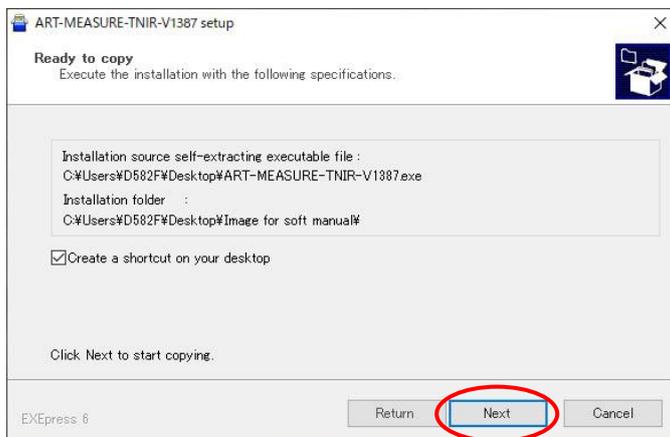
2. When the following screen is displayed, click "Next".



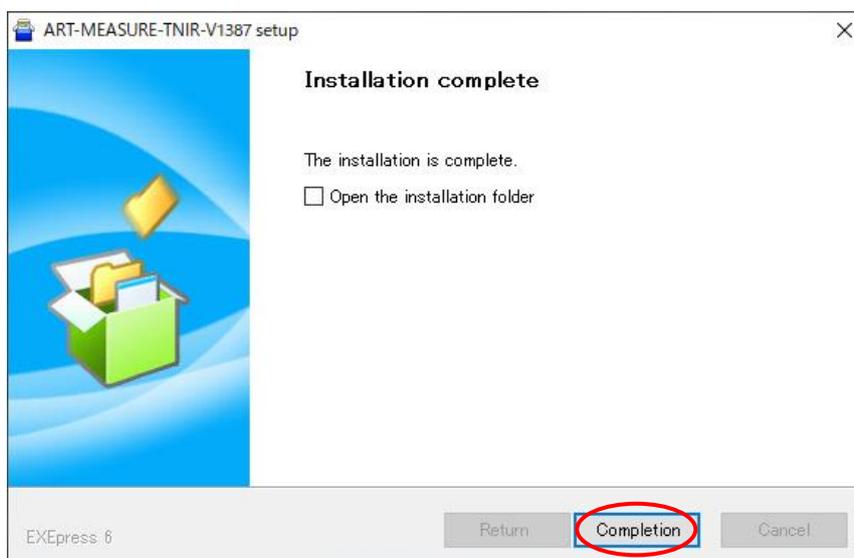
3. When the following screen is displayed, confirm the destination folder for your copied file and click "Next". To change the destination folder, click "Browse" and specify the folder.



4. When the following screen is displayed, check the content, and click "Next".
The file will start to be copied.



5. When the following screen is displayed, click "Completion".
The installation of the viewer software completed.



4. Launching of viewer software

The following explains the basic functions of viewer software.

4.1. Start-up / Display

The following explanation is the screen of ARTCAM-990SWIR-TEC.

The basic operation is the same for all models except ARTCAM-130XQE-WOM.

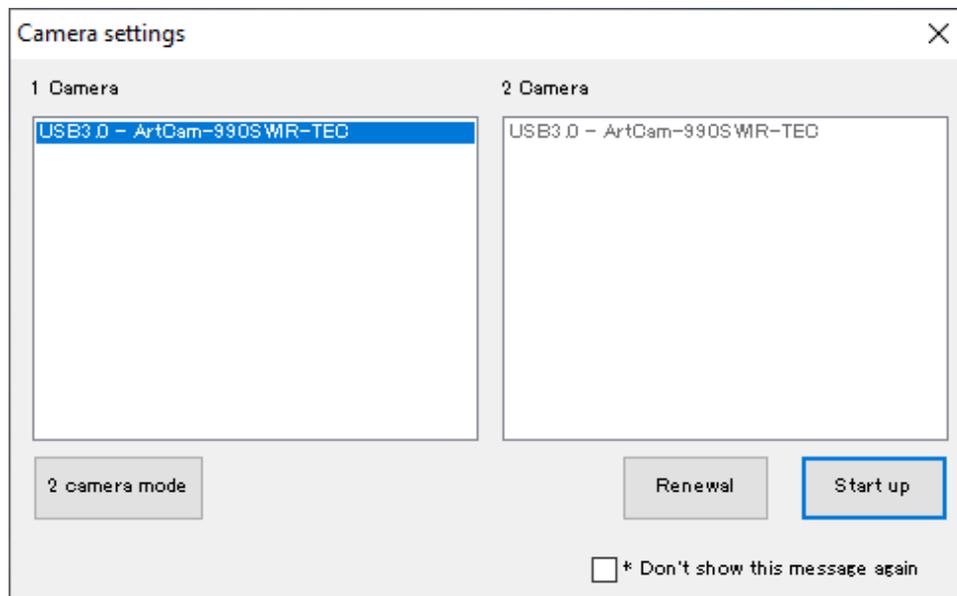
1. Connect the camera.
2. Start Art Measure for camera.

Start → Please select ART MEASURE-TNIR_V ***.



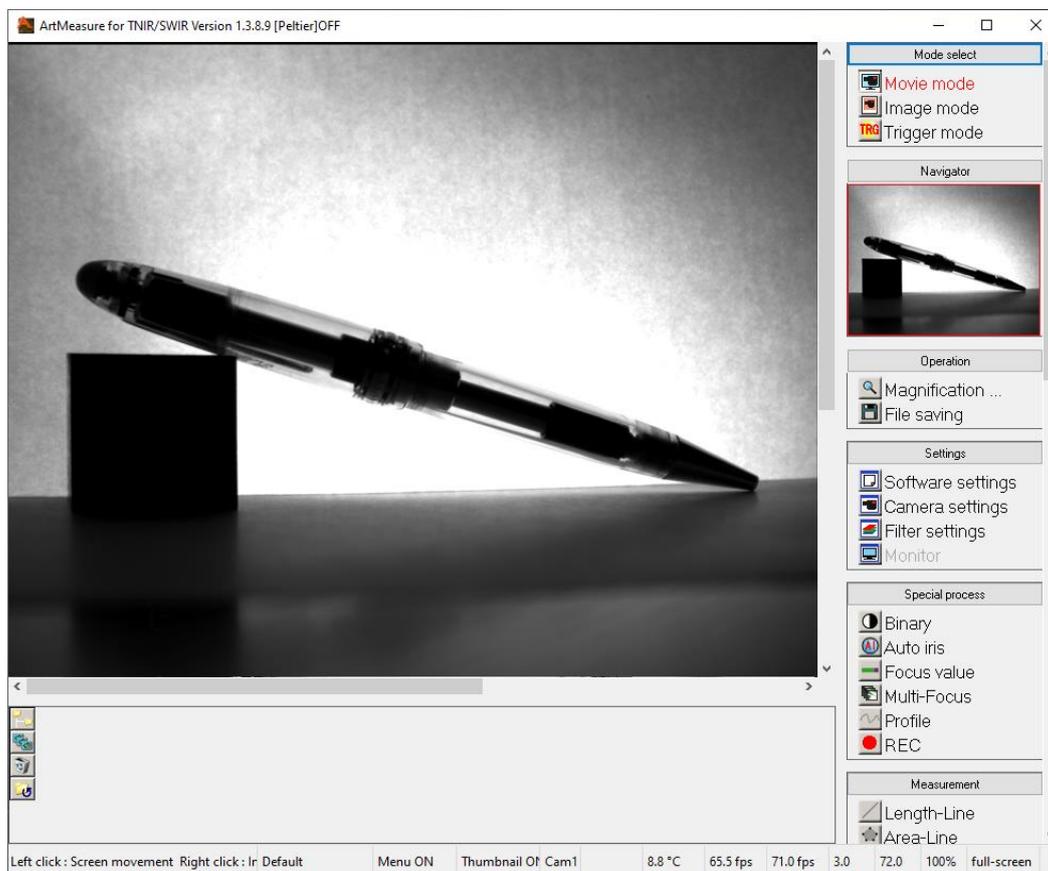
3. Select the camera model to be activated and click "Startup".
If the model's name of the camera you want to start-up is not displayed, click "Renewal".
The latest connection status will be shown.

※If there is no recognized camera, the selection screen will not be displayed. In that case, see page 13. Please check "2.2 Confirming whether the camera is recognized by the PC " and connect it correctly.



4. The dot compensation file will load automatically.
If it cannot load automatically, the config file selection screen will be displayed.
Select Config.dat in the same folder as the viewer software.

5. As the viewer software starts, the camera image is displayed in Movie mode.



4.2. Start-up / Display

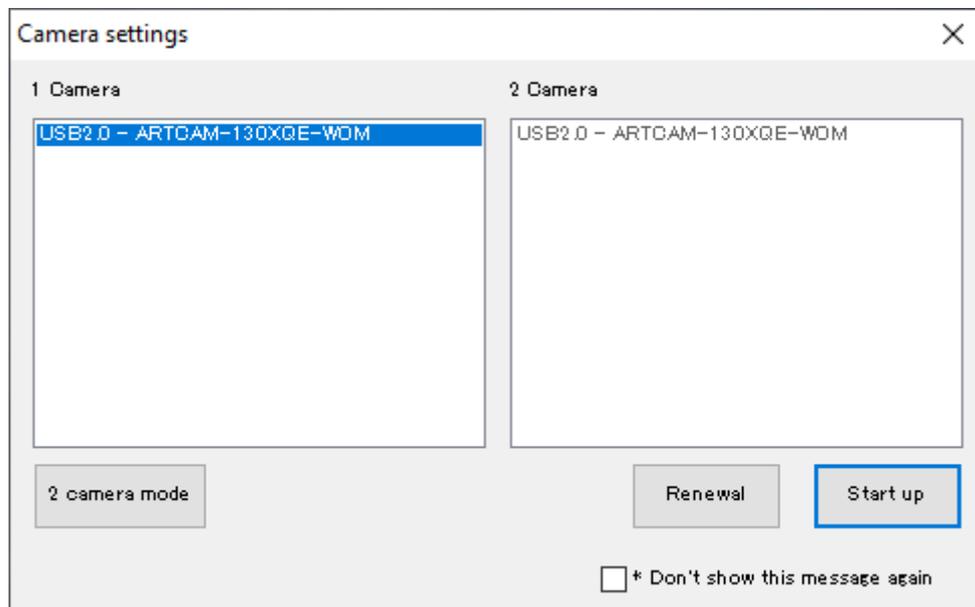
The following explanation is the screen of ARTCAM-130XQE-WOM.

1. Connect the camera.
2. Start Art Measure for camera.

Start → Please select ART MEASURE-TNIR_V ***.

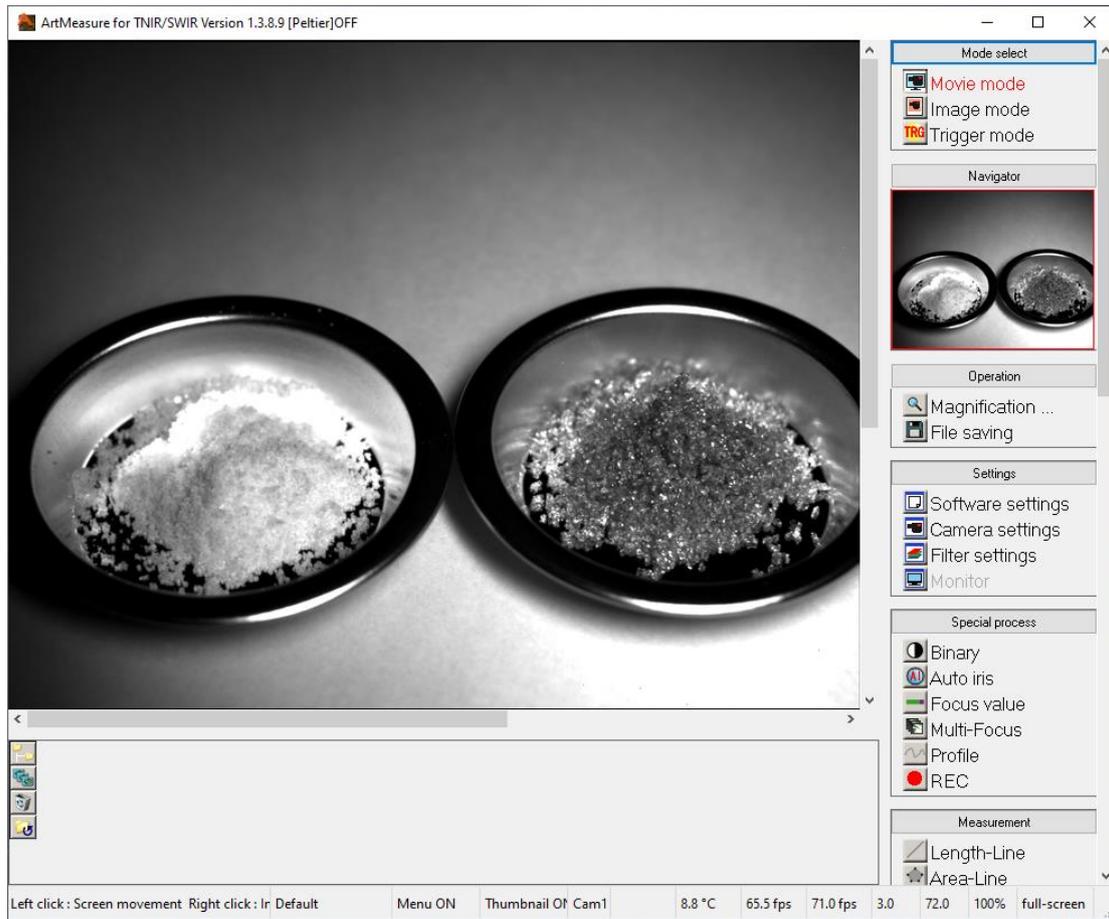


3. Select the model of the camera to start and click "Startup".
If the model's name of the camera you want to start-up is not displayed, click "Renewal".
The latest connection status will be shown.



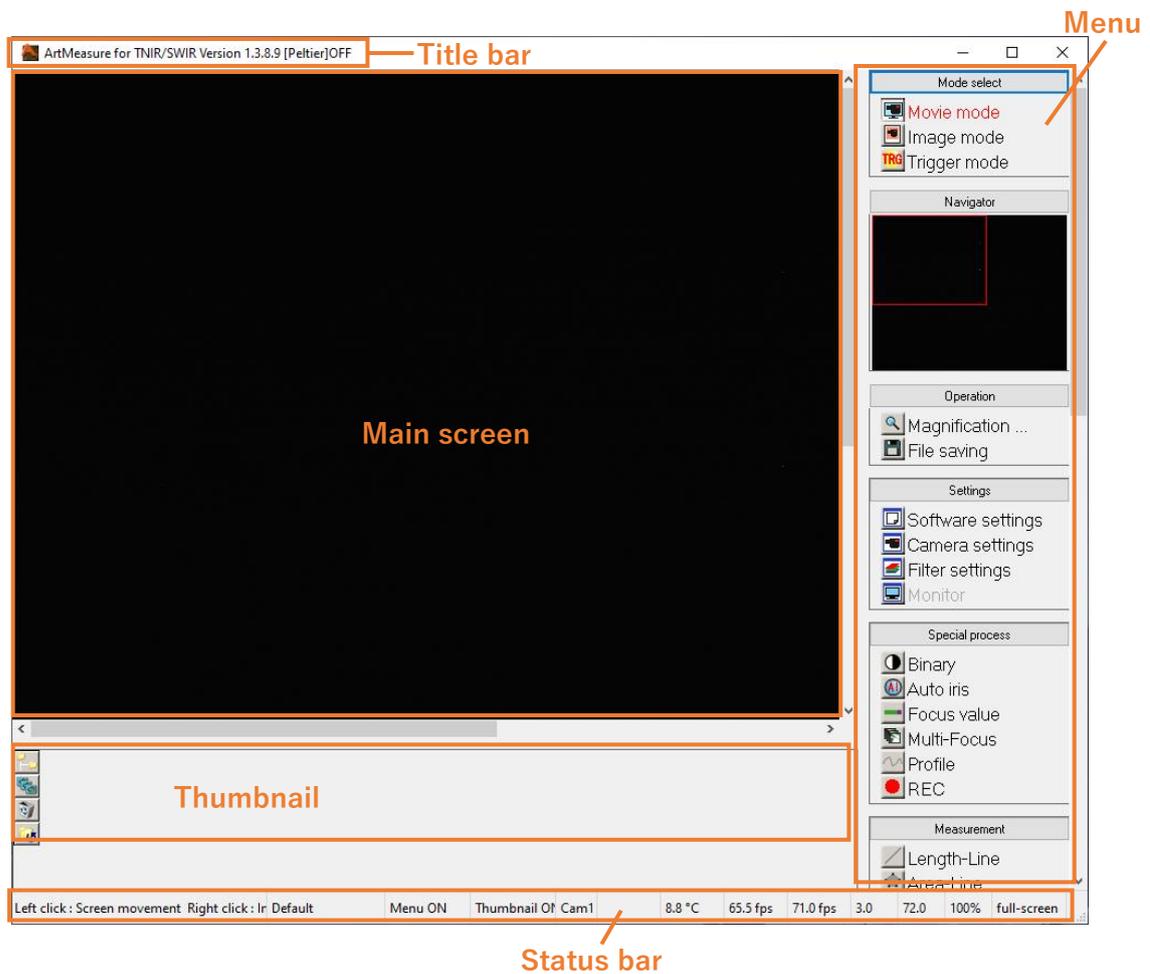
4. Initialization will start. Please wait.
5. If you connect the ARTCAM-130XQE-WOM color model, an error message will be displayed, and you will not be able to start the viewer software.
Please use Art Viewer if you would like to use a color model.
6. The dot compensation file will load automatically.
If it cannot load automatically, the config file selection screen will be displayed.
Select Config.dat in the same folder as the viewer software.

6. As the viewer software starts, the camera image is displayed in Movie mode.



4.3. Screen description

The screen of the viewer software is divided into five parts.



Title bar

Displays the viewer software version.

Main screen

Displays the capture from the camera.

Thumbnail

Shows the images which have been saved into a designated folder.

- Click  to change the destination folder for your images.
- Click  to start a slideshow of the images in the folder.
- To delete the file inside the destination folder, select the file and click .
- Click  to update the thumbnail to the latest status.

Menu

Possible for various operations.

You can fold and unfold the menu by clicking the operation name at the top of the menu.

※The "Monitor" function is not available for Art Measure for TNIR / SWIR.

Status bar

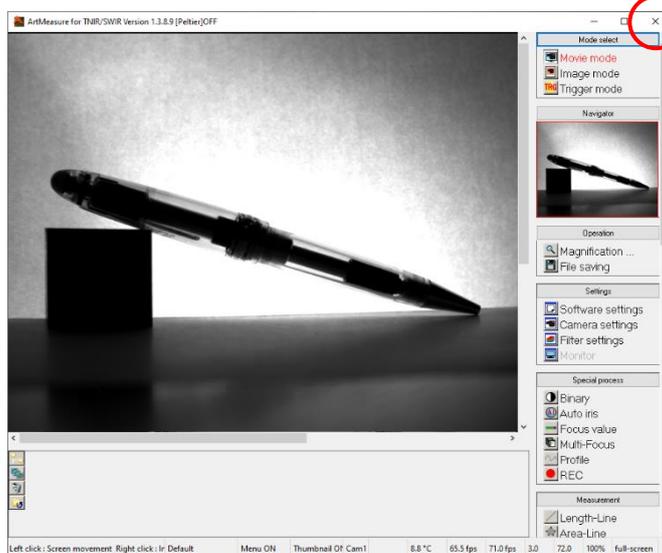
Shows current activities.

Left click : Screen movement	Right click : In Default	Menu ON	Thumbnail Off	Cam1		65.5 fps	71.0 fps	3.0	72.0	100%	full-screen
①	②	③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪

- ① Explanation and operation method will be displayed when you match the cursor to the menu
- ② Displays the applied calibration value setting.
- ③ Click to switch the menu display ON / OFF.
- ④ Click to switch the thumbnail display ON / OFF.
- ⑤ Display the operation target camera (Cam1 / Cam2).
- ⑥ Frame rate displayed on the main screen.
- ⑦ Frame rate captured from the camera.
- ⑧ X coordinate of the mouse pointer on the image.
- ⑨ Y coordinate of the mouse pointer on the image.
- ⑩ Shows the display magnification of the screen. Click/ right click to change the magnification.
- ⑪ Click to switch between full screen / window mode.
※To return from full-screen mode to window mode, move the cursor to the bottom of the screen and click "Window".

4.4. How to exit

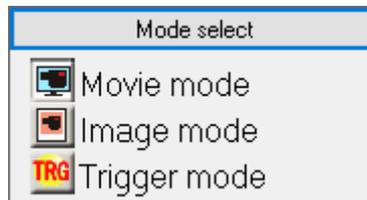
To exit the viewer software, click x button at the top right corner of the screen to close it.



5. Display the image

5.1. Mode selection (Movie / Image / Trigger)

There are three image display modes: movie mode, image mode, and trigger mode.



Display in movie mode

Click  Movie mode from " Mode select " in the menu.

The image of the camera is displayed in real time.

Display in image mode

Click  Image mode from " Mode select " in the menu.

Camera will stop capturing when you switch the display mode from Movie mode to Image mode.

This mode will be used also when a still image such as a BMP file or JPG file is read.

Display in trigger mode

Click  Trigger mode from " Mode select " in the menu.

Initialize the camera in external trigger mode.

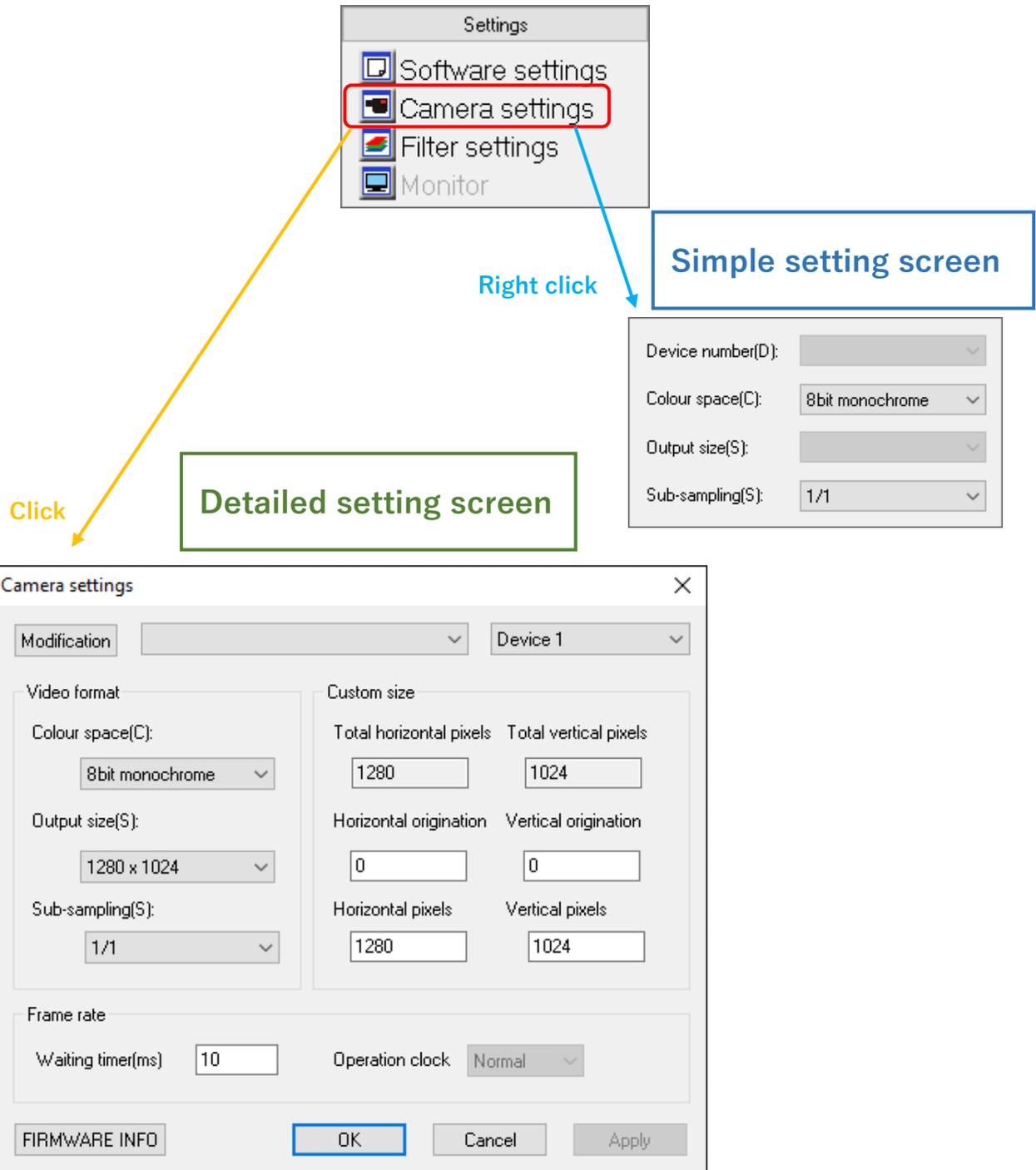
The image from the camera is not always previewed but is captured by the electronic shutter when the trigger signal is input to the camera.

※Notes

- For the details of trigger signal, please refer to the manual of each camera.
- Some models do not support trigger mode.
- For compatible models, refer to “13.1 List of available functions by camera” on page 127.

5.2. Camera settings

You can make various settings related to the camera from the simple setting screen or the detailed setting screen.

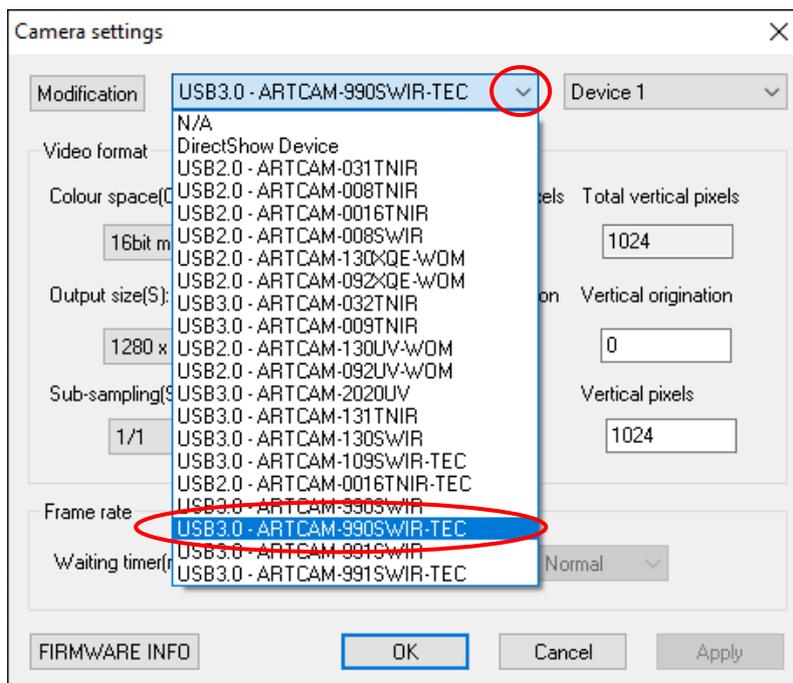


※Notes

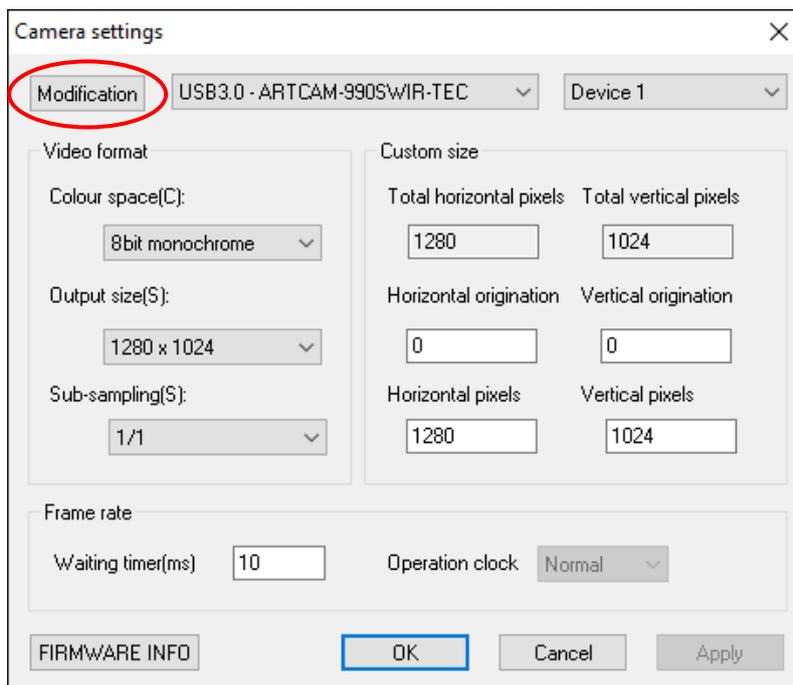
- Click "OK" to apply changes which is set on the detailed setting screen.
- If you do not want to apply changes settings which is set on the detailed setting screen, click "Cancel".

Change the model of the connected camera

1. Select the camera to connect from the list on the detailed setting screen.



2. Click "Modification".

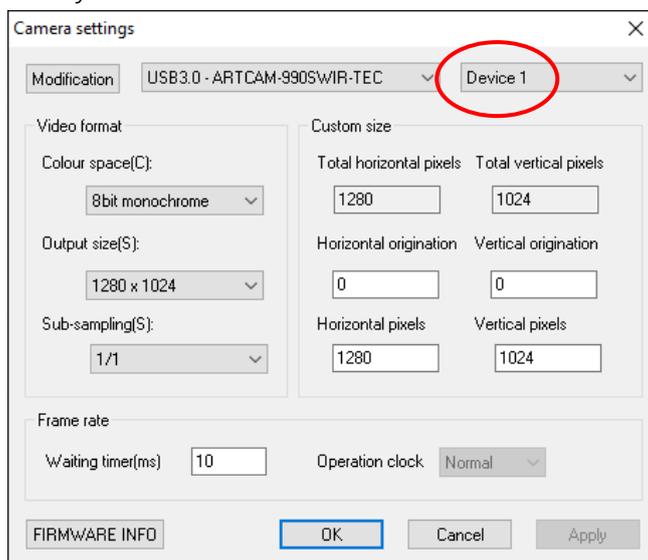


The camera will be detected and displays the image automatically.

Change the device number of the connected camera

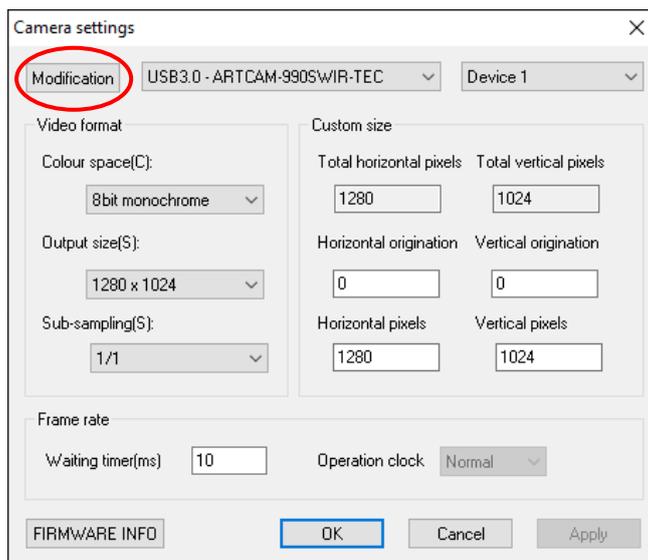
< Set on the detailed setting screen >

1. Select the device number you would like to connect to.



2. Click "Modification".

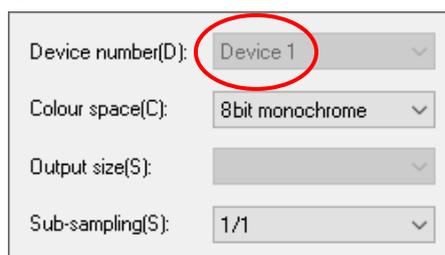
Image of the camera connected to the switched device number is displayed.



< Set on the simple setting screen >

Select the device number you would like to connect to.

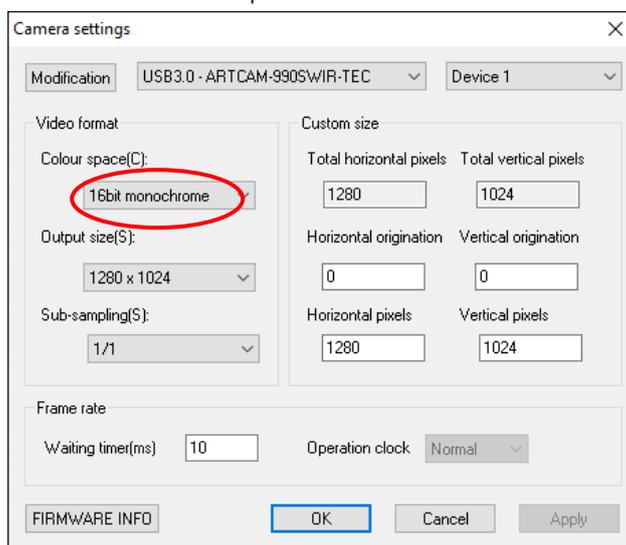
Image of the camera connected to the switched device number is displayed.



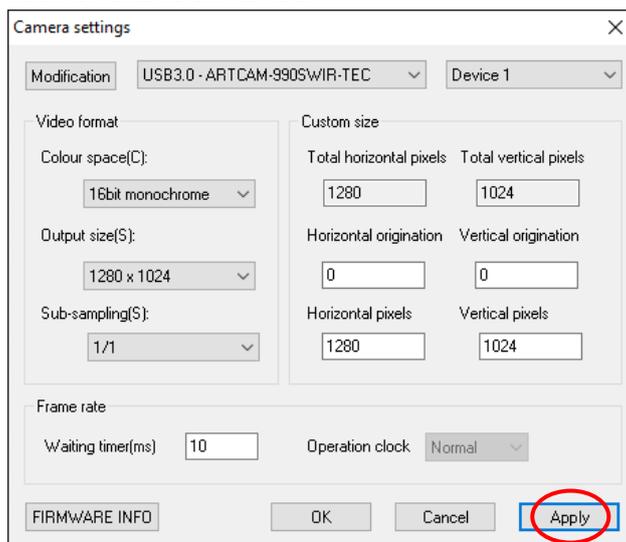
Set the number of output bits

<Set on the detailed setting screen >

1. Select the number of bits from "Colour space".

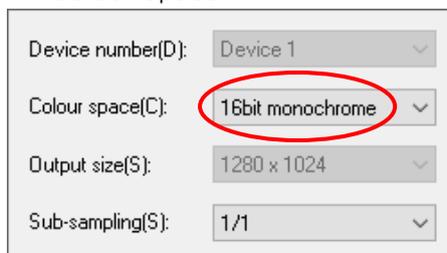


2. Click "Apply". The number of bits is switched.



<Set on the simple setting screen >

Select the number of bits from "Colour space".



※Notes

- The actual number of output bits are different depending on the camera. For example, ARTCAM-990SWIR-TEC has output 12 bits, when it is on 16 bit mode, lower 12 bits are valid data and the upper 4 bits are invalid data.

Set output size (ROI function)

For compatible models, see “13.1 List of available functions by camera” on page 126.

<Set on the detailed setting screen >

1. Select Output size to Custom.

Camera settings

Modification: USB3.0 - ARTCAM-990S/WIR-TEC Device 1

Video format

Colour space(C): 16bit monochrome

Output size(S): Custom

Sub-sampling(S): 1/1

Custom size

Total horizontal pixels: 1280 Total vertical pixels: 1024

Horizontal origination: 0 Vertical origination: 0

Horizontal pixels: 1280 Vertical pixels: 1024

Frame rate

Waiting timer(ms): 10 Operation clock: Normal

FIRMWARE INFO OK Cancel Apply

If you want to set any size you want, please make sure to select "Custom".
If you do not select Custom, the settings will be overwritten.

2. Enter the effective origination and effective pixels in "Custom size".

Horizontal origination: 0 Vertical origination: 0

Horizontal pixels: 160 Vertical pixels: 128

3. Click "Apply". The output size is changed.

Camera settings

Modification: USB3.0 - ARTCAM-990S/WIR-TEC Device 1

Video format

Colour space(C): 16bit monochrome

Output size(S): Custom

Sub-sampling(S): 1/1

Custom size

Total horizontal pixels: 1280 Total vertical pixels: 1024

Horizontal origination: 0 Vertical origination: 0

Horizontal pixels: 160 Vertical pixels: 128

Frame rate

Waiting timer(ms): 10 Operation clock: Normal

FIRMWARE INFO OK Cancel Apply

<Set on the simple setting screen >

Select the size from "Output size". The output size will be switched.

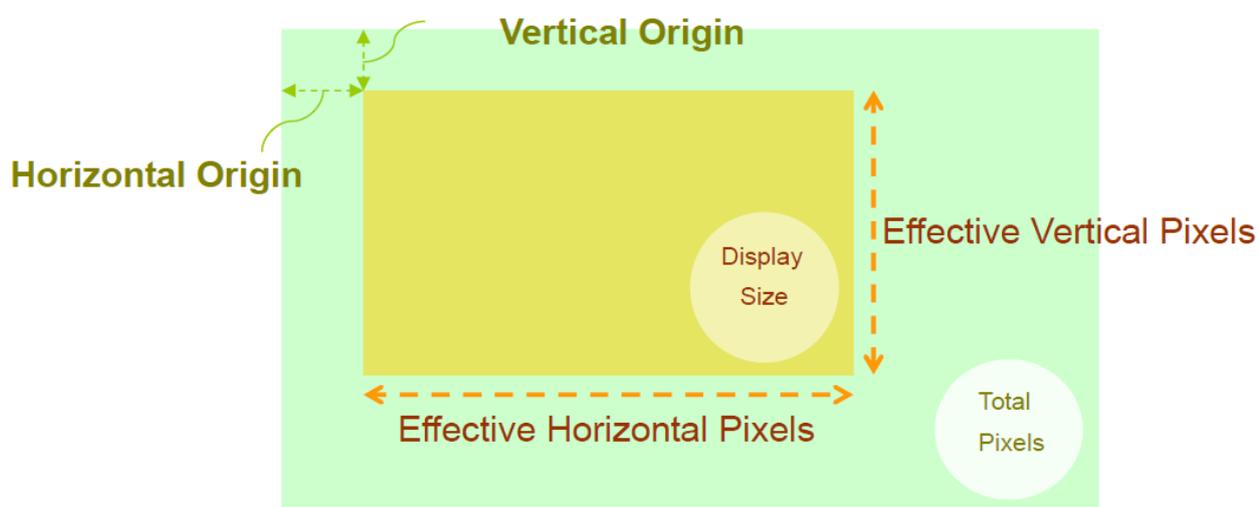
Device number(D):	Device 1
Colour space(C):	16bit monochrome
Output size(S):	160 x 128
Sub-sampling(S):	1/1

From the simple setting screen, you can only select settings that you have added in the "Custom" mode of the Detailed setting screen. To set an arbitrary output size for the first time, please add the setting from the detailed setting screen.

※Notes

- If the effective horizontal pixels are set to a value other than multiple of 4, part of the image may be disordered.
- If the ROI function is not supported, even if the number of effective pixels is set up, total numbers of pixels will be read and only the arranged part will be displayed.

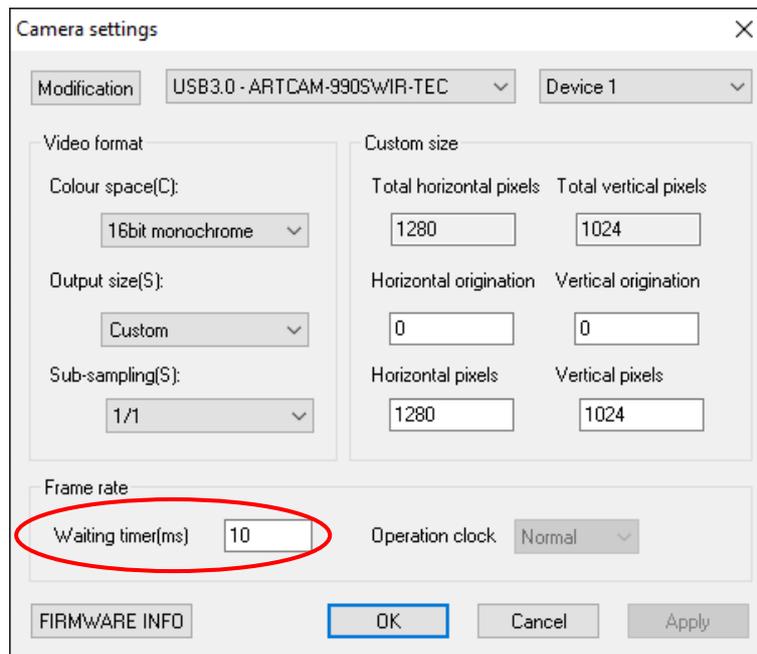
※Effective origin and effective pixels



Set waiting timer

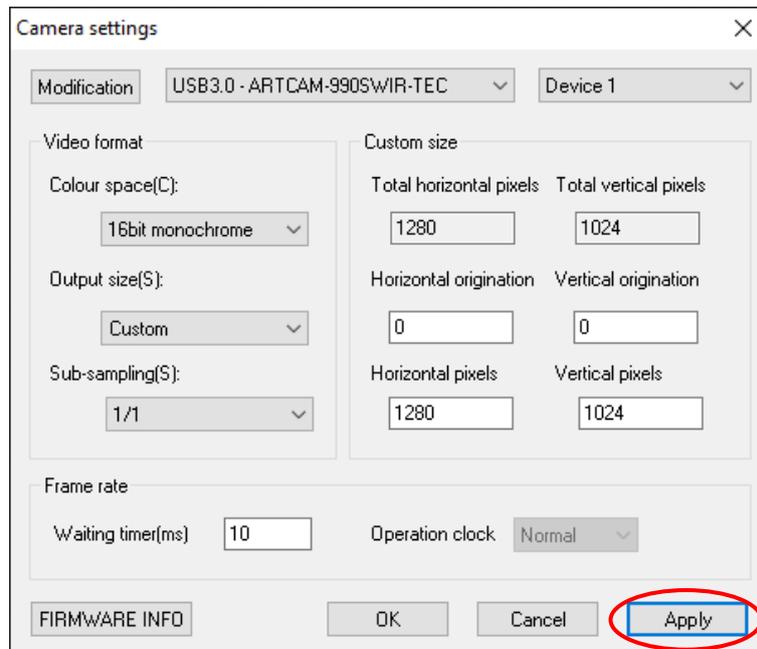
In the software, after acquiring one frame of image from the camera, filtering by software such as Bayer conversion and brightness and drawing of the measurement result are performed. The wait time is the time it takes to send a command to the camera to get the next frame after these are finished.

1. Enter the wait time in the "Waiting timer" field on the detailed setting screen.
The unit of wait time is milliseconds.



The screenshot shows the "Camera settings" dialog box. The "Modification" dropdown is set to "USB3.0 - ARTCAM-990SWIR-TEC" and "Device 1" is selected. Under "Video format", "Colour space(C)" is "16bit monochrome", "Output size(S)" is "Custom", and "Sub-sampling(S)" is "1/1". Under "Custom size", "Total horizontal pixels" is 1280, "Total vertical pixels" is 1024, "Horizontal origination" is 0, and "Vertical origination" is 0. Under "Frame rate", the "Waiting timer(ms)" field is highlighted with a red circle and contains the value "10". The "Operation clock" is set to "Normal". At the bottom, there are buttons for "FIRMWARE INFO", "OK", "Cancel", and "Apply".

2. The waiting timer is set after clicking "Apply".



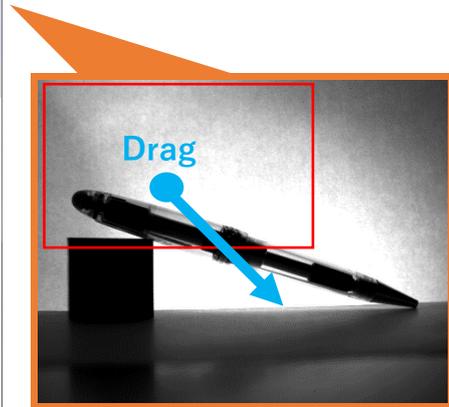
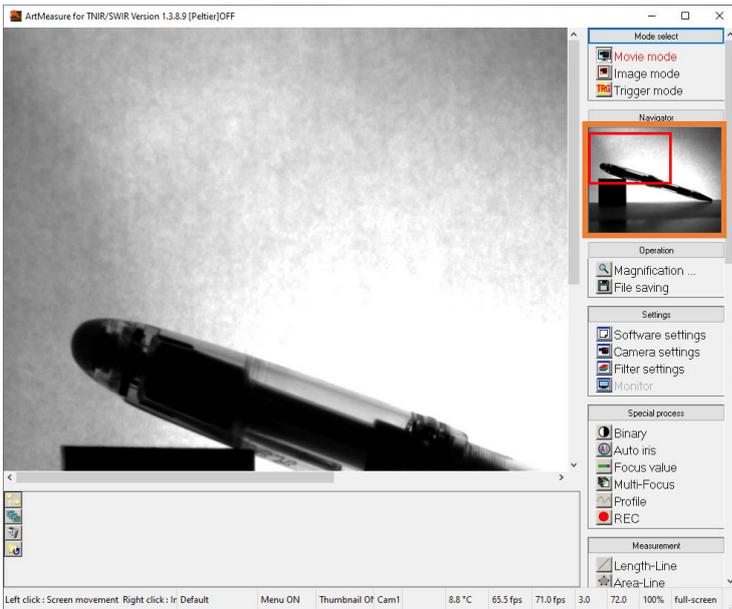
The screenshot shows the "Camera settings" dialog box, identical to the previous one, but with the "Apply" button highlighted with a red circle. The "Waiting timer(ms)" field still contains the value "10".

5.3. Change the position displayed on the main screen

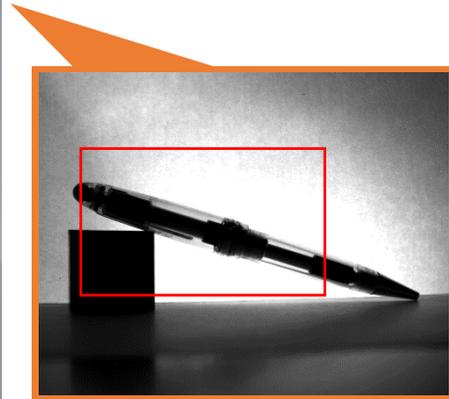
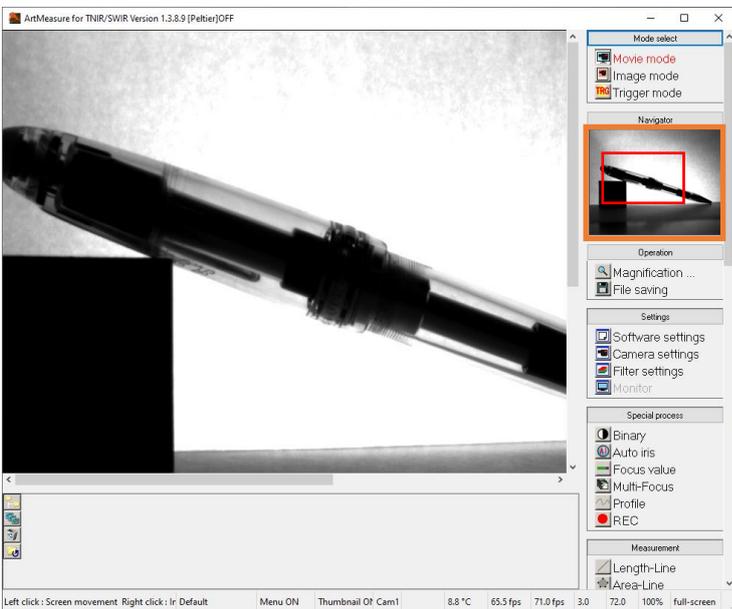
In the "Navigator" of the menu, the part currently displayed on the main screen is indicated by a red frame.

You can move the display location by dragging the red frame.

1. Click inside the red frame of "Navigator" in the menu and drag it to the position you want to display on the main screen.



2. The display position is moved successfully.



※Notes

- The measurement result is not reflected on the navigator.

5.4. Set the display magnification

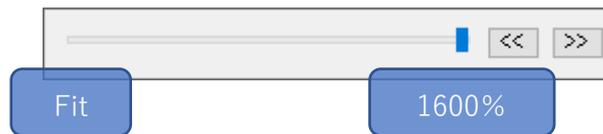
You can set the magnification of the image displayed on the main screen. The range of magnification that can be set is from Fit (full screen display) to 1600%. You can check the current display magnification at the right end of the status bar.

< Change step by step >

Click the  Magnification ... from "Operation" in the menu. Each time you click, the display magnification changes in the order of Fit (full screen display) → 50% → 100% → 200% → 400% → 800% → 1600% → Fit...

< Make big and small changes at once >

Right-click the  Magnification ... from "Operation" in the menu. You can change the display magnification with the slider bar.



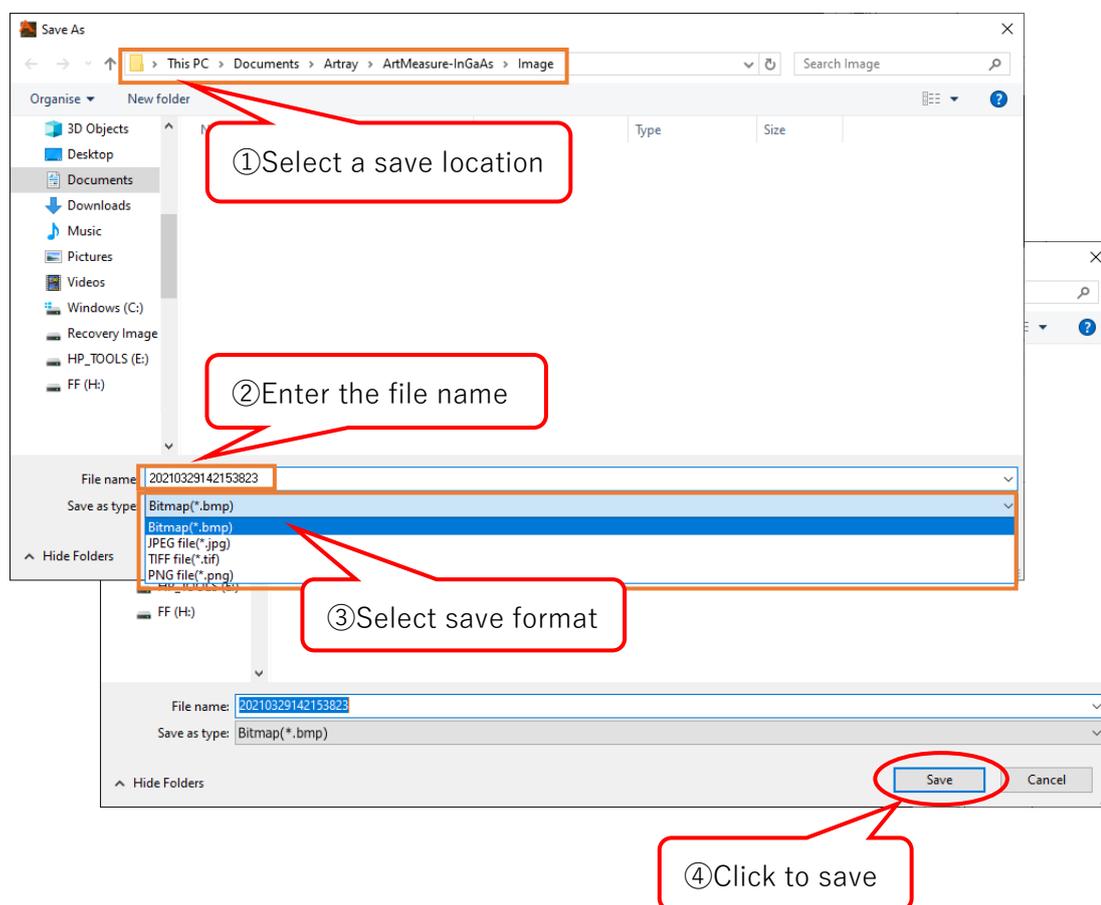
- To change the display magnification step by step, drag the slider bar or click  .
- To change the display magnification by increments of 1%, press the “←” and “→” of the cross keys on keyboard.

To close the slider bar, move the mouse pointer out of the slider bar, or press "Enter" or "Esc" key.

5.5. Saving image

To save the currently displayed image into a file.

1. Click the  File saving from "Operation" on the menu.
2. The file save dialog will be displayed. Select the save location, enter the file name, select the save format, and click "Save".



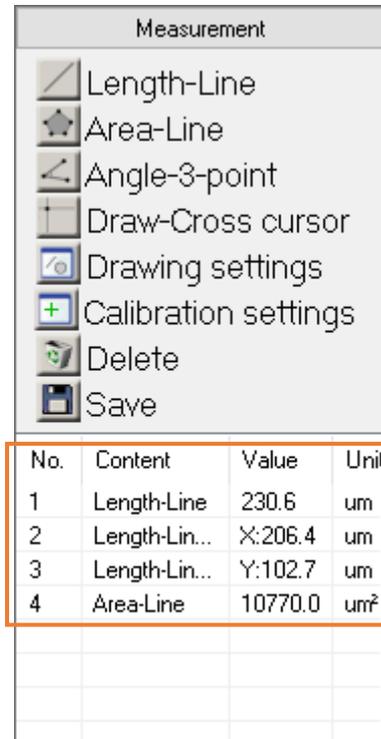
※The default save folder is "Artray ¥ Art Measure-InGaAs ¥ Image" in the document.

※If the file save dialog is not displayed, it is possible that "Generate a file name automatically when saving" is selected in the file saving settings. Please refer to "Automatically assigning a file name" on page 85 for more details.

※If you have performed histogram compensation or dot compensation, the compensated image will be saved. See "Histogram compensation" on page 105 for histogram compensation.

6. Measurement

You can perform different types of measurements and drawings. The measurement results will be displayed on the list under "Measurement" of the menu.



The screenshot shows a software interface with a menu titled "Measurement" and a table of results below it. The menu items are: Length-Line, Area-Line, Angle-3-point, Draw-Cross cursor, Drawing settings, Calibration settings, Delete, and Save. The table below has four columns: No., Content, Value, and Unit. The first four rows of the table are highlighted with an orange border.

No.	Content	Value	Unit
1	Length-Line	230.6	um
2	Length-Lin...	X:206.4	um
3	Length-Lin...	Y:102.7	um
4	Area-Line	10770.0	um ²

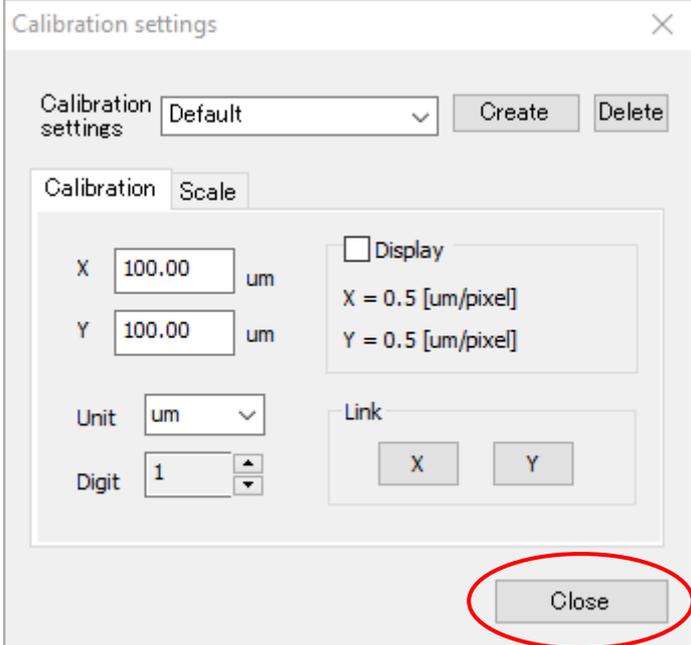
Moving the scroll bar to show more measurement results that exceed the set displaying number.

6.1. Calibration value settings

In addition to calibration value settings, you can name the setting and save / delete it. When start measuring, please make sure to set the calibration value first.

The calibration value settings could be set from the calibration settings screen. The procedure for displaying the calibration settings screen is as follows.

1. Click the  Calibration settings from "Measurement" on the menu.
2. The calibration settings screen is displayed.



Calibration settings

Calibration settings: Default [Create] [Delete]

Calibration Scale

X: 100.00 um

Y: 100.00 um

Unit: um

Digit: 1

Display: Display

X = 0.5 [um/pixel]

Y = 0.5 [um/pixel]

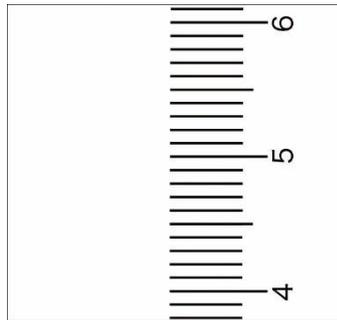
Link: [X] [Y]

Close

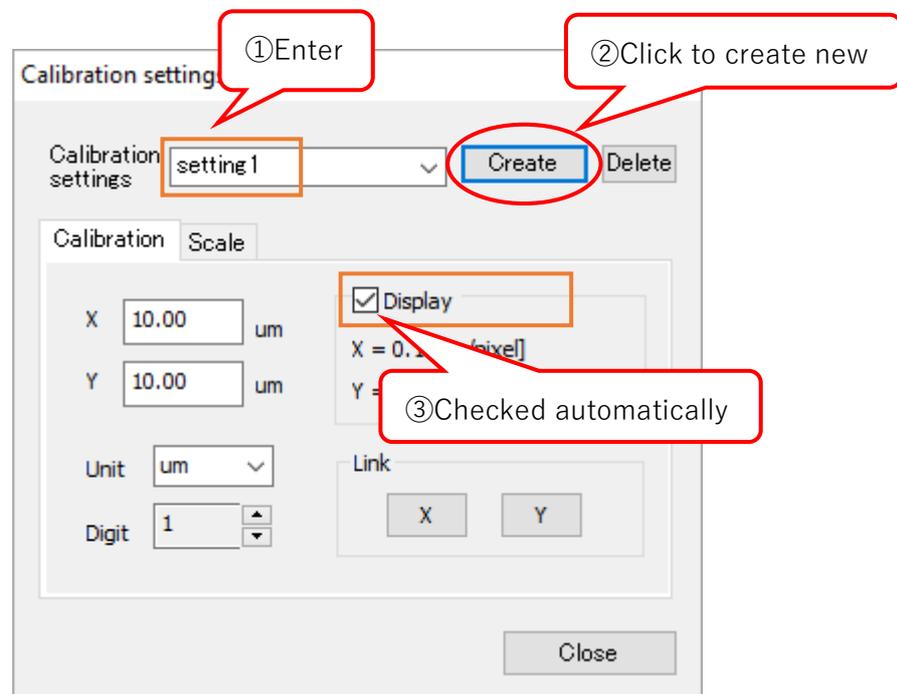
Click "Close" to close the screen after completing the settings related to calibration value.

Set calibration value

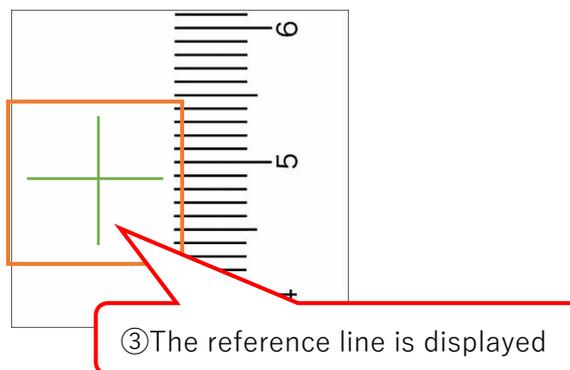
1. Show the actual measurement value.



2. Enter the created name of the setting on "Calibration settings" field from the calibration settings screen and click "Create".

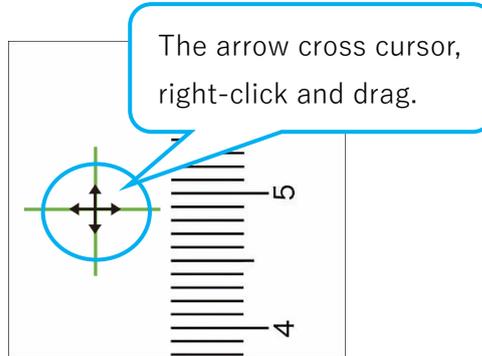


When you click "Create", "Display" is checked, and the reference line will be displayed.

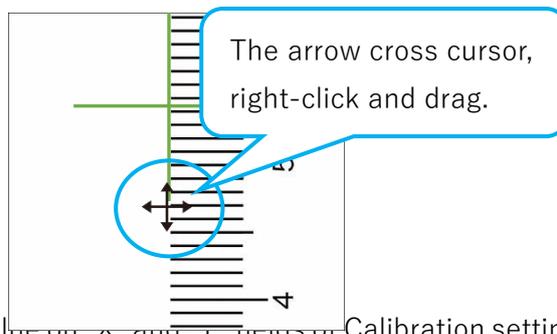


3. Move the reference line on the actual measurement value, and then fit the size of the reference line to actual measurement value.

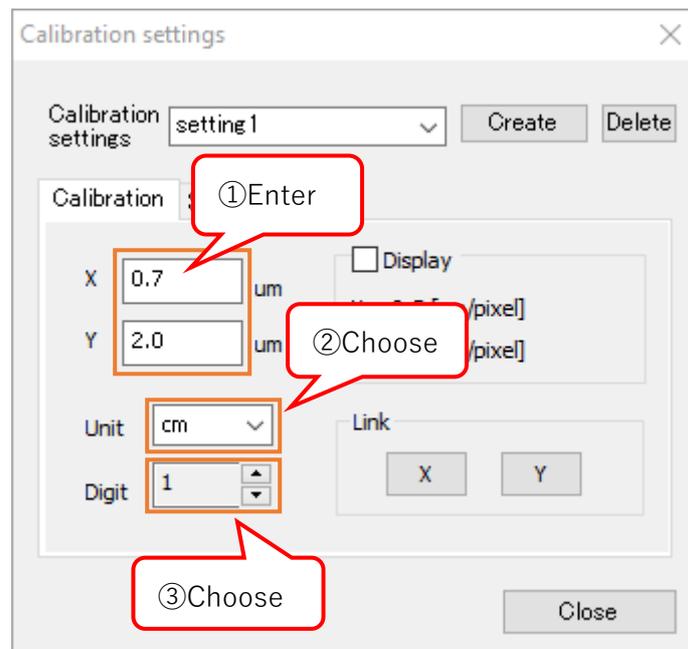
To move the reference line, place the cursor on the intersection of the reference lines, and while the cursor shape changed to arrow cross, right-click and drag.



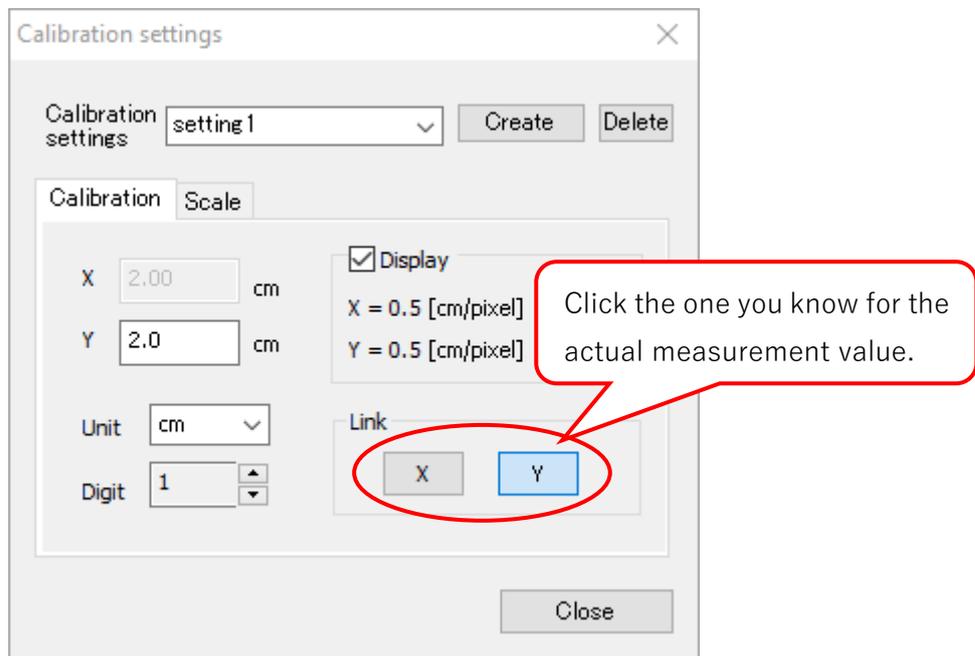
To expand or contract the reference line, place the cursor on the end of the line where you want to expand or contract, when the cursor shape changed to arrow cross key, right-click and drag.



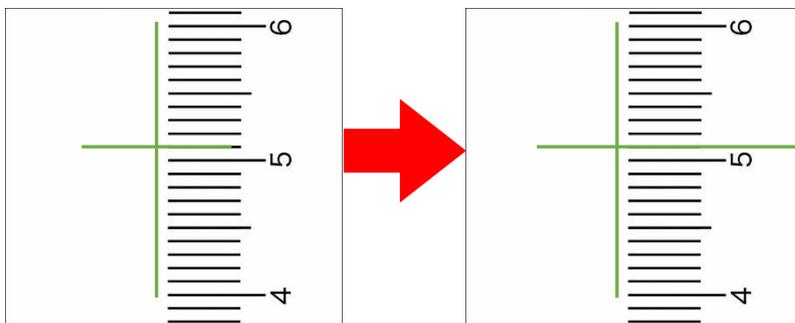
4. Enter the actual measurement value on X and Y fields of Calibration settings screen and select "Unit" and "Digit".



5. If you only know one actual measurement value X or Y, click the one you know for the actual measurement value from "Link" on the calibration settings screen.



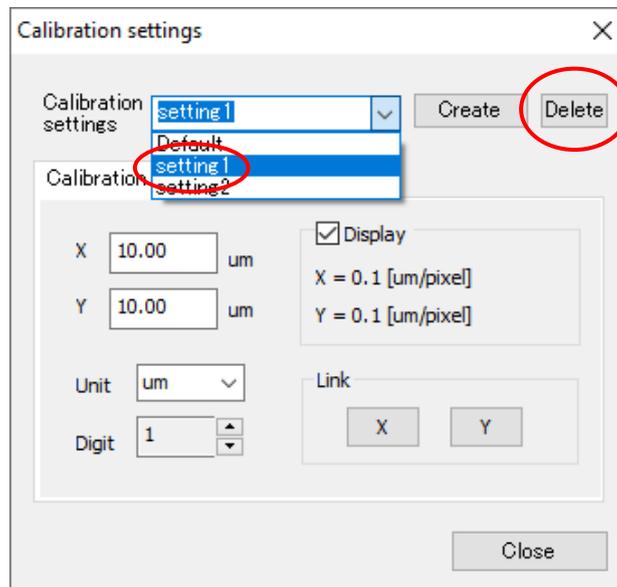
The actual measurement value you do not know will be resized automatically by linking up with the value you know.



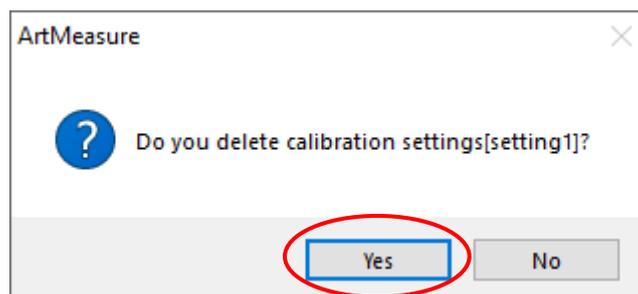
The calibration value setting completes.

Delete calibration value settings

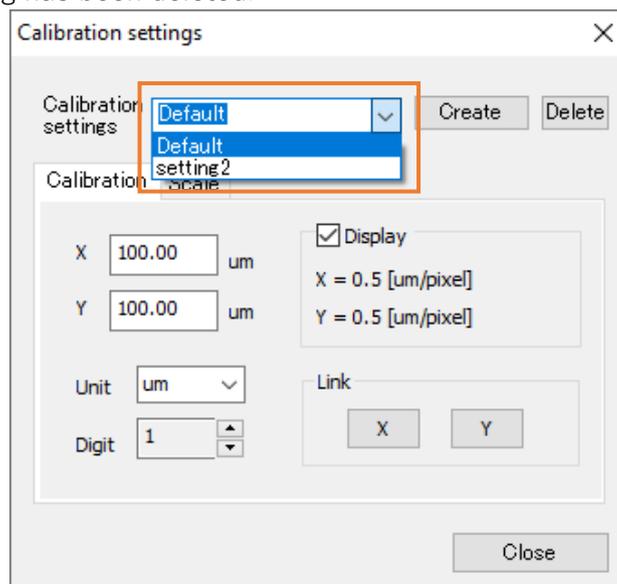
1. Select the setting you want to delete from "Calibration settings" field on the calibration settings screen and click "Delete".



2. When the following screen is displayed, click "Yes".



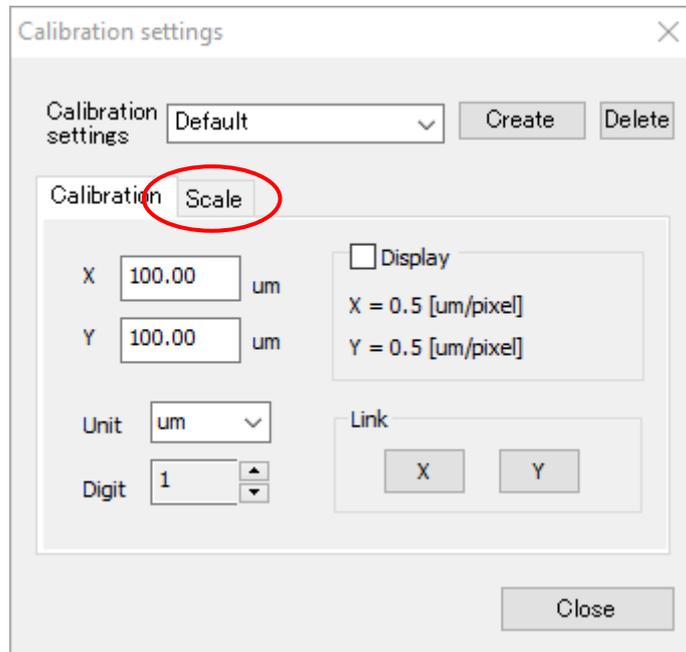
3. The calibration setting has been deleted.



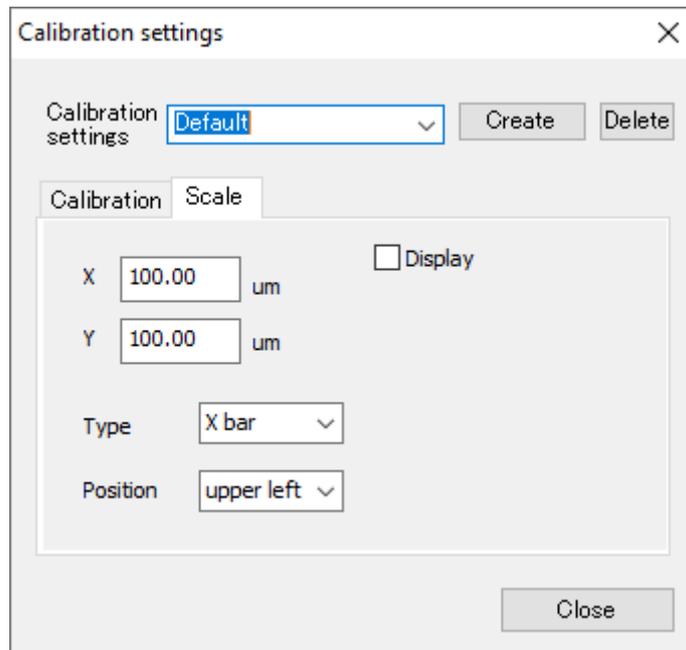
6.2. Scale settings

Scale settings can be set from the Scale tab on the Calibration settings screen. Check below the procedure for opening the scale tab.

1. Click  Calibration settings on "Measurement" from the menu.
2. From the calibration settings screen, click the "Scale" tab.



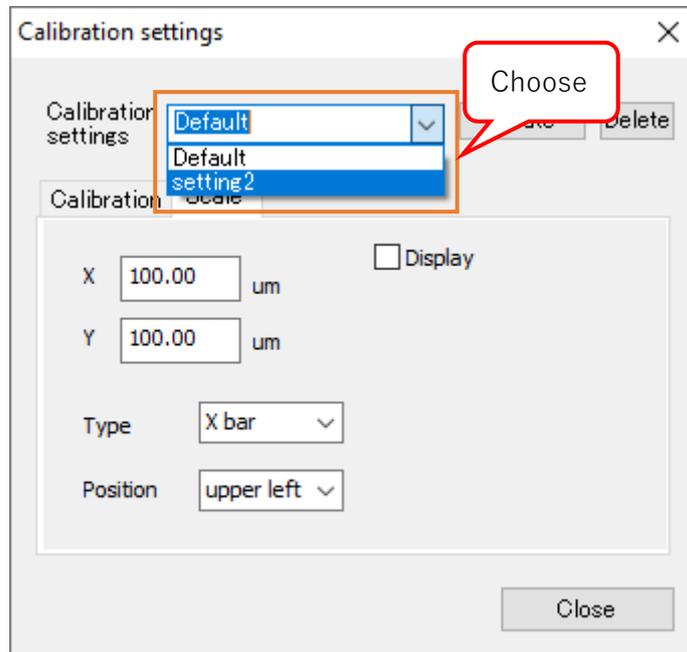
3. The scale setting screen is displayed.



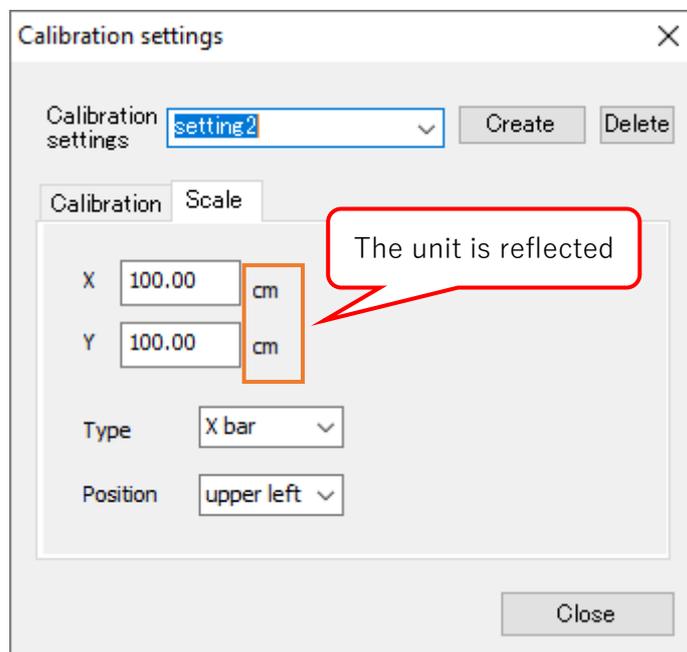
Click "Close" to close the screen after the scale settings is completed.

Scale settings

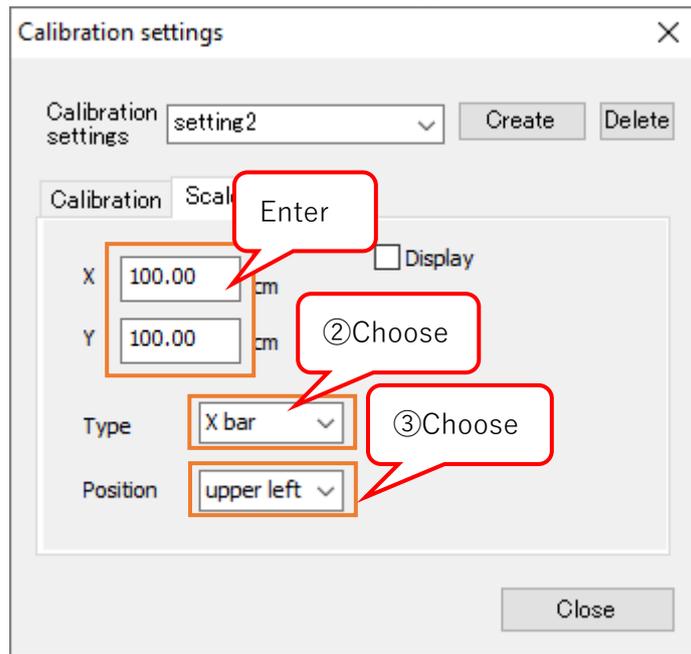
1. From the "Calibration settings" field on the scale setting screen, select the calibration value setting which you want to adapt.



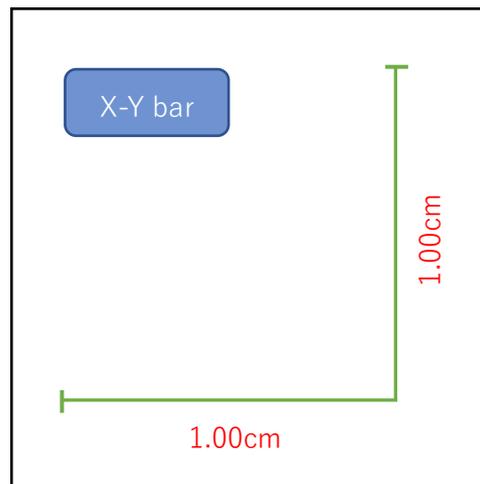
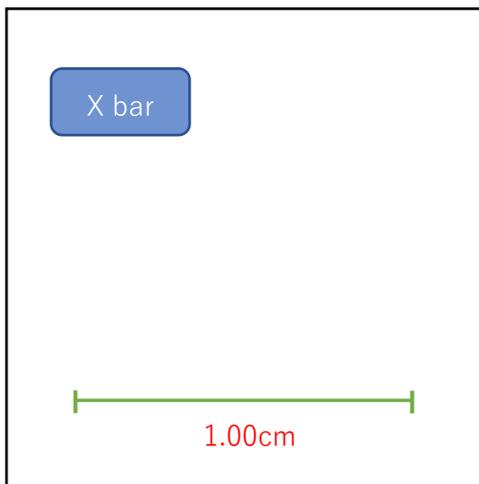
When you select the calibration value setting, it will be switched to the value you have set automatically.



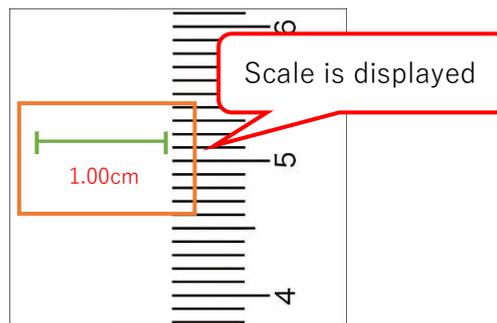
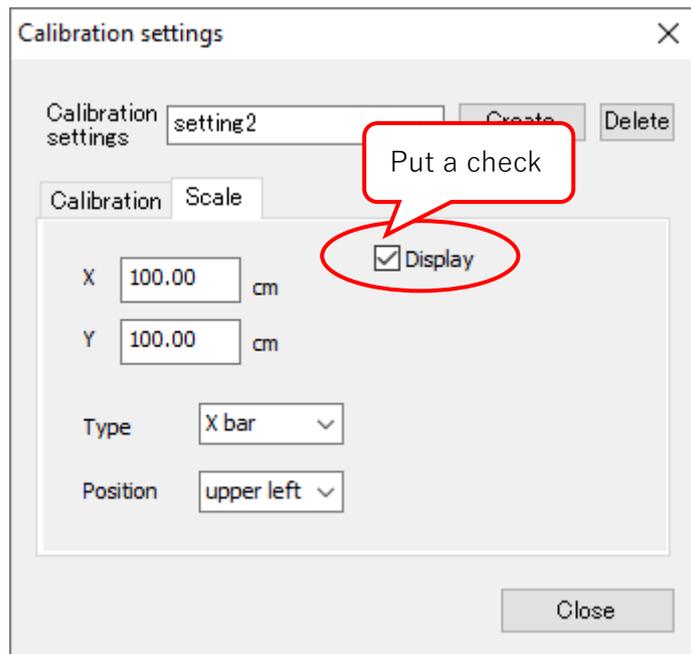
2. Enter the scale length on "X" and "Y" and select "Type" and "Position".



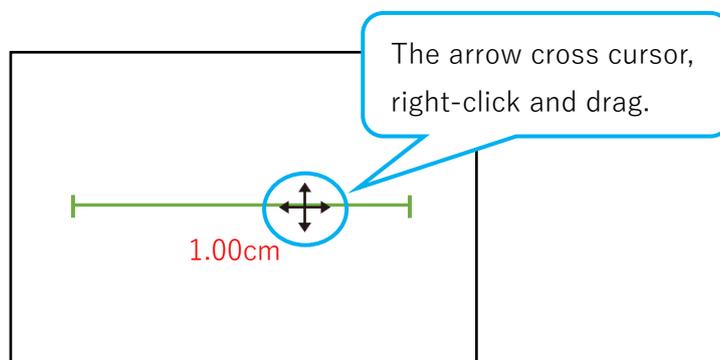
Select the display type from "X bar" and "X-Y bar".



3. Check the box "Display". The scale is displayed.

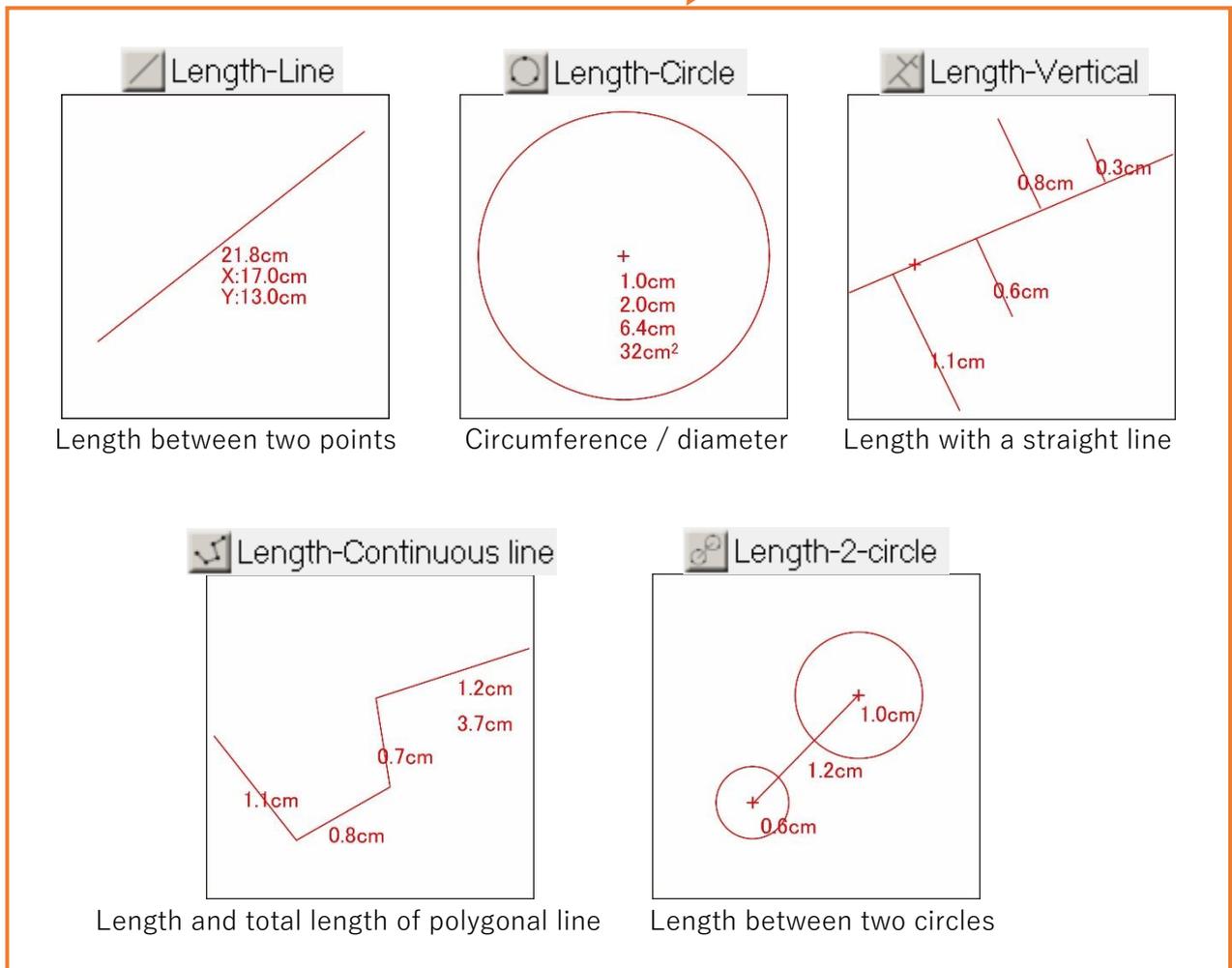
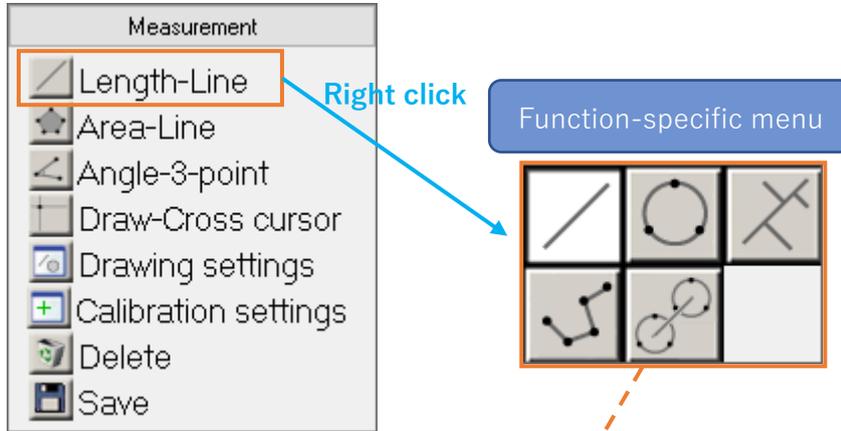


To move the scale, please right-click and drag the key when the cursor shape turns to arrow cross.



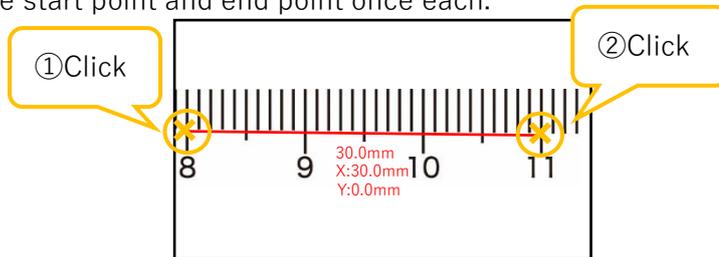
6.3. Measure the length

It is possible to measure the distance between two points, circumference, diameter, vertical line, bent straight line, and length between two circles. Next to "Length" of the menu, the currently selected function is displayed.

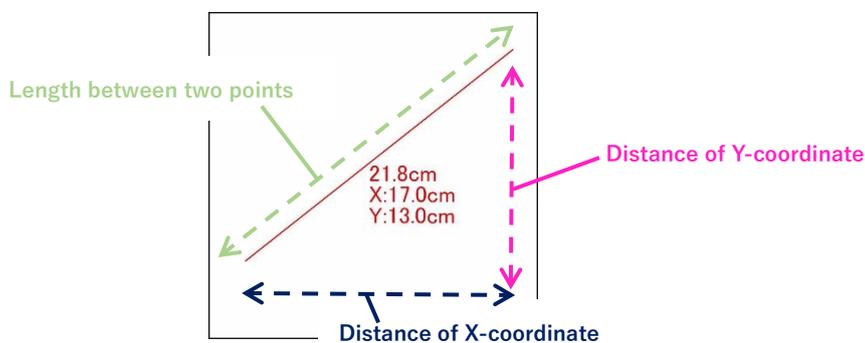


Measure Length between two points

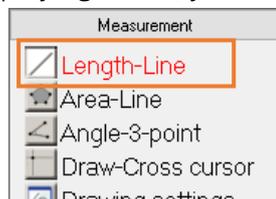
1. Right-click the  Length from "Measurement" on the menu.
2. Click the  from functional menu.
3. Click the start point and end point once each.



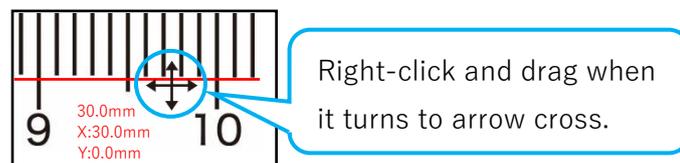
The measurement results are the distance between two points from the top, the distance of X-coordinate, and the distance of Y-coordinate.



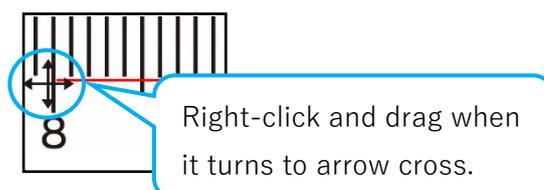
If the menu is still displaying in red, you can continue to measure.



4. To move the value of measurement result displayed on the screen, move the cursor to the upper left corner of the value, and when the cursor shape turns to arrow cross key, right-click and drag.

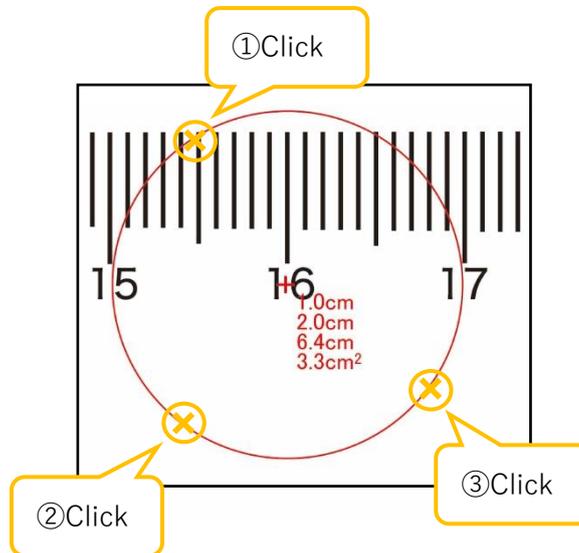


5. To remeasure, move the cursor to the point you want to remeasure, and while the cursor shape turns to arrow cross key, right-click and drag. It is now possible to move the point.



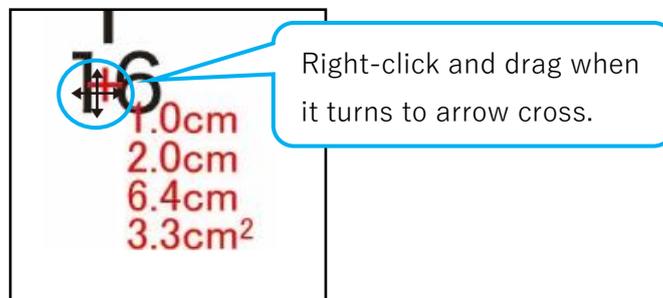
Measuring circumference and diameter

1. Right-click the  Length from "Measurement" on the menu.
2. Click the  from functional menu.
3. Click any three points on the circumference.



The measure results are radius, diameter, circumference, and area from the top.

4. To move the circle, place the cursor on the center of the circle and when the cursor shape turns to arrow cross key, right-click and drag.

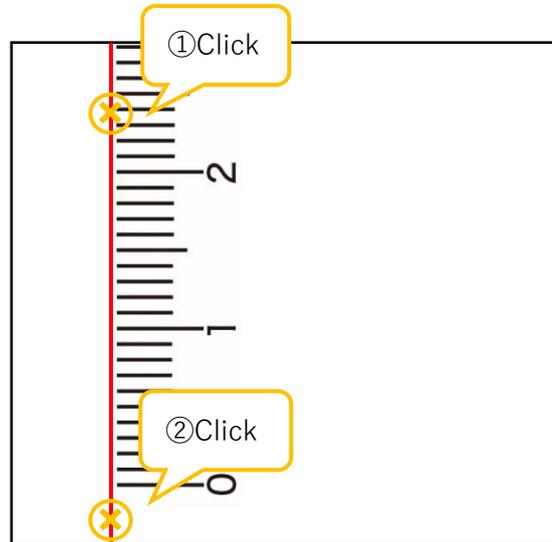


5. To remeasure the circumference, place the cursor on the circumference and when the cursor shape turns to arrow key, right-click and drag. It is now possible to move the circumference.

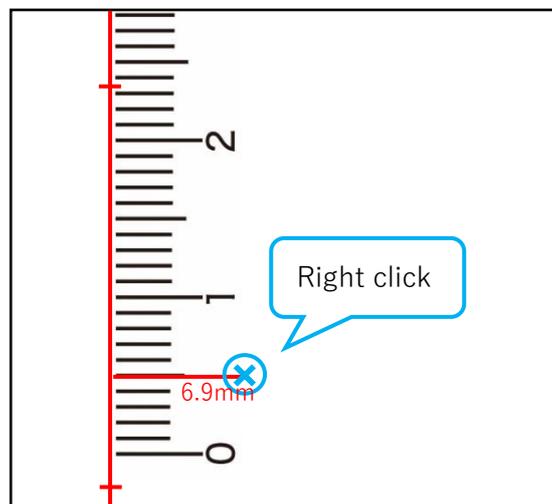


Measuring length of a straight line and a vertical line

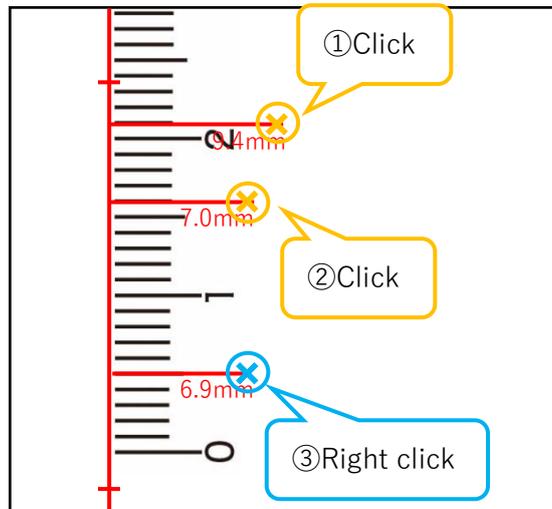
1. Right-click the  Length from "Measurement" on the menu.
2. Click the  from functional menu.
3. Click any two points on the straight line.



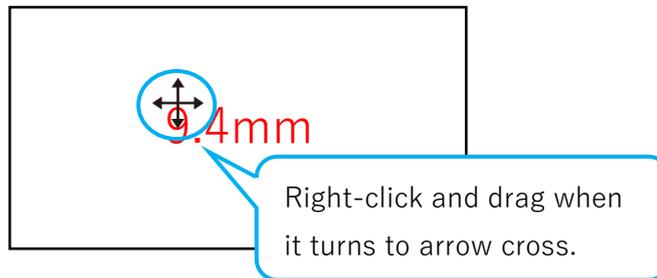
4. If you want to measure the length from one point only to the straight line, right-click on the measurement point.



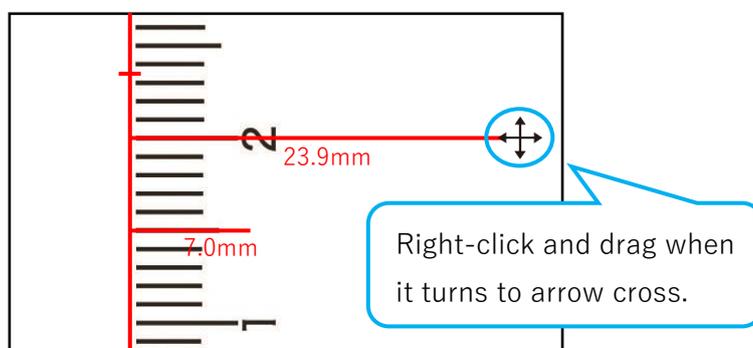
5. If you want to measure the length from multiple points to the straight line, click each measurement point and right-click only the last measurement point.



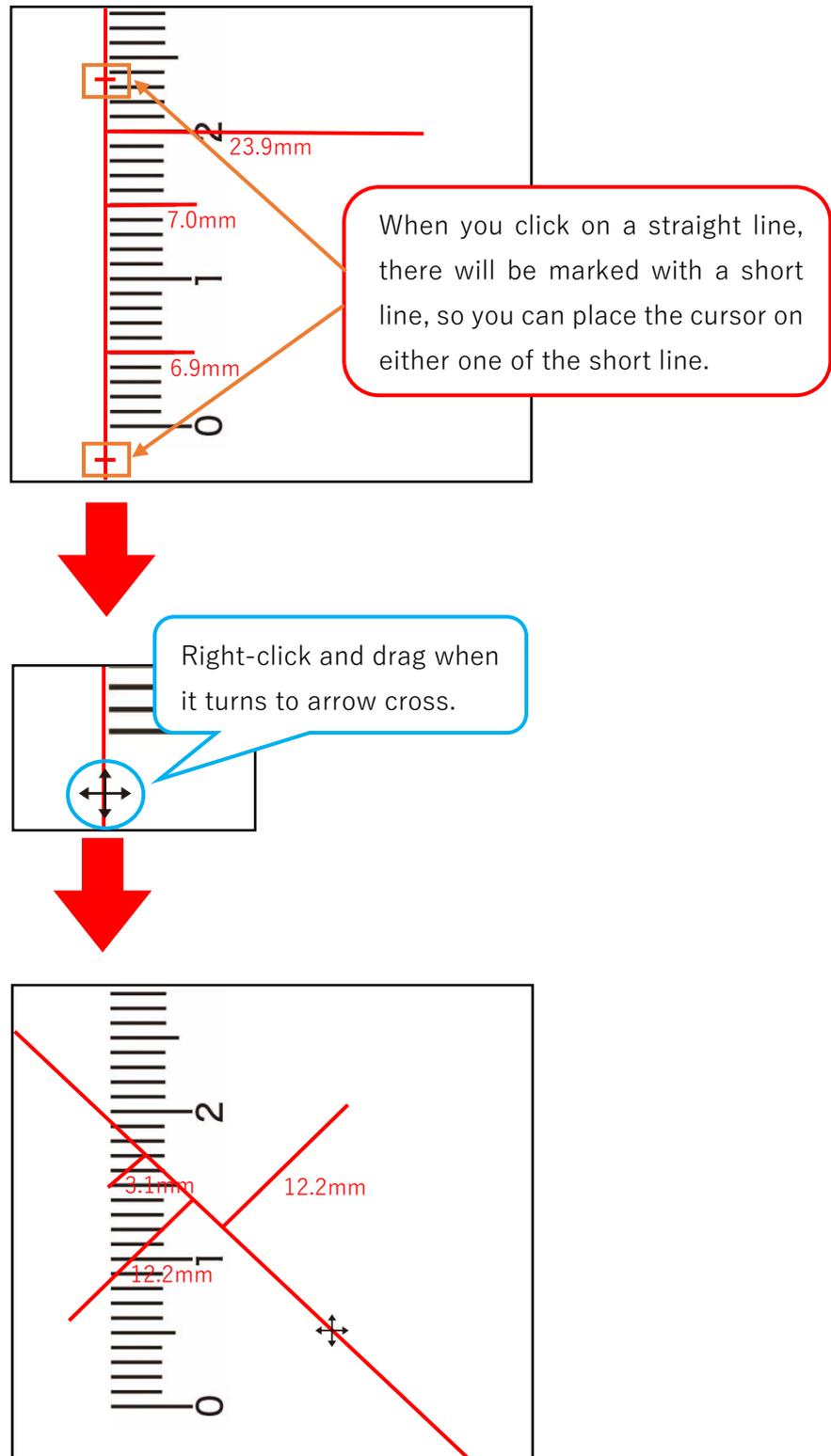
6. To move the value of measurement result displayed on the screen, move the cursor to the upper left corner of the value, and when the cursor shape turns to arrow cross key, right-click and drag
- 7.



8. To move the measurement point, place the cursor on the measurement point and when the cursor shape turns to arrow cross key, right-click and drag.

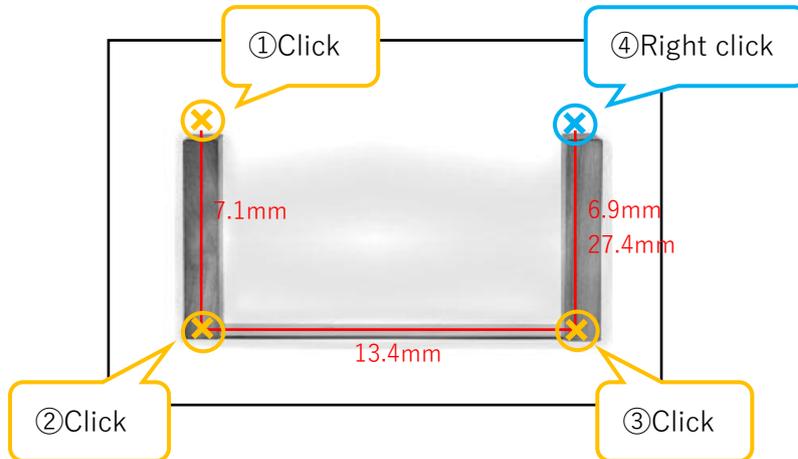


9. To move a straight line, place the cursor over the point where you clicked when drawing a straight line, and when the cursor shape turns to arrow cross key, right-click and drag.

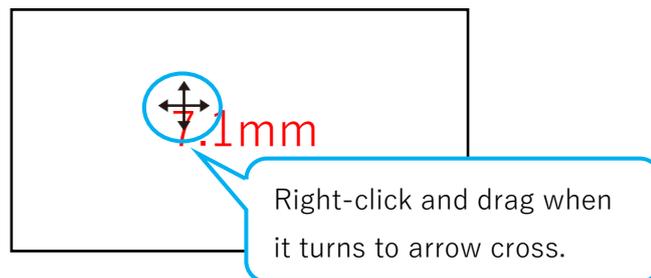


Measuring length and total length of polygonal lines

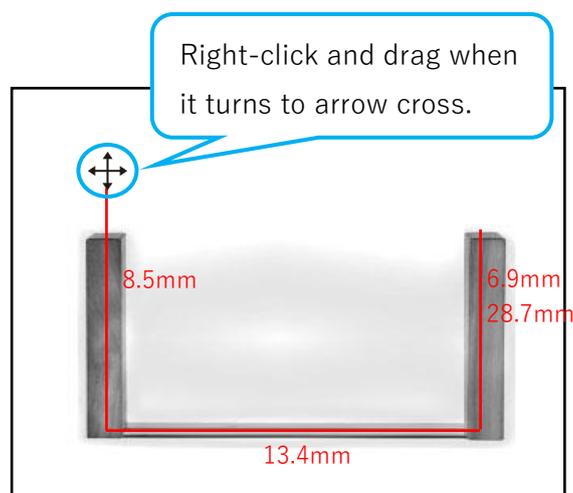
1. Right-click the  Length from "Measurement" on the menu.
2. Click  from the function-specific menu.
3. Click each of the points and right-click on the end point.



4. To move the value of measurement result displayed on the screen, move the cursor to the upper left corner of the value, and when the cursor shape turns to arrow cross key, right-click and drag.

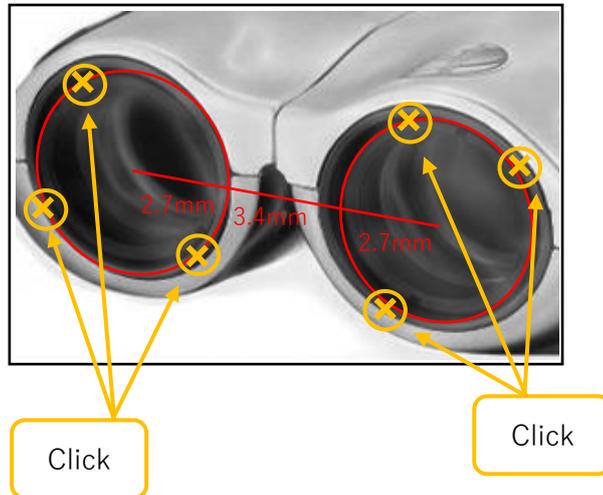


5. To remeasure, place the cursor on the end of the line that you want to remeasure, and when the cursor shape turns to arrow cross key, right-click and drag. You can move the end of the line.

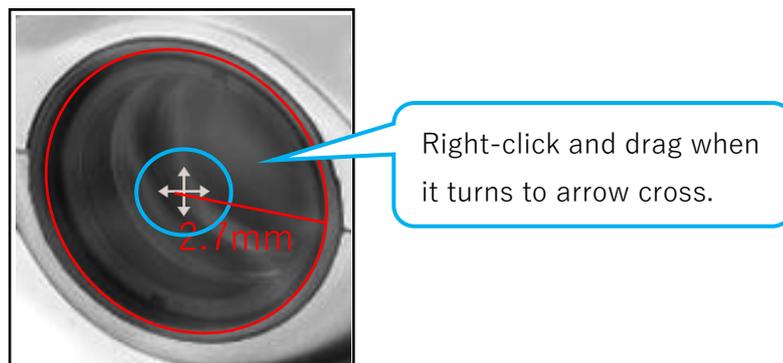


Measuring length between two circles

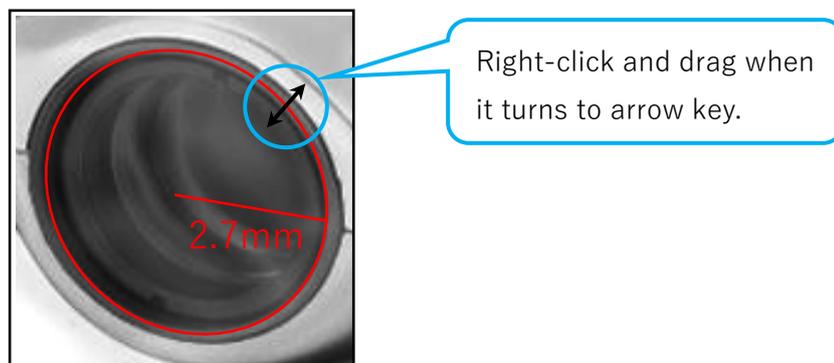
1. Right-click the  Length from "Measurement" on the menu.
2. Click  from functional menu.
3. Click each of the three points on the circumference of two circles.



4. To move the circle, place the cursor on the center of the circle and when the cursor shape turns to arrow cross key, right-click and drag.



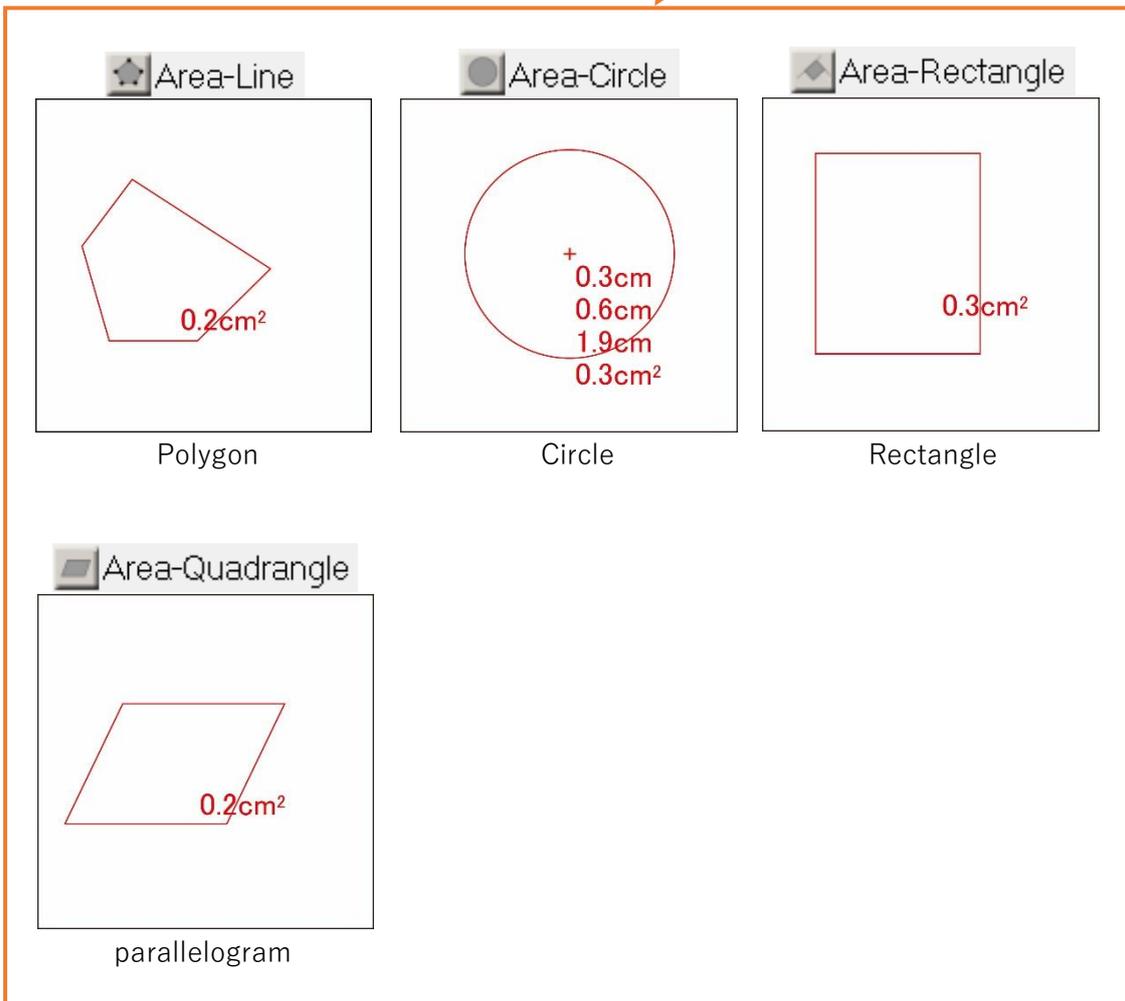
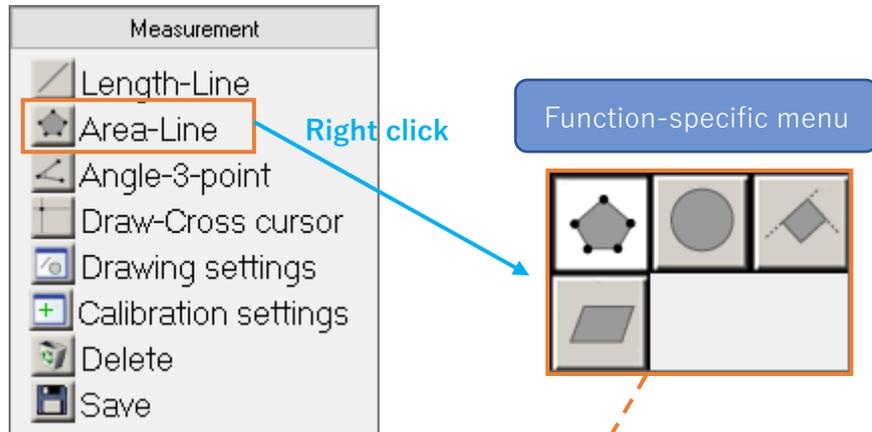
5. To remeasure the circumference, place the cursor on the circumference and when the cursor shape turns to arrow key, right-click and drag. It is now possible to move the circumference.



6.4. Measure Area

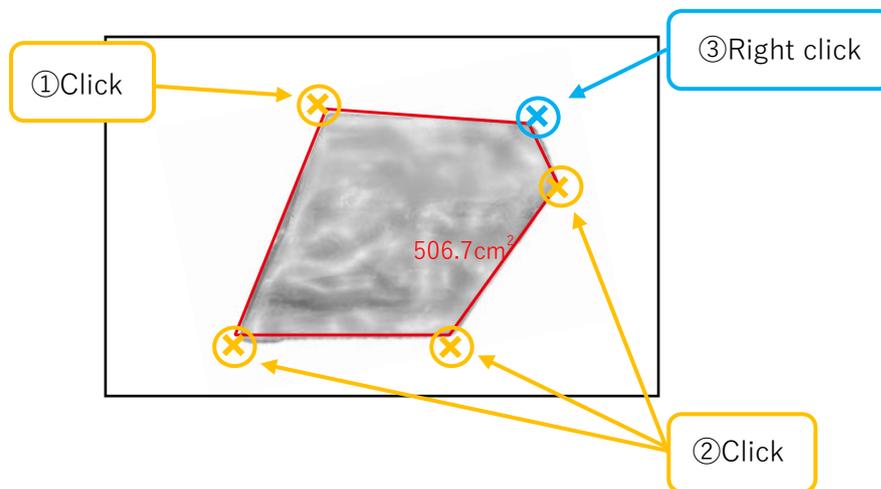
You can measure the area of polygons, circles, rectangles, and parallelograms.

The currently selected function is displayed next to “Area” on the menu.

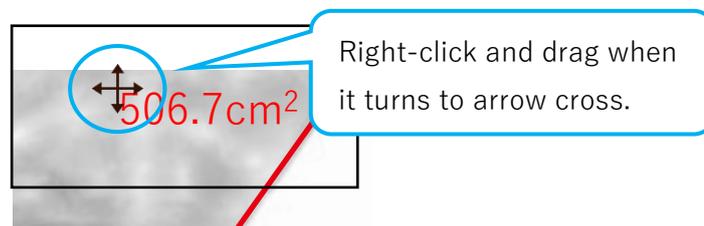


Measuring the area of polygon

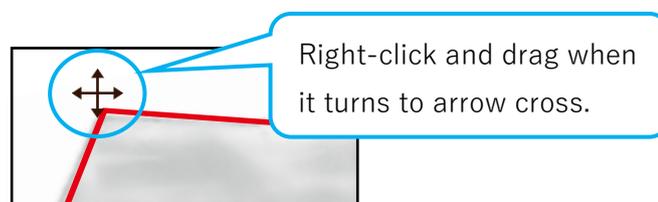
1. Right-click the  Area from "Measurement" on the menu.
2. Click  from functional menu.
3. Click each vertex and right-click on the last vertex.



4. To move the value of measurement result displayed on the screen, move the cursor to the upper left corner of the value, and when the cursor shape turns to arrow cross key, right-click and drag.

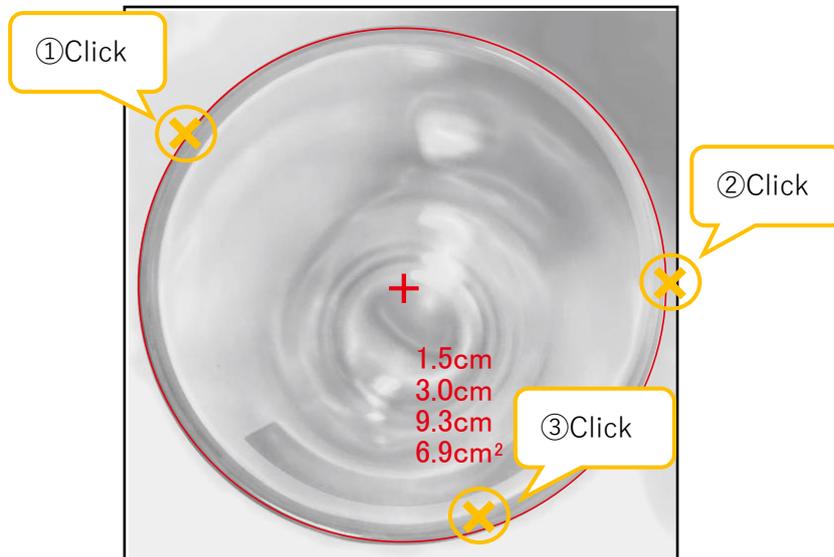


5. To remeasure, place the cursor on the vertex you clicked when drawing the rectangle, and when the cursor shape turns to arrow cross key, right-click and drag. It is now possible to move the vertices.



Measure the area of a circle

1. Right-click the  Area from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click any three points on the circumference.

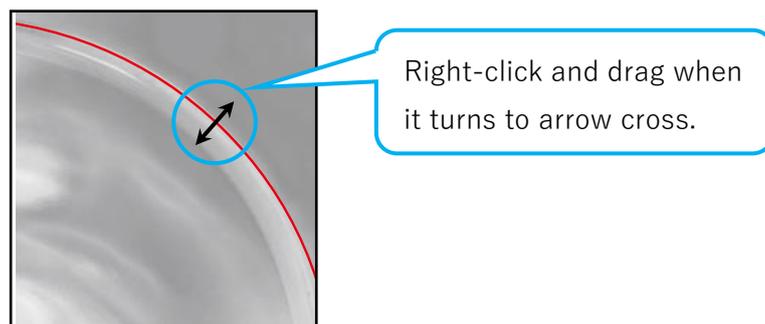


The measurement results are radius, diameter, circumference, and area from the top.

4. To move the circle, place the cursor on the center of the circle, and when the cursor shape turns to arrow cross key, right-click and drag.

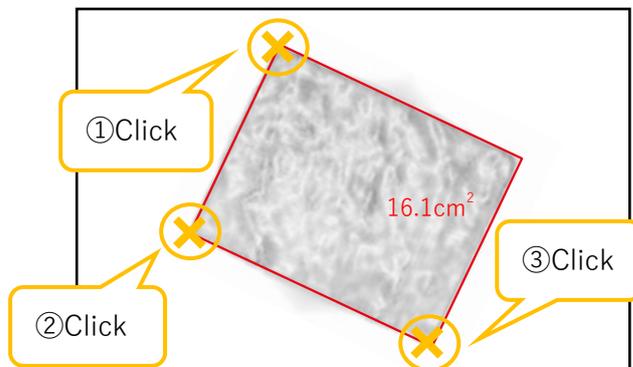


5. To remeasure the circumference, place the cursor on the circumference and when the cursor shape turns to arrow key, right-click and drag. It is now possible to move the circumference.

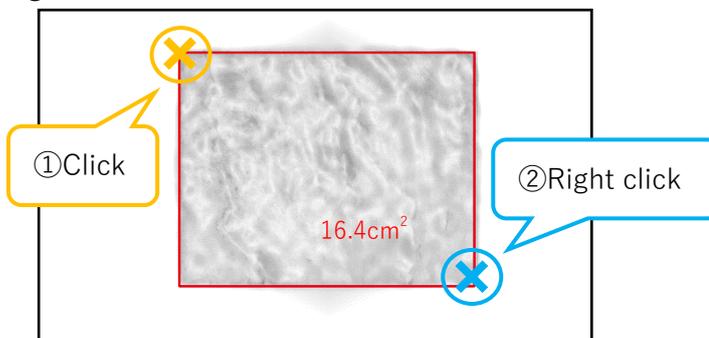


Measuring the area of rectangle

1. Right-click the  Area from "Measurement" on the menu.
2. Click  from the functional menu.
3. If the rectangle is at an angle to XY axis on the screen, click the three vertices.



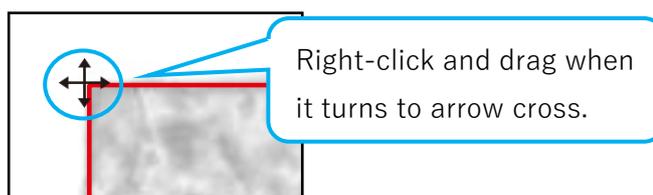
4. If the rectangle is parallel to XY axis on the screen, click the top left vertex of the rectangle and right-click the bottom right vertex.



5. To move the value of measurement result displayed on the screen, move the cursor to the upper left corner of the value, and when the cursor shape turns to arrow cross key, right-click and drag.

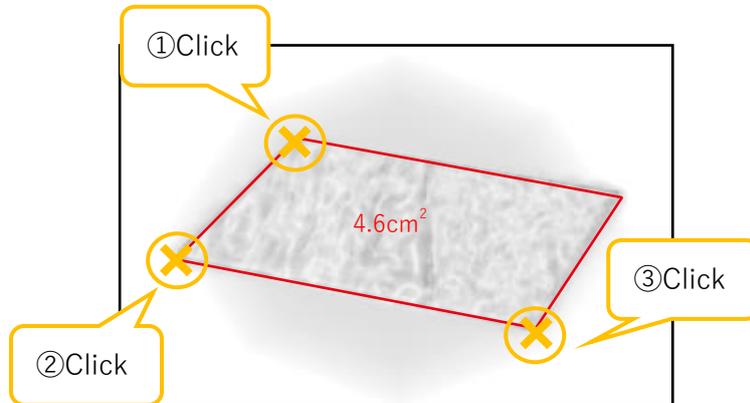


6. To remeasure, place the cursor on the vertex you clicked when drawing the rectangle, and when the cursor shape turns to arrow cross key, right-click and drag.



Measuring the area of parallelogram

1. Right-click the  Area from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click on the three vertices.



4. To move the value of measurement result displayed on the screen, move the cursor to the upper left corner of the numerical value, and when the cursor shape turns to arrow cross key, right-click and drag.

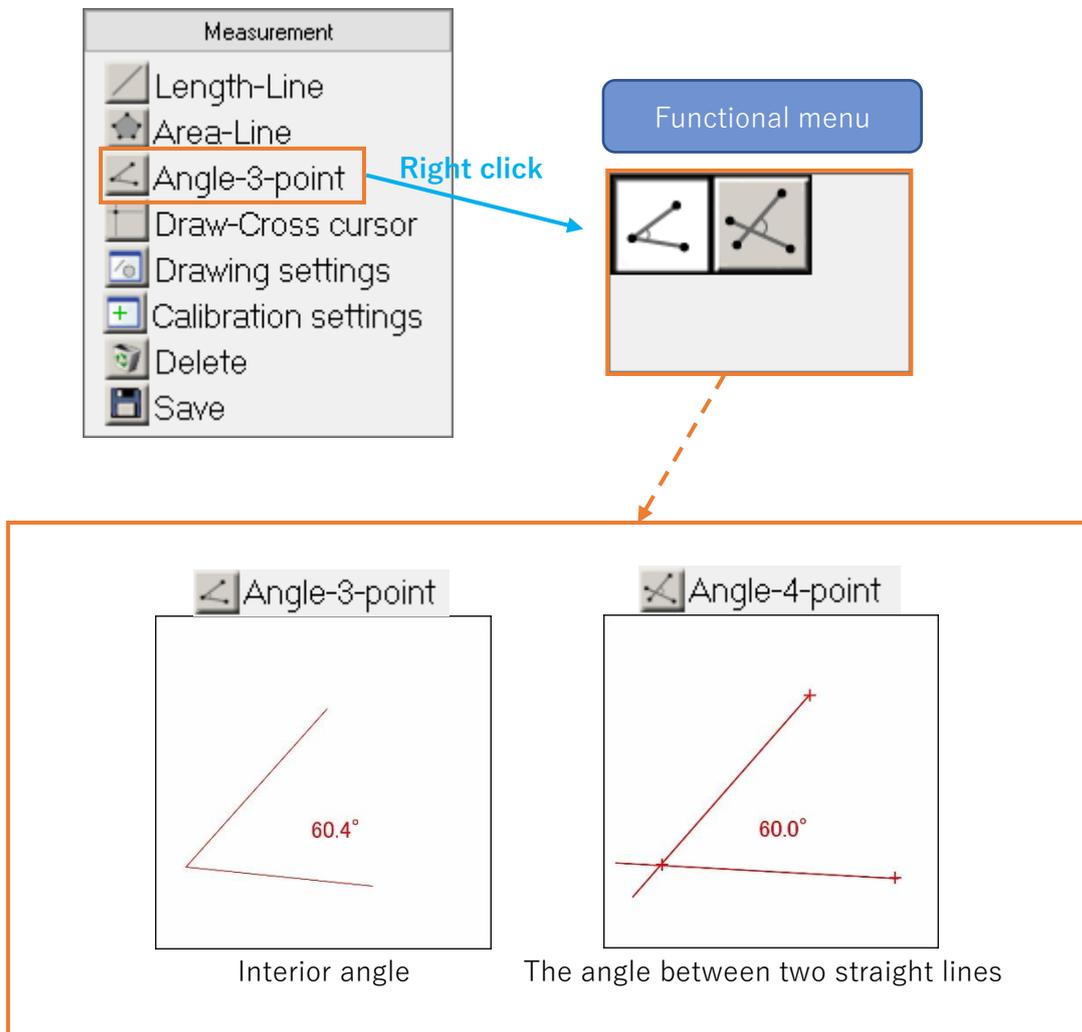


5. To remeasure, place the cursor on the vertex you clicked when drawing the parallelogram, and when the cursor shape turns to arrow cross key, right-click and drag. It is now possible to move the vertices.



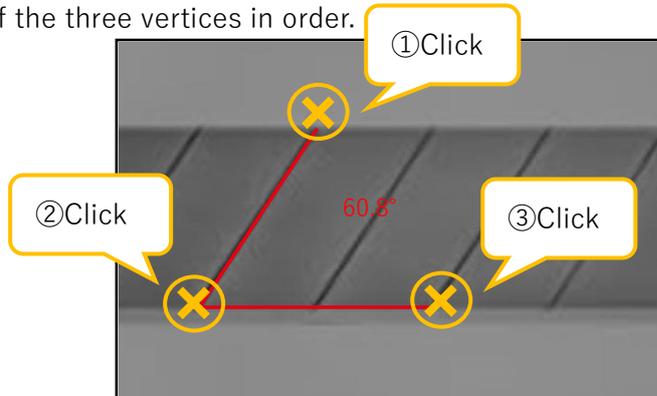
6.5. Measuring angle

You can measure the interior angle and the angle formed by two straight lines. Next to "Angle" of the menu, the currently selected function is displayed.



Measuring interior angle

1. Right-click the  Angle from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click on each of the three vertices in order.

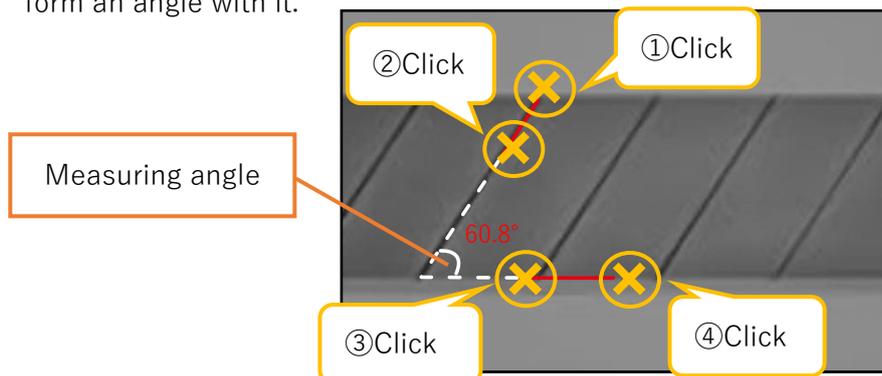


4. To remeasure, move the cursor to the vertex and when the cursor shape turns to arrow cross key, right-click and drag. It is now possible to move the vertices.

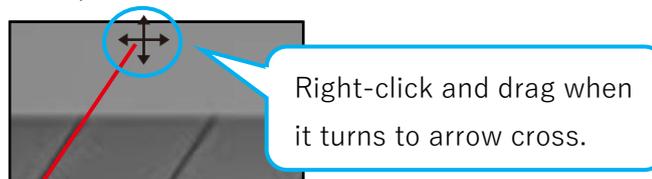


Measuring the angle formed by two straight lines

1. Right-click the  Angle from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click any two points on a straight line, then click any two points on the other straight line that form an angle with it.



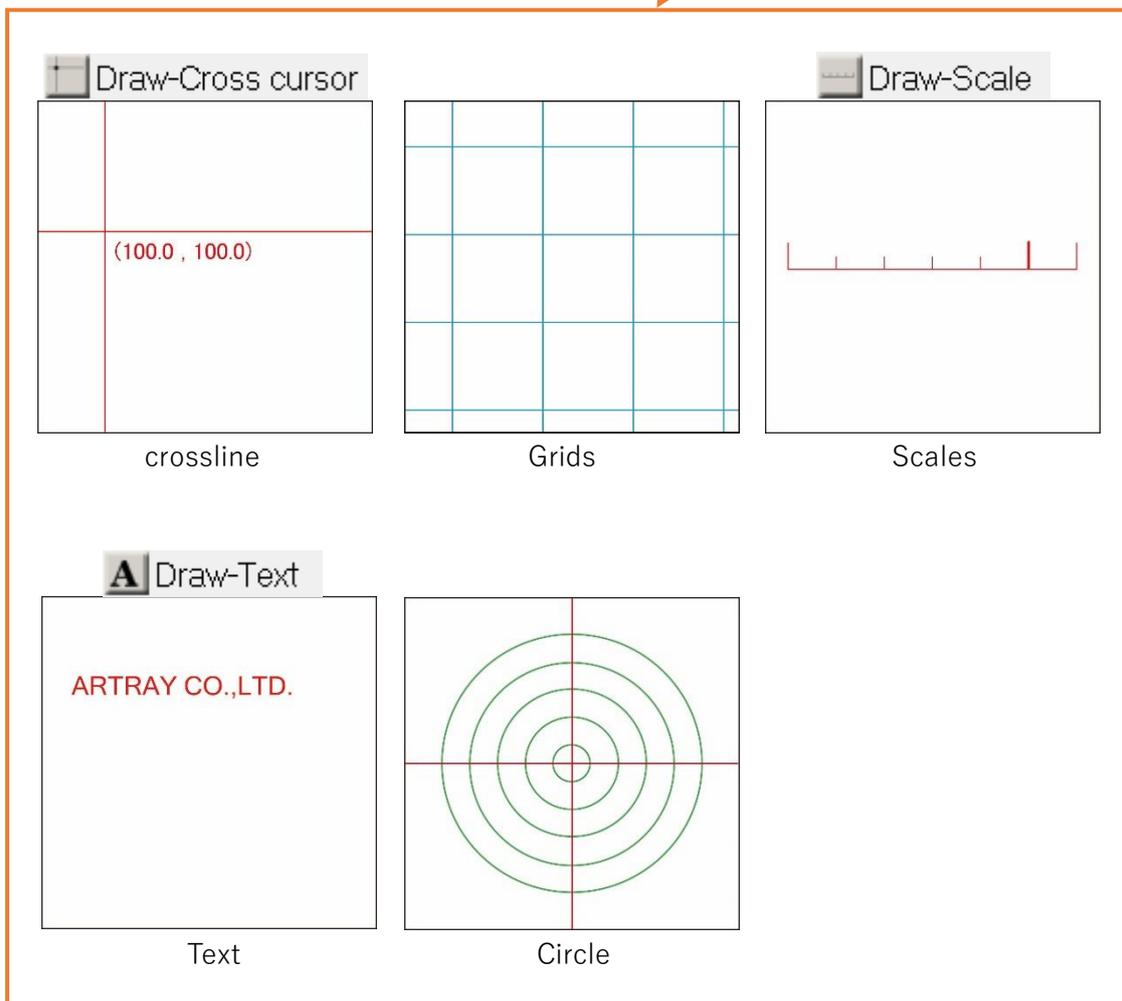
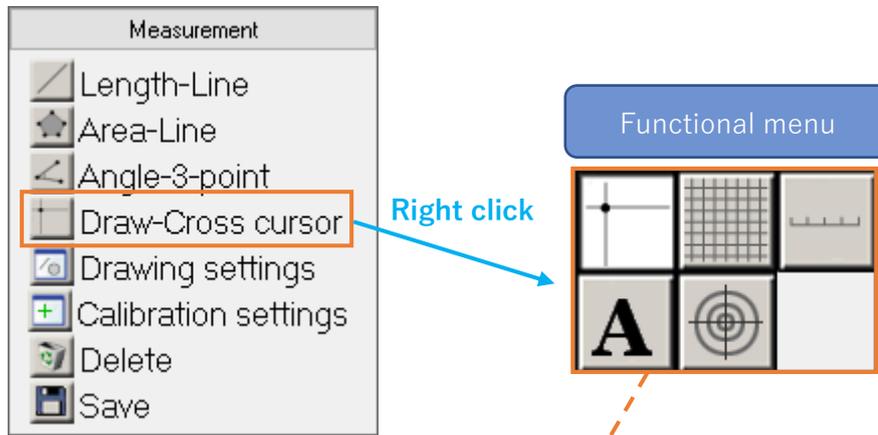
5. To remeasure, place the cursor on the vertex and when the cursor shape turns to arrow cross key, right-click and drag. It is now possible to move the vertices.



6.6. Drawing

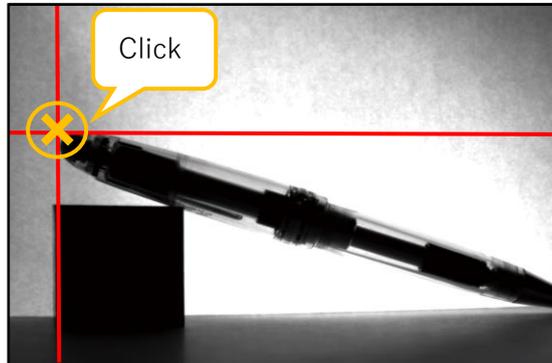
You can draw crossline, grids, scales, text, and circles.

When crossline, scale, or grid is selected, the function name is displayed next to "Draw" of the menu.



Draw a cross line

1. Right-click the  Draw from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click the point on the screen where you want to put the intersection with the cross line. Draw a cross line.



4. To move the cross line, move the cursor to the intersection and when the cursor shape turns to arrow cross key, right-click and drag.

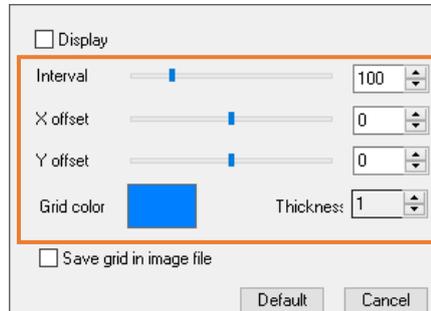


5. To delete the cross line, move the cursor to the intersection, and after the cursor shape turns to arrow cross key, right-click on it and press the Delete key on your keyboard.



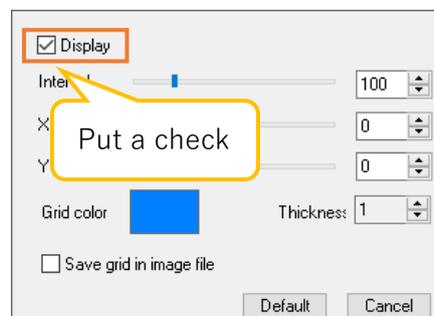
Draw a grid

1. Right-click the  Draw from "Measurement" on the menu.
2. Click  from the functional menu.
3. From the grid setting screen, set grid interval, X offset, Y offset, grid color, and thickness.



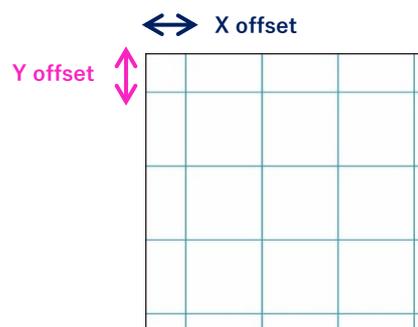
All the unit of grid interval, X offset, Y offset, and thickness is Pixels.

4. Check "Display" to display the grid.



< X offset and Y offset >

X offset is the distance between the left edge of the image and the start position of the vertical grid line. Y offset is the distance between the top edge of the image and the start position of the horizontal grid line.

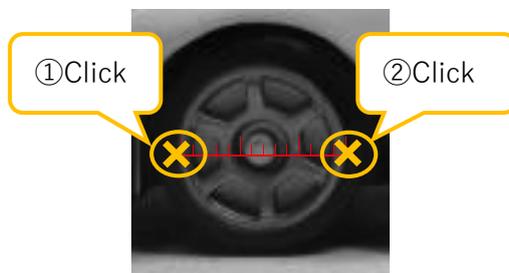


※Notes

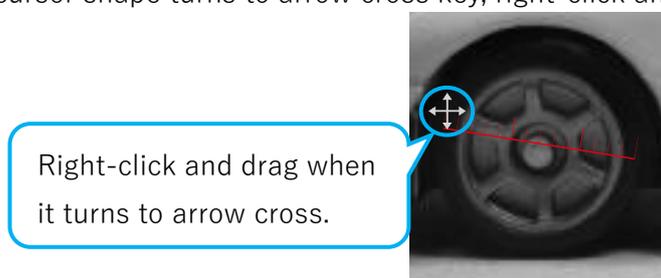
- If X offset / Y offset is larger than the grid spacing, the actual offset value will be the offset value you set subtracting the grid space.
- For example, if the grid spacing is 30px and the X offset setting is 50px, the distance between the left edge of the image and Y-axis of the grid will be 20px (50px – 30px).

Draw scale

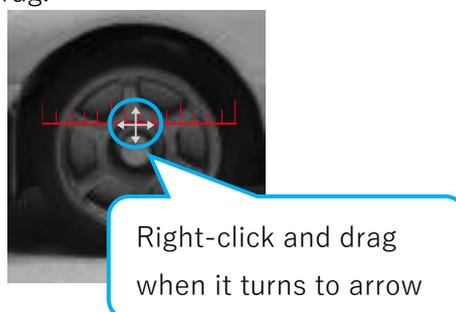
1. Right-click the  Draw from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click the two points on both ends of the scale on the screen. Draw a scale.



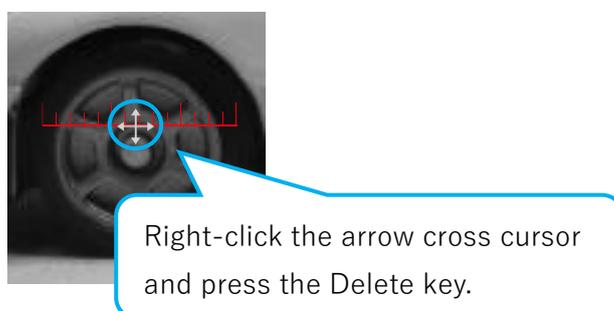
4. To redraw the scale, place the cursor on the end of the scale that you want to redraw, and when the cursor shape turns to arrow cross key, right-click and drag.



5. To move the scale, place the cursor on the center of the scale, and when the cursor shape turns to arrow cross key, right-click and drag.



6. To delete a scale, place the cursor on the center of the scale, and when the cursor shape turns to arrow cross key, right-click on it and press the Delete key on your keyboard

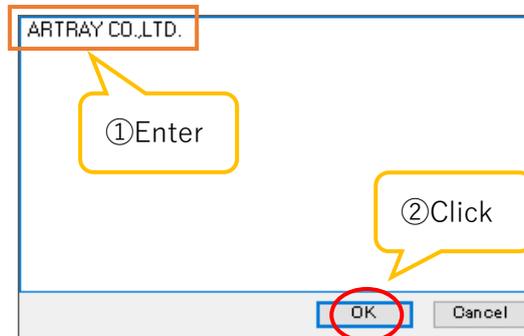


※Notes

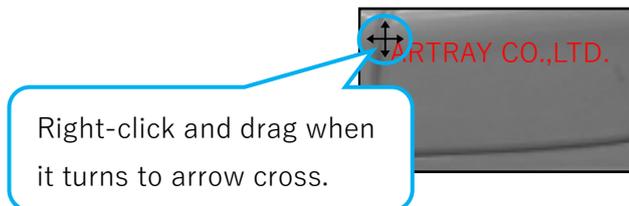
- The unit of the scale is the unit selected in the calibration value setting.

Draw text

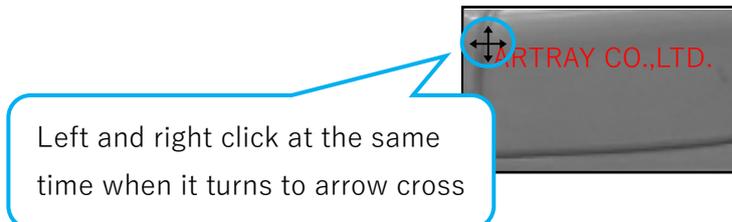
1. Right-click the  Draw from "Measurement" on the menu.
2. Click  from the functional menu.
3. Click on the screen where you want to draw the text.
4. From the edit screen, enter the text and click "OK" to draw the text.



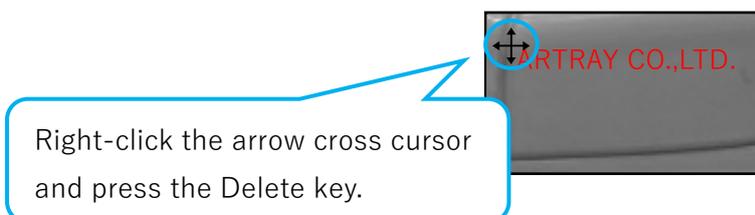
5. To move the text, place the cursor on the upper left corner of the text, and when the cursor shape turns to arrow cross key, right-click and drag.



6. To re-edit the text, place the cursor on the upper left corner of the text and left and right click at the same time when the cursor shape turns arrow cross key. The edit screen is displayed.

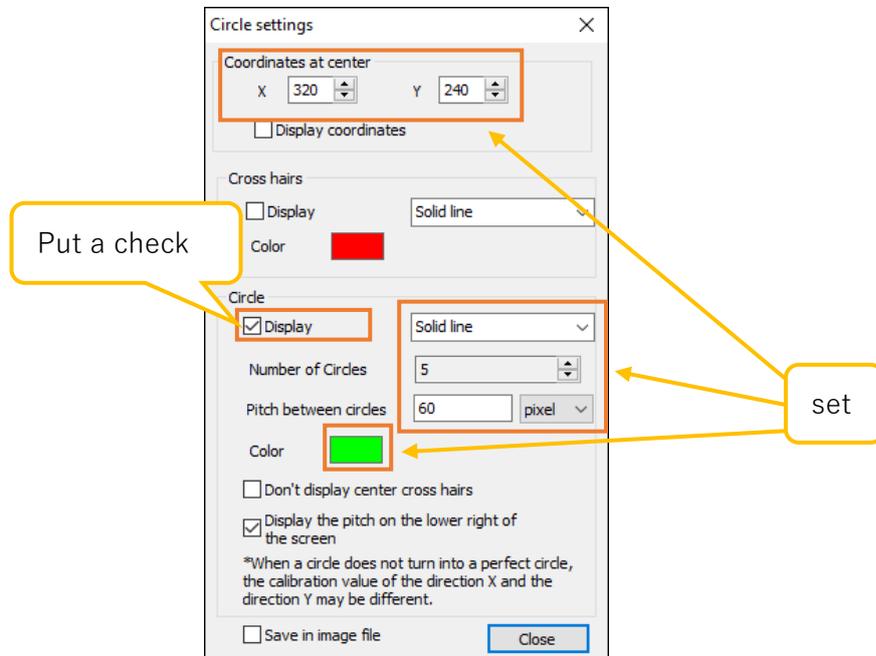


7. To delete the text, place the cursor on the upper left corner of the text, and when the cursor shape turns to arrow cross key, right-click on it and press the Delete key on your keyboard

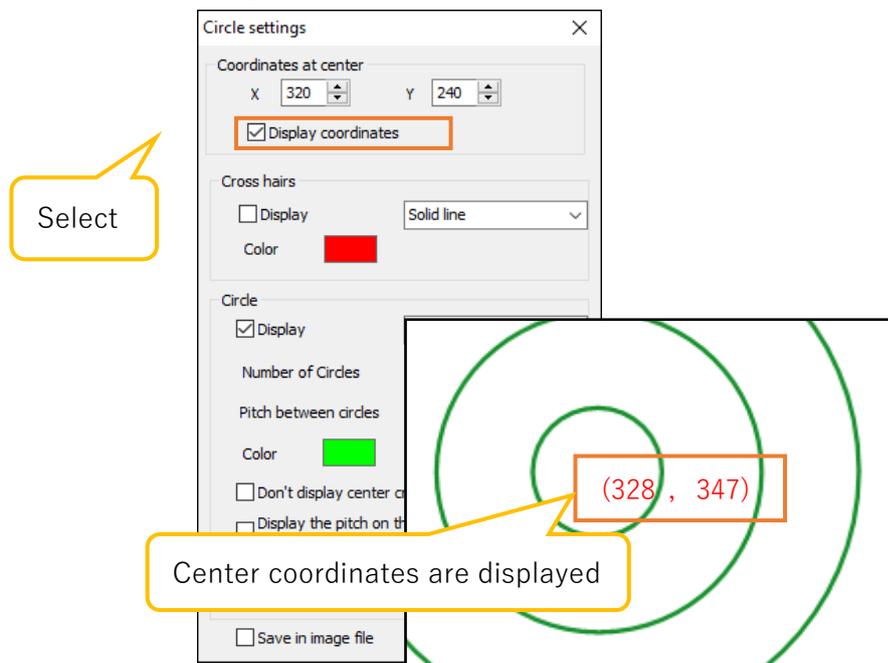


Draw a circle

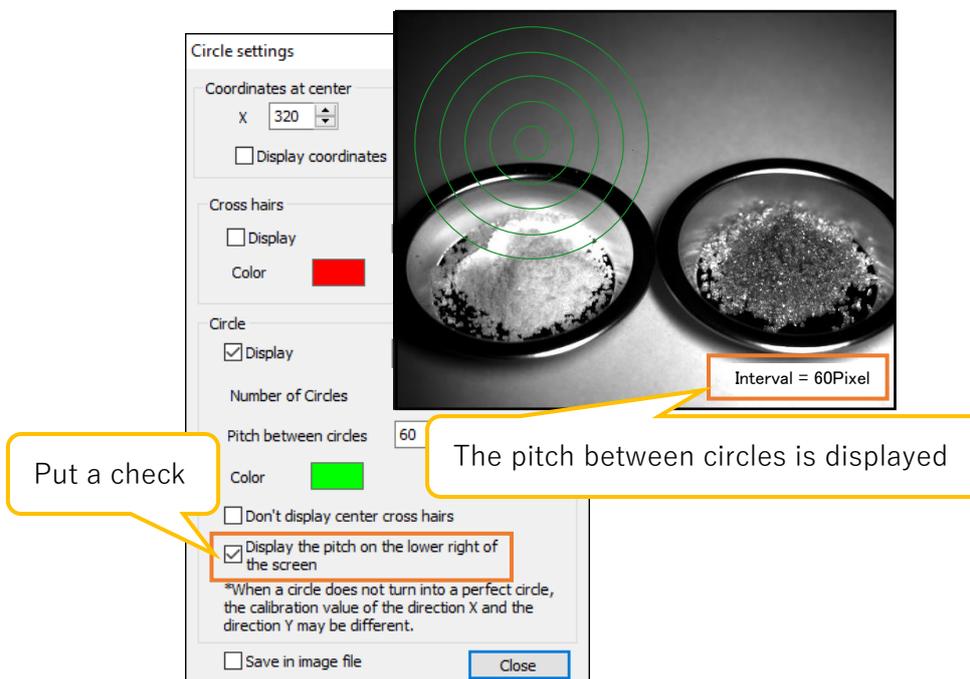
1. Right-click the  Draw from "Measurement" on the menu.
2. Click  from the functional menu.
3. From the circle settings screen, set the center coordinates, line types of circles, number, pitch between circles, and line color. Check "Display" and to show the circle.



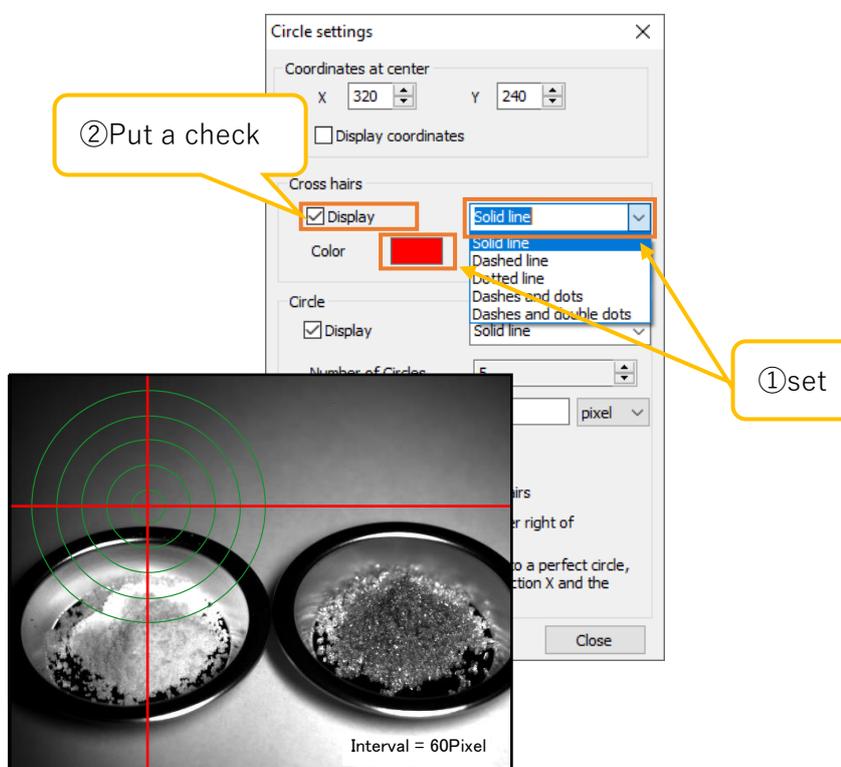
4. If you want to display the center coordinates of the circle by text, please select "Display coordinates" from the circle settings screen.



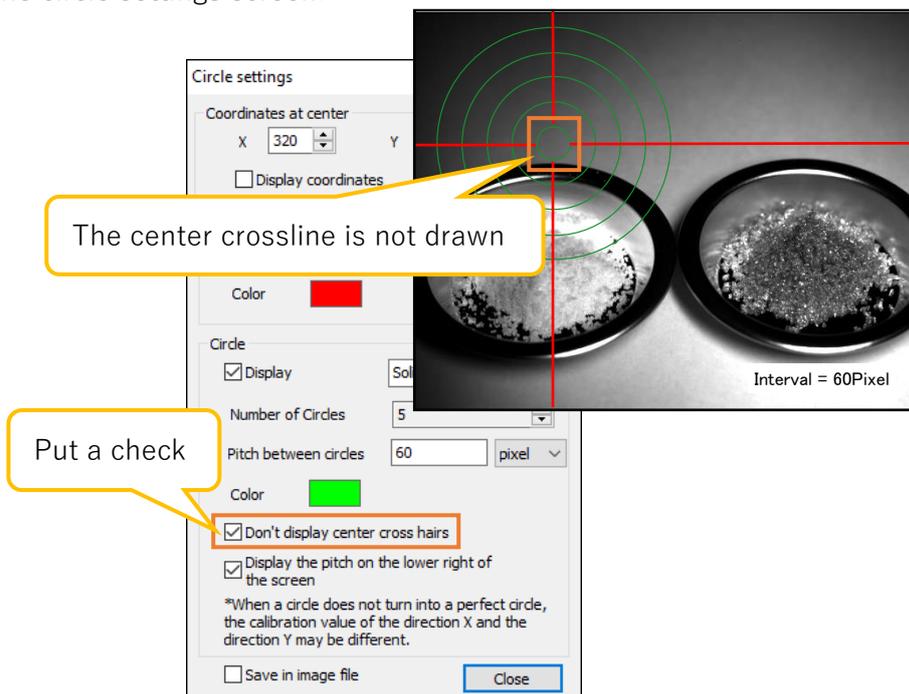
- If you want to display the pitch between circles at the bottom right of the screen, please select "Display the pitch on the lower right of the screen" from the circle settings screen.



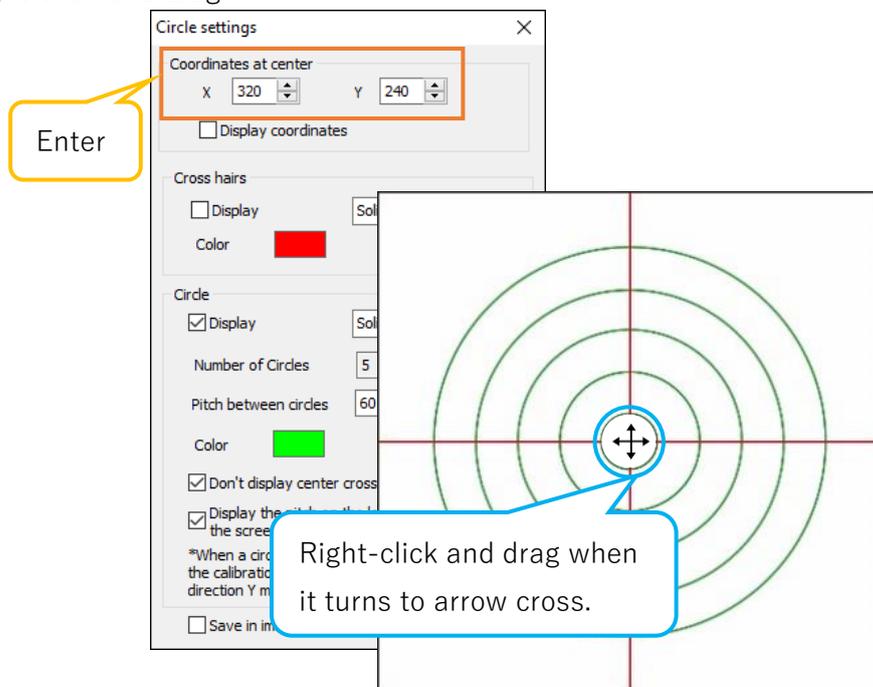
- To display the cross line, set the line type and line color of the cross line from the circle settings screen, and then select " Display ".



7. If you do not want to display the cross line of the center circle, check "Don't display center crossline" from the circle settings screen.



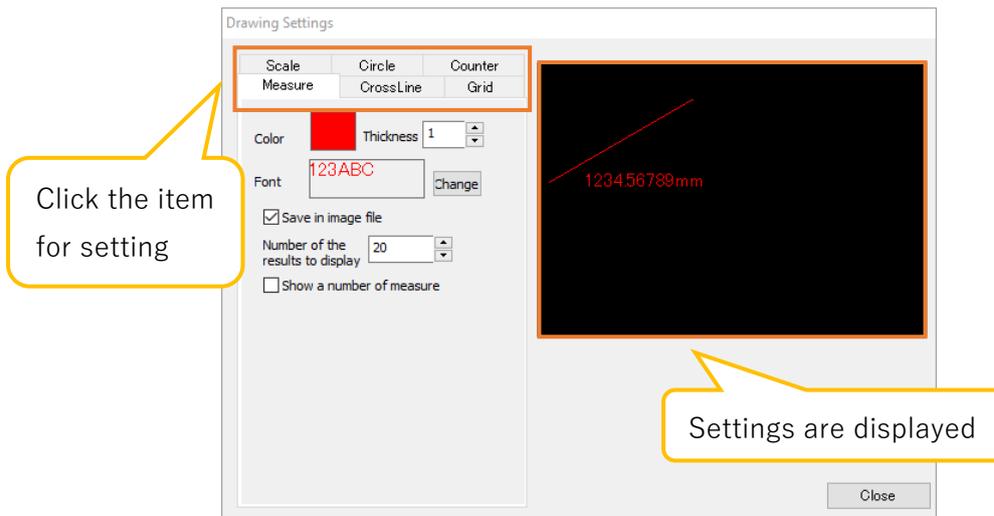
8. To move the circle or cross line, change the center coordinates from the circle settings screen, or move the cursor to the center coordinates on the screen and when the cursor shape turns to arrow cross key, right-click and drag.



6.7. Drawing settings

You can make various settings related to measurement such as font and line thickness. Settings related to drawing can set from the drawing settings screen. The display procedure of the drawing settings screen is as follows.

1. Click  Drawing settings from "Measurement" on the menu.
2. Click the tab which you want to arrange settings from Drawing Settings screen.



Distance, area, and angle drawing settings are set from "Measure" tab. The settings will be reflected on the right side of screen.

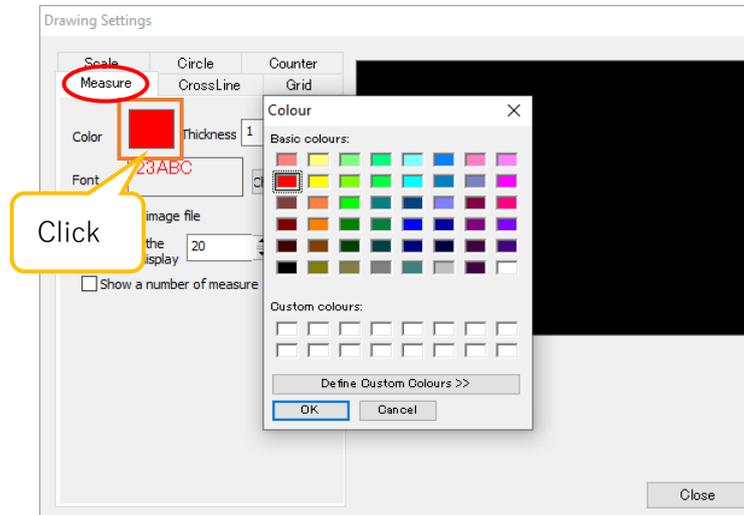
※Notes

- The settings related to drawing color, line thickness, font, and image saving are reflected on the measured data after the change of settings. The setting data that already been measured will not be changed.

Drawing settings of measurement items

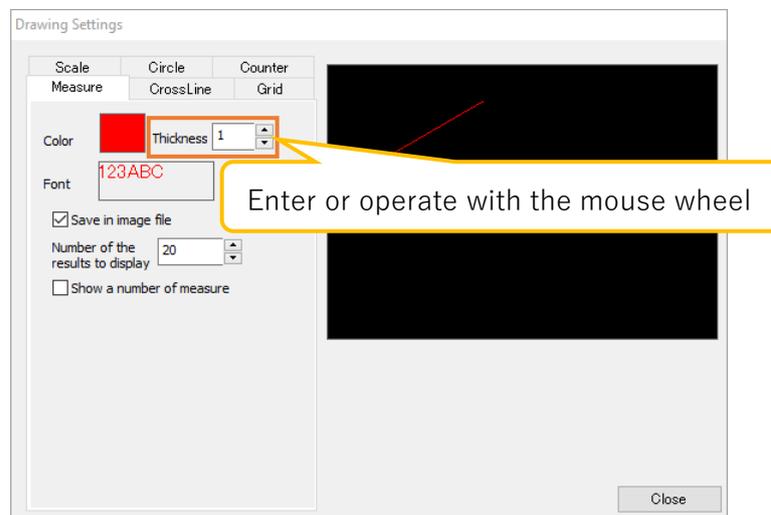
A) Set the drawing color

Click the rectangle from the right side of "Color". The "Color" screen will be displayed and please select the drawing color.



B) Set the line thickness

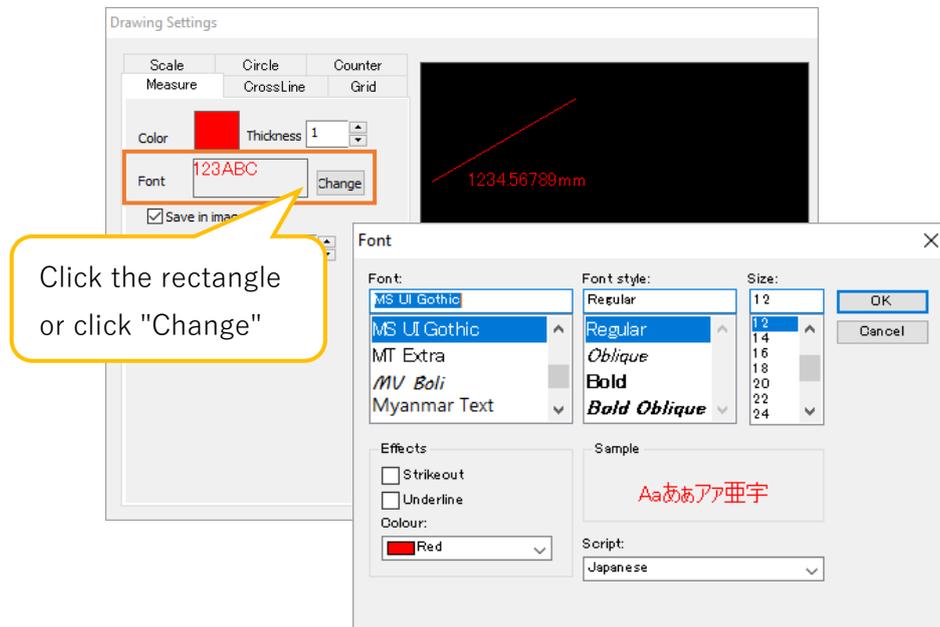
Enter the thickness that you want to set on "Thickness" or change the value with the mouse wheel.



The thickness range is 1 to 20.

C) Set the font

Click the rectangle from the right side or click "Change". "Font" screen will be displayed.
Please select a font.

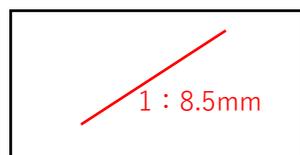
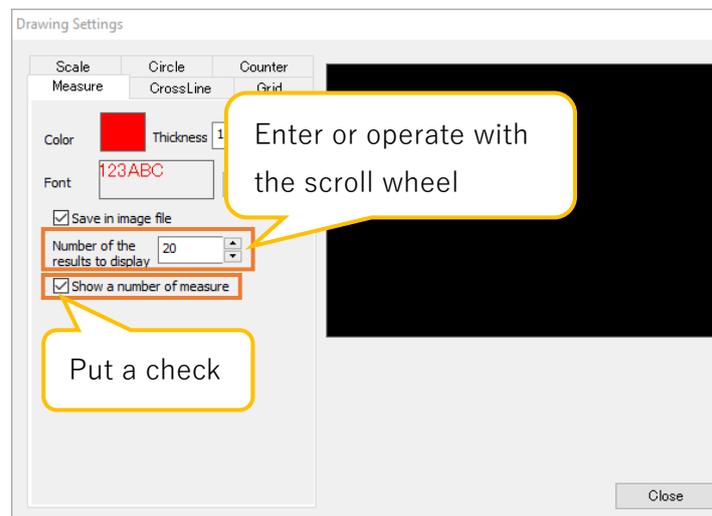


D) Set the number to be displayed in the measure results list.

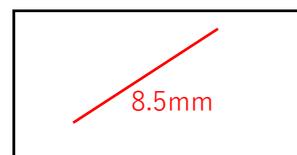
Enter the number to be displayed in "Number of the results to display" or to change the value with mouse wheel.

E) Assign a serial number next to the measurement result

Please put a check on "Show a number of measure".



Show the number

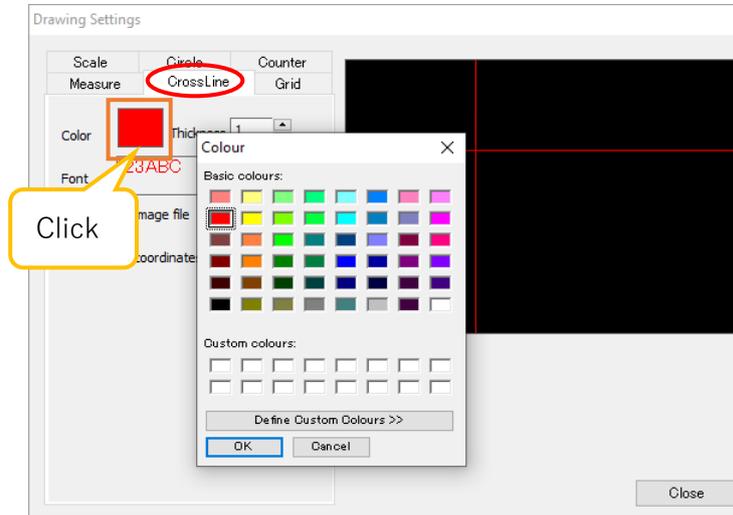


Do not show the number

Drawing settings of cross line

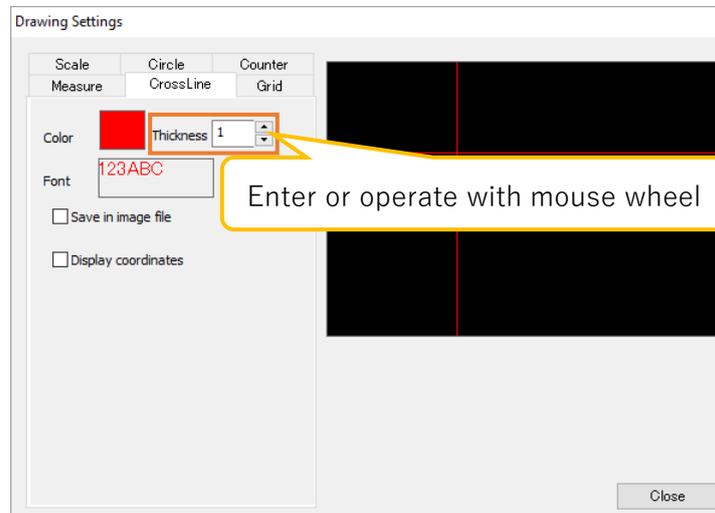
A) Set the drawing color

Click the rectangle on the right side of "Color". The "Colour" screen will be displayed. Please select the drawing color.



B) Set the line thickness

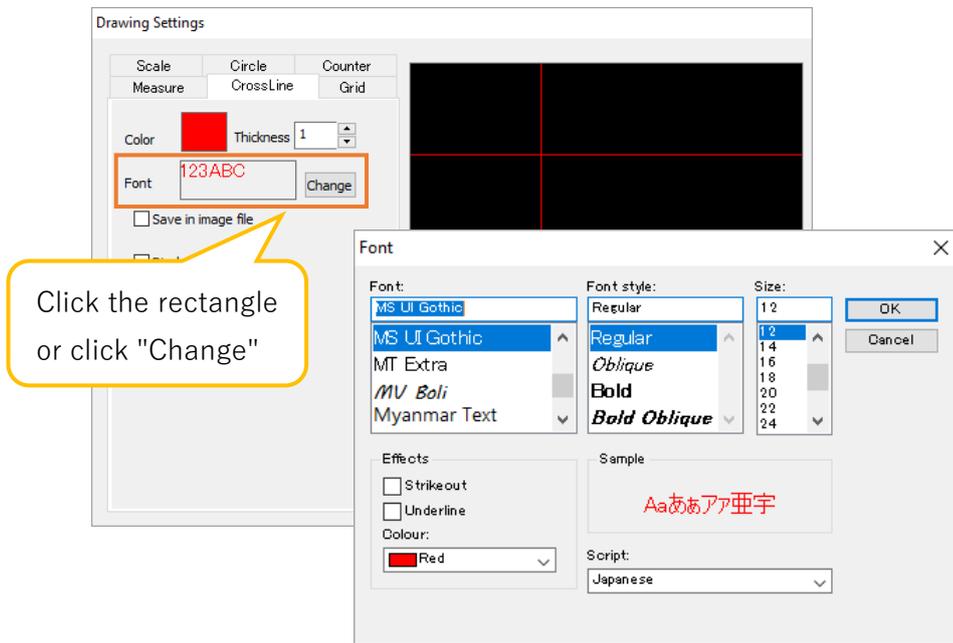
Enter the setting thickness on "Thickness" or change the value with mouse wheel.



The thickness range is 1 to 20.

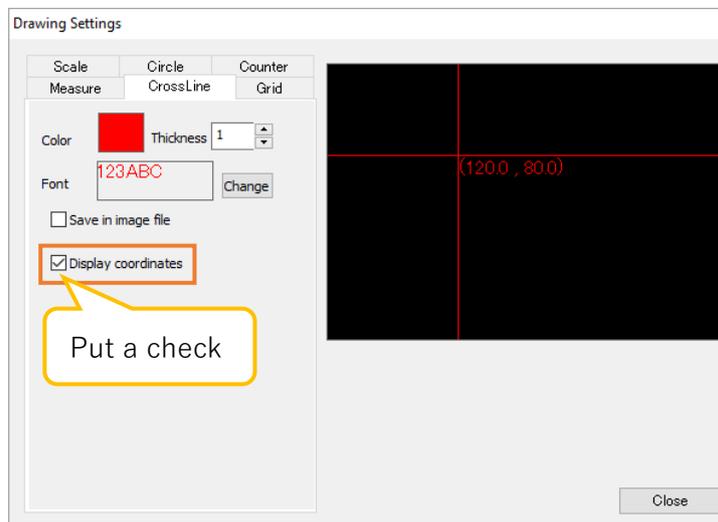
C) Set the font

Click the rectangle on the right side of "Font" or click "Change". The "Font" screen will be displayed. Please select a font.



D) Display the coordinates

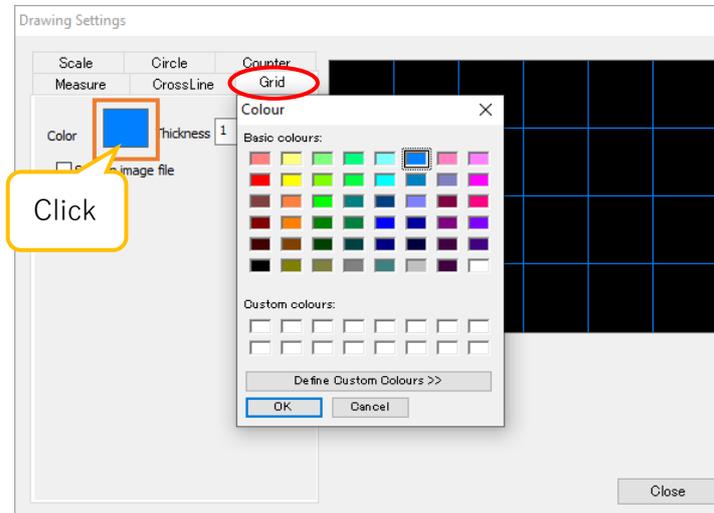
Please select "Display coordinates".



Drawing settings of grid

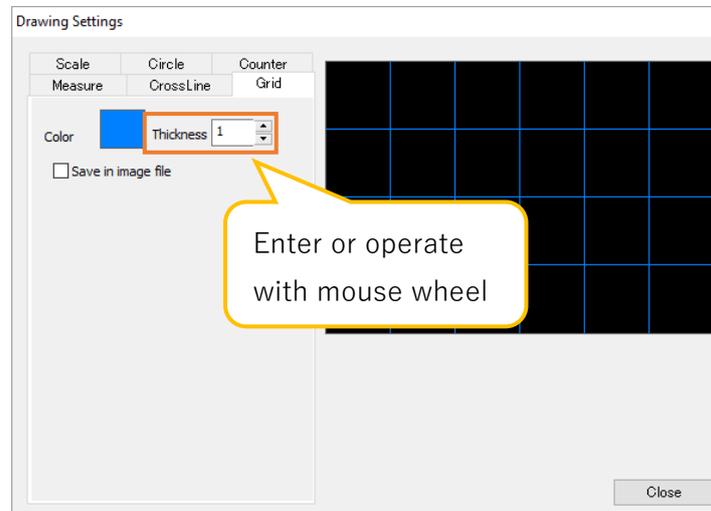
A) Set the drawing color

Click the rectangle on the right side of "Color". The "Colour" screen will be displayed. Please select the drawing color.



B) Set the line thickness

Enter the setting thickness on "Thickness", or change the value with mouse wheel.

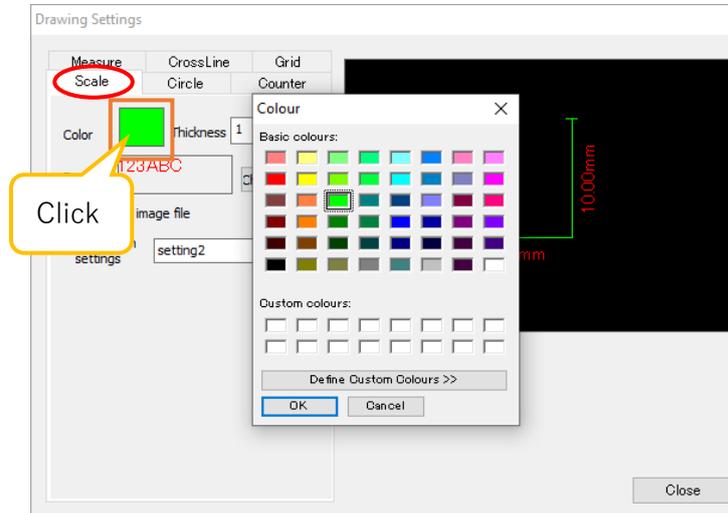


The thickness range is 1 to 5.

Drawing settings of scale

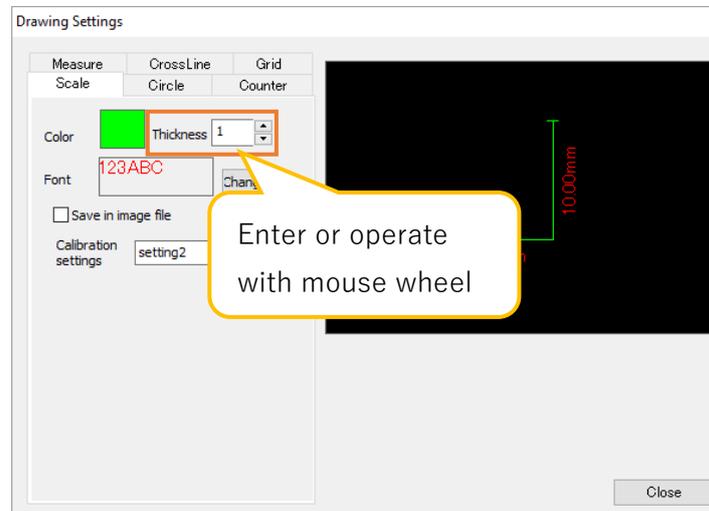
A) Set the drawing color

Click the rectangle on right side of "Color". The "Colour" screen will be displayed. Please select the drawing color.



B) Set the line thickness

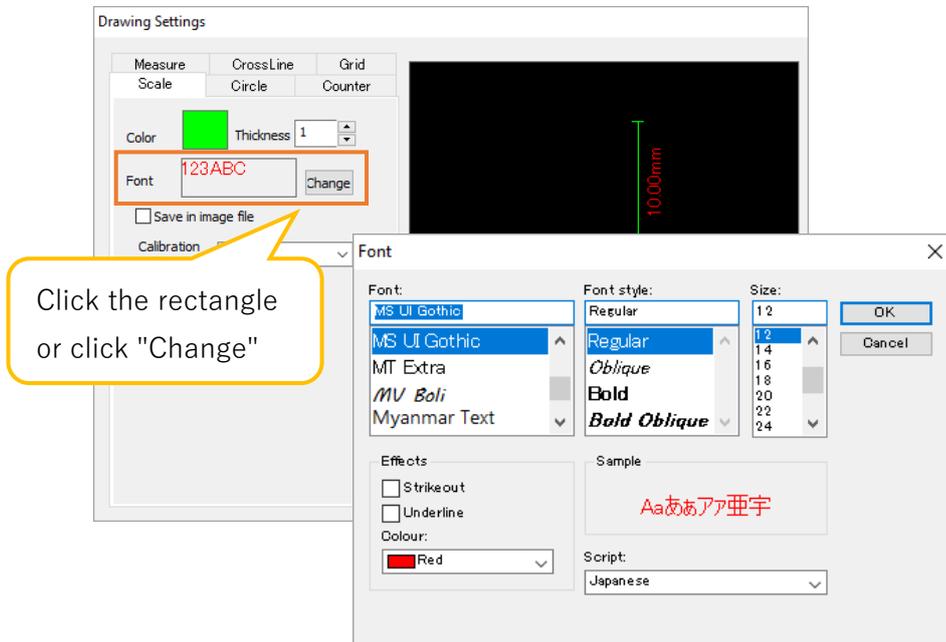
Enter the setting thickness on "Thickness" or change the value with mouse wheel.



The thickness range is 1 to 5.

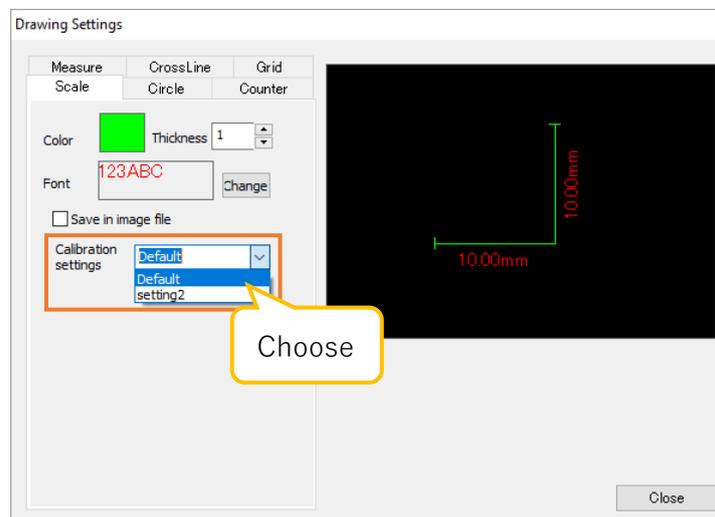
C) Set the font

Click the rectangle on the right side of "Change" or click "Font". The "Font" screen will be displayed. Please select a font.



D) Set the calibration value setting to be applied

Select the calibration value setting to be applied from "Calibration settings".



※Notes

- This drawing setting is applied to the scale set on the calibration settings screen. Regarding the drawing scale, the drawing settings set on "Measurement" tab will be applied.

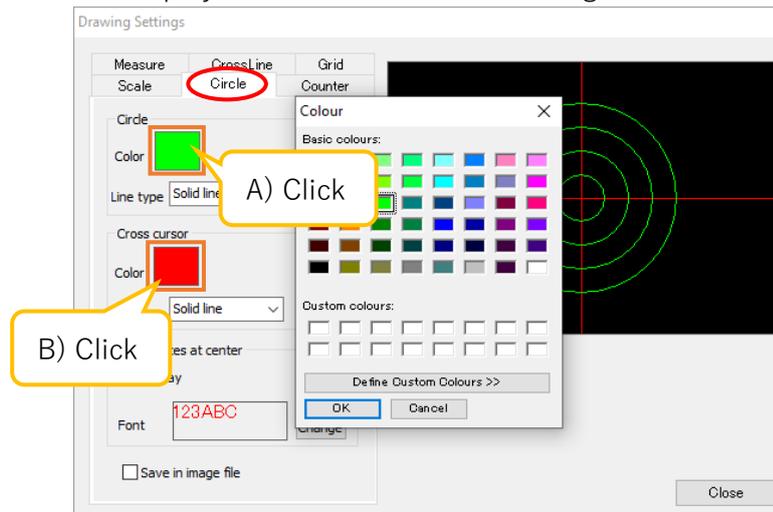
Drawing settings of circle

- A) Set the drawing color of circle

Click the rectangle on the right side of "Color" from the "Circle" item. The "Colour" screen will be displayed. Please select the drawing color.

- B) Set the drawing color of cross line

Click the rectangle on the right side of "Color" from the "Cross cursor" item. The "Colour" screen will be displayed. Please select the drawing color.

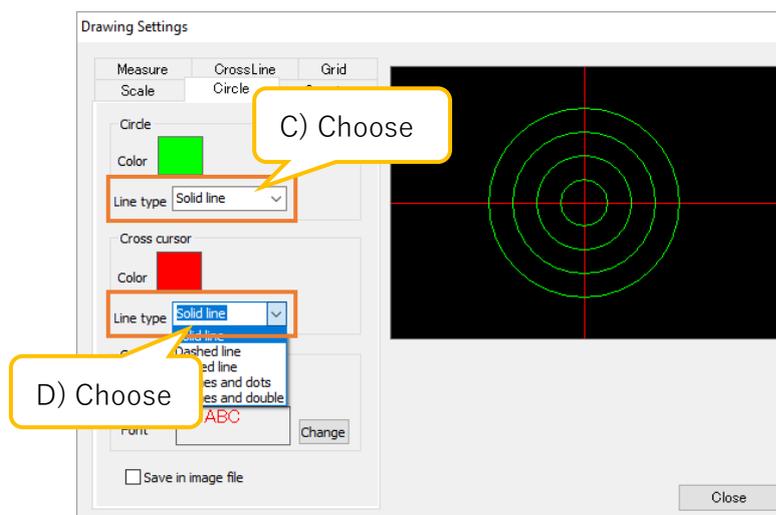


- C) Set the line type of circle

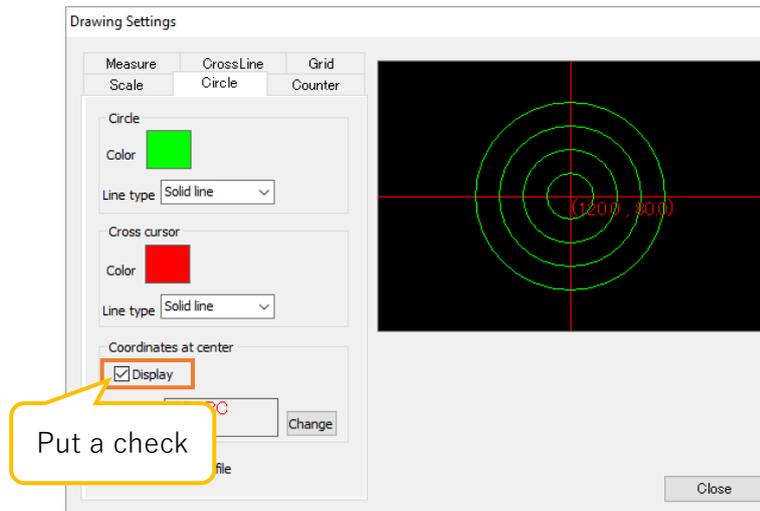
Please select "Line type" from the "Circle" item.

- D) Set the line type of cross line

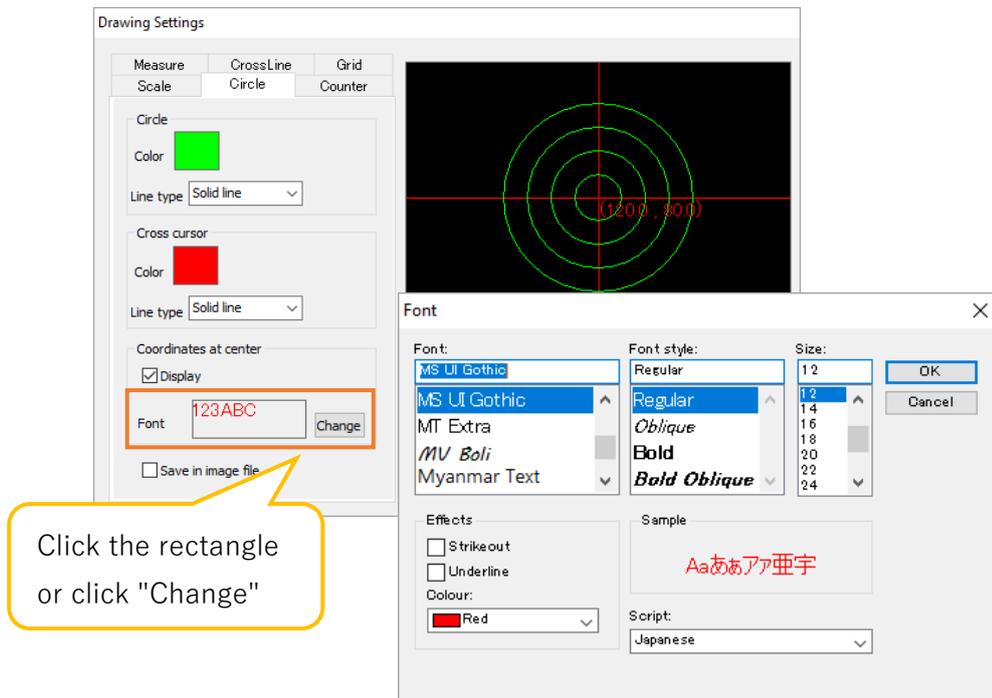
Select "Line type" from the "Cross cursor" item.



- E) Display the coordinates on the center of crossline
 Check "Display" from the "Coordinates at center " item.



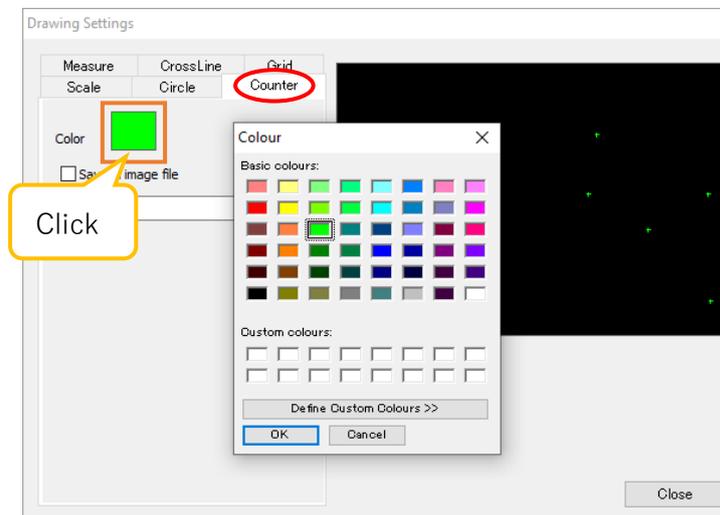
- F) Set the font of center coordinates
 Click the rectangle on the right side of "Font" or click "Change" from the "Coordinates at center ". The "Font" screen will be displayed. Please select a font.



Drawing settings of counter

A) Set the drawing color

Click the rectangle on the right side of "Color". The "Colour" screen will be displayed.
Please select the drawing color.



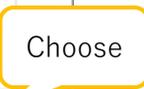
6.8. Delete measurement result

You can delete the measurement results of length, area, and angle from the screen and the list.

Delete items one by one

1. Select the item that you want to delete from the list of "Measurement" on the menu.

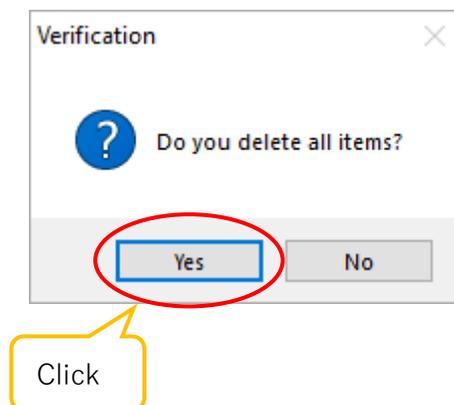
No.	Content	Value	Unit
1	Length-Line	230.6	
2	Length-Lin...	X:206.4	
3	Length-Lin...	Y:102.7	um
4	Area-Line	10770.0	um ²
5	Circle-Radi...	9.1	cm



2. Click  Delete from "Measurement" on the menu.
The selected measurement item will be deleted.

Delete all items

1. Click  Delete without choosing any result from the list of "Measurement" on the menu.
2. When the screen below is displayed, click "Yes" to delete all items.

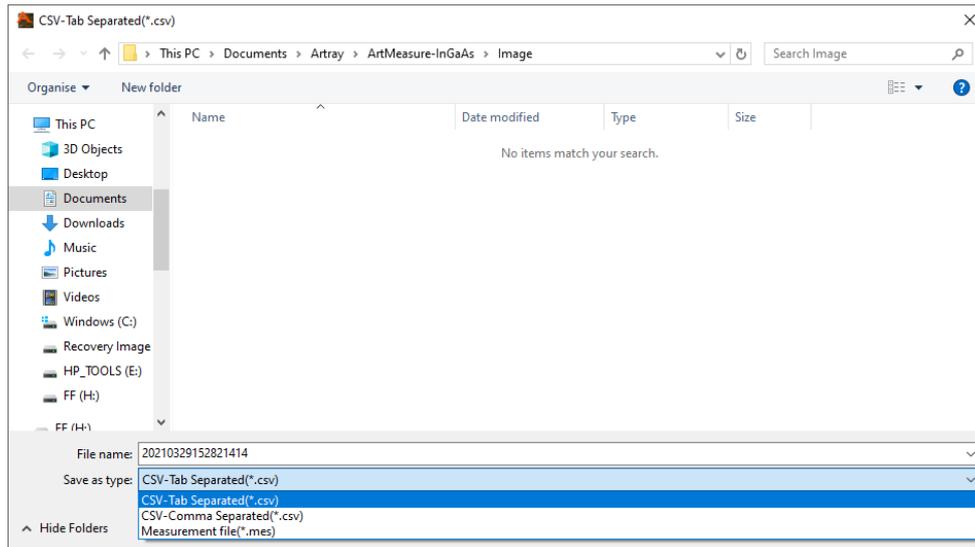


6.9. Save measurement result

You can save the measurement results of length, area, and angle in CSV or mes format.

Save measurement result

1. Click  Save from "Measurement" on the menu.
2. The file saving screen will be displayed. Select the file name, file format, saving location, and click "Save".



Saving format

You can select from three types: CSV format (tab separated), CSV format (comma separated), and mes format (measurement file). The mes file (measurement file) is a file which saves the measurement results displayed on the screen. The mes file (measurement file) can be displayed on the screen again by dragging and dropping.

※Notes

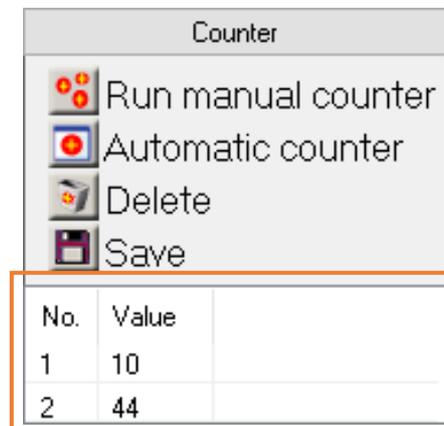
- When dragging and dropping a mes file (measurement file), if the pixel size of the image do not match with the mes file, it will not be displayed correctly.

7. Counting

It is possible for counting manually and automatically.

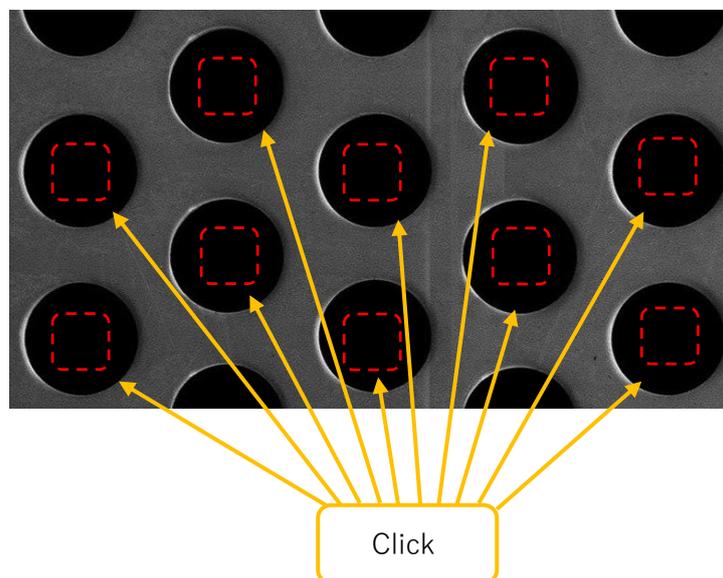
With automatic counting, it is possible to detect similar colors and differences of brightness of images.

The counting result is displayed in the list from "Counter" of the menu.



7.1. Manual counting

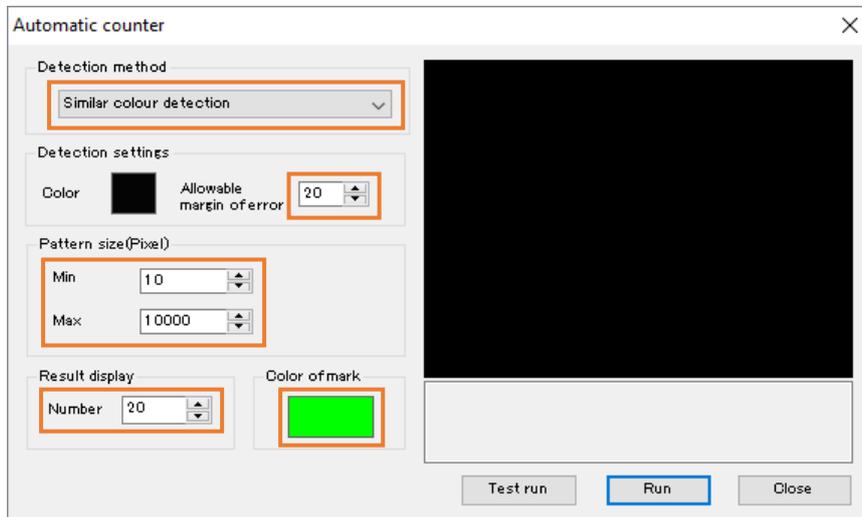
1. Click  Run manual counter from "Counter" on the menu.
2. On the screen, click on the object for counting.



3. When finished counting, please right-click on the screen. The counting result is confirmed.

7.2. Automatic counting

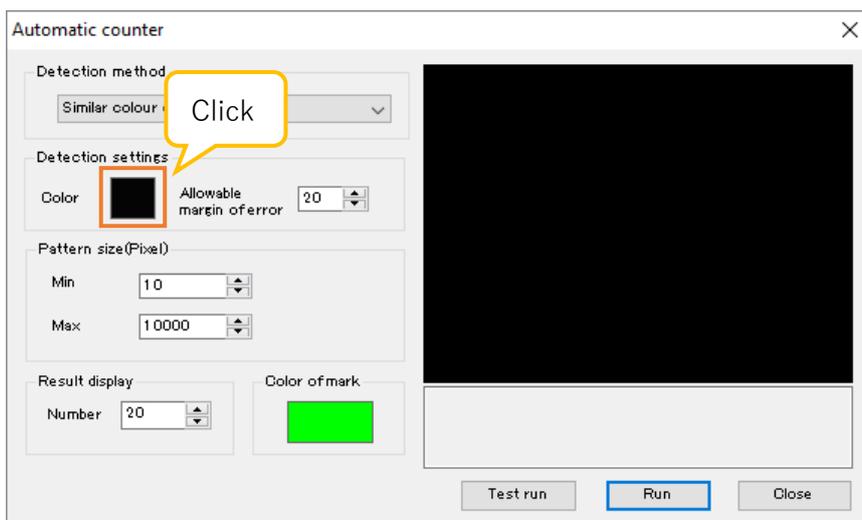
1. Click  Automatic counter from "Counter" on the menu.
2. From automatic counter screen, set the detection method, margin of error, pattern size, number of results to be displayed, and mark color.



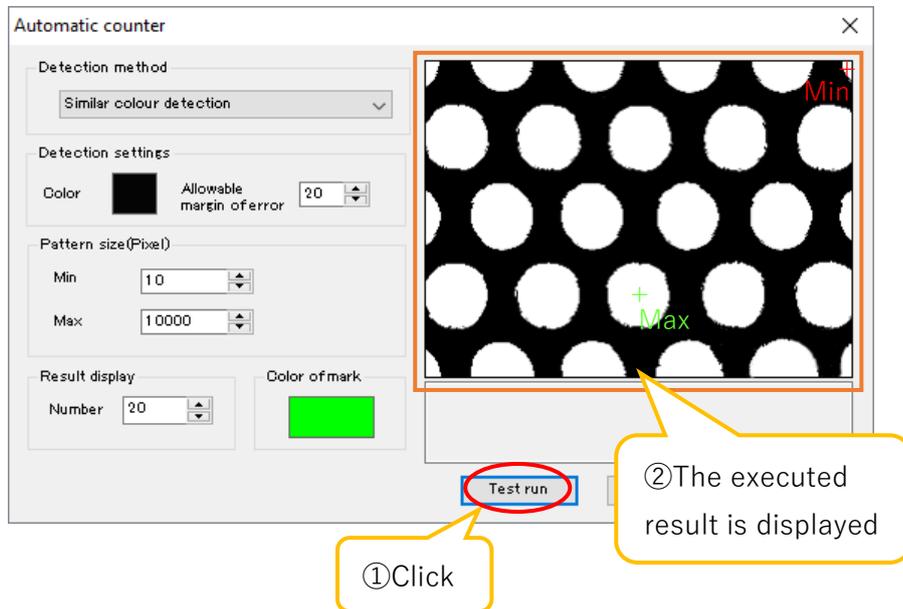
The detection method can be selected from "similar color detection" and "brightness difference detection" two types.

- Similar color detection = Detects the same color of the image
- Brightness difference detection = Detects the same brightness on the image (valid only on monochrome images)

3. Click the rectangle on the right side of "Color" from "Detection settings" on the automatic counter screen.

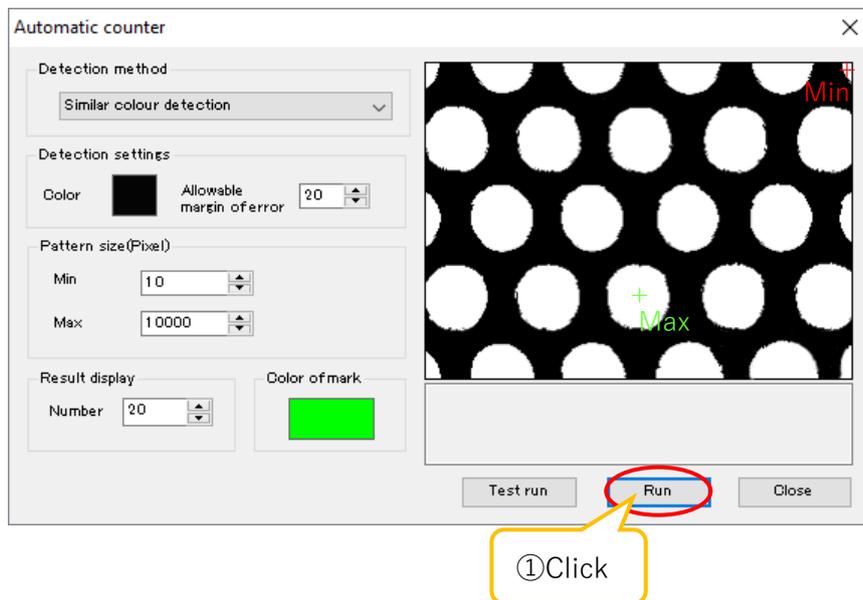


- On the screen, click the color part which you want to detect.
- Click "Test run" from the automatic counter screen.



The executed result will be displayed on the right side of the automatic counter screen. If you don't get the results you expect, go back to 2 to reset and click 「Test run」. You can run the test as much as you need. If you get the results you expect, please go to 6.

- Click "Run" from the automatic counter screen. The counting result will be confirmed.



※How to set the pattern size

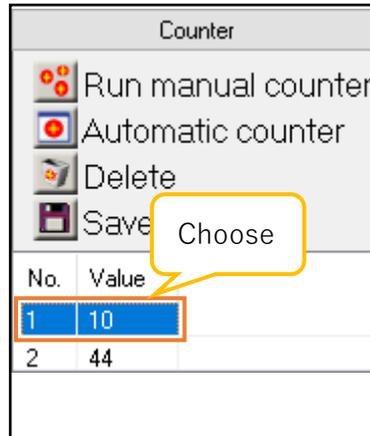
About the test results, "Max" is the largest area of color detected on the screen and "Min" is the smallest area. After starting the test, if you run the test again with the minimum and maximum pattern sizes close to the "Max" and "Min" of the test executed results and test once more, it can obtain a more accurate data.

7.3. Delete counting results

You can delete the counting results from the screen or the list.

Delete one item at a time

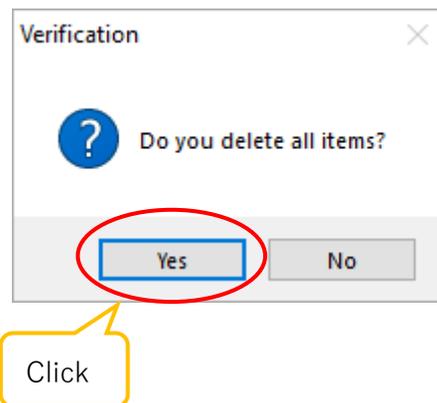
1. Select the item you want to delete from the list of "Counter" on the menu.



2. Click  Delete from "Counter" on the menu to delete the selected item

Delete all items

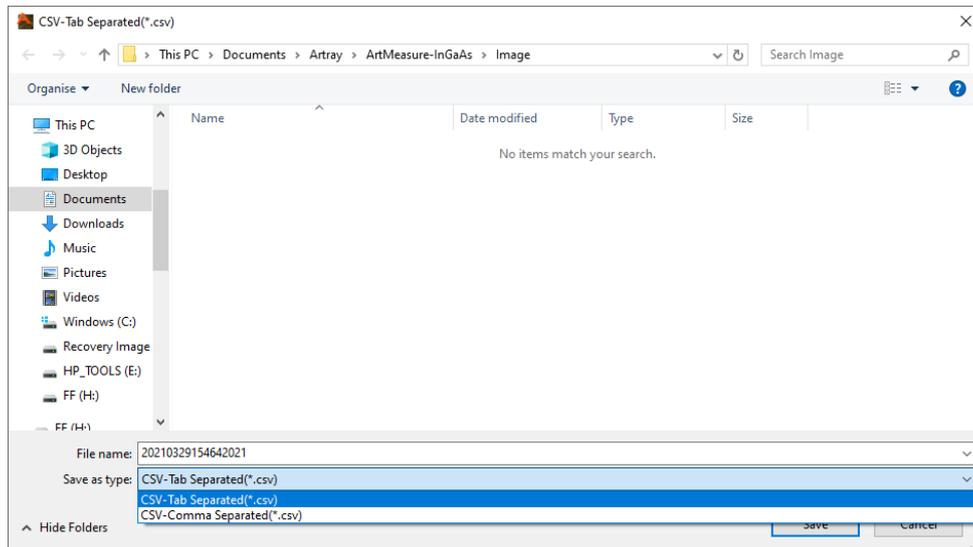
1. Click  Delete without selecting any items from the list of "Counter" on the menu.
2. When the screen below is displayed, click "Yes" to delete all items.



7.4. Save Counting result

You can save the count result in CSV format.

1. Click  Save from "Counter" on the menu.
2. The file save screen will be displayed. Select the file name, file format, save location, and click "Save".

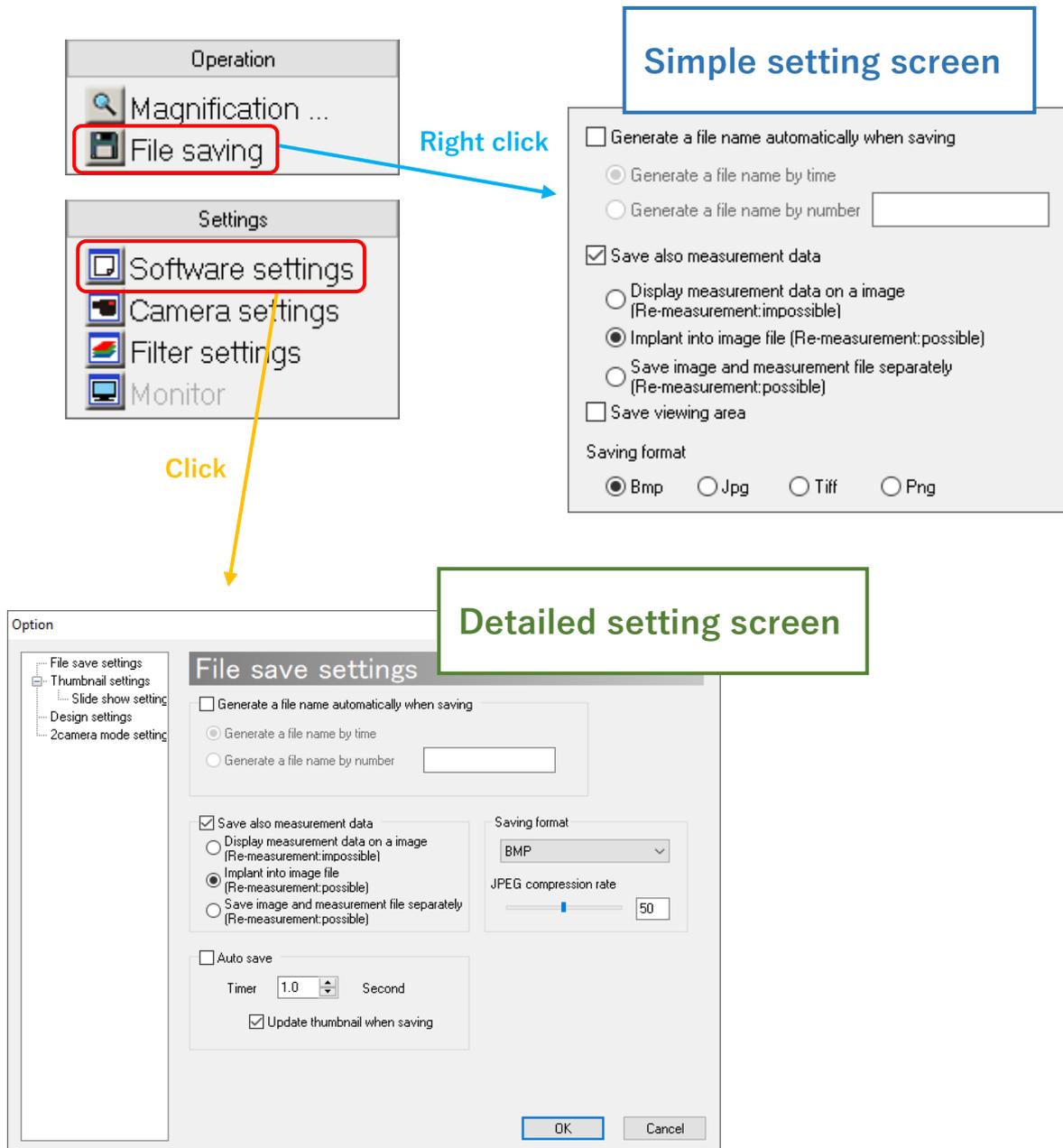


The save format is in CSV format, you can select from two types, tab separated and comma separated.

8. Various settings

8.1. File save settings

Settings related to file saving can be set from the simple setting screen or the detailed setting screen.



※Notes

- Click “OK” to show the settings made on the detailed setting screen.
- If you do not want to show the settings made on the detailed settings screen, click “Cancel”.

Automatically assigning a file name

When you click  File saving from "Operation" on the menu, you can automatically save the file with under certain conditions without opening the file setting dialogs. You can select the file name format from the following two types.

A) Time for saving the files

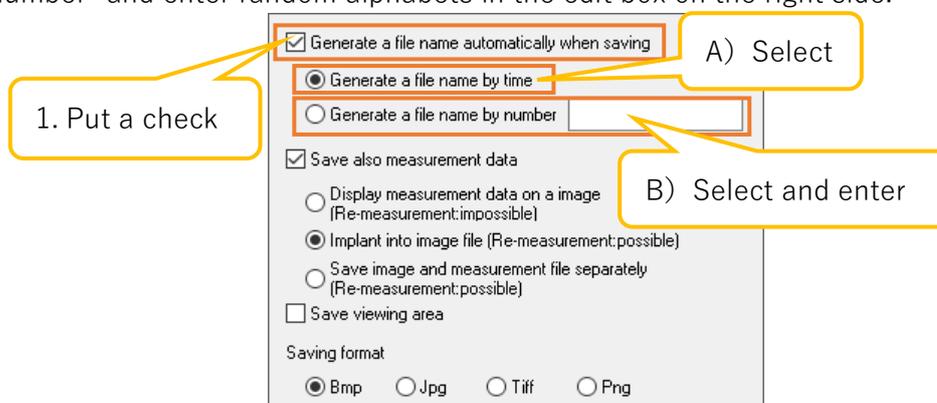
The file name will be the time when you save the file. For example, if you save it at 14:25:12:23 on February 15, 2007, the file name will be "2007021514251223. (Extension)".

B) Random alphabets and consecutive numbers

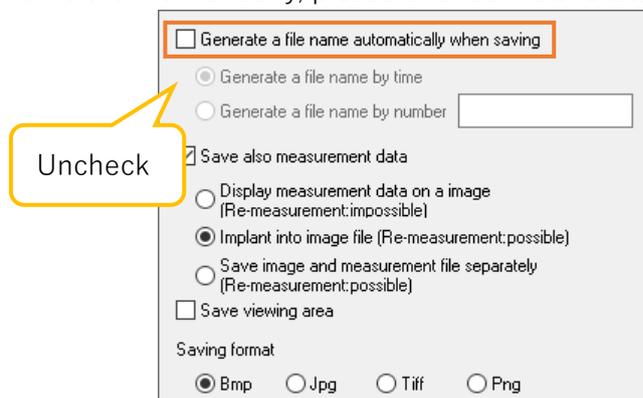
Name the file with any random alphabets + consecutive numbers specified by the user. For example, if you specify "AAA" for any random alphabets, file names will be "AAA0001. (Extension)", "AAA0002. (Extension)", and so on. If you do not specify random alphabets, the file name will be "0001. (Extension)", "0002. (Extension)", and so on.

Settings can be changed on both simple setting screen and detailed setting screen. The followings explain the setting method from the simple setting screen, the same setting can also be changed from detailed setting screen.

1. Select "Generate a file name automatically when saving".
2. Select the file name format.
 - A) If you want to name the file by time, please select "Generate a file name by time".
 - B) If you want to add consecutive numbers to the file name, please select "Generate a file name by number" and enter random alphabets in the edit box on the right side.



If you want to name the file manually, please uncheck "Generate a file name automatically when saving".



Save measurement data at the same time

It is possible to save the camera images and measurement data at the same time. You can select the save format from the following three types.

A) Combine the measurement image with the original image

Combines camera image and measurement data into one file. The pixel information below the measurement result will be lost. It cannot be remeasured. Since the measurement data is combined and saved in 8-bit monochrome image or 16-bit monochrome image, colors such as the drawing color set from each item of the drawing settings will be converted to monochrome.

B) Embed the measurement data to the image file

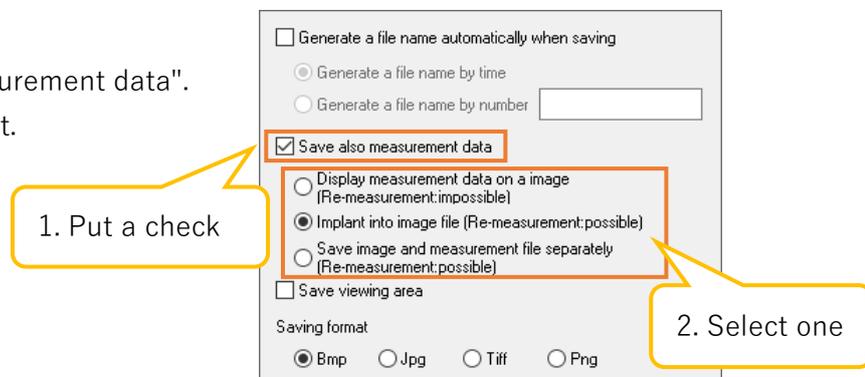
Embed the measurement data to the footer of the image file. The information of original image will not lose. If you reload the image file, it is possible to remeasure.

C) Save the image and measurement data in separate files

Save the camera image in any saving format and save the measurement data in mes format. You can load and measure again by dragging and dropping the measurement data to the screen.

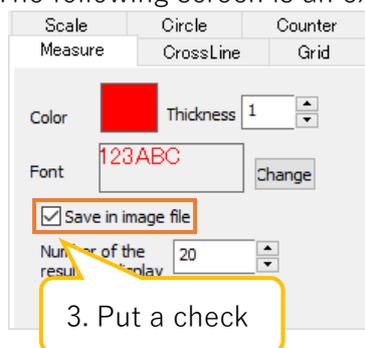
The followings explain the setting method from the simple setting screen, the same setting can also be changed from detailed setting screen.

1. Select "Save also measurement data".
2. Select the saving format.



3. Please select "Save in image file" from the drawing settings of each measurement item.

The following screen is an example of measurement items.



Regarding to the display procedure of drawing setting screen, please refer to "6.7. Drawing settings" on P.66. The grid and circles of drawing items can also be set from each setting screen.

For details, please refer to "Draw a grid" on P.60 or "Drawing settings of circle" on P.74.

Set the saving format

You can select 4 types of file saving format: Bmp, Jpeg, Tiff, Png.

Settings can be changed from both simple setting screen and detailed setting screen, but you can set the compression ratio in JPEG format only from the detailed setting screen.

<Setting from simple setting screen >

Please select the save format you want to set from "Saving format".

The screenshot shows a settings window with the following options:

- Generate a file name automatically when saving
 - Generate a file name by time
 - Generate a file name by number
- Save also measurement data
 - Display measurement data on a image (Re-measurement:impossible)
 - Implant into image file (Re-measurement:possible)
 - Save image and meas (Re-measurement:pos)
- Save viewing area
- Saving format:
 - Bmp
 - Jpg
 - Tiff
 - Png

A yellow callout box labeled "Check one" points to the radio buttons in the "Saving format" section.

<Setting from detailed setting screen >

Please select the saving format you want to set from "Saving format".

The screenshot shows a detailed settings window titled "File save settings" with the following options:

- Generate a file name automatically when saving
 - Generate a file name by time
 - Generate a file name by number
- Save also measurement data
 - Display measurement data on a image (Re-measurement:impossible)
 - Implant into image file (Re-measurement:possible)
 - Save image and measurement file separately (Re-measurement:possible)
- Auto save
 - Timer: 1.0 Second
 - Update thumbnail when saving

The "Saving format" section is expanded, showing a dropdown menu with options: BMP, JPEG, TIFF, PNG. A callout box highlights this menu.

The "JPEG compression rate" section is also expanded, showing a slider bar and an input box with the value 50. A callout box highlights this section.

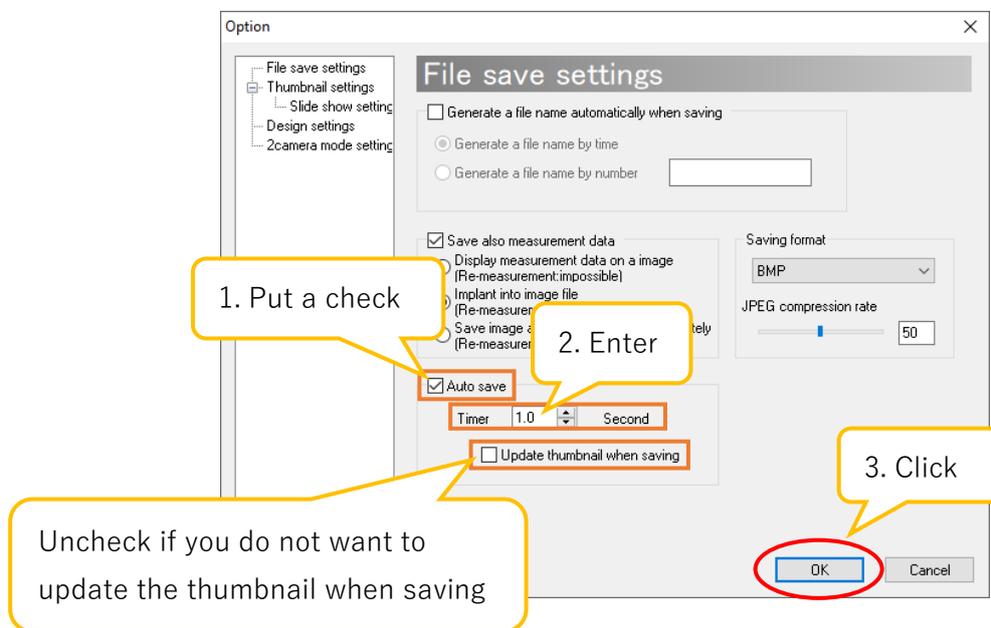
Buttons for "OK" and "Cancel" are at the bottom.

For JPEG, you could specify the compression ratio between 1 and 100. You could use the slider bar or enter a value to the edit box.

Set automatic saving of files

Images can be saved automatically by setting a random time.

1. Please select "Auto save".
2. Enter the interval for saving images on "Timer" field.



If you do not want to update the thumbnail when saving, uncheck "Update thumbnail when saving".

3. Press "OK" to start automatic saving.

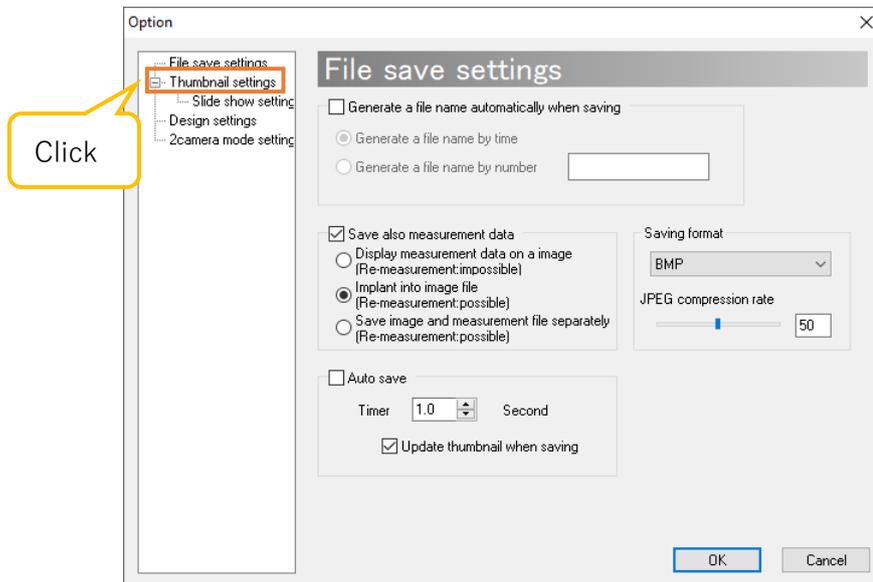
※Notes

- The timer can be set from 0.0 to 1000.0 seconds in 0.1 second units, but the actual saving timing depends on the frame rate, wait time, PC specifications of the camera, etc.
- For example, even if you set the timer to 0.1 when the frame rate is 10, it is not always possible to save 10 images per second.
- If "Generate a file name automatically when saving" is not checked, the automatically saved time will be the file name and saved.
- If "Generate a file name automatically when saving" is selected, the file is automatically saved with the file name you have set.
- To stop saving, click  File saving from "Operation" on the menu, or uncheck "Auto save" and click the "OK" button.

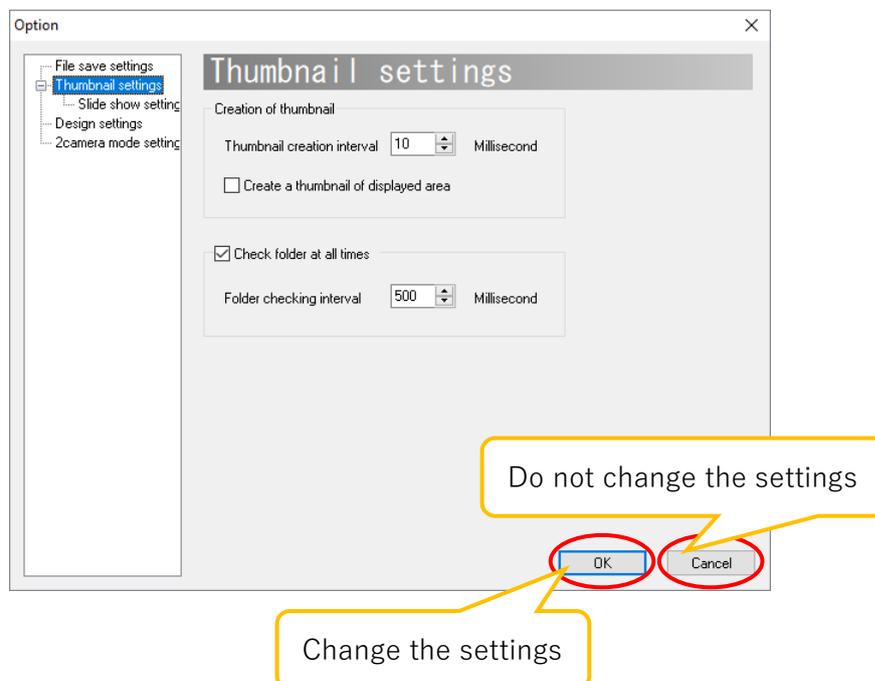
8.2. Thumbnail settings

The thumbnail settings could be set from the thumbnail setting screen. The procedure for displaying the thumbnail setting screen is as follows.

1. Click  Software settings from "Settings" on the menu.
2. Click "Thumbnail Settings" from the tree on the left side of the screen.

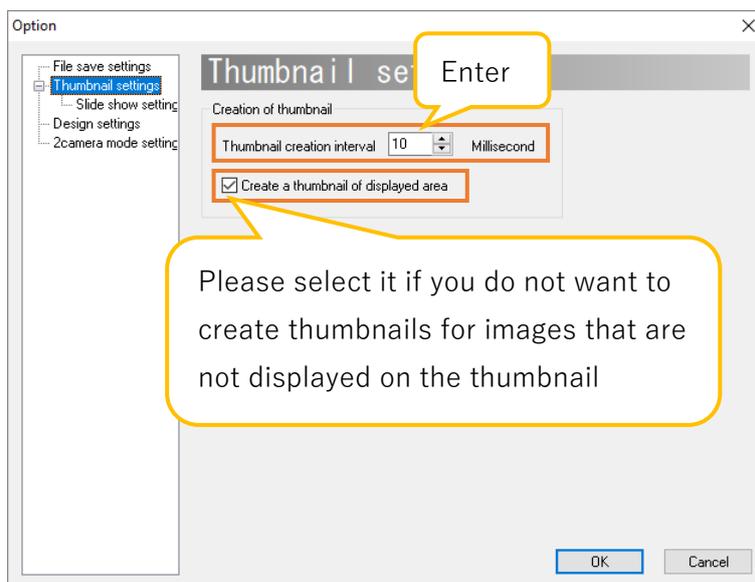


3. The thumbnail setting screen is displayed.
To reflect the changes in the settings, click "OK" after finish setting each item.
If you do not want to change the settings, please click "Cancel".



Set the interval for creating thumbnails

Please set the interval on "Thumbnail creation interval" from "Creation of thumbnail".

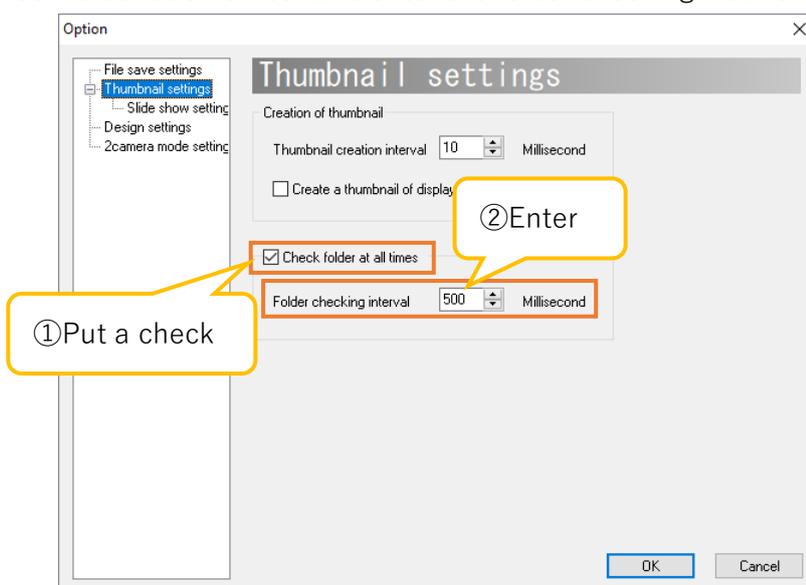


The thumbnail creation interval can be set in the range of 1 to 10000 milliseconds. If you do not want to create thumbnails of images that are not displayed on the thumbnail screen, please put a check on "Create a thumbnail of displayed area". When creating thumbnails of all images, the software may become slower if there is large number of images.

Monitor the thumbnail folder at all time

If you have set the folder of creating the thumbnails to be constantly monitored, the thumbnail will be recreated when a file is added by an external application or other application.

Please select "Check folder at all times" and enter the folder checking interval.

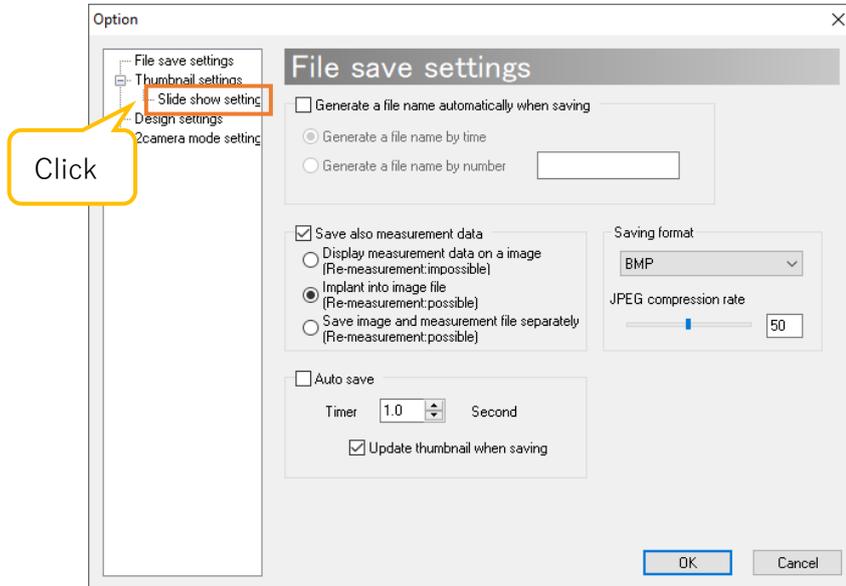


The folder monitoring interval can be set in the range of 100 to 10000 milliseconds. "Check folder at all times" is already be selected on default mode.

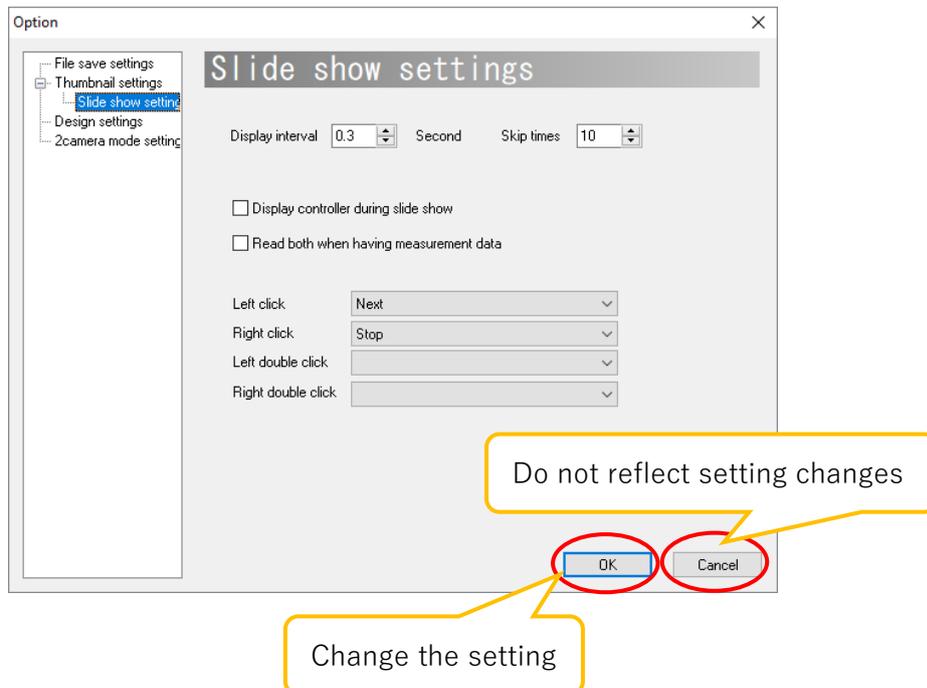
8.3. Slide show settings

Settings of slide show can be set from the slide show settings screen. The procedure for displaying the slide show settings screen is as follows.

1. Click  Software settings from "Settings" on the menu.
2. Click "Slide show Settings" from the tree on the left side of the screen.



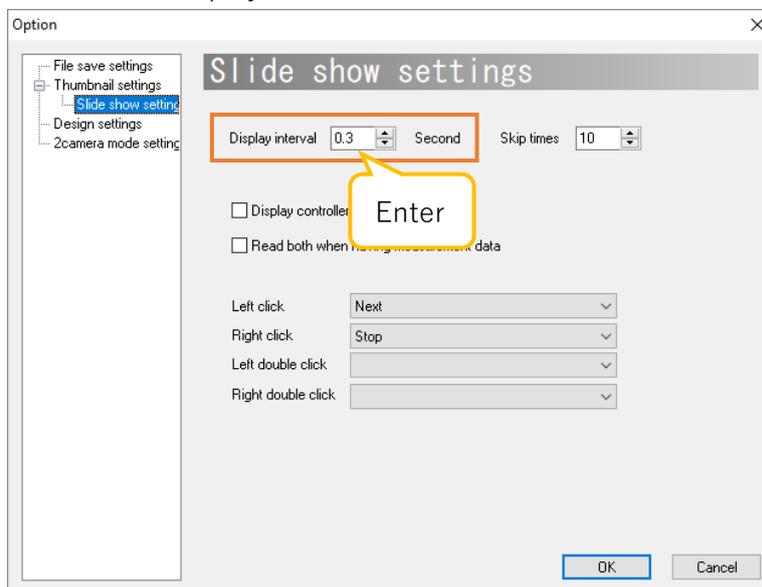
3. The slideshow settings screen is displayed.
To reflect the changes in the settings, click "OK" after setting each item.
If you do not want to change the setting, click "Cancel".



Set the slide show display interval

You can set the image display interval when displaying a slide show.

Enter the display interval to the "Display interval" field.

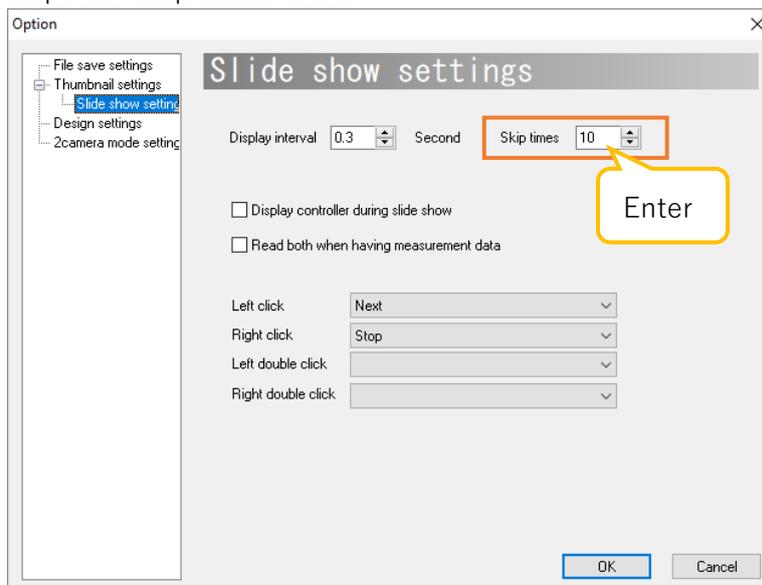


The display interval can be set from 0~1000 seconds by intervals of 0.1 second

Set the number of skips on slideshow

When displaying the slideshow, you can set the number of skips of images by pressing forward / reverse.

Enter the number of skips on "Skip times" field.



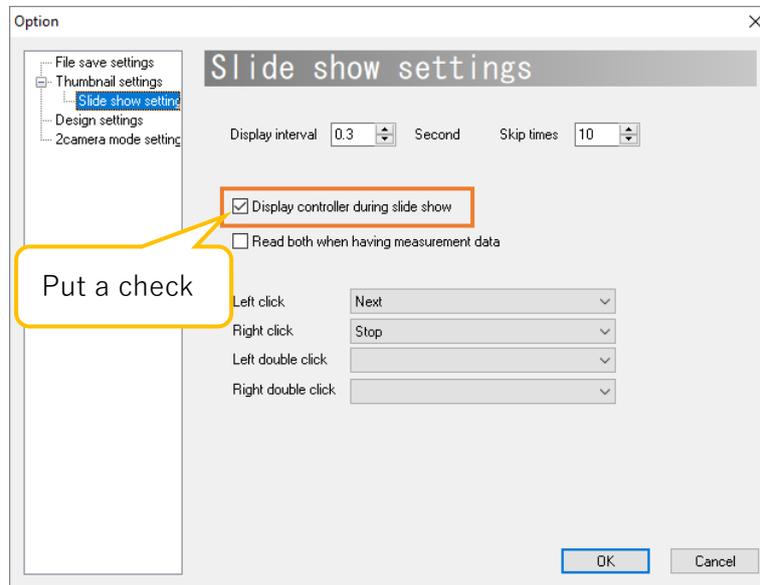
The number of skips can be set in the range of 0 to 1000.

Display the controller during slideshow

You can display or hide the controller (as below) during the slideshow.



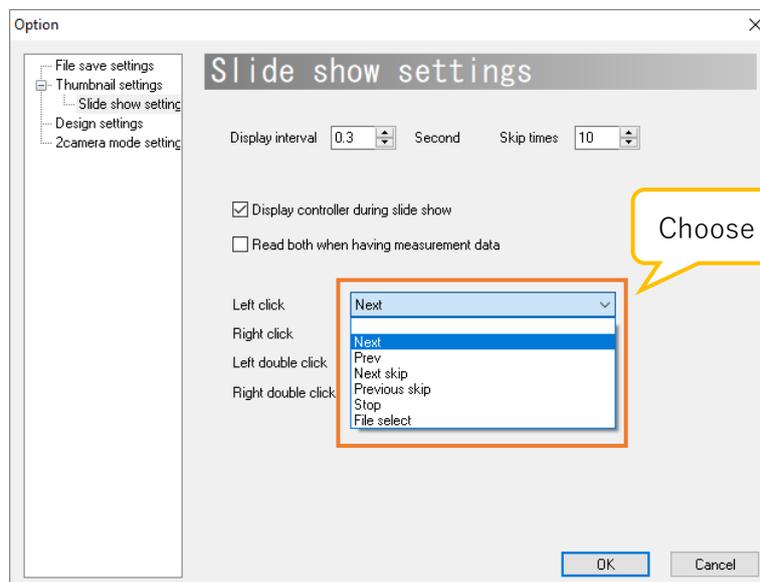
Please select "Display controller during slide show".



Set mouse operation during slideshow

Mouse settings can be changed when you use the mouse on the slide show display screen.

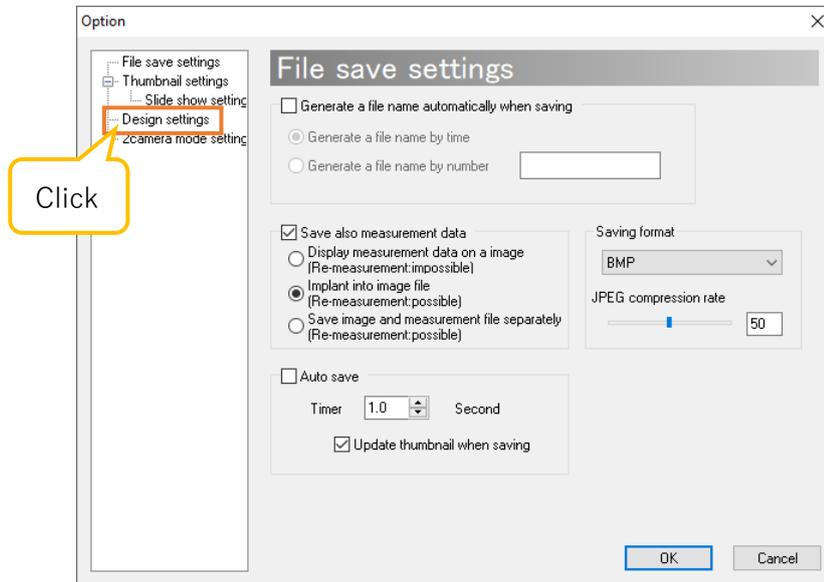
Please set the operation for each item of "left click", "right click", "left double click", and "right double click".



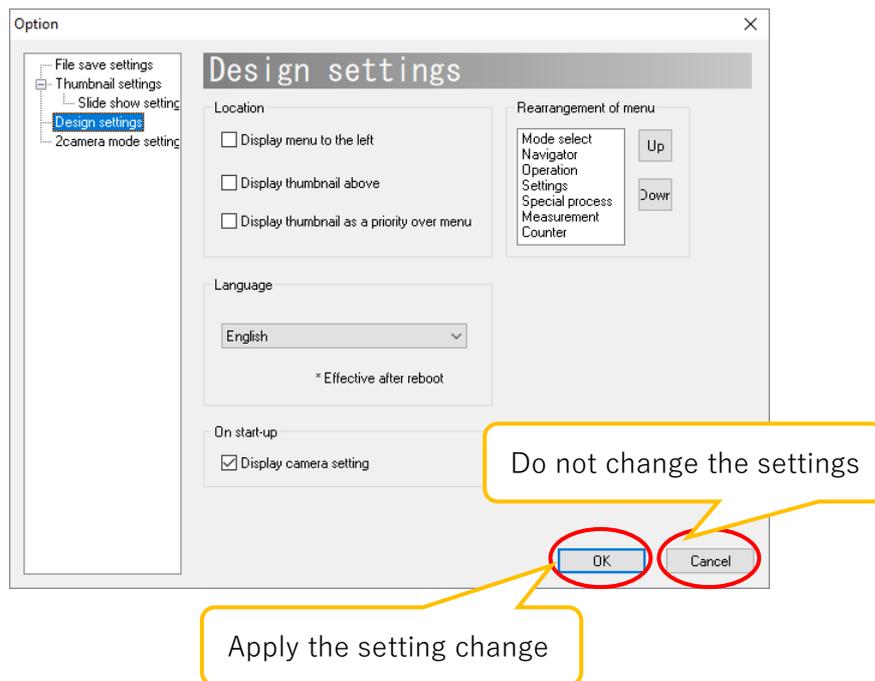
8.4. Design settings

Design settings can be changed from the design settings screen. The procedure for displaying the design settings screen is as follows.

1. Click  Software settings from "Settings" on the menu.
2. Click "Design settings" from the tree on the left side of the screen.

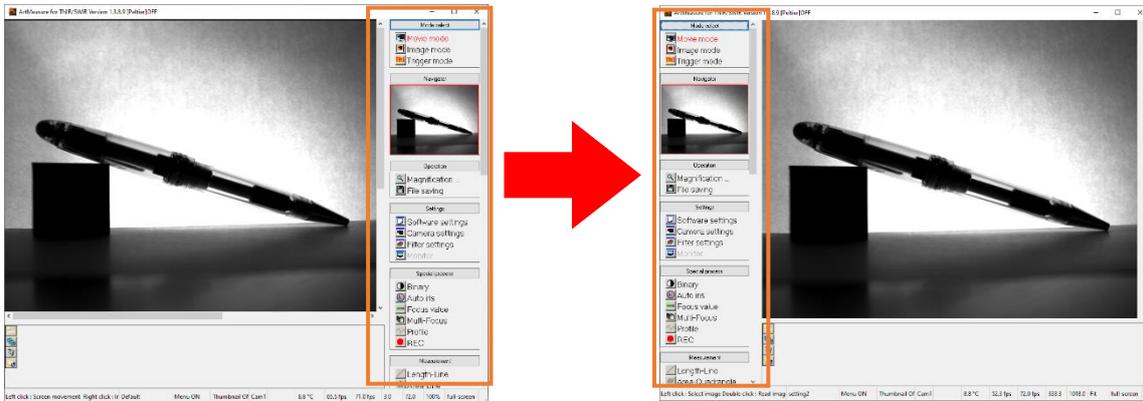


3. The design settings screen is displayed.
To apply the changes on settings, click "OK" after setting each item.
If you do not want to change the setting, click "Cancel".

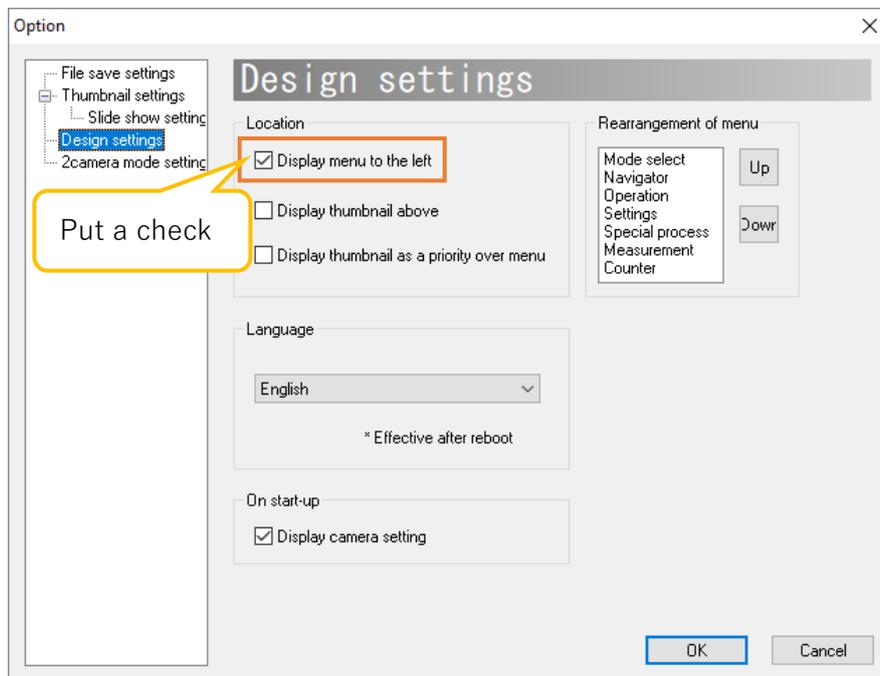


Display menu on the left

The menu is on the right side of the screen by default, but you can place it on the left side.

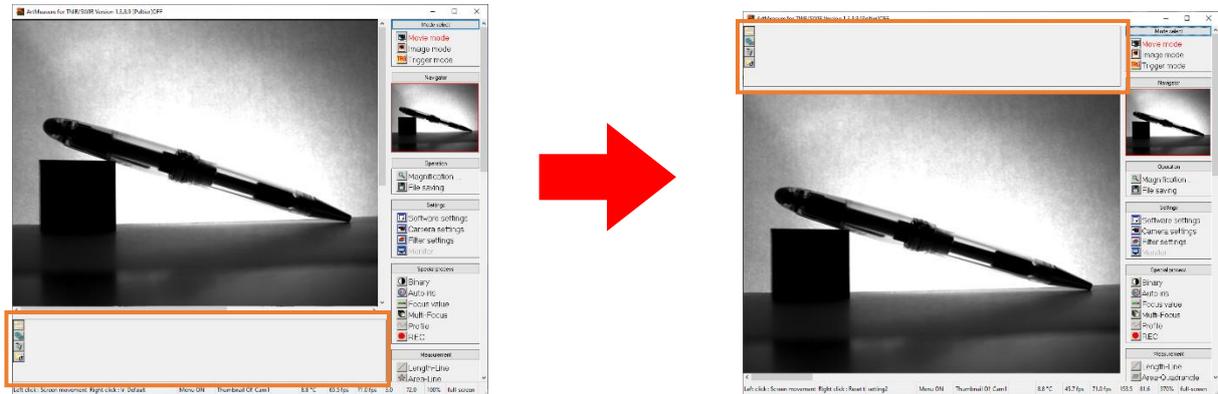


Please select "Display menu to the left".

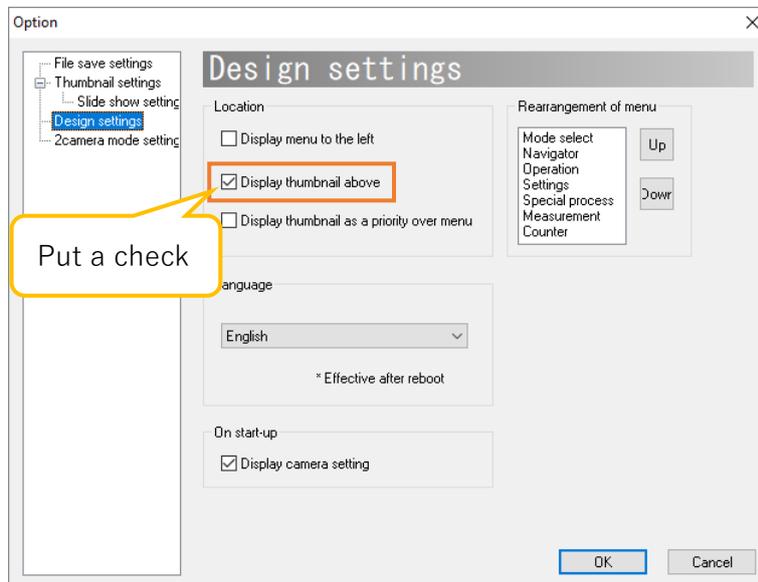


Display thumbnails above

Thumbnails are at the bottom of the screen by default, but you can place them to the top.

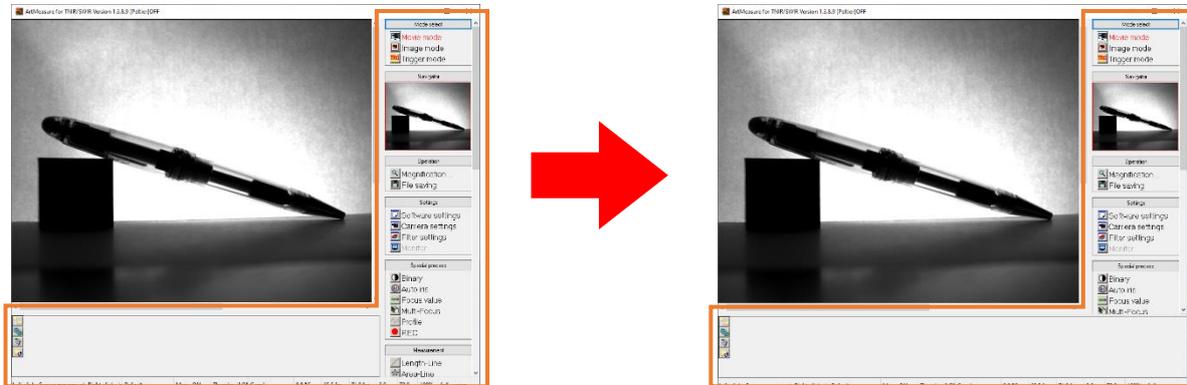


Please select "Display thumbnails above".

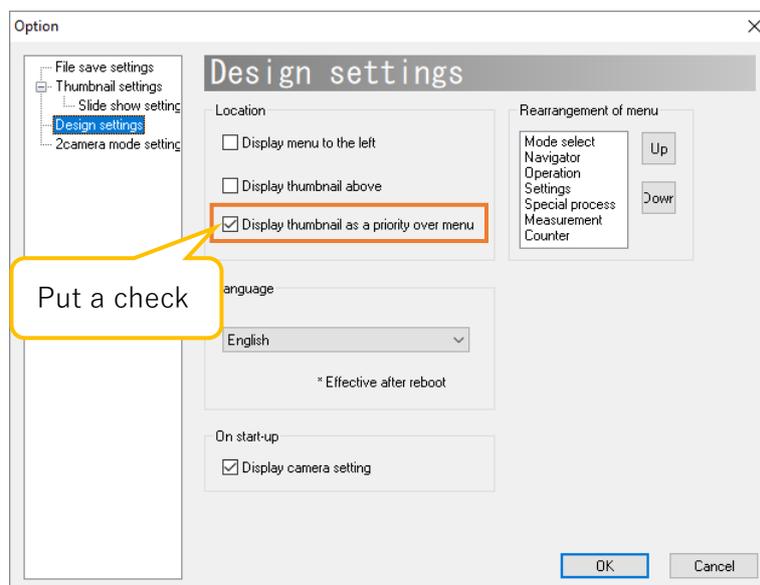


Display thumbnail as a priority over menu

The menu is the top layer on the Viewer Software window by default, but thumbnails can fill the width of the software.

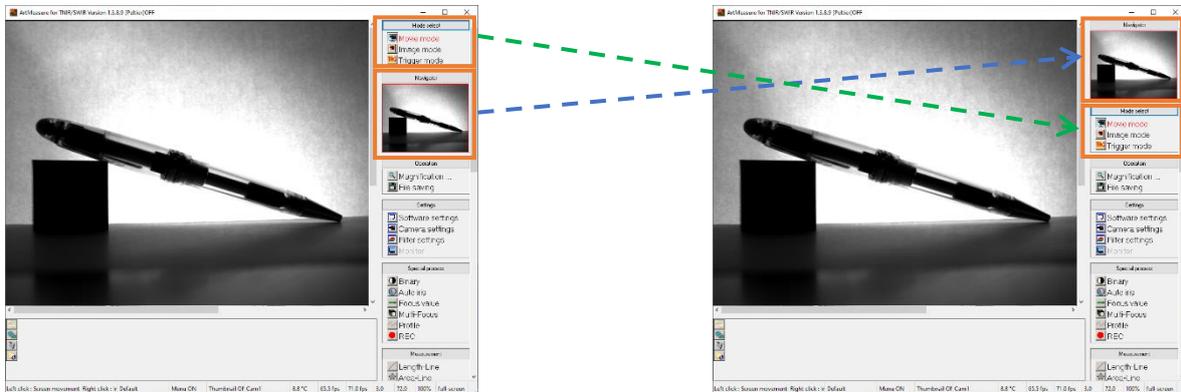


Please select "Display thumbnail as a priority over menu".

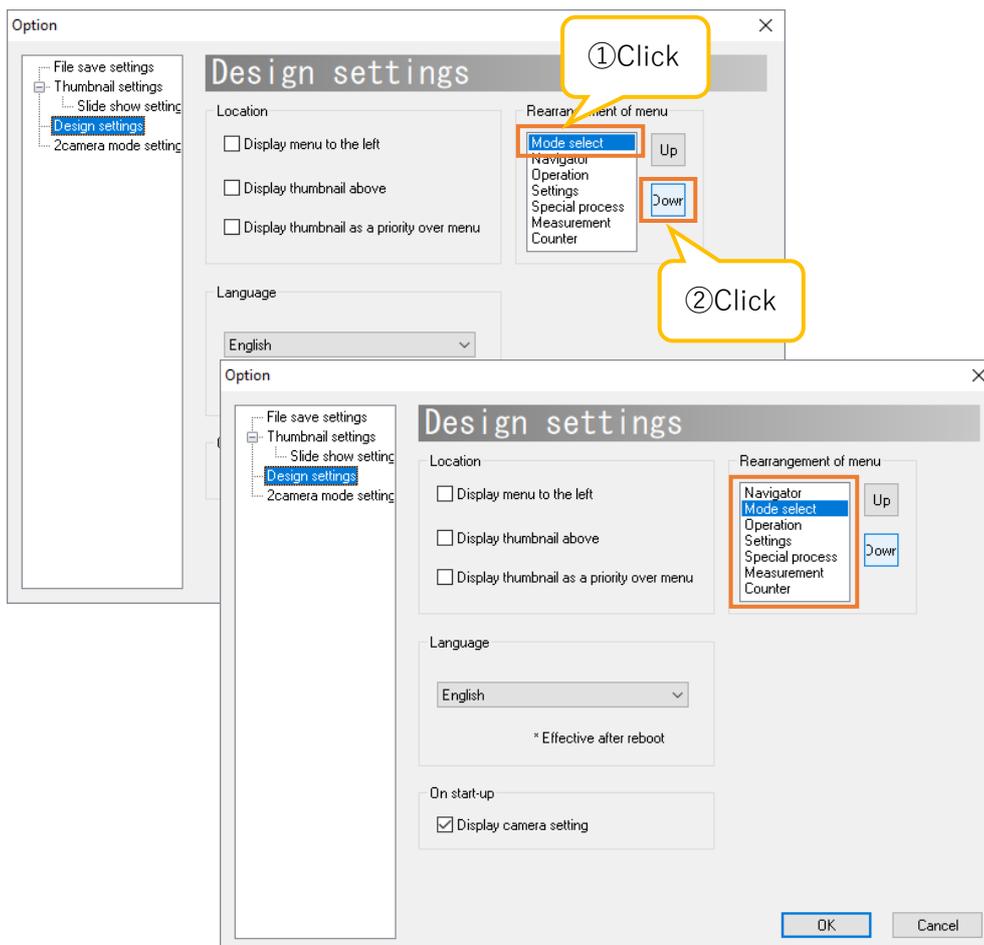


Menu Rearrangement

You can change the order of the menus. The following is an example of moving the “Mode select” downwards.

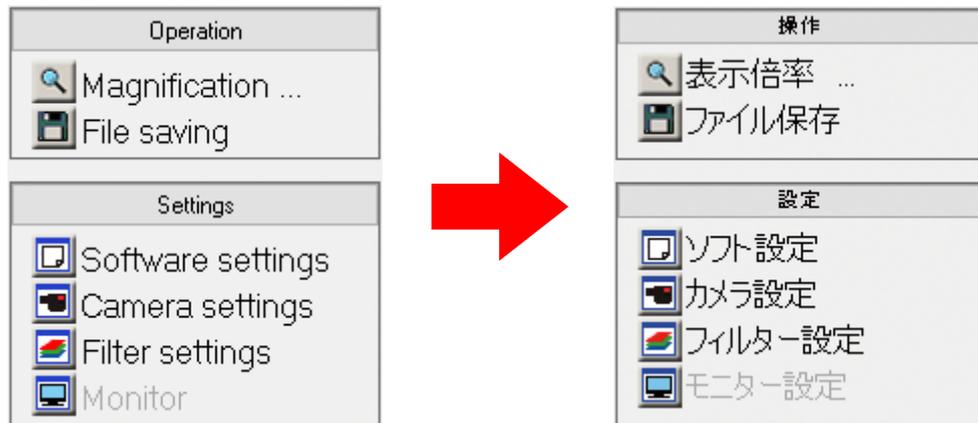


Select the item you want to move from the "Rearrangement of menu" field, and then click the direction you want to move (Up or Down).

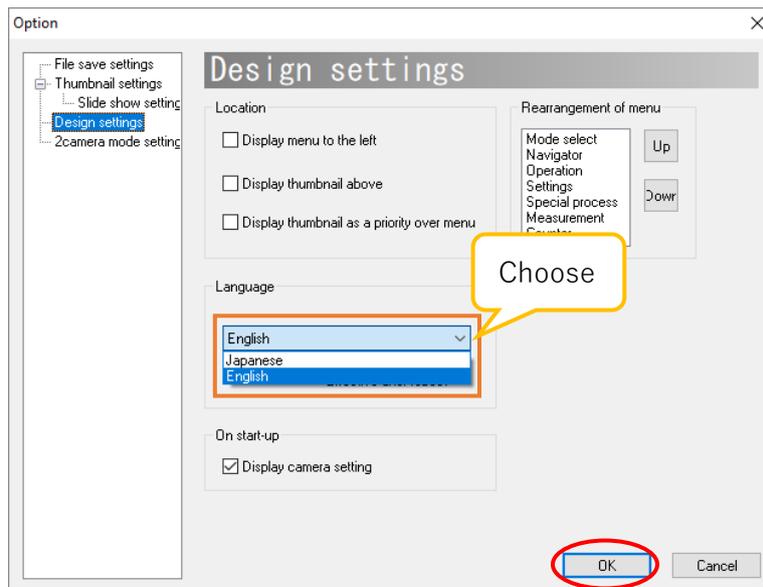


Language settings of software (English/Japanese)

You can switch the language of the software.



From "Language", please select the language you want to set.



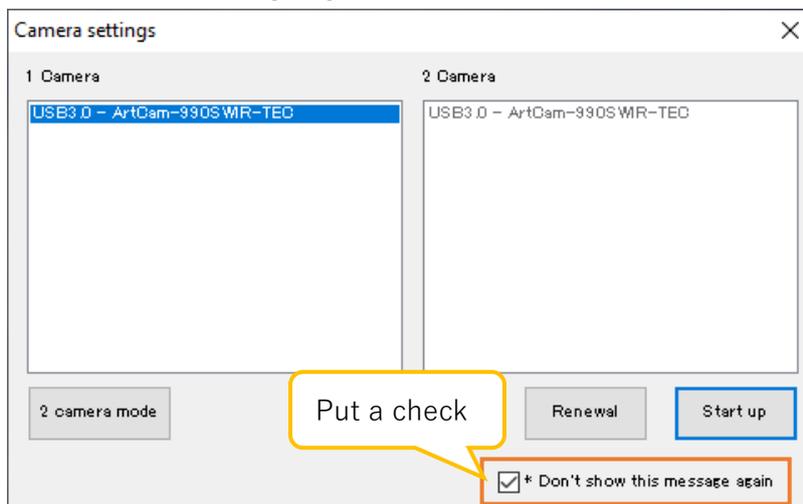
To enable this setting, click OK to close the design settings screen and then restart the software.

Hide the camera settings dialog at startup

By default, the camera settings dialog (as below) is displayed when the software is started, but you can hide it. It can be set from both the camera settings dialog at startup and the design settings screen.

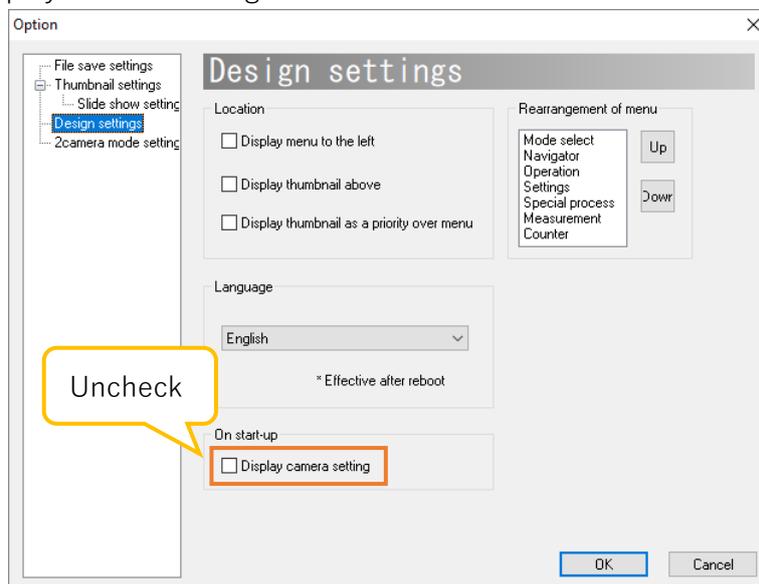
<Set from the camera settings dialog at startup>

Please select "* Don't show this message again".



<Set from the design settings screen>

Please uncheck "Display camera setting".



※Notes

- If the camera settings dialog is not displayed at startup, the same camera which is as same as the camera that you have shut down successfully on the last time will be selected automatically. If you want to connect a camera you have shut down successfully last time, please start the software, and then reselect the camera from "Camera settings" of "Settings" on the menu.

8.5. Filter settings

About filter settings, it can be set from the Simple setting screen and the Detailed setting screen.

The diagram illustrates the navigation process for filter settings. It starts with a 'Settings' menu containing 'Software settings', 'Camera settings', 'Filter settings', and 'Monitor'. A red box highlights 'Filter settings', with a blue arrow labeled 'Right click' pointing to the 'Simple setting screen'. A yellow arrow labeled 'Click' points from 'Filter settings' to the 'Detailed setting screen'. The 'Simple setting screen' shows 'Global gain' at 0 and 'Shutter speed' at 138. The 'Detailed setting screen' is split into two panels: 'InGaAs camera' and 'CMOS camera UV camera'. The 'InGaAs camera' panel includes 'Software filters' (Brightness, Contrast, Sharpness, Gamma), 'Shutter speed' (1.3 ms), 'Global gain' (0), and checkboxes for 'Peltier', 'RAW image', 'Filter compensation', 'Vertical mirror', and 'Horizontal mirror'. The 'CMOS camera UV camera' panel includes 'Software filters', 'Shutter speed' (637), 'Global gain' (0), and checkboxes for 'Vertical mirror' and 'Horizontal mirror'. Both panels feature a histogram and 'Histogram compensation' options (Auto, All frames). A dashed green box encloses the detailed setting screens, with a note below stating: 'CMOS cameras and UV cameras do not have Peltier control and Filter compensation functions.'

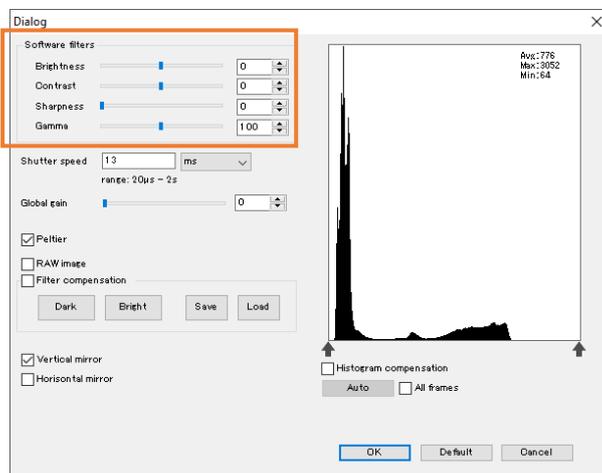
※Notes

- Click “OK” to change the settings set on the detailed setting screen.
- If you do not want to change the settings set on the detailed setting screen, click “Cancel”.
- The display of setting screen will be different depending on different camera model.

Filter

It is possible to apply filters of brightness, contrast, sharpness, and gamma.

Operate the slider control of each item from the detailed setting screen of "Software filters" or enter the value to the edit box.



The standard of Gamma is ($r = 1.00$) when the value is 100.

If sharpness is applied, the frame rate may decrease due to the processing speed.

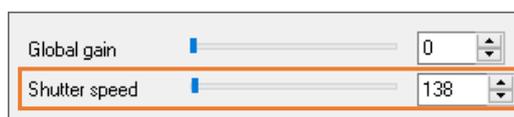
* When setting the software filters, the CPU may be overloaded, and the preview may be delayed.

Setting of shutter speed

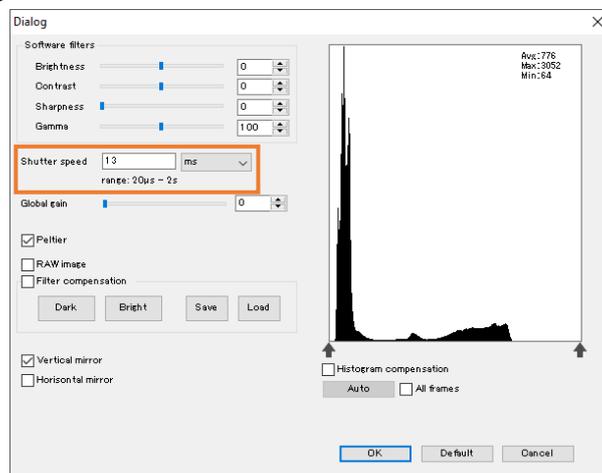
The shutter speed can be set from both the simple setting screen and the detailed setting screen.

Enter a value to the "Shutter speed" edit box.

< Simple setting screen >



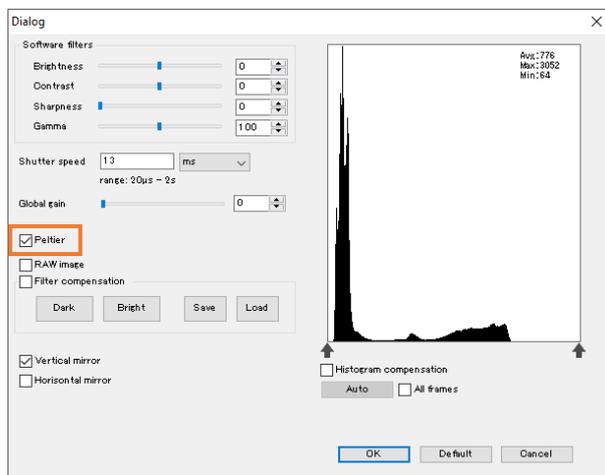
< Detailed setting screen >



Peltier controlling

For models which are compatible with Peltier control, the sensor can be cool down and noise can be reduced by controlling the voltage applied to the Peltier element of sensor.

For compatible models, please refer to “13.1 List of available functions by camera” on page 127.



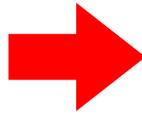
Mask compensation (filter compensation)

Noise can be reduced by applying a compensation mask data.

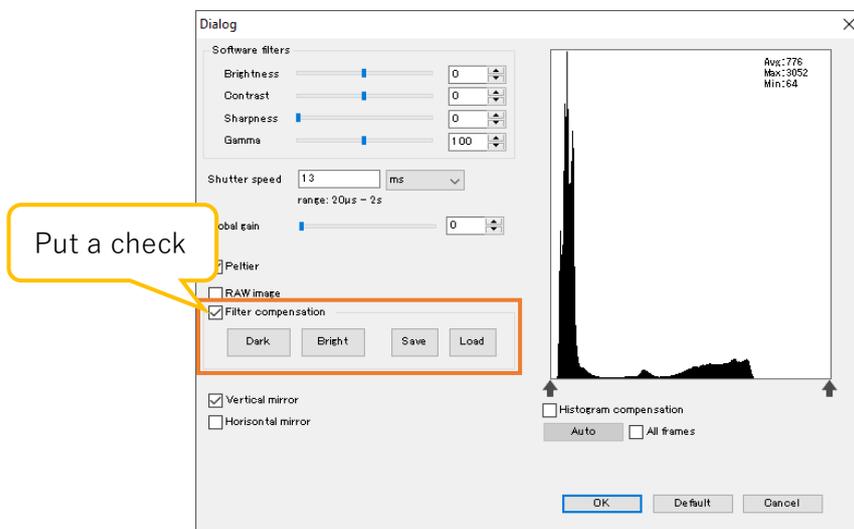
For compatible models, please refer to “13.1 List of available functions by camera” on page 127.



Without mask compensation



With mask compensation



Apply filter compensation

It is possible to apply mask compensation by selecting "Filter compensation" on the detailed setting screen.

* When Art Measure for TNIR / SWIR is installed, the mask data "Default.msk" included will be applied in the meantime.

Create / Save / Load compensation mask data

1. With completely light shielding (with the camera image blacked out), please click "Dark".
2. With the lens cap removed (with the camera image white), click "Bright".
3. Compensation will be applied after selected "Filter compensation".

Click "Save" to save the mask data.

To apply the saved mask data, click "Load" and specify the mask data.

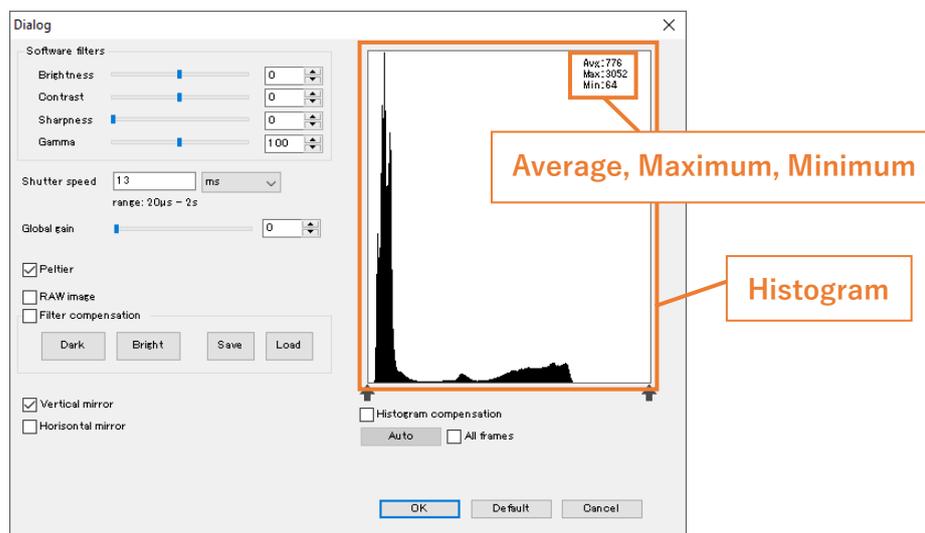
* If you close the software with the saved mask data applied, the mask data will be applied on the next time you start up the software.

* If the newly created compensation mask data is set to "Default.msk", the original compensation mask data will be overwritten. We recommend you rename and save the data.

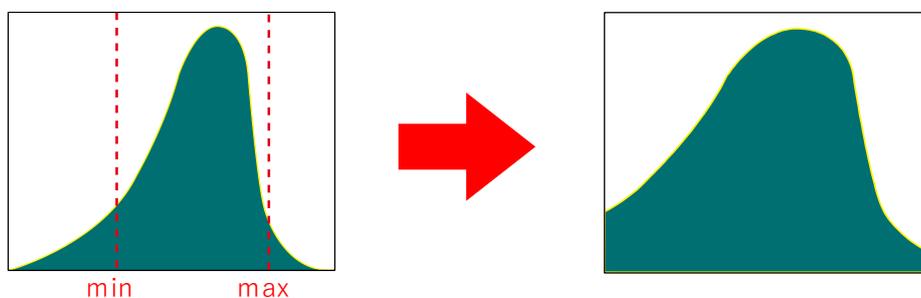
Histogram compensation

About the histogram

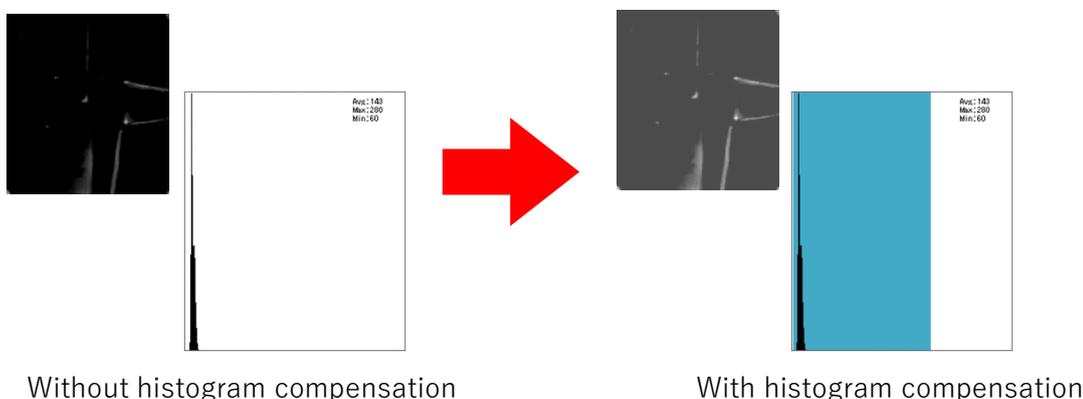
A histogram of the brightness of all pixels on the image is displayed on the filter settings screen. Average, maximum, and minimum brightness values are displayed on the upper right corner of the histogram.



When the color space is 16-bit monochrome, you can extend the brightness in a specific range from 0 to 16 bits by applying histogram compensation. (The actual data length is different depending on each model. Please confirm the A/D resolution from the product manual.)

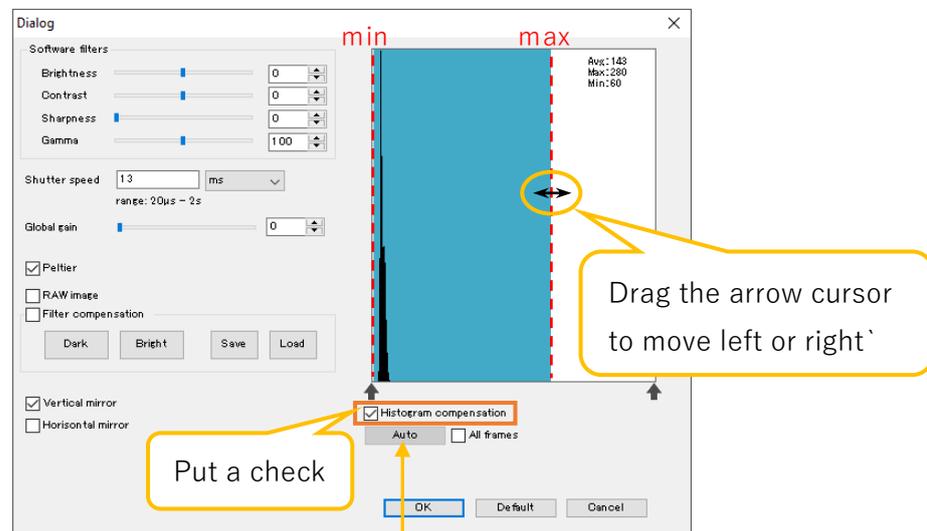


You can improve the contrast of the image by applying histogram compensation.



Apply histogram compensation

If you select "Histogram compensation" on the detailed setting screen, the blue part of background will appear. Move the cursor to  or the background color changing part, and when the cursor shape turns to arrow cross key, please right-click and drag. It is possible to move it left or right. The changing parts of background color will be the highest and the lowest values of the compensation.

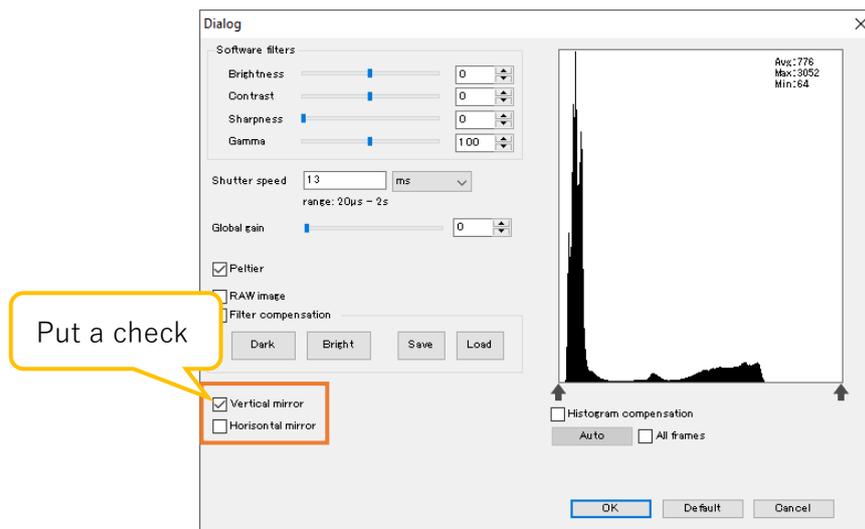


Auto : Auto function

It is a function that always adjusts the width of the histogram compensation to the minimum and maximum brightness in the image.

Invert the mirror

Please select each item of "Vertical mirror" and "Horizontal mirror" on the detailed setting screen.



Some models do not support the "Horizontal mirror" function.

For compatible models, please refer to "13.1 List of available functions by camera" on page 127.

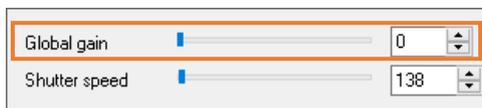
For incompatible models, the selected items are grayed out and cannot be selected.

Setting of global gain

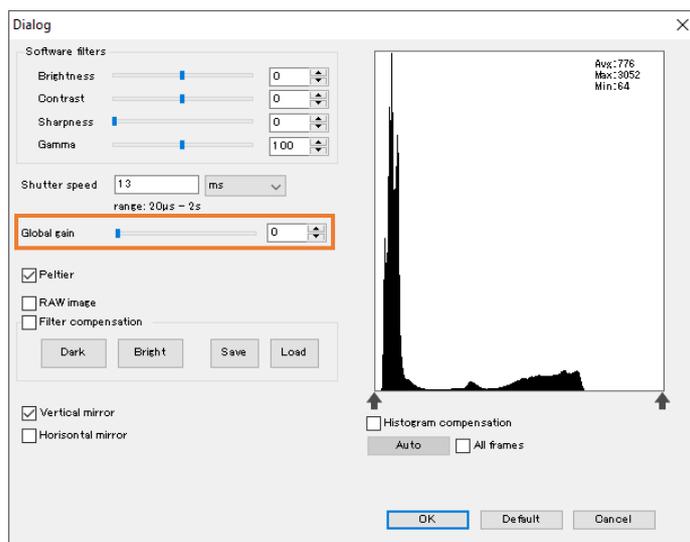
* Global gain can be set only on some cameras.

The global gain can be set from both Simple setting screen and Detailed setting screen. Operate the slider of "Global gain" or enter a value to the edit box.

< Simple setting screen >



< Detailed setting screen >



9. Perform special processing

9.1. Binary

Binarize the image.

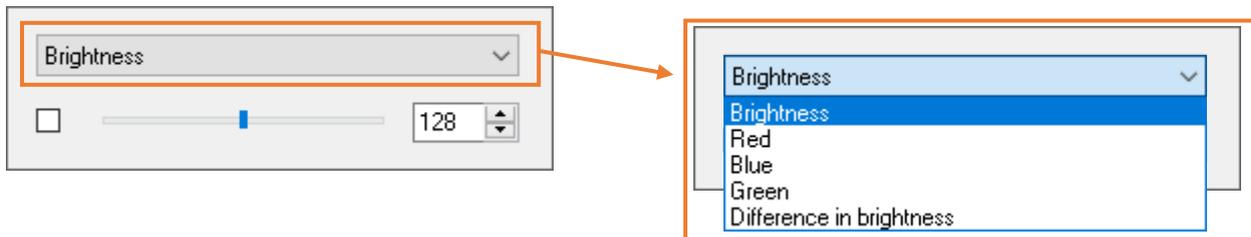


<Automatically binarize>

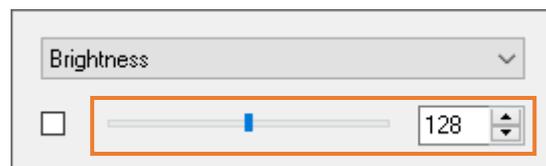
Click  Binary from "Special process" on the menu.

<Set binarization>

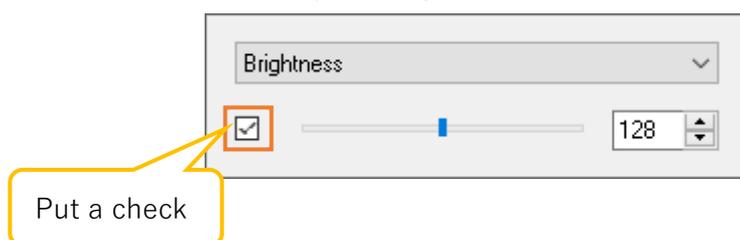
1. Right-click the  Binary from "Special process" on the menu.
2. Select the binarization criteria from the detailed settings screen.



3. Set the binarization threshold from the detailed settings screen. Operate the scroll bar or enter a value on the edit box.

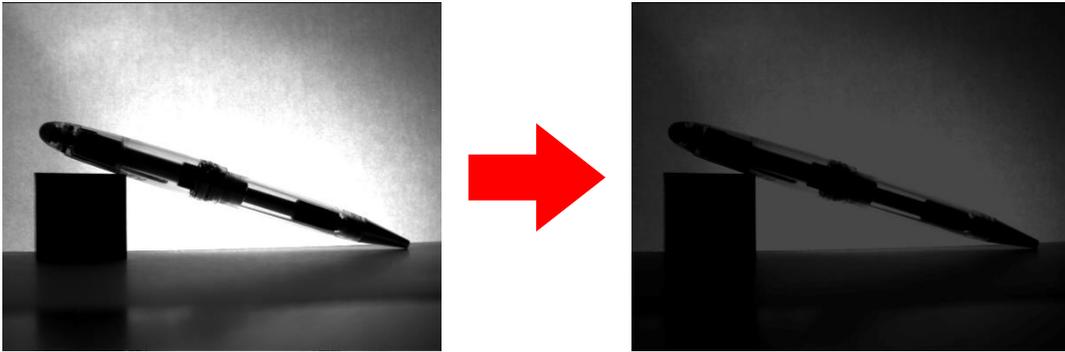


4. Please select the left side of the detailed setting screen, and binary will be performed. You can also turn binarization ON / OFF by clicking the check box on the scroll bar.



9.2. Auto iris

It is possible to set Auto iris.

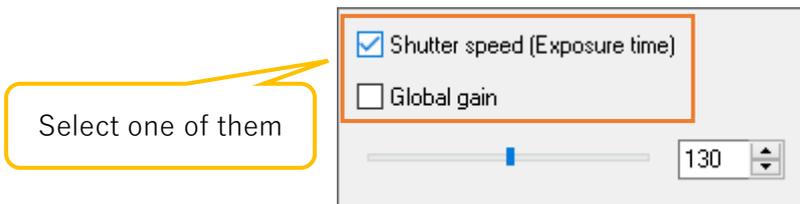


< Set automatically >

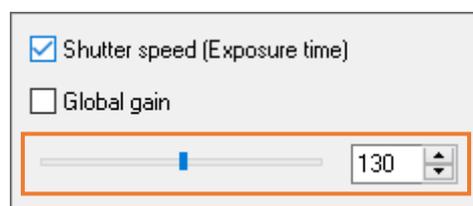
Click  Auto iris from "Special process" on the menu.

< Set the details >

1. Right-click the  Auto iris from "Special process" on the menu.
2. Please select the standard item of Auto iris from the detailed screen settings.



- If you select "Shutter speed (Exposure time)", the global gain will be fixed, and the shutter speed will change.
 - If you select "Global gain", the shutter speed will be fixed, and the global gain will change.
3. Set the threshold from the detailed setting screen. Change the scroll bar or enter a value on the edit box.



9.3. Focus value display

Click  Focus value from "Special process" on the menu. The focus value is displayed as a bar graph.



If it is out of focus, it will be displayed in pink.

To close the focus value display screen, please right-click on the focus value display screen.

Focus value is detected by primary differential calculus with Sobel filter of the image center and showed the areas where the brightness gradient is above a certain level by an edge. The green part from "Focus value" is the sum of the edge, the pink part shows the maximum value of the green part. Therefore, when adjusting the focus within the same view, the focus should be adjusted with the green part overlaps the pink part.

9.4. Multi-Focus

Merge two images with different focal points into one.

When using multi-focus function, please set it to 8-bit monochrome.



Image in focus in the background

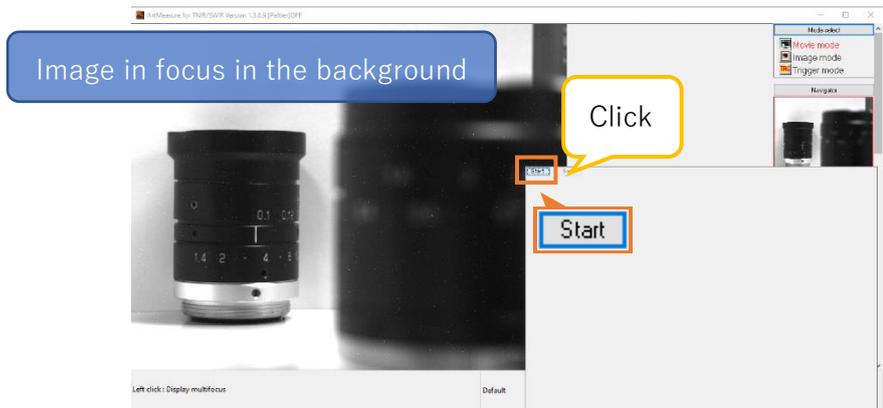


Image in focus in the foreground



Merge images that are both in focus in the background and foreground

1. Click  Multi-Focus from "Special process" on the menu.
2. When the merged image displayed on the screen, click "Start" on the multi-focus screen.



3. Click "Start" again with the merged image displayed on the screen.

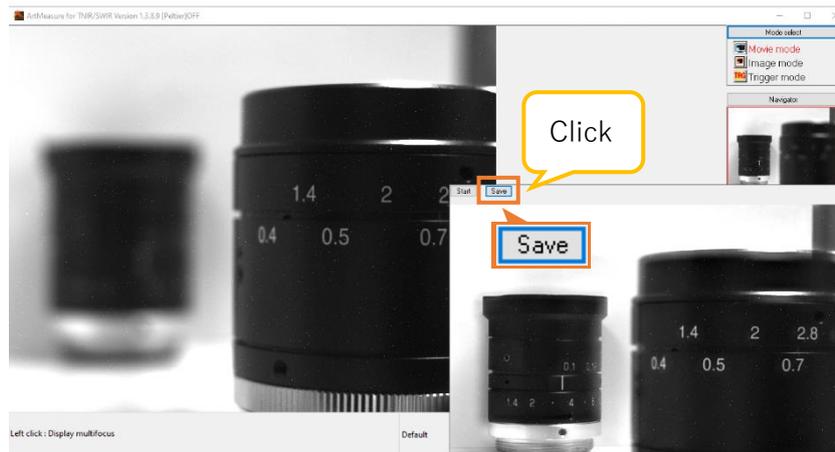


4. The image has been merged.

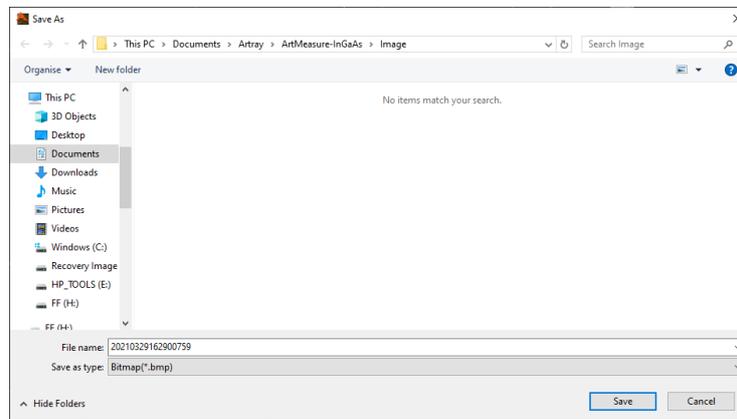


Each time you click "Start", the image will be merged.

5. Click Save button to save the merged image.



The file save dialog will be displayed, please specify the saving file name and location.



6. To close the multi-focus screen, please right-click on the multi-focus screen.

※Notes

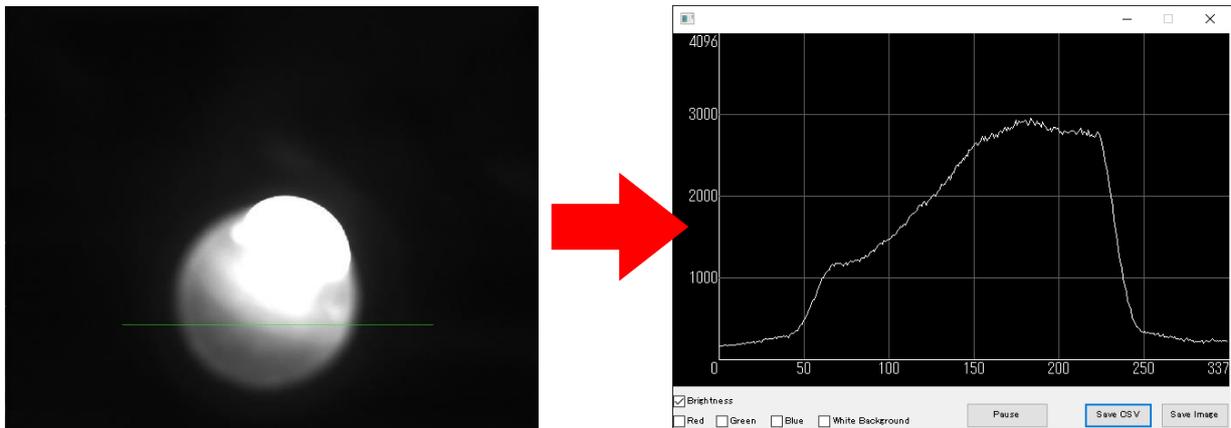
- Depending on the number of pixels and the specifications of the PC, the merging may take some time. While the word "Start" is gray, the merging is in progress. Therefore, please do not close the multi-focus screen.
- If the multi-focus screen is closed during the merging process, you will not be able to perform other operations such as clicking the menu. This is because the composition process is still in progress. When the merging is completed, you will be able to operate again. Therefore, please wait it finished.

9.5. Profile

Displays the profile on the specified line as a graph.

< Measure profile >

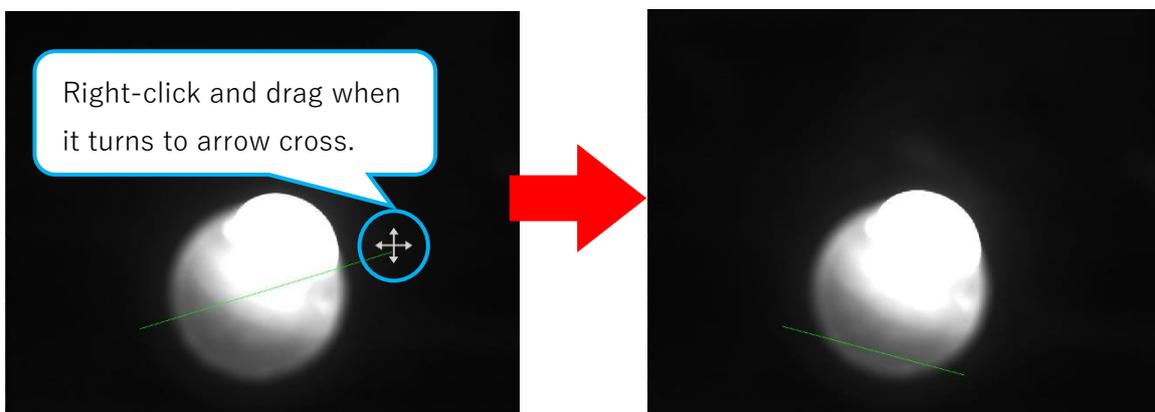
1. Click  Profile from "Special process" on the menu.
2. Click the start and end points where you want to display the profile in the image. A green line will appear, and the profile window will be opened. Profile data such as brightness is drawn as a graph in real time.



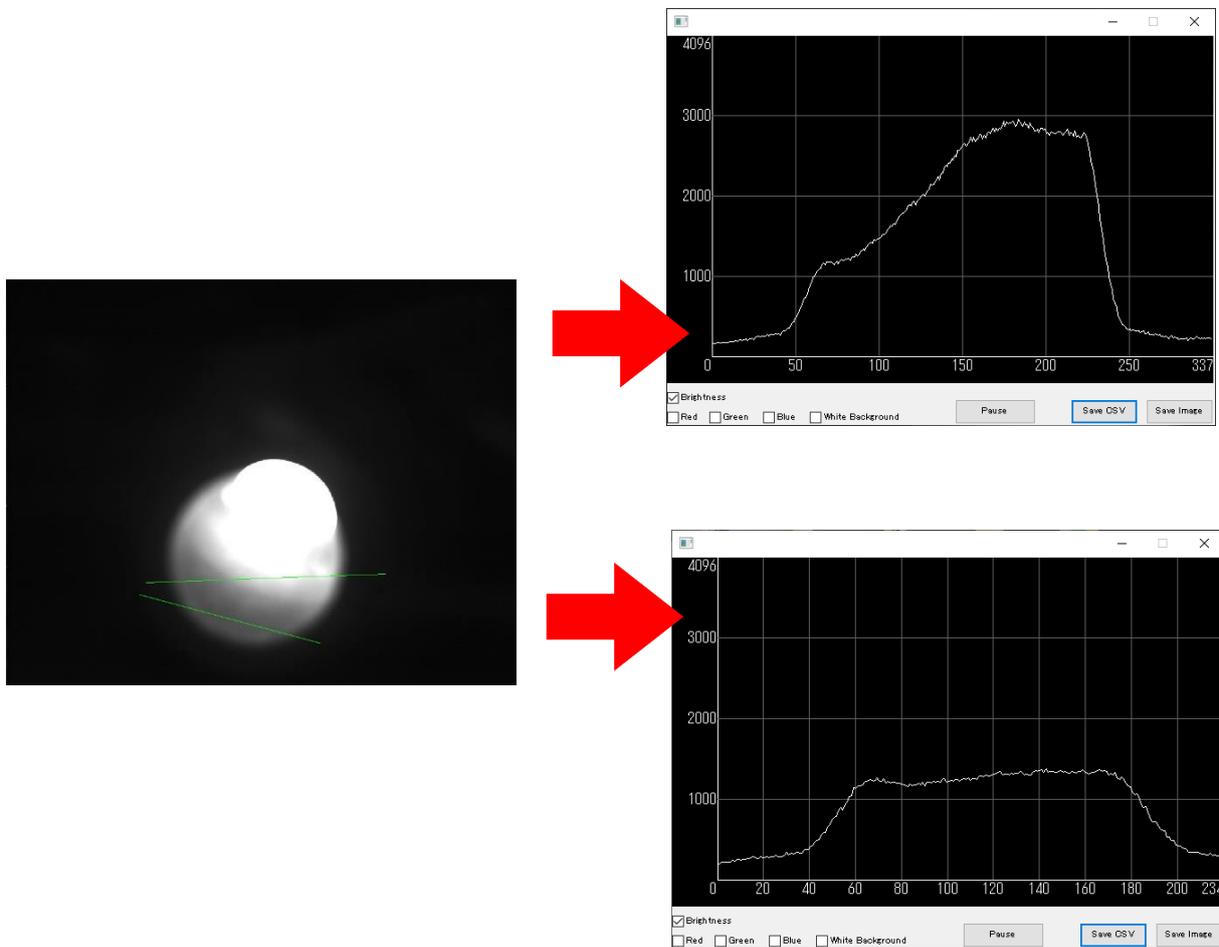
3. The line disappears once you close the profile window.

< Change / addition of measurement points >

1. Place the mouse cursor at the end of the line, and when the cursor shape turns to arrow cross key, right-click and drag. You can now change the length and position of the line.

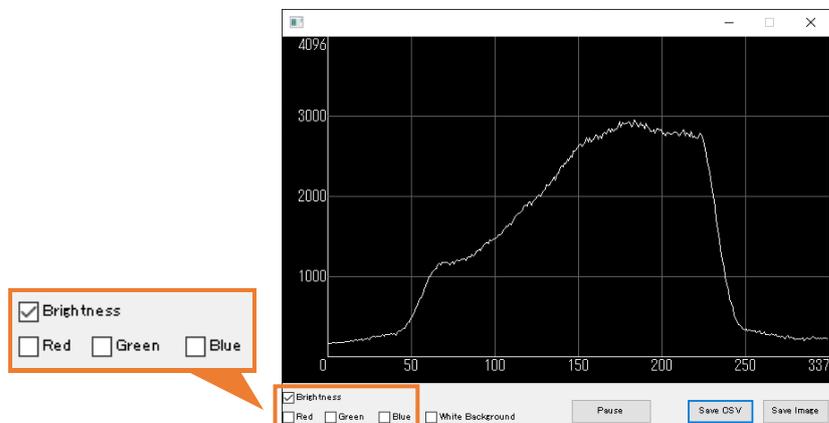


- You can set multiple lines each time you click  Profile .
(The profile window will be opened in another window)

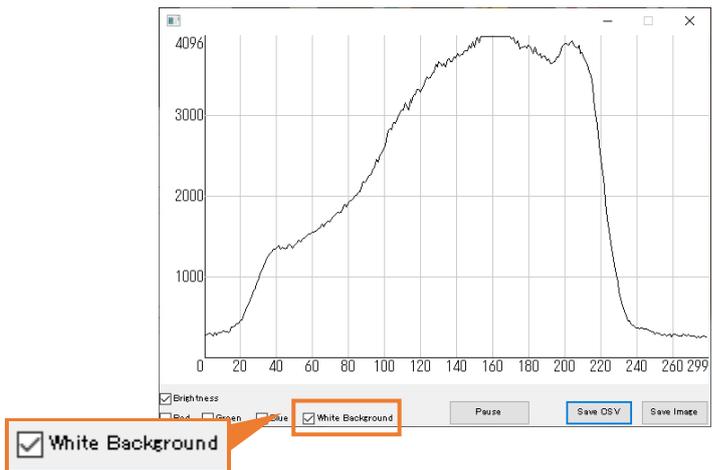


< Profile window settings >

- By selecting the brightness, red, green, and blue at the bottom left of the profile window, the corresponding brightness and RGB values will be displayed as a graph.



2. Please select White background to switch the graph background to white color.



3. Click Pause button to stop the graph at that point. (The video will not be stopped)
Click the Pause button again to resume drawing the graph.

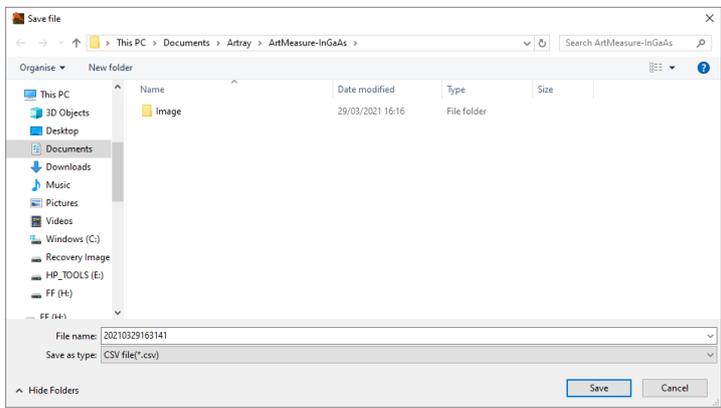


< Data storage >

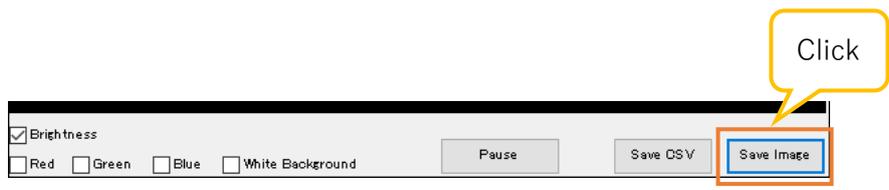
1. Click “Save CSV” to save the current profile values in CSV format.



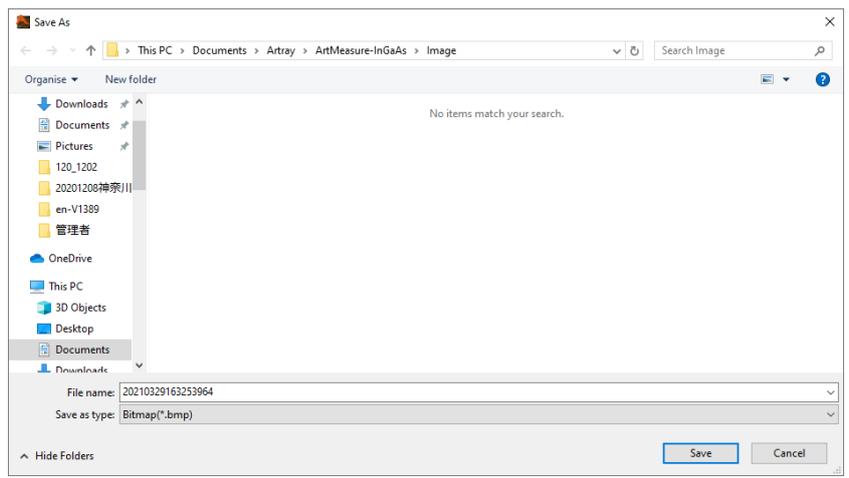
The file save dialog will be displayed, please specify the file name and saving location.



2. Click Save Image button to save the current graph as an image.

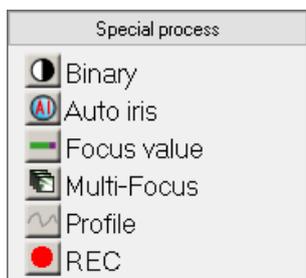


The file saving dialog will be displayed. Please specify the file name and location to save the data. (File format can be selected as bitmap (.bmp), JPEG (.jpg), TIFF (.tif), PNG (.png))



< Recording >

The image can be saved as AVI format.



1. Click  REC from "Special process" in the menu to start recording.
2. Click  REC again to stop recording

The saved AVI file will be saved in the folder specified as an auto-save location. The file will be named as the saving date and time.

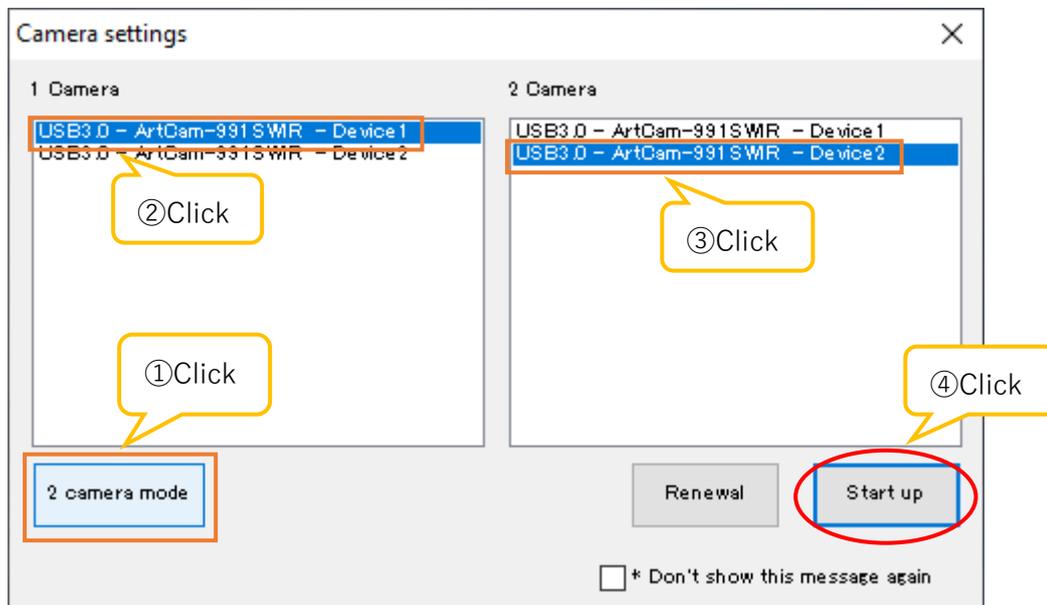
10. Special use cases

10.1. 2 camera mode

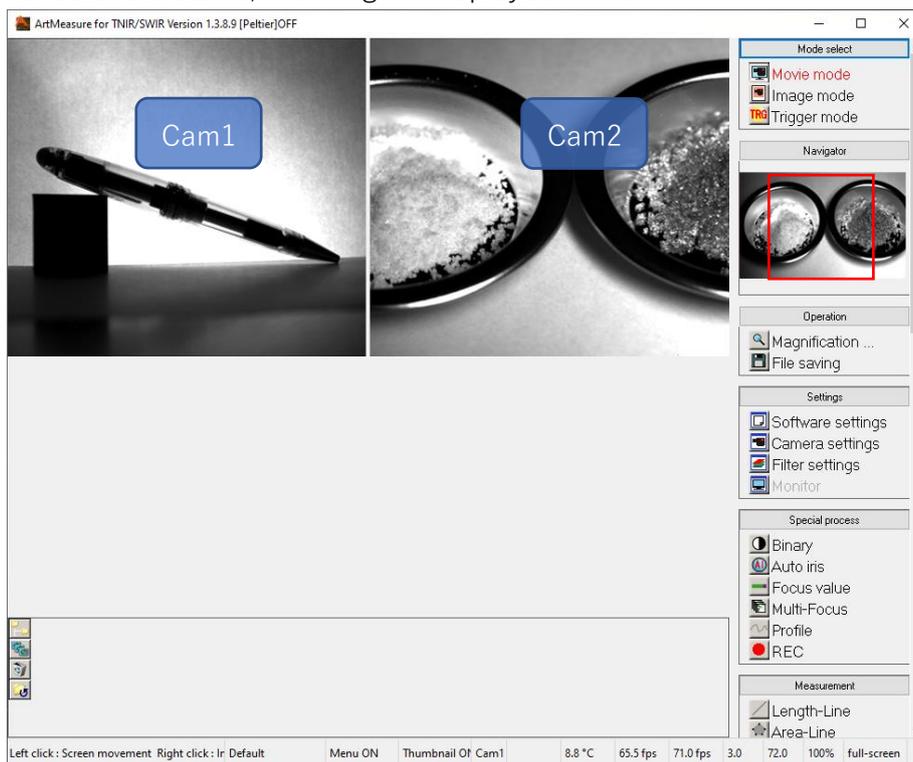
It can use 2 Camera mode by using 2 units of the same model simultaneously. Please note that there is no synchronization between the 2 cameras.

Launching viewer software and projecting images

1. Connect the camera to the PC.
Please make sure that lenses are attached properly and connect the two cameras to the USB ports of your PC. Please connect two same model of cameras to the PC.
2. Start the viewer software.
The startup process is same as 1 camera mode. For the details, please refer to "4.1. Start-up / Display" on page 16.
3. Select the camera model to start-up.
Click "2 camera mode", select "Device 1" and "Device 2" from "1 camera" and "2 camera" on the Camera settings dialog box, and then click "Startup".



4. As the viewer software starts, the image is displayed in Movie mode.



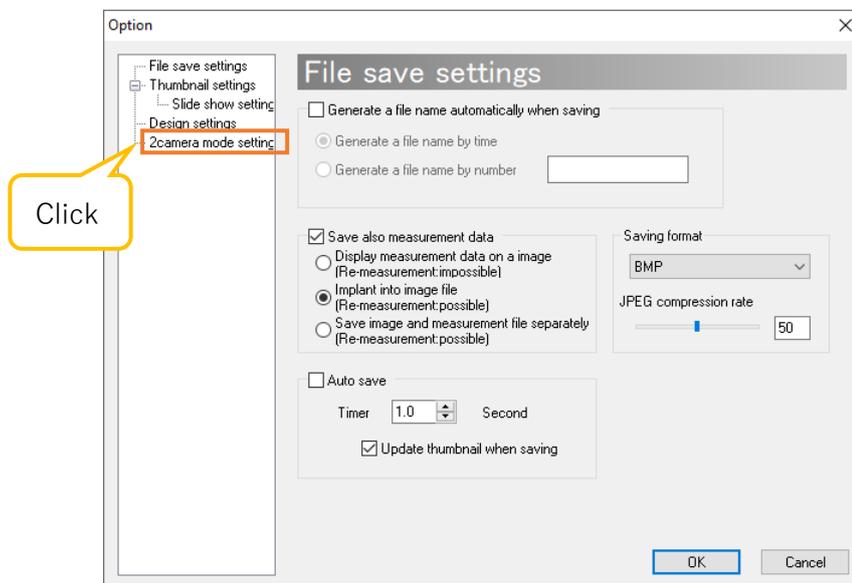
※Notes

- If the function is not linked up to both cameras, the operation will be reflected on the selected camera.
- The images from the **selected** camera are shown on Navigator of the menu.
- To switch the selected camera, please click on the display screen of the camera which you would like to switch to.

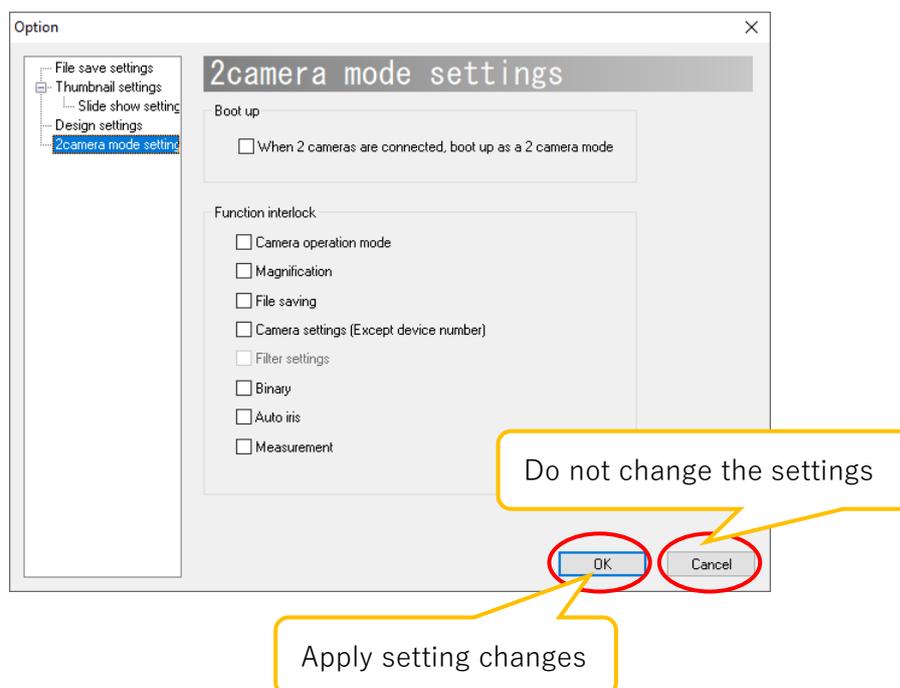
Settings of 2 camera mode

Settings of 2 camera mode can be set from 2 Camera mode settings screen. The procedure for displaying the 2 camera mode settings screen is as follows.

1. Click  Software settings from "Settings" of the menu.
2. Click "2 camera mode settings" on the left side of the screen.



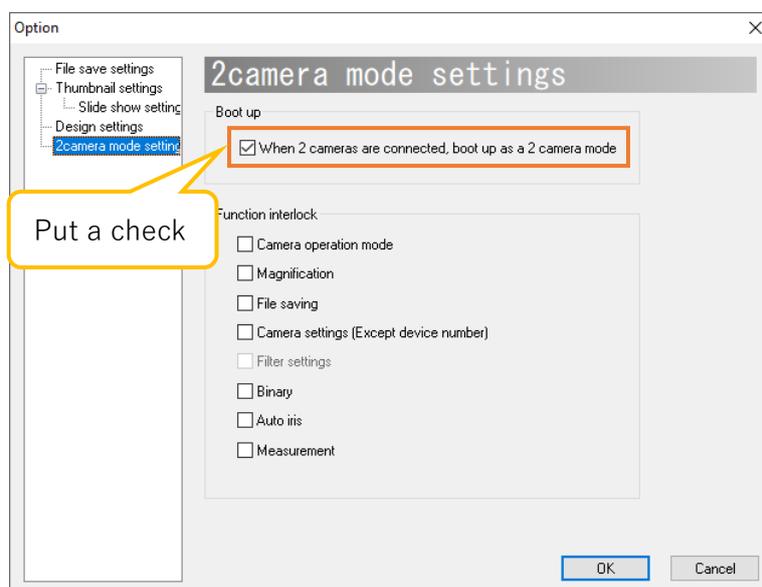
1. 2 camera mode settings screen is displayed.
To apply the changes on settings, click "OK" after setting each item.
If you do not want to change the settings, click "Cancel".



Automatically start the software with 2 camera mode

When the software started, it is possible to start 2 camera mode automatically without displaying Camera Settings dialog box

1. Set Camera Settings dialog to be hidden when starting.
For the details, please refer to “Hide the camera settings dialog at startup” on page 100.
2. On the 2 camera mode setting screen, please select "When 2 cameras are connected, boot up as a 2 camera mode".



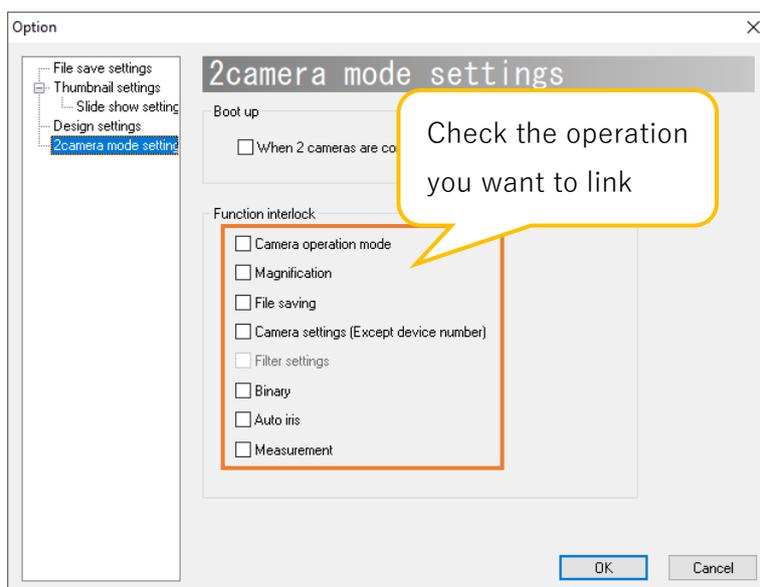
※Notes

- If 2 camera mode is started automatically, please connect two cameras of the same model with a PC at startup.
- If 2 camera mode is started automatically, and only one camera is connected, or if you start the software with two different models connected, one device will be accessed at the same time, and the OS may shut down abnormally.

Interlock functions between two cameras

In the 2 camera mode, the functions of two cameras are not interlocked by default setting, and all operation can be set individually. The users can interlock two cameras for particular operation.

Please check the operation you want to link from "Function interlock" on the 2 camera mode settings screen.



※Notes

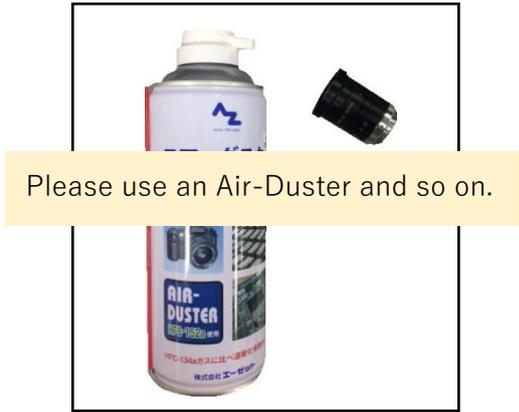
- If an interlock for "Save File" is set but the names of the saving files are not set to be generated automatically, images will show in save dialog boxes in the order of camera 1 and camera 2.
- Interlock for Filter Settings is not available with the current version.

11. Precautions for use

11.1. Removal of dust and dirt on the sensor

When you equip or move the lens from the camera, the sensor may get dust or dirt. To clean the sensor, please follow the instructions below.

1. The dust may on the lens side.
Remove dust by using Air-Duster and so on.



2. If there is dust on the camera side, please use a cotton swab with "anhydrous ethanol (anhydrous alcohol)" and lightly wipe the sensor from the center to the outside edge. Depending on the quality of the cotton swabs, the cotton fibers may shed. Recommended cotton swab: Made by Johnson & Johnson Co., Ltd.

If you remove the dust with an air duster, the dust may move to the back of the camera, so please remove it with a cotton swab instead of air duster.



11.2. About the use of other USB devices

The connection of the camera to the PC may not operate normally if you are using another USB devices (e.g. external hard disk or USB memories etc.) except mouse or keyboard if you are using the camera on the same time. In this case, please adopt USB port extenders (e.g. PCI, PCIMCIA) to connect other USB devices.

11.3. Software cannot be installed/ No image is displayed

Since the USB camera operates at high speed, the camera may not operate normally on a PC that an Intel USB chipset does not be equipped. In that case, please contact ARTRAY Sales Department.

If an Intel USB chipset is equipped on the PC, you will see the following example shows the "Universal Serial Bus Controllers" of Device Manager.

How to show: Right-click the start button → click "Device Manager"

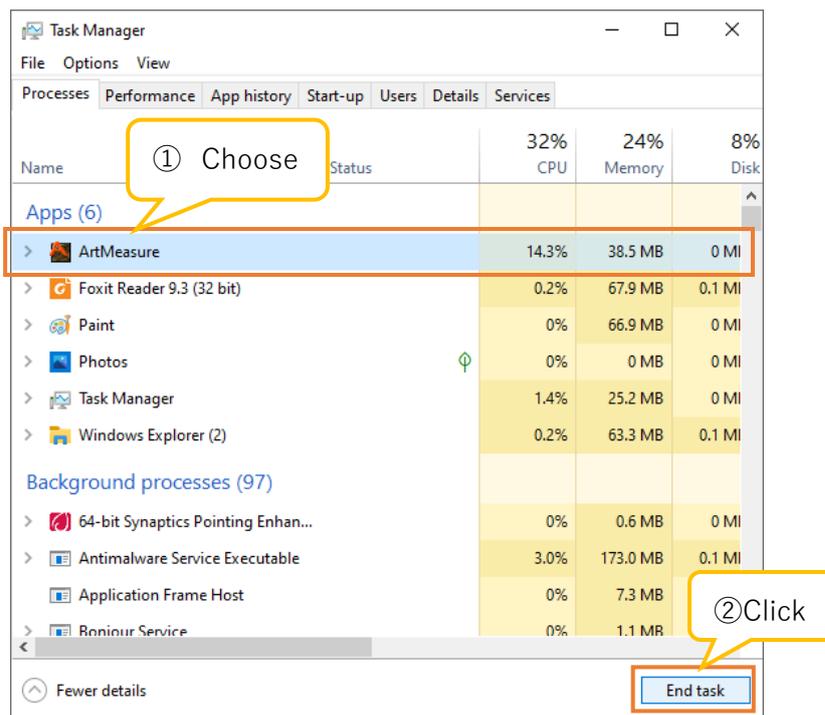


12. When in trouble

12.1. Software does not start

If you follow the instructions "4.1. Start-up / Image projection" on page 16 but still encounter the problems of starting the Viewer Software, please follow the instructions below.

1. Start the software with the camera and PC not connected.
 - If the software starts, go to step 2.
 - If the software does not start, go to 3.
2. When the software starts, please select the camera model from the Camera settings. For the procedure for displaying the Camera settings screen, please refer to "5.2. Camera settings" on page 23.
 - ① If Total Pixels < Effective Origination + Effective Pixels, please reset the values of total pixels and effective pixels.
 - ② Please select "OK" on Camera settings screen and then click  **Movie mode** to check if the image is displayed correctly.
 - ③ If you cannot switch to the Movie mode by clicking on  **Movie mode**, please close the software and restart the OS system.
3. If the software does not start, please right-click on the taskbar and select Task Manager.
 - ① "Task Manager" will start. Please select "ArtMeasure.exe" in the display field of the "Processes" tab and click "End task".



- ② If "ArtMeasure.exe" disappears from the list of the "Processes" tab of "Task Manager", please restart the software.
- ③ If "ArtMeasure.exe" is found from the list of the "Processes" tab on "Task Manager", please restart Windows.

If the software still cannot start after performing the above operations, please contact the support center. For contact information, see "14. Support" on page 128.

12.2. No image is displayed

If there is no image displayed on the viewer software, please check the following points.

1. Lens
Make sure that the lens cap is removed. If the cap is still attached, images will not be displayed. Please open the aperture of the lens. If the aperture is dark, images may not be displayed.
2. Device Recognition (for USB2.0 / USB3.0 cameras).
Please open Device Manager and make sure the camera is recognized correctly by the system. For the confirmation method, see "2.2. Confirming whether the camera is recognized by the PC" on page 13. If the camera is not recognized, please confirm if the camera is connected to your PC or not. If the camera is connected but cannot be recognized by the PC, please unplug the USB cable and power adapter, and plug in again.
3. Display mode
Please confirm if "Display mode" in the software menu is set to Movie mode. If you are in another mode, please click  Movie mode .
If you cannot switch to the Movie mode by clicking  Movie mode , please close the software and restart Windows.
4. Camera Settings
Please confirm if the connected camera is selected on the Camera Settings dialog box. For the details, please refer to "Change the model of the connected camera" on page 24.
5. Shutter speed
Please confirm if Shutter speed is not at an extremely low. For the details of adjustments, please refer to "Setting of shutter speed" on page 102.

If the problem still cannot be solved after performing the above 5 operations, please contact the support center. For contact information, please refer to "14. Supports" on page 128.

13. References

13.1. List of available functions by camera

Model Name	Trigger	Peltier	Filter compensation	ROI	Sub-sampling	Histogram compensation	Horizontal mirror
InGaAs camera							
ARTCAM-990SWIR-TEC	✓	✓	-	✓	1/2 Mode	✓	✓
ARTCAM-990SWIR	✓	-	-	✓	1/2 Mode	✓	✓
ARTCAM-130SWIR	✓	-	✓	✓	-	✓	-
ARTCAM-991SWIR-TEC	✓	✓	-	✓	1/2 Mode	✓	✓
ARTCAM-991SWIR	✓	-	-	✓	1/2 Mode	✓	✓
ARTCAM-991SWIR-WOM	✓	-	-	✓	1/2 Mode	✓	✓
ARTCAM-131TNIR-TEC	-	✓	✓	-	-	✓	-
ARTCAM-131TNIR	✓	-	✓	-	-	✓	-
ARTCAM-032TNIR	✓	-	-	-	-	✓	-
ARTCAM-031TNIR	✓	✓	✓	✓	-	✓	-
ARTCAM-009TNIR	✓	-	-	-	-	✓	-
ARTCAM-008TNIR	✓	✓	✓	✓	-	✓	-
ARTCAM-0016TNIR-TEC	-	✓	-	-	-	✓	-
ARTCAM-0016TNIR	✓	-	-	-	-	✓	-
CMOS camera							
ARTCAM-130XQE-WOM	✓	-	✓	✓	-	✓	-
ARTCAM-092XQE-WOM	✓	-	-	✓	-	✓	-
UV camera							
ARTCAM-2020UV-USB3	✓	-	-	✓	-	✓	-
ARTCAM-130UV-WOM	✓	-	✓	✓	-	✓	-
ARTCAM-092UV-WOM	✓	-	-	✓	-	✓	-

14. Supports

For questions about cameras and software, please contact us at the following:

ARTRAY Co., Ltd. Support Center
1-17-5 Kouenji-kita, Suginami-ku, Tokyo, 166-0002, Japan
Tel+81-3-3389-5488
E-mail : support@artray.co.jp
URL : www.artray.us

ARTRAY NIR Camera • UV Camera
2D Measurement & Filing Software
Art Measure for TNIR/SWIR
Manual

ARTRAY

1-17-5 Koenjikita, Suginami-ku,
Tokyo Ueno Building 4F

TEL : +81-3-3389-5488

FAX : +81-3-3389-5486

www.artray.us