HAS-XViewer

Ver1.4.0.15

Operation Manual

Rev:2.19

DITECT
Digital Image Technology

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1. Introduction

Thank you for using **HAS-XViewer.** Please read this manual carefully and follow the instructions and the precautions for use.

[Notes]

1. If you are planning to use HAS-XViewer for long hours, please refer to the instruction manual of your computer.

2. Please make sure to turn off the sleep mode to prevent recording interruption when using HAS-XViewer.

2. HAS-XViewer Overview

HAS-XViewer is particularly developed for DITECT's high speed cameras for image reviewing, recording, saving, etc.

Software name	HAS-XViewer Camera Memory	
Version	Ver1.3.10.2	
Copyright	DITECT Corporation	
PC requirements	OS :	Windows 7 SP1 32bit / 64bit Windows 8.1 32bit / 64bit (Please apply KB2919355 before installation) (*Windows 8 is not supported) Windows 10 32bit / 64bit
	CPU :	1.0GHz or higher, 32bit / 64bit processor is recommended
	Memory :	4GB or higher is recommended
	HDD :	At least 20GB of available space (not including space for the image data)
	Display :	1360×768 resolution 32bits or higher display colors is recommended
	USB :	3.0
Software type	Commercial version	
Compatible Cameras	HAS-D71 / HAS-D72 / HAS-EF HAS-U1 / HAS-U2 / HAS-DX / HAS-D73	

Notes : Windows is the registered trademarks of Microsoft Corporation in the United States and/or other countries.

3. Installation and Setup

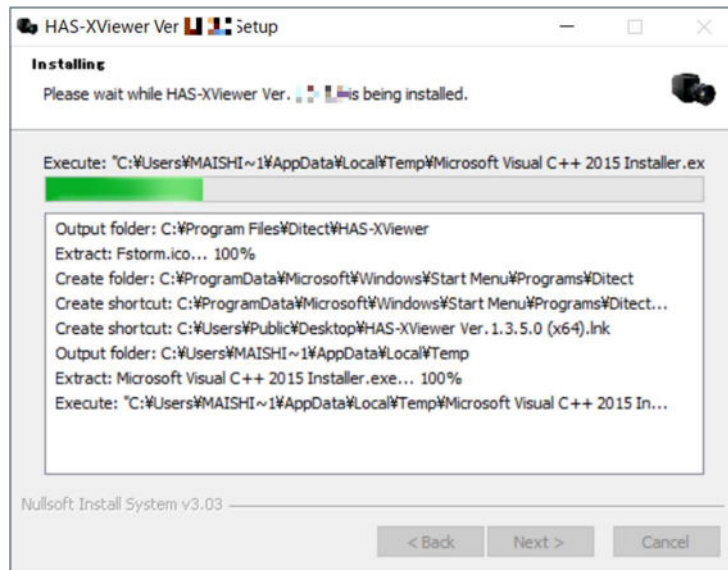## 3.1. Install HAS-XViewer

Please follow the instructions below for installing HAS-XViewer.

① Insert HAS-XViewer CD-ROM into your computer.

② Double click on **setup.exe** in the setup folder.
   * If your computer does not have the device driver, please go to **3.3 Install Device Driver** and install the device driver first.

③ Select the language first, then click "Install".

④ Please wait until the installation is completed.

⑤ Click "Finish" to complete the installation.
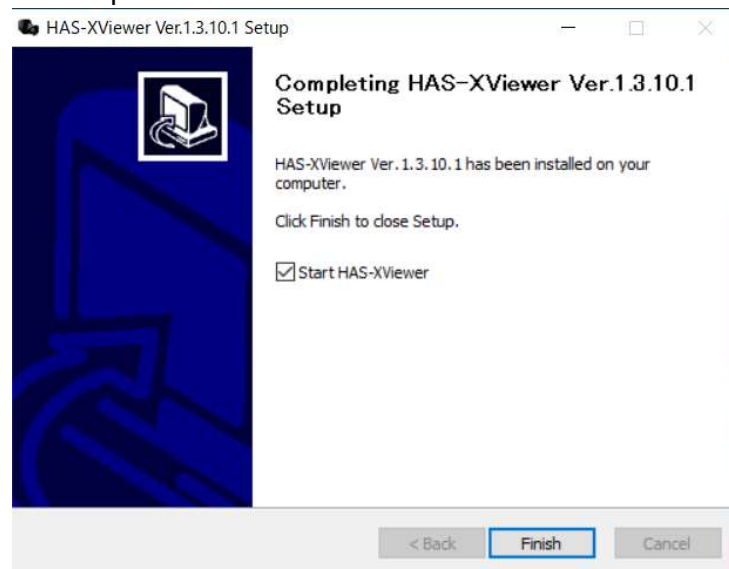
Please verify that HAS-XViewer is now installed on your computer.
Go to [Start] menu, find [All Programs] and choose [Ditect] folder.
If you can find HAS-XViewer, the software has been successfully installed.

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3.2.　　Uninstall HAS-XViewer

If you wish to uninstall HAS-XViewer, please follow the instructions below.

① Go to [Start] menu, find [Control Panel] and choose [Uninstall or change a program] under [Programs].

② Select "HAS-XViewer" from the list and click [Uninstall].

③ Uninstallation is completed.

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3.3.   Install device driver

3.3.1   Auto Installation via the Internet

This software is using USB3.0 driver of Cypress Semiconductor Corporation.

If the camera and PC are connected with USB3.0 when you are online, it starts installation automatically.

When the automatic installation is successfully completed, the window shown in **Figure 1** will be displayed.

In case that you have no access to the internet or the automatic installation does not work, please go to **3.3.2 Trouble shooting**.

Figure 1 Check device driver

3.3.2   Trouble shooting

Please follow the instructions below in case that the USB driver is not recognized.

1. Connect USB cable to the camera device.
2. Turn on the camera.
3. "Unknown" device or [FX3] device will appear in the device manager.

Figure 2 The image before installing the driver

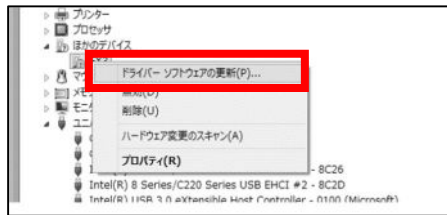4. Right click on the [FX3] icon and select "Update Driver Software".
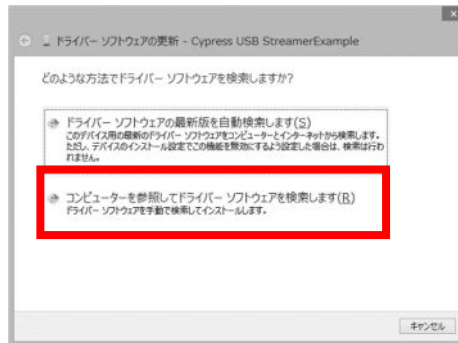

Figure 3 Driver update

Figure 4 Browse my computer for driver software

5. Open CD drive in explorer
   * Drive name: CD/DVD means [D:] drive
   ■Windows 7   64bit
   D: ¥usb driver¥win7¥x64
   ■Windows 7   32bit
   D: ¥usb driver¥win7¥x86
   ■Windows 8.1   64bit
   D: ¥usb driver¥win8¥x64
   ■Windows 8.1   32bit
   D: ¥usb driver¥win8¥x86
   ■Windows 10   64bit
   D: ¥usb driver¥win10¥x64
   ■Windows 10   32bit
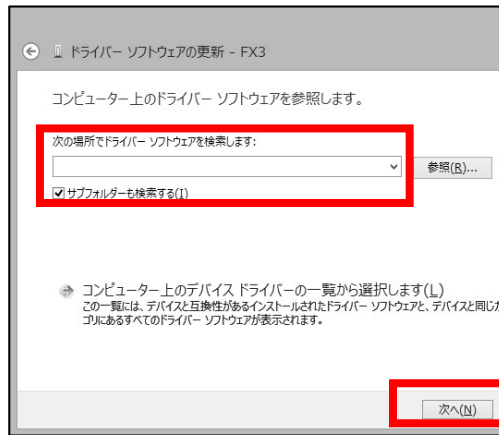   D: ¥usb driver¥win10¥x86

Figure 5 Search for driver software in this location

6. When you see the following box, the installation has been completed.
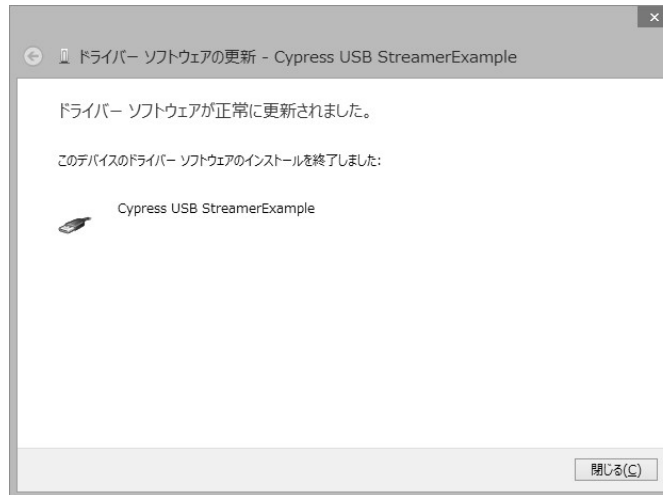

Figure 6 Successfully updated your driver software

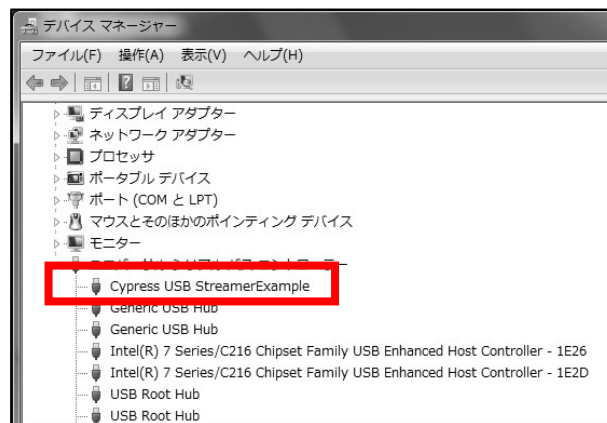7. Please make sure "Cypress USB Streamer/Example" icon is in the device manager.

Figure 7 Confirm in Device Manager

4. Getting started

4.1. Launch HAS-XViewer

In order to launch this software, please go to [Start]-[All Programs]-[Ditect]-[HAS-XViewer].

Figure 8 Desktop shortcut icon

Or you can double click on the HAS-XViewer desktop icon as well.
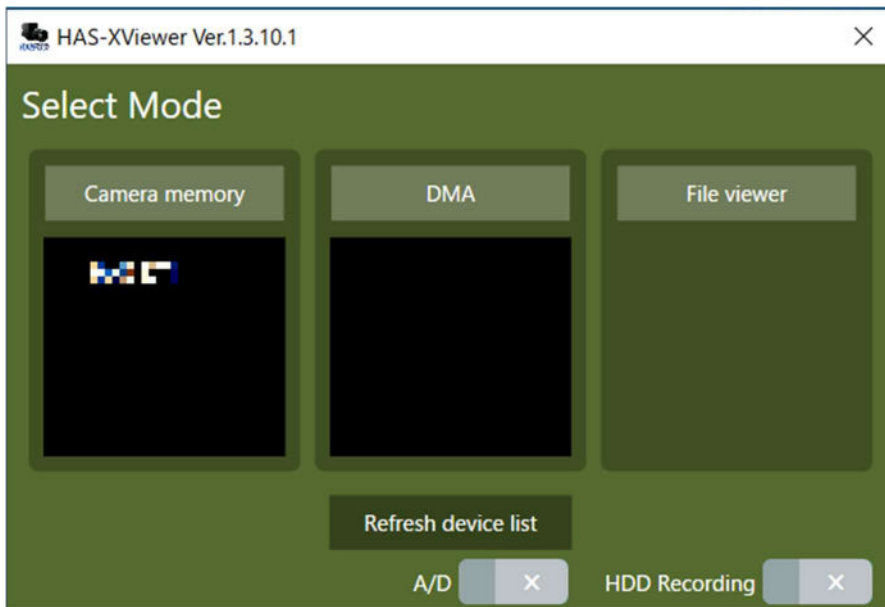
Select Mode window will appear.

Figure 9 Select mode window

Details of each item of the Select Mode window.

Item	Description
Camera memory	Save the images to the camera internal memory.
DMA	Save the images to the PC's system memory. With the large memory, longer recording time is available.
File viewer	Load and display the movie files that have been saved by HAS-XViewer.
Refresh device list	Refresh the list of cameras that are connected to the PC.
A/D	With the A/D license, USB A/D input device can be used. *Not available to use A/D and HDD Recording at the same time.
HDD recording	While DMA mode is selected, you can select to save the image files to HDD directly. Long-time recording is available until HDD or SSD gets full. This function is available with the purchase of HDD recording license. *Not available to use A/D and HDD Recording at the same time.

【Note】 Skip Select Mode window

By right clicking on each camera mode, you can create a desktop shortcut to directly open each mode.

After you select a mode, the application will be initialized and main menu will appear.
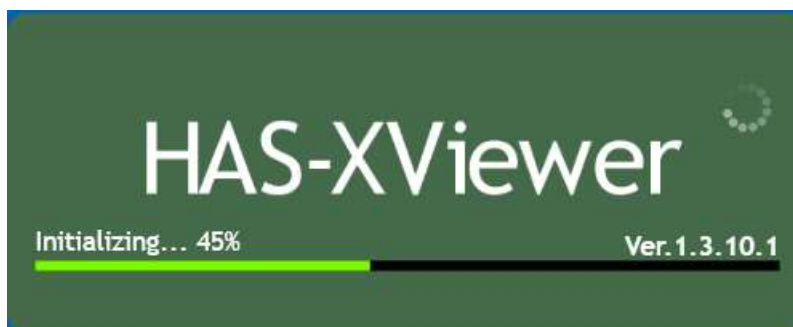

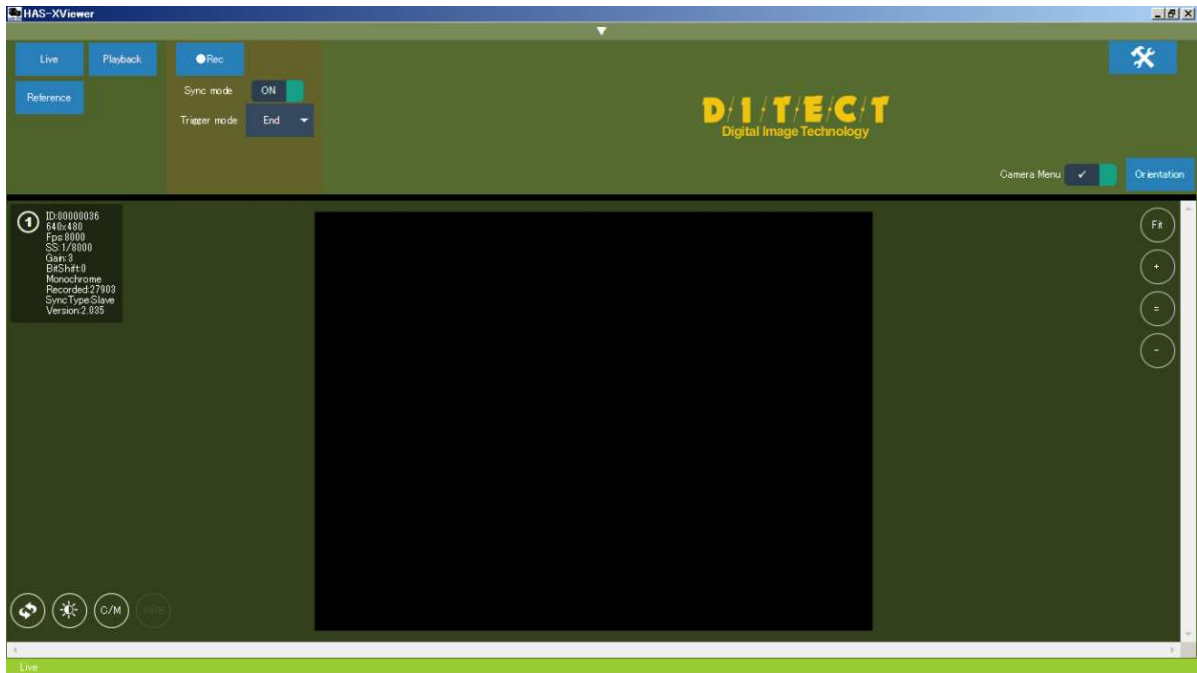**Figure 10 Initializing after selecting a mode**

4.2.　　Main window

Figure 11 Main window

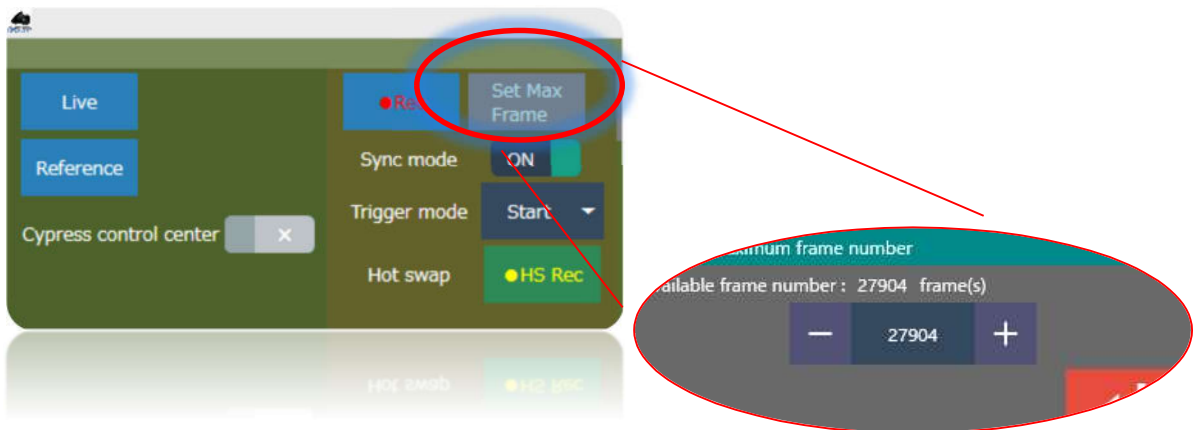## 4.2.1　　Change the number of recording frames

Figure 12 Change the number of recording frames

If you wish to change the frame number, please click on the "Set Max Frame" button on the top left. The dialog box will appear on your screen and you can change it.
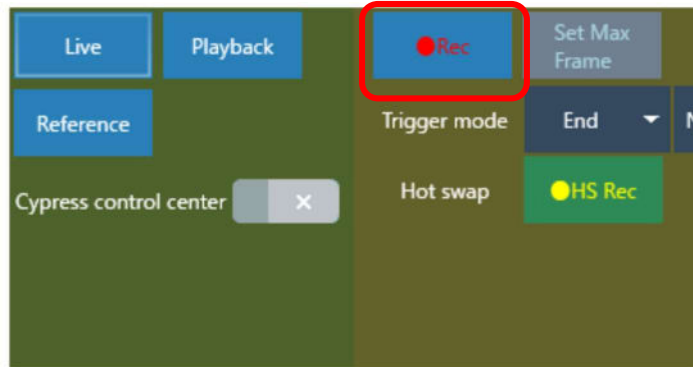
4.2.2   Record

Figure 13 Recording button

You will see the buttons on the top left of the main window screen.
【Live / Pause】 Switches between through-the-lens images and pause.

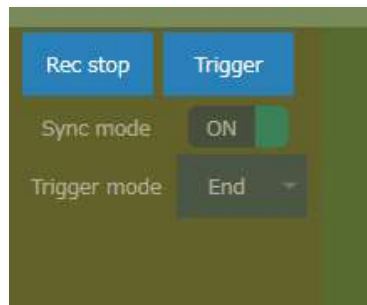【●Rec】It will start recording when it gets clicked. While recording, you will see the following as **Figure 14**.

Figure 14 Recording mode

Unless you click on【Rec stop】or receive the trigger signal, it will keep recording images. Once it reaches the maximum frame number, the software will start loop-recording from the beginning.
*If you wish to use the trigger button, your camera needs to be connected by the master cable.

4.2.3 Use the play mode

Once it finishes recording, the play mode will be displayed as in **Figure 15** and **Figure 16**.
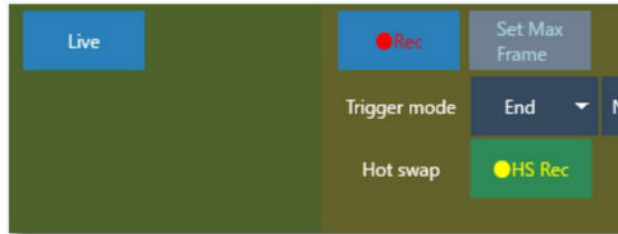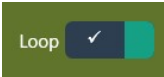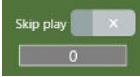

Figure 15 Play mode

Figure 16 Play control

① Head frame

Go to frame number zero.

② Play backwards

Play backwards from the current frame.

③ Step back

Move one frame backward.

④ Pause

Stop at the current frame.

⑤ Go to next frame

Move one frame forward.

⑥ Play

Play from the current frame.

⑦ Last frame.

Move to the last frame.

⑧ Trigger frame

Move to the triggered frame, in case that you use the trigger button.

⑨ Loop check

Check the looping images.
This can be used in the "Play backwards" mode as well.

⑩ Skip play

Skip per number of designated frames while in the play mode.

⑪ Playback speed

Select the frame rate to play.

⑫ Save

Save the recorded images into a file.

⑬ Save screen capture image

Save the screen capture image of the play mode.

4.2.4   Save the image

When you click on the save button , a dialog box shown in **Figure 18** appears.
Select the File Type and CH, and save the image.

File Type: You can choose the file type from the following;
    AVI movie file, WMV movie file, BMP files, JPEG files, PNG files, and TIFF files.
Frame Rate: Frame rate of playing AVI movie file
CH: When you are using more than two cameras on a single PC, you can select a camera CH to save the images. If you select all, all the camera channels will be saved from CH1.

Skipping frames: You can skip the number of frames that you have pre-set and save each following frame.

When you click on [icon], you can set the inter-frame calculation applied to the skipped frames.

*コマ飛ばし部分にフレーム間演算を使用する：Apply the inter-frame calculation to the skipped frames.

*画像処理の種類：Types of image processing (Average / Maximum / Minimum brightness)

Figure 17 Skipping frames dialog

e.g. Apply the inter-frame calculation (average brightness) to the skipped frames (3 frames).
1st frame: Use the 1st frame as it is.
2nd frame: Take the average of frames 2-4.
3rd frame: Take the average of frames 5-7.
4th frame: Take the average of frames 8-10…

Save as raw mode (Bayer): Images will be saved as AVI movie file without any corrections or adjustments made.
For color cameras, the images as bayer format and the look up table will be saved. By saving the file in raw mode, it accelerates the data saving speed. When you open the raw image in the File viewer mode, you can transform it into the state when it was recorded.

Memo: Movie data information will be output as text file.
If you want to add a comment on the movie file, you can click on Memo and type your comment in the text box.

Adding data to the image: If you wish to add something on the images such as grids, check this box and open the settings box.

You can click this button [icon] and select information which you want to add on the images.
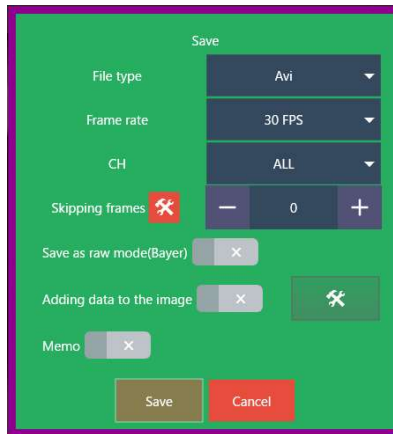
Figure 18 Save settings dialog

When the dialog shown in **Figure**   pops up, then assign a file name and select the file type. As the default settings, the recording date and time are being used for the file name.
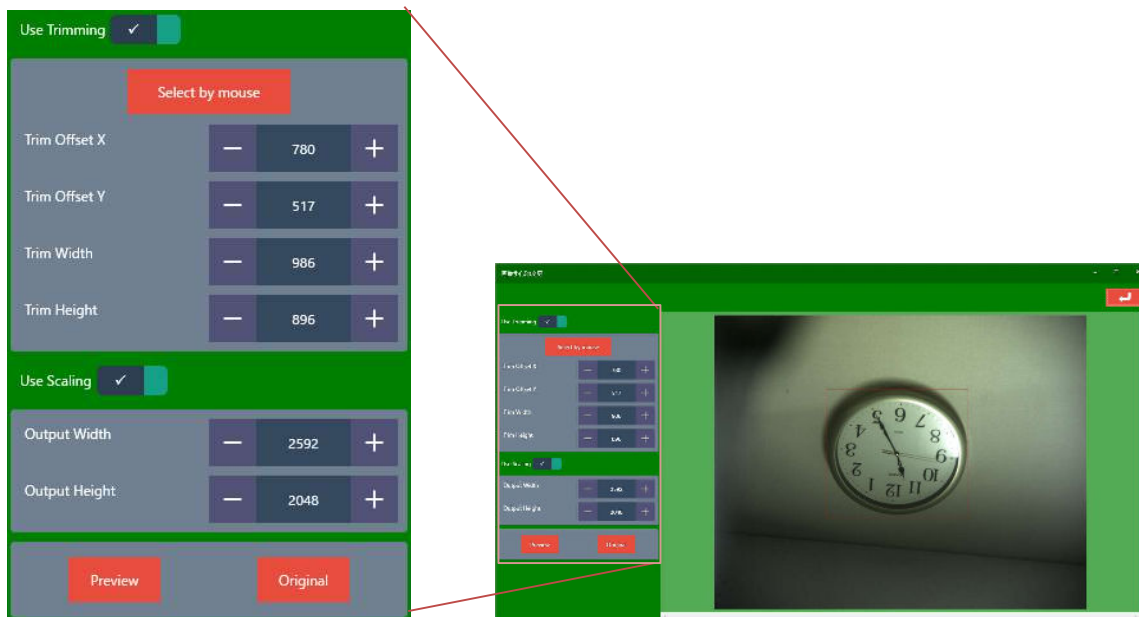
【**Change the image size**】

Figure 19 Change the image size menu

Use Trimming: if the checkbox is checked, the trimming can be used
Select by mouse: specify the trimming area by dragging the mouse
Trim Offset X: specify the X-axis start point for trimming
Trim Offset Y: specify the Y-axis start point for trimming
Trim Width: specify the width of the trimming area
Trim Height: specify the height of the trimming area
Use Scaling: if the checkbox is checked, the size of the image can be changed
Output Width: specify the width of the output image (in pixels)
Output Height: specifies the height of the output image (in pixels)

Preview: to show a preview of the resized image with applied parameters you set
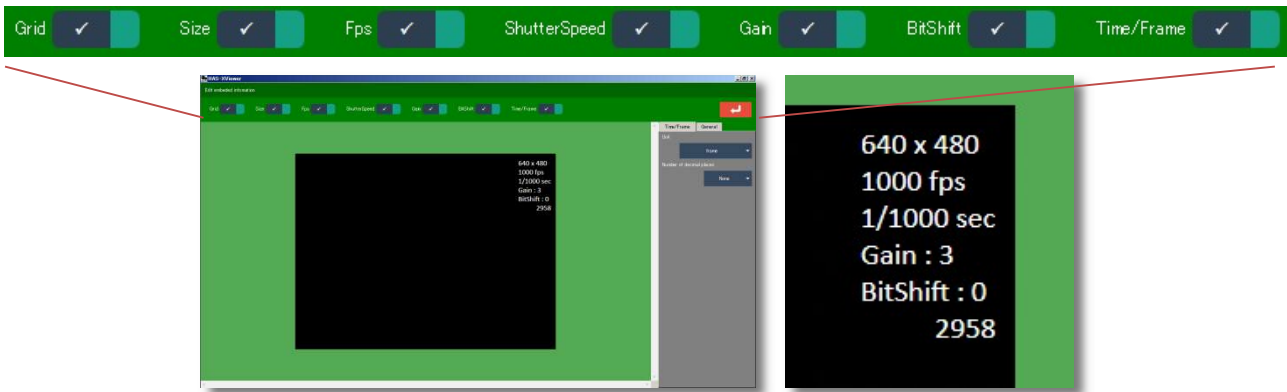**Original**: return to the image before changes

【Adding data to the image】

Figure 20 Adding data to image settings

Grid: If you check this box, the grid previously set up in the main window will be saved.

Size: If you check this box, the image size will be displayed on the corner of the image.
　　　(e.g. **640x480** in Figure 19)

Fps: If you check this box, the frame rate is displayed on the corner of the image.
　　　(e.g. **1000fps** in Figure 19)

Shutter Speed: If you check this box, the shatter speed will be displayed on the corner of the image.
　　　(e.g. **1/1000sec** in Figure 19)

Gain: If you check this box, the gain is displayed on the corner of the image. (e.g. **Gain: 3** in Figure 19)

Bit Shift: If you check this box, the bit shift will be displayed on the corner of the image.
　　　(e.g. **BitShift: 0** in Figure 19)

Time/Frame: If you check this box, the time or frame number will be displayed on the corner of the image. (e.g. **2958** in Figure 19)

You can change the display settings in more details by clicking this tab.

【Time/Frame】 You can set the format of time or number of frames.

【General】 You can change the font, font size, font color, and the position of the data information on the display.

* Please note that once the images are saved as a movie file, you cannot make any changes to the display. Please make sure before you proceed to save.
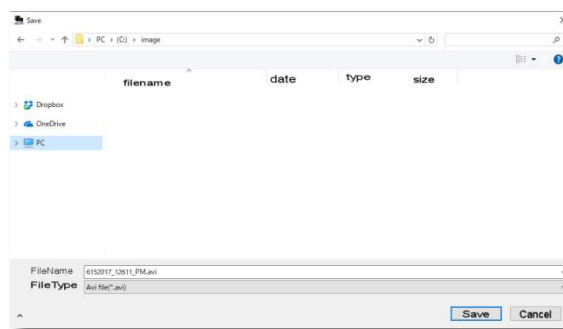

Figure 21 Save file dialog box

When you use a single camera, the images will be saved as *[input filename].avi.*

When you are using multiple cameras, the images will be saved as *[input filename]_Cameraxx*.avi.
The camera number will be added to the name.

| 4.2.5 | Save screen captures |

When you click this button ![button], Save screen capture button as shown in **Figure**   appears.
Select File type and click Save.
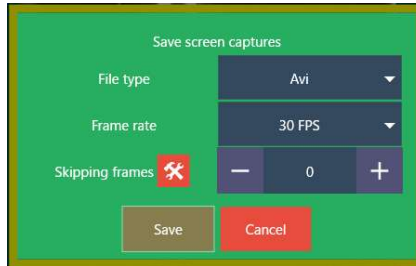Screen capture image of the display will be saved.

Figure 22 Save screen capture dialog

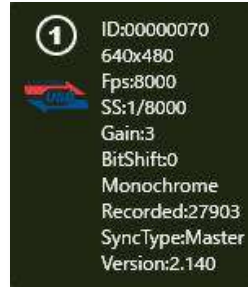## 4.2.6 Adjust camera settings

【Status window】

Figure 20 Status window

The camera specifications will be displayed on the status window.

Item	Description
ID	Camera ID
resolution	Resolution
Fps	Frame rate
SS	Shutter speed
Gain	Gain setting
BitShift	Bit shift *Certain models do not display this parameter.
Color	Monochrome / Color
Recorded	Total frame count
SyncType	Master/Slave camera mode (when recording by multiple cameras)
Version	Firmware version information

【USB3.0 recognition】
If your device recognizes the **USB3.0**, the left icon as shown in **Figure 21** will be displayed.
If your device does not recognize the **USB3.0**, the reason is one of the following.
☐ You might be using a USB2.0 cable.
☐ The port connected to the cable is USB 2.0.
☐ USB3.0 wrong recognition

Figure 21 USB3.0 (left), USB2.0 (right)

If it's not recognized as USB3.0, disconnect the USB cable once, and reconnect to the USB3.0 port.

【Reference】
If you click the Reference button, the reference settings appear and you can set resolution, frame rate, and shutter speed.
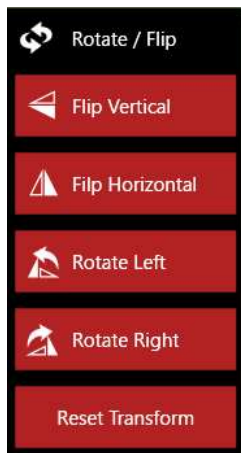
Figure 22 Frame rate settings

【Adjust button】

① Change the view direction

From the top
- – Flip Vertical (Upside down)
- – Flip Horizontal (Horizontal mirror)
- – Rotate left (Turn 90 degree to the left)
- – Rotate right (Turn 90 degree to the right)
- – Reset Transform (Reset to the original)

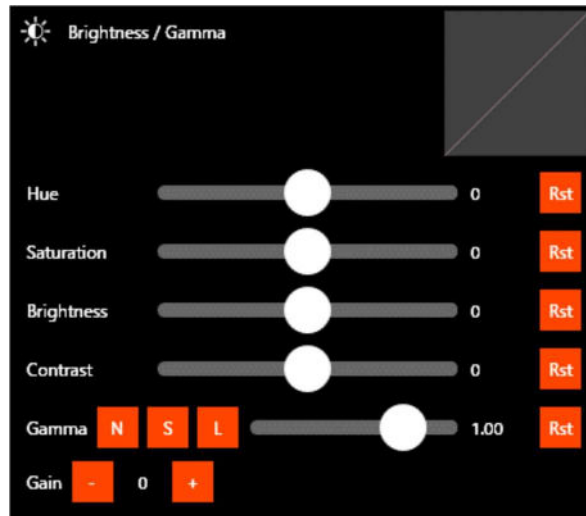**Figure 23 Rotate / Flip button**

② Brightness adjustment

Figure 24 Brightness / Gamma adjustment dialog

【Hue】Adjust hues *not available for monochrome cameras
【Saturation】Adjust saturation *not available for monochrome cameras
【Brightness】Adjust brightness
【Contrast】Adjust contrast

Decrease the gain

Increase the gain

Decrease the bit shift *Certain models do not support this function.

Increase the bit shift *Certain models do not support this function.

*Please note that the gain settings vary depending on the camera type.
(usually between 0 to 3, for some models, 0 to 4)

Normal gamma correction

S curve gamma correction

Reverse S curve gamma correction

Reset button: clear gamma correction settings

③ GridLine

Select the number of grid lines and its color.

【Size adjustment】

You can set the image size on the main window.
From the top
Fit：The image size fits to the window size.
＋：To zoom in
＝：Equals to 100% magnification image size.
－：To zoom out.

【Pixel view assistance】
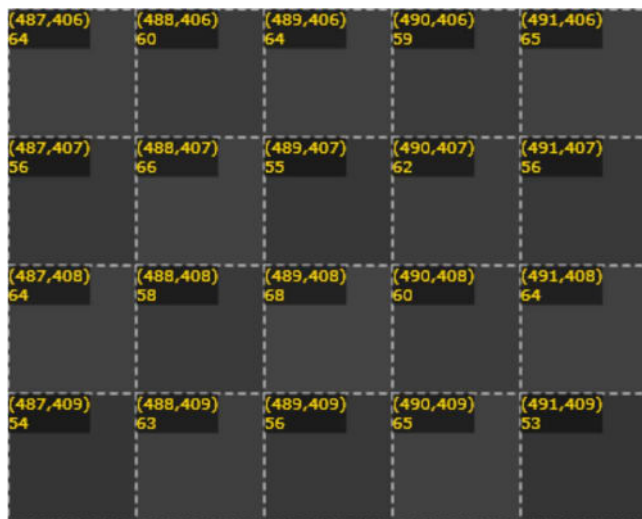You will see each pixel's information as you keep zooming in the image as shown below.

Figure 25 Brightness information

4.2.7　　　Saturation display

【Exposure warning check box】
If you check this exposure warning box, the saturated pixels will be displayed in red for monochrome cameras or with slash marks for color cameras. You can choose the default threshold value from 220, 230, and 240.
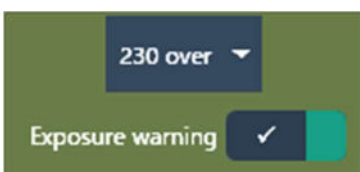
・Monochrome camera: Displayed in red.
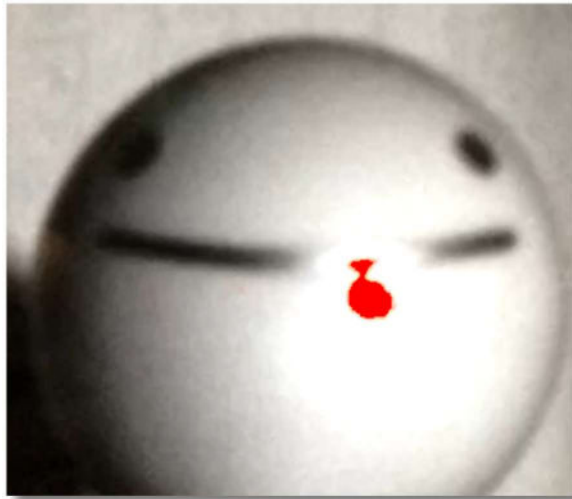・Color camera: Displayed as diagonal lines.

Figure 26 Saturation display

● The threshold is between 220-240 since there are the pixels that are not completely saturated due to noise differences in horizontal direction.

4.2.8　　Adjust focus

【Focus peaking check box】
If you check this focus peaking box, the edge pixels will be displayed in color. You can choose a color among the given color options. You can choose the edge levels among low, medium and high.
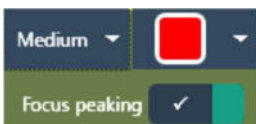

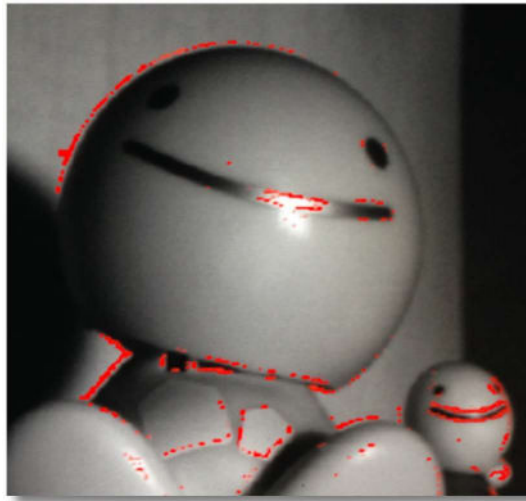**Figure 30 Focus peaking [Bad focused sample image]**

Figure 27 Focus peaking [Well focused sample image]

4.2.9　Recording display mode

【Rec preview】
When you check this rec preview box, you can change the display settings while recording.
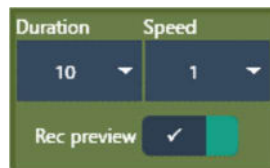

Figure 28 Recording display mode setting

　【Duration】The total number of frames that will be displayed while recording.
　【Speed】The number of frames that will be skipped to display while recording. When 0 is selected, it will stop.

4.2.10　Frame step recording

When DMA mode is selected at the select mode window, you will see【Frame step】on the screen. (This is not available when A/D device is being used)
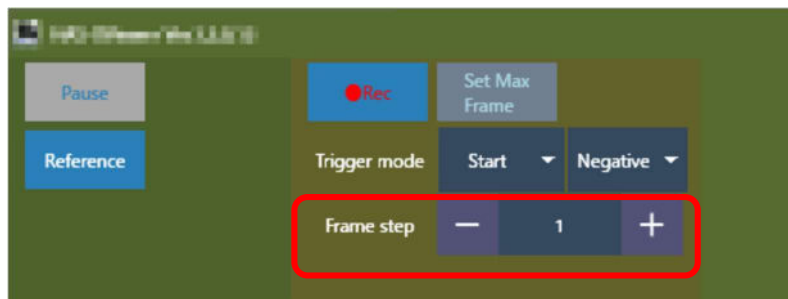

Figure 29 Frame step

【Frame step】

Set the frame interval when you wish to skip frames for recording.

If you wish to record every other frame, set the frame step as "2".

Default value of frame step is set as "1" and no frame will be skipped. (normal recording)

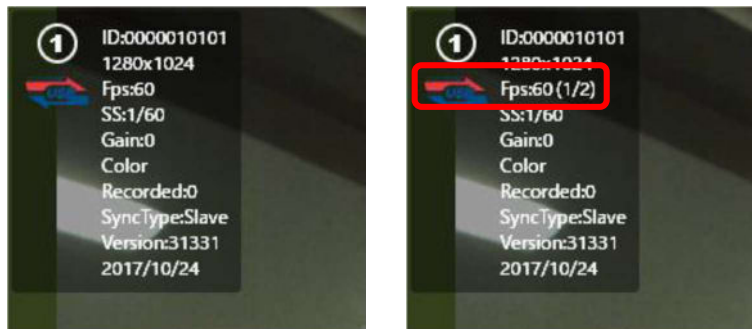When you use this feature, Fps will be displayed differently.

Figure 30 Fps information display while recording: normal (left), skipping frames (right)

e.g., When it records at 1 frame skip interval (frame step: 2), it will be displayed as 1/2 as shown in **Figure 30** (left). Recording at 60Fps, it will be equal to the data size of 30Fps.

【Time-lapse】

Specify the frame interval in seconds to record Time-lapse video. Click "Time-lapse" to activate this option.
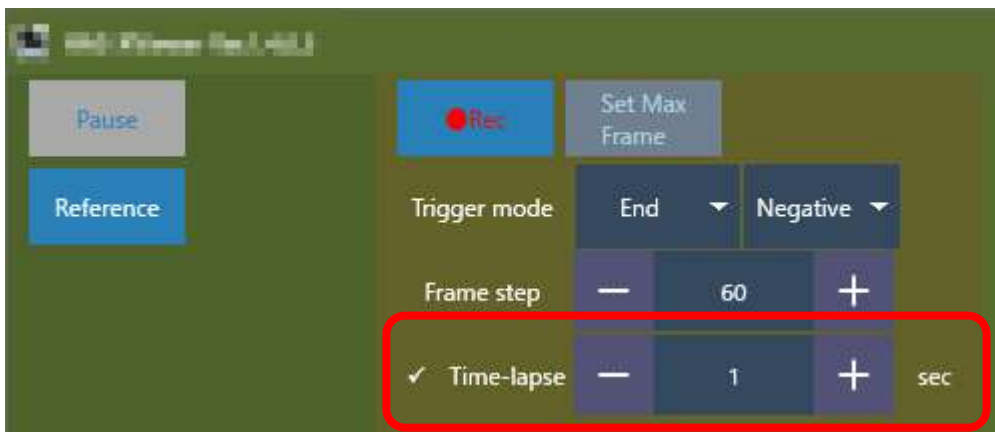

Figure 31 Time-lapse

If you change the Time-lapse number, the Frame step will be displayed in accordance with the current FPS rate.

If you change the FPS, you need to change the Time-lapse value again.

The actual number of skipped frames is calculated using the number of frames entered in the "Frame step" field.

4.2.11　　Main menu

When you click on , main menu appears.

*If you use a tablet-PC, please press for a while on the corner of the image.
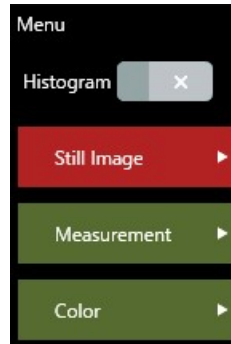

Figure 32 Main menu

【Histogram】
The histogram box will be displayed on the window.
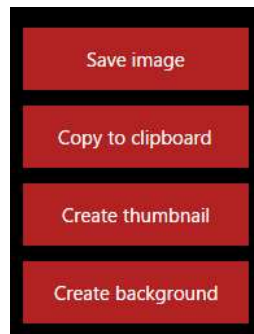
 menu

Options for the image currently displayed.

Figure 33 Still Image menu

【Save Image】
You can save the still image that is currently displayed on the screen.

【Copy to clipboard】
You can copy the image to the clip-board.

【Create thumbnail】
You can create thumbnail images (contact sheet) from the recorded image data.
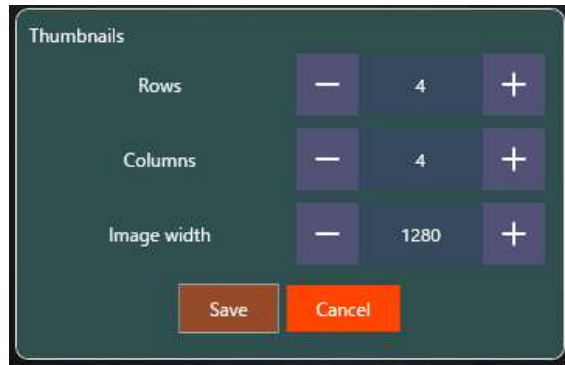
Figure 34 Save the thumbnail image settings

【Rows】
Set the number of lines (images) for thumbnails in vertical direction.

【Columns】
Set the number of line (images) for thumbnails in horizontal direction.

【Image width】
Set the image size of a thumbnail. The vertical length will be automatically adjusted by aspect-ratio.

When you click Save button, thumbnails will be displayed as shown in **Figure 35**.
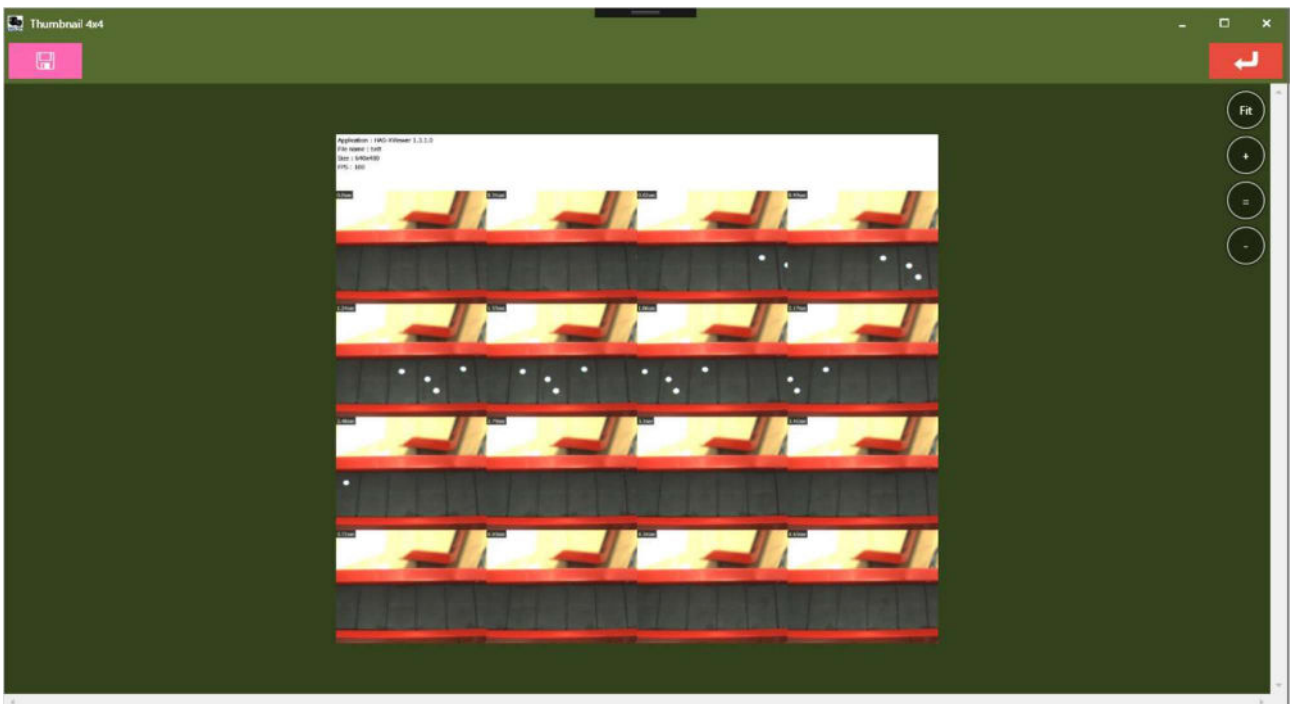

Figure 35 Thumbnail display window

Click to save the thumbnails.

【Create background image】

You can create a background image (integrated image of the frames) from the recorded image data

Figure 40 Create background image

【Algorithms】

You can choose from these four algorithms to create a background image.

- Average brightness（平均輝度）
- Maximum brightness（最大輝度）
- Minimum brightness（最小輝度）
- Median brightness（中央輝度）

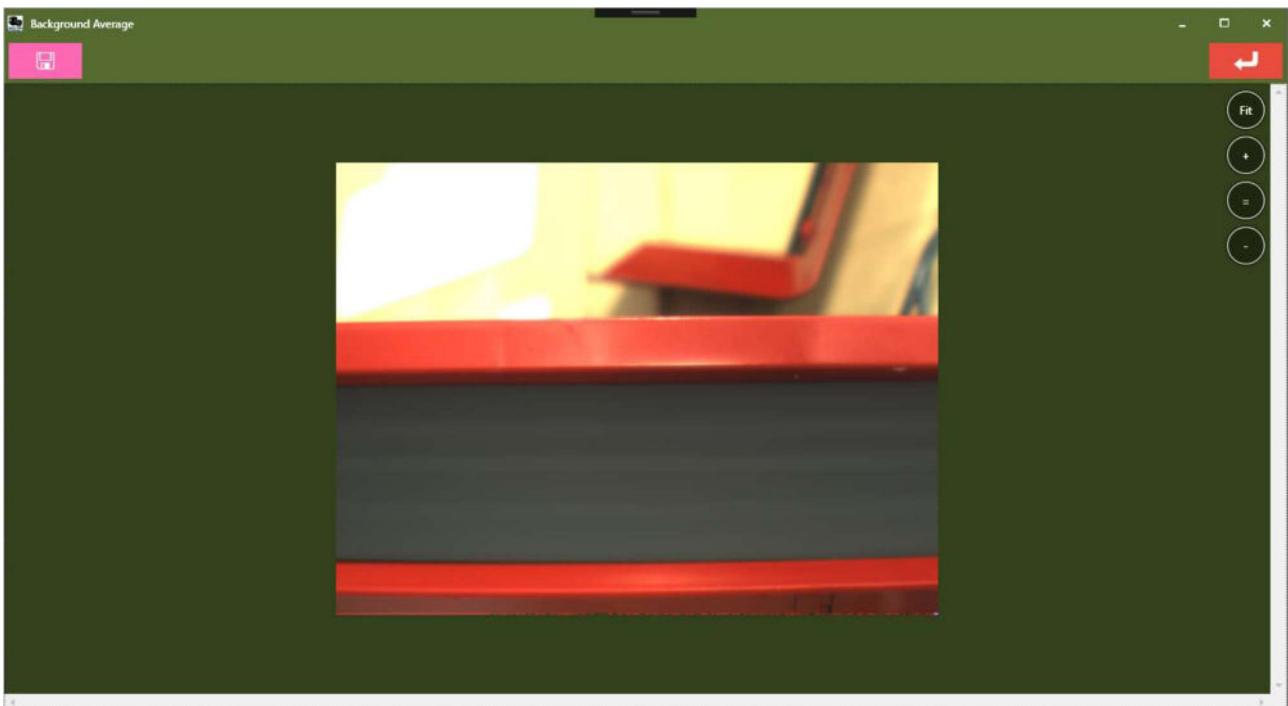When you click create button, background image will be displayed as shown in **Figure** .

Figure 41 Background image display window

Click to save the background image.

Measurement ▶ menu

You can select the options for measurement.

Figure 36 Measurement menu

【Calibration】
Process the two-point calibration.
Please refer to **4.3 Calibration** for more details.

【Easy Measure】
Process the measurement of two-point distance, three-point angle, the angle between two straight lines, and radius with two-point.
Please refer to **4.4 Easy Measure** for more details.

【Measure】
Process the measurement of velocity / acceleration, angle variation, variation of polygon area from the recorded data.
Please refer to **4.5 Manual measurement** for more details.

Color ▶ menu

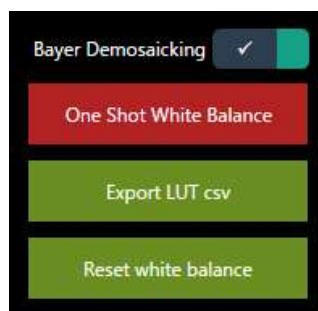You can process the operation for color camera.

Figure 37 Color menu

【Bayer Demosaicking】(Color camera only)
Reconstruct full color images from bayer-patterned image.

【One Shot White Balance】(Color camera only)
Click One Shot White Balance button while recording, and white balance is applied.
By having the target that is a neutral color (close to gray) to the entire display, the accuracy of white balance increases.

【Export LUT csv】(Color camera only)
Export the Look Up Table.
Look Up Table contains white balance and gamma setting information.

【Reset white balance】(Color camera only)
Reset the white balance.

4.2.12　　Change the settings

When you click on the tool icon on the right corner of the window, the settings dialog will be displayed.
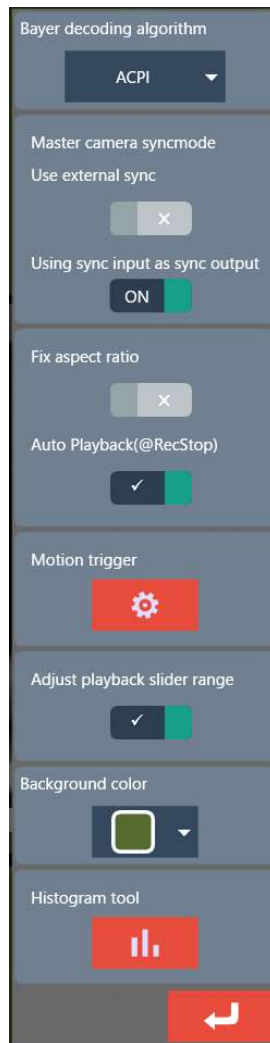

Figure 38 Tool icon

Figure 39 Settings dialog

【Bayer decoding algorithm】
You can select the bayer algorithm from these 4 options below.
・Bilinear
・Color correlation
・ACPI demosaicking (default)
・AHD demosaicking

【Use external sync】 *Certain models do not support this function.
The camera can receive the input signal and be synchronized with the external device.

【Using sync input as sync output】 *Certain models do not support this function.
The sync master cable has a sync input port. With this function, it works as the output port.
This function can be used when you use DITECT's original LED-light.

【Input/output settings of BNC cable】 *Certain models do not support this function.
You can change the BNC cable input/output settings.
Sync input/output (Negative logic): It's the sync output when the camera is a master, and the sync input when the camera is a slave.
External sync input/output (Negative logic): This function will be used when the external sync signal is input to one master camera.

【Fix aspect ratio】
With this function, you can adjust the image size with aspect ratio. The image size will be still the same size as when it is at the maximum size.
If you save the image with aspect ratio, the saved image will be the same size.
You can still change the setting by unchecking this function if it's before saving the image.
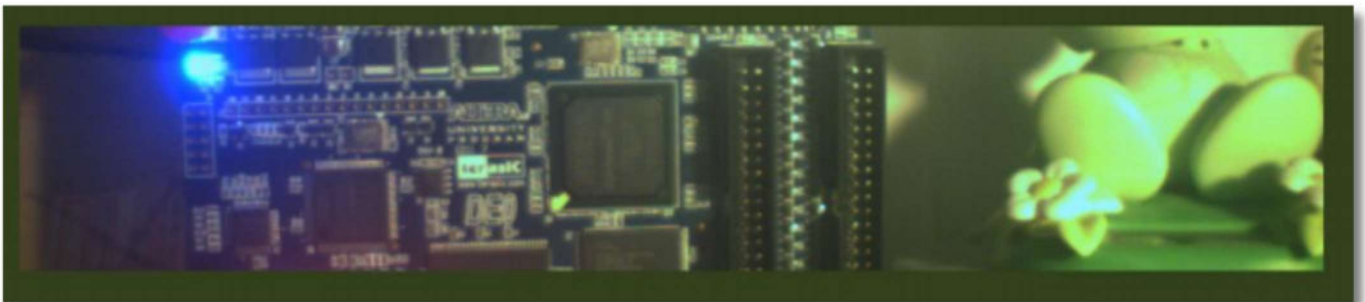

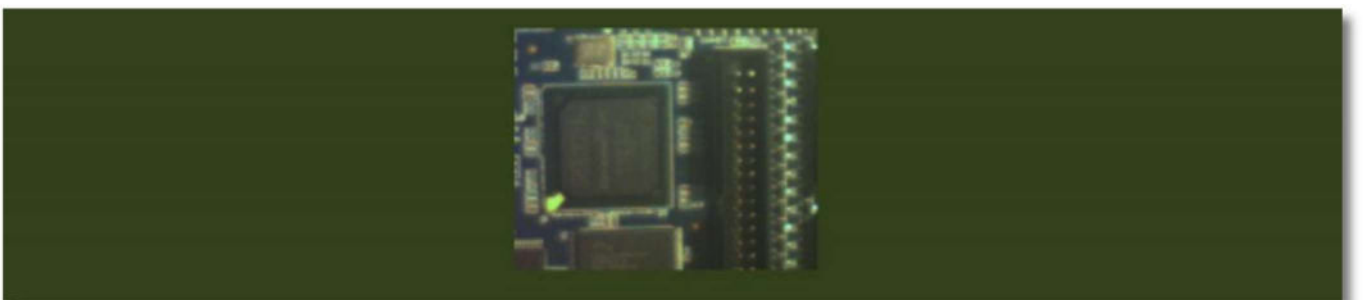**Figure 40 Original image without aspect ratio**

Figure 41 Image with fixed aspect ratio

【Auto Playback @RecStop】
When the recording stops, it automatically starts replaying the recorded images.

【Motion trigger】
You can change the trigger settings here.

【Adjust playback slider range】
If you check the box, the slider range will be the total number of recorded frames.
If you uncheck the box, the slider range will be the total recordable frames.

【Background color】
You can select the background color among the given choices.

Figure 42 Background color choices

【Histogram Tool】
You can change the histogram display using ROI.

4.3.　　Calibration

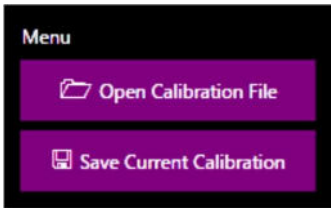When you click the Calibration menu in the Menu, settings window will appear.

Figure 43 Calibration menu

Figure 50 Calibration window

4.3.1 Calibration menu

【Open Calibration File】
Load the previously saved calibration settings file.

【Save Current Calibration】
Save the current calibration settings as a file.

4.3.2 Two-point calibration

If you know the actual length between two points in the image, distance calibration can be done.
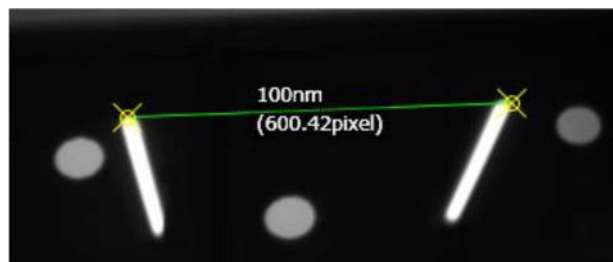Click on the image to select two points.

Figure 51 Two-point calibration

Input the actual size and the unit.

Figure 44 Actual size and unit settings

【Length】
Input the actual length between selected two points.

【Unit】
Select the unit of the length between selected two points.

4.3.3   Select FPS

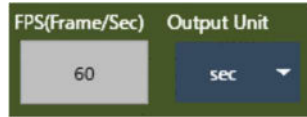Select the time settings between frames (FPS: frame per sec).

Figure 45 FPS settings

【FPS】
Select the time settings for the frame interval. The unit is frame per sec (FPS).

【Output Unit】
Select the unit for the velocity measurement result.

4.3.4   Scale bar settings

When you check this box, scale bar settings dialog will appear as shown in **Figure 48**.
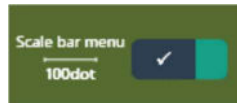

Figure 46 Scale bar menu box

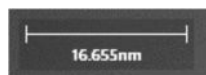Scale bar is the reference for the distance calibration.

Figure 47 Scale bar display

When you wish to write the scale bar to the movie file, check the box **4.2.4 Save the image**.
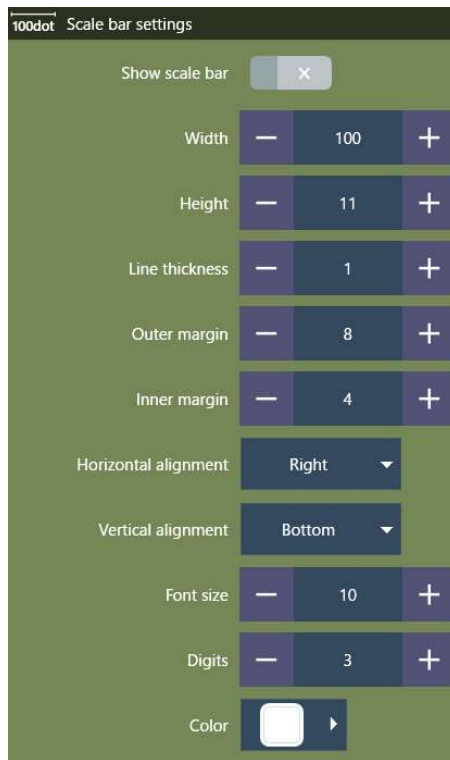
Figure 48 Scale bar settings

【Show scale bar】
Check this box to show the scale bar.

【Width】
Select the size of the scale bar in horizontal direction.

【Height】
Select the size of the scale bar in vertical direction.

【Line thickness】
Select the thickness of the line of the scale bar.

【Outer margin】
Select the size of the outer margin.

【Inner margin】
Select the size of the inner margin.

【Horizontal alignment】
Select the position of the scale bar in horizontal direction.

【Vertical alignment】
Select the position of the scale bar in vertical direction.

【Font size】
Select the font size of the scale bar.

【Digits】
Select the number of digits to be displayed.

【Color】
Select the color of the scale bar.

4.4. Easy Measure

Easy measurement can be performed with XViewer software.
If the calibration has already been performed, the results will be shown in the actual size.
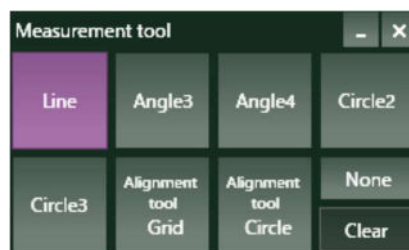

Figure 49 Easy Measure menu
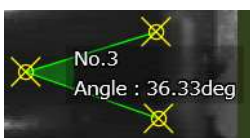

Figure 50 Easy Measure menu panel

【Line】
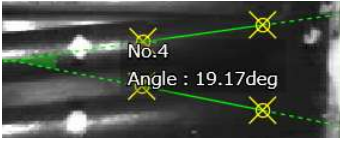Select two points by clicking on the image and measure the distance.

【Angle3】
Select three points by clicking on the image and measure the angle.
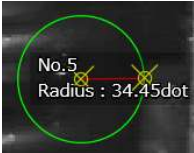
【Angle4】

Select two lines with four points by clicking on the image and measure the angle.

No.4
Angle : 19.17deg

【Circle2】

Select two points (one as the center and the other on the circumference) by clicking on the image and measure the radius.

No.5
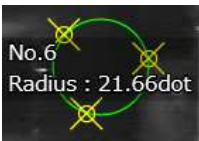Radius : 34.45dot

By right clicking on the green circumference, you can change the measurement item.

Remove
✓ Radius
Circumference
Area

【Circle3】

Select three points by clicking that are on the circumference, and measure the radius.

No.6
Radius : 21.66dot

You can change the measurement item by right clicking on the green circumference as in the 【Circle2】.

【AlignmentToolGrid】

Select two points by clicking on the image to set the position and the interval of the grids.

No.7
Location : 157.83,67.83
Space : 25.05dot
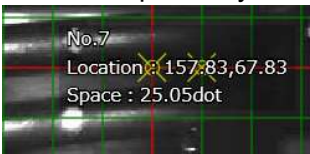
You can delete the dragged line by right clicking on it.

【AlignmentToolCircle】

Select two points (one as the center and the other to set the interval of the circles) by clicking on the image to have concentric circles.

【None】

Disable to add any items by clicking on the image.

【Clear】

Delete all the measurement items.

4.5.   Manual measurement

Velocity, acceleration, and other items are measured for the recorded data.
If the calibration has already been performed, the results will be shown in the actual size.

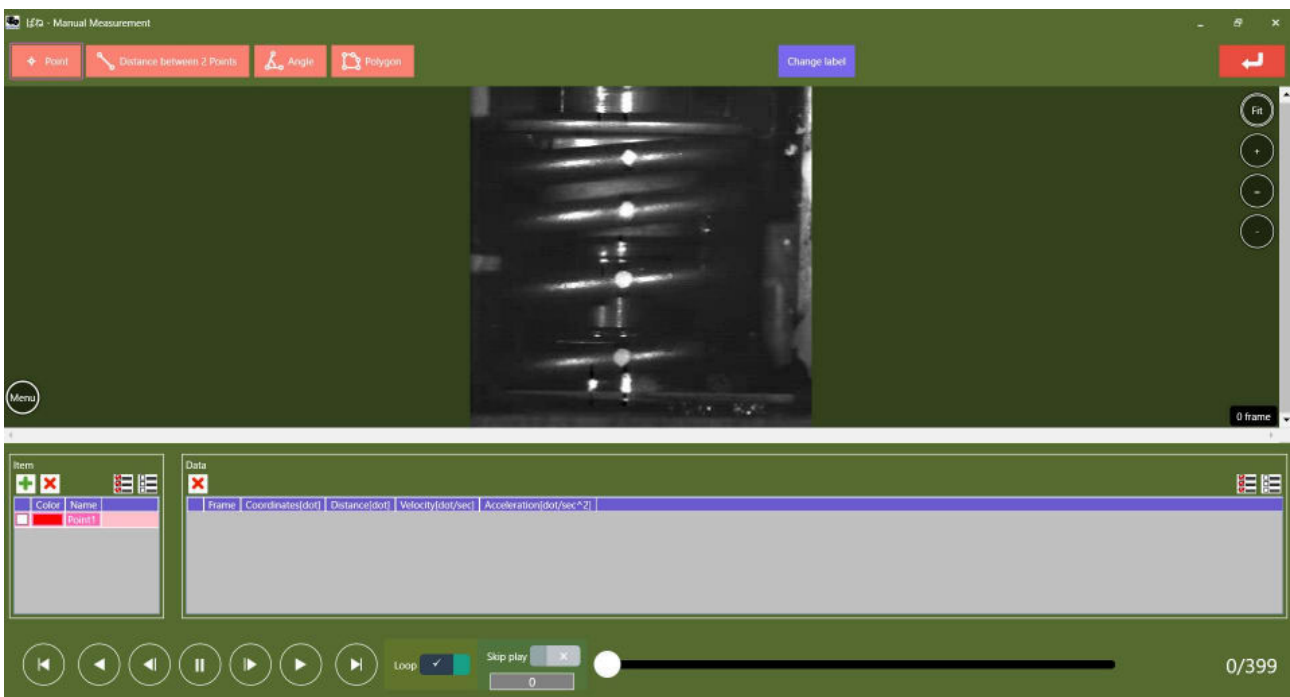
Figure 51 Manual measurement menu
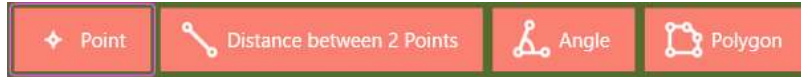

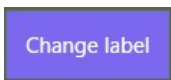**Figure 60 Manual measurement window**

Figure 61 Measurement mode

Item	Description
Point	Measure the velocity of a movement of one point on the image
Distance between 2 Points	Measure the distance variation between two points on the image
Angle	Measure the angle variation of three points on the image
Polygon	Measure the area or the perimeter variation of a polygon on the image

  Keep clicking on this button to change the item to be displayed on the window.
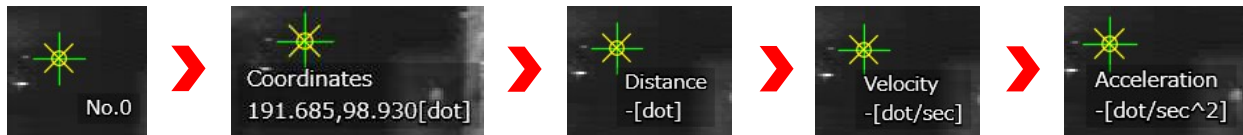
e.g. Point measurement

Figure 52 Change items
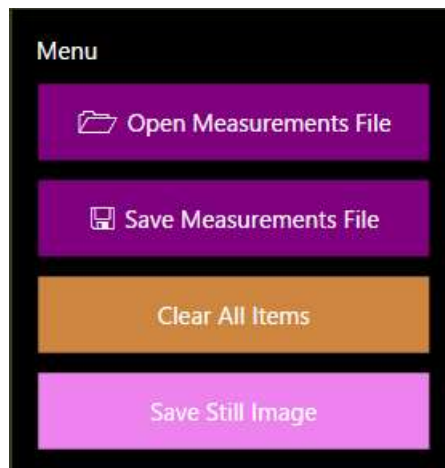
4.5.1 Menu

Figure 53 Manual measurement menu

【Open Measurement File】
Open the saved measurement result file.

【Save Measurement File】
Save the current measurement result.

【Clear All Items】
Delete all the measurement result.

【Save Still Image】
Save the current measurement images as still images.

4.5.2   Measurement procedure

1) Select the measurement mode from 【Point】【Distance between 2 points】【Angle】【Polygon】.

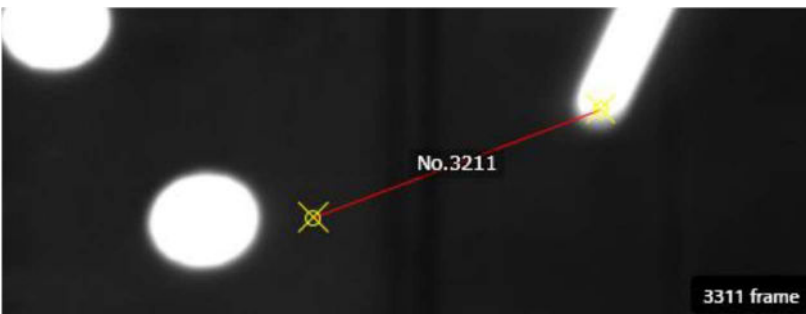2) Use the play control and select the frame for the measurement.

You can also use [F] key (forward: next frame) or [B] key (backward: previous frame) of keyboards.
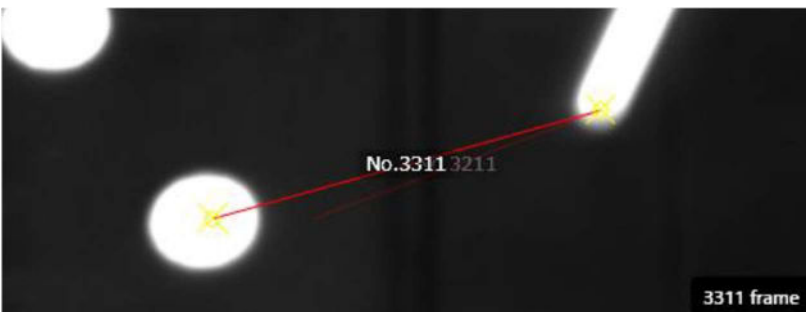
3) Click on the image to select the point(s).

4) Move to the next frame using the play control.

5) Move the added measurement point to the point you wish to measure.

Move the measurement point by mouse dragging

6) Measurement data will be added to the table

	Frame	Coordinates(Origin)[dot]	Coordinates(Destination)[dot]	Distance[dot]	Change of Distance[dot]	Velocity(Change of Distance)[dot/sec]	Acceler
☐	0	176.058,98.930	220.419,96.914	44.407	-	-	-
☐	9	113.549,100.442	220.419,96.914	106.928	62.521	694.679	-
☐	25	117.582,94.897	220.419,96.914	102.857	-4.071	-25.446	-4500.78
☐	30	113.549,104.979	220.419,96.914	107.174	4.317	86.340	2235.70

7) Repeat the steps from 2) to 5) as necessary

8) When the data is created, go to Save Measurement File from Menu and save the CSV data.

5. Trigger input

You can set up the trigger with the device as shown in **Figure 54.**

Please connect the sync-master cable (①) with the trigger switch (②).

*Depending on the type of the camera, the sync cable connection varies. Please check your device specifications.
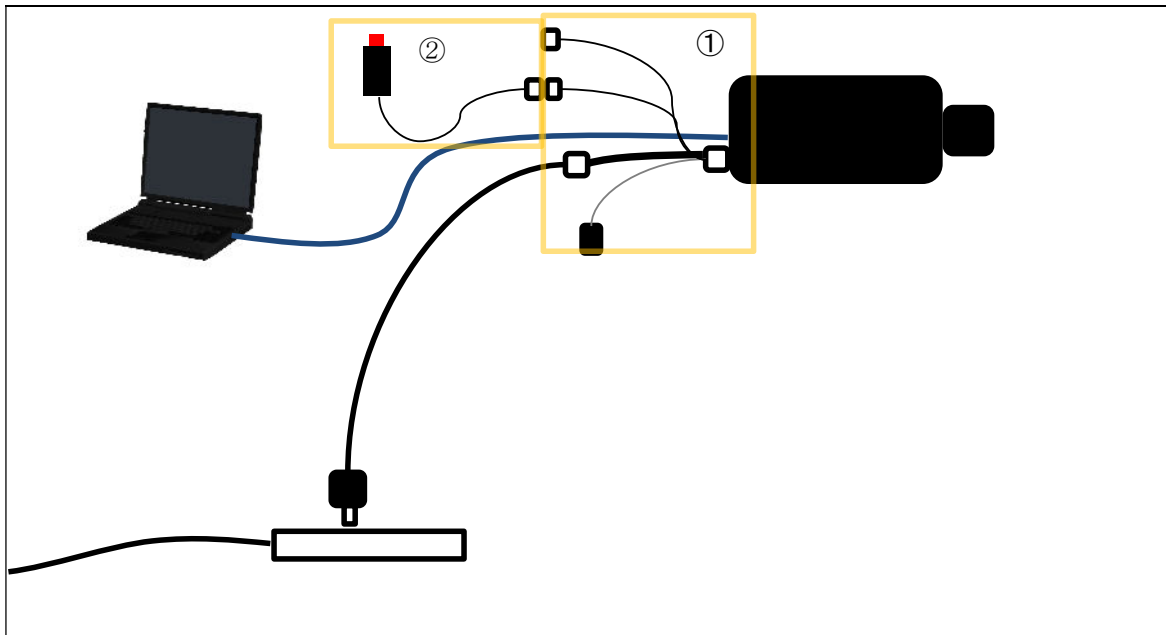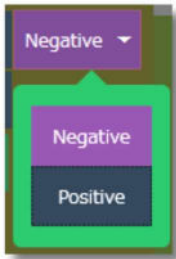

Figure 54 Trigger settings sample

【Trigger mode】
Select a trigger mode from [Start] [Variable] [AutoSave] [End] or [Random].

【Negative/Positive】
Select the trigger edge from negative or positive.

Negative: Falling edge
Positive: Rising edge

【Start Trigger】
This is the trigger to start recording.
If you click on the Rec button, it will start recording from the triggered frame to the maximum frame number. *The recording automatically stops when it reaches the maximum frame, so no need to push the trigger button again to stop.

【Variable Trigger】
After pressing the trigger input, it will record for a certain period of time and stop.
You may use this function when you wish to check the image right before and/or after the trigger input.
You can change the range by percentage for how long it will record before and after the trigger input.

【AutoSave】
After pressing the trigger input, it will record for a certain period of time and stop.

The recorded data will be saved to a file in the directory that was pre-set.

After the file is saved, it will go back to be on hold for the trigger input again.

You can change the range by percentage for how long it will record before and after the trigger input.
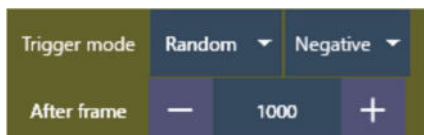
Use the button [⚙] for the directory settings.

If you click on the button [Rec stop] without using the trigger button, AutoSave will be terminated.

【End Trigger】
It will end recording at the time of receiving the trigger input.

【Random Trigger】
You can set a certain number of frames and record this numbers of frames into the camera memory every time you press the trigger.

Select the trigger mode as Random and set the number of frames (recording frames per trigger).
When you click on the Rec button, the camera will be on hold for recoding.
If you click on the trigger in this condition, the camera will start recording from receiving the trigger input for the number of frames you have previously set. This action can be repeated every time you click on the trigger, as long as the memory allows.
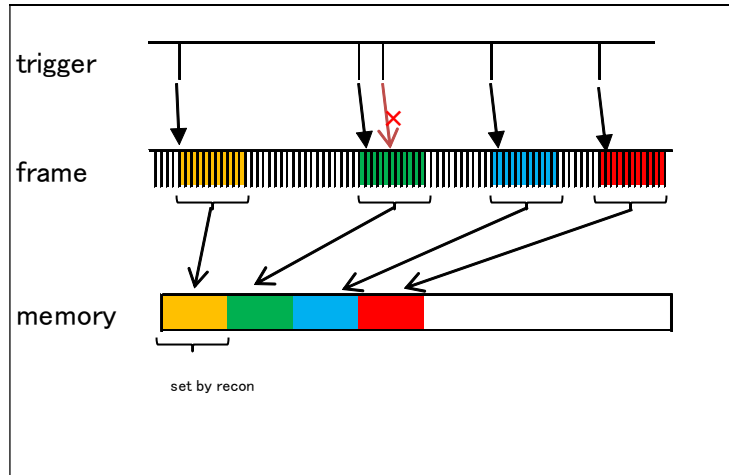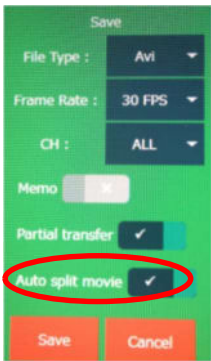
Figure 55 Random trigger image

In case that the recording was done with the random trigger mode and also with the auto split mode, each group of frames will be saved as individual files.

When it is in a random trigger mode, the monitoring function is not available.

6. Motion Trigger

Set the motion trigger settings in Settings dialog shown in **Figure 39**.

Set the scale on the image and the trigger will automatically turn on when the average brightness of the scale reaches the pre-set brightness. The settings will be the same as in **5 Trigger input**.
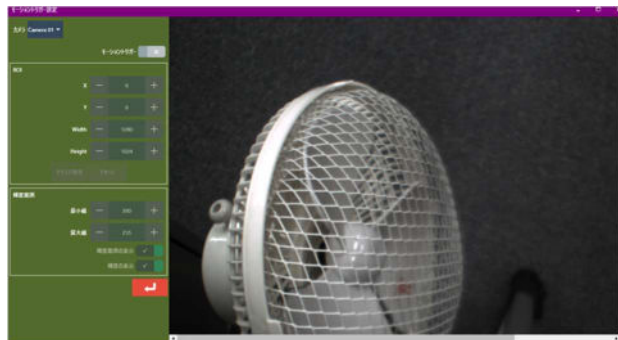

Figure 56 Motion Trigger settings screen

【Adjust button】

① Camera select button

Select the camera that you need to use the motion trigger.

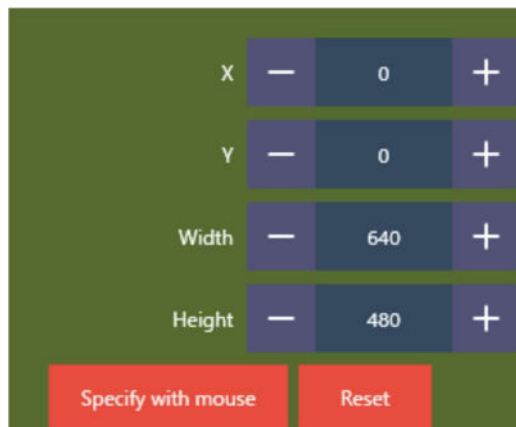② Choose to enable or disable the motion trigger.

③ ROI settings

Figure 57 Motion Trigger ROI settings

Assign the scale for the motion trigger as shown below.

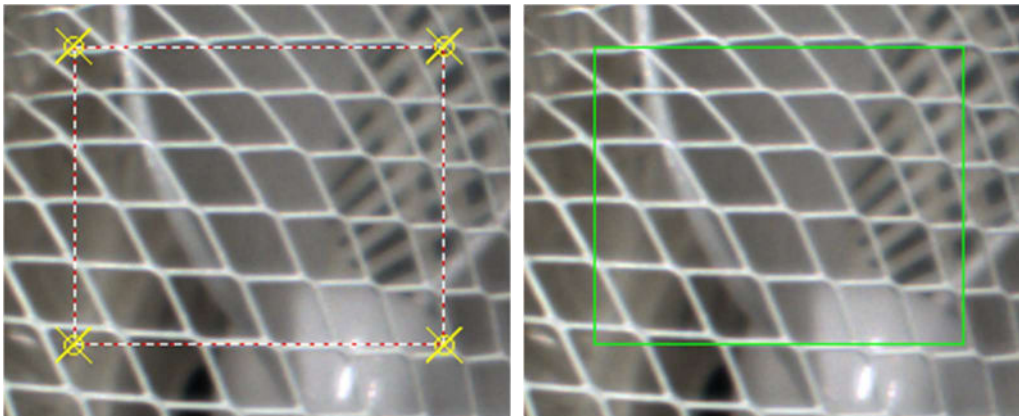You can also set the scale on the image by clicking on 【Specify by mouse】. Confirm with the right click.

Figure 58 Motion Trigger ROI settings screen
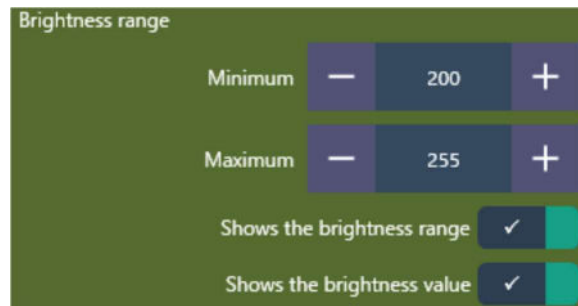
④ Choose the brightness level.

Figure 59 Motion Trigger Brightness level settings screen

Set the range of brightness level for the motion trigger.

You can check the current brightness level on the left corner. You can choose the display settings by clicking on and off in the green boxes.
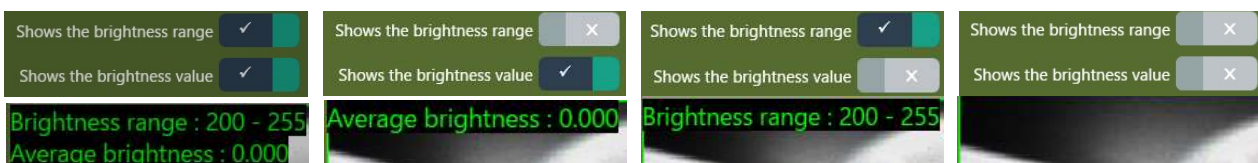

Figure 70 Motion Trigger Brightness information

7. Histogram

Select the histogram tool in Settings dialog shown in **Figure 39.**
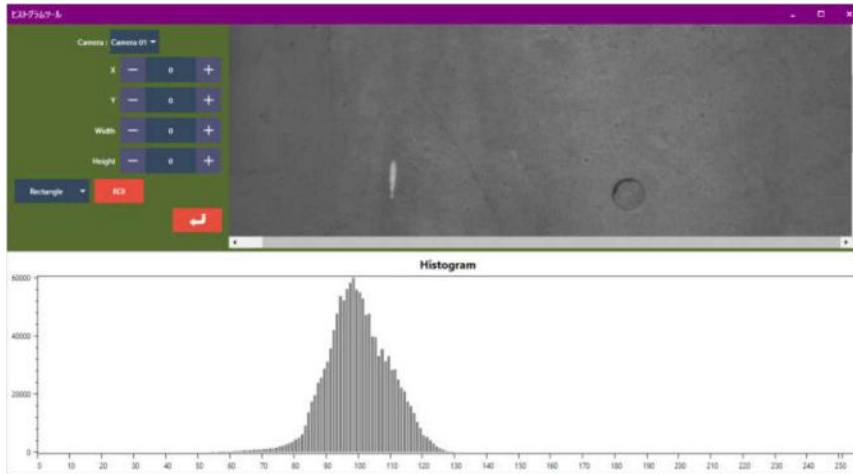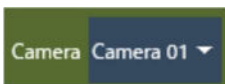Choose the range on the image and the histogram will be displayed for that area.

Figure 71 Histogram tool screen

【Adjust button】
⑤ Camera selection

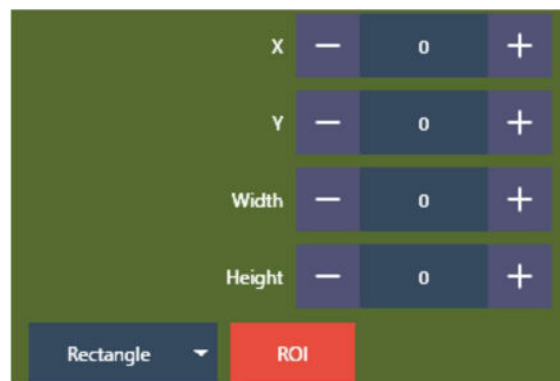Select the camera that you wish to display the histogram.

⑥ ROI settings

Figure 60 Histogram tool ROI settings

Assign the area on the image using [ROI] button.
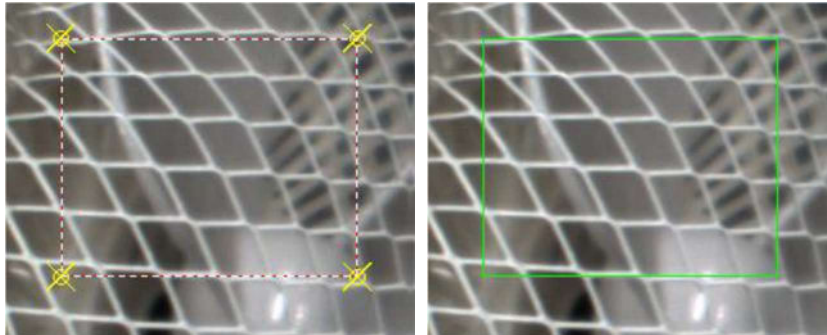You can select the shape of the area either rectangle or round. Confirm with the right click.

Figure 61 Histogram tool ROI settings

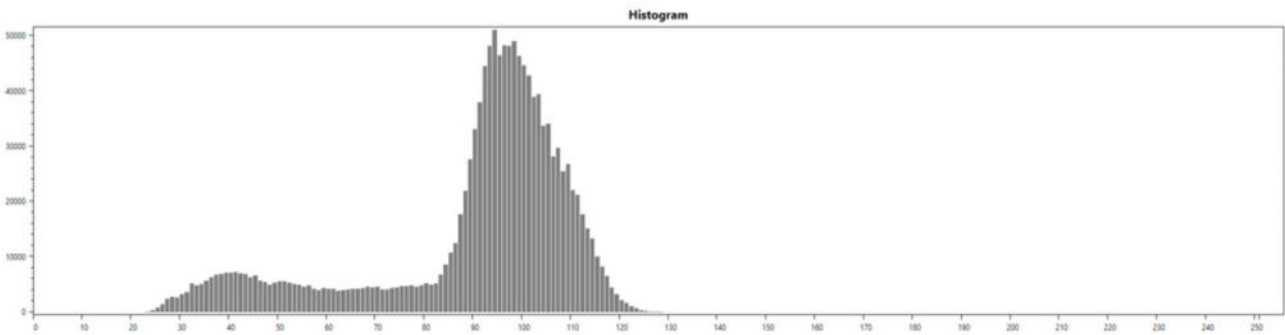Histogram of the selected ROI will be displayed on the bottom of the screen.

Figure 62 Histogram display

8. Image Capture

Refer to Error! Reference source not found. **45)** to see the Image Capture tool.

If you press the "Capture" button on the live image, a still image will be saved in the memory.

Images saved in memory can be saved to a file at once later.
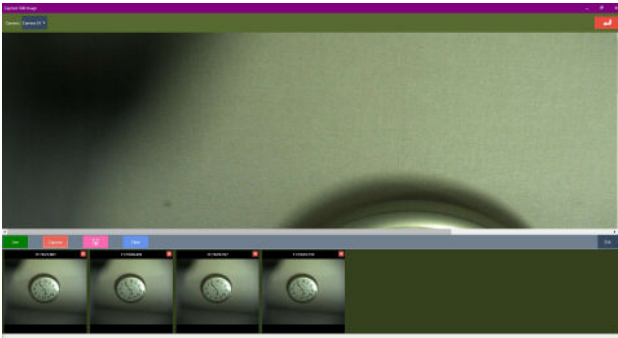

Figure63   Image Capture tool screen

[Adjustment button]

⑦ Camera selection

Select the camera from which you want to capture still images
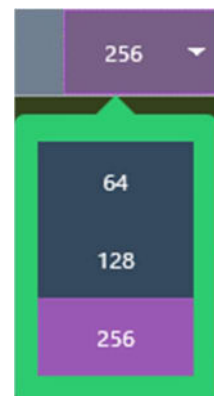
⑧ Manual operation button

Figure 64 Image Capture button

Live: Display the camera live image.

　　　Click an image in the thumbnail list to display it on the screen.

　　　It helps to switch from a thumbnail image to a live image.

Capture: Capture still images and add them to the thumbnail list at the bottom of the screen.

🖫: 　Save the still image from the thumbnail list as a file.

Clear: Clear the thumbnail list.

256: 　Change the thumbnail size.

[🖫] When you press the button, the following dialog will be displayed.

Set the file save location, file name, format, etc. and click "OK" to save.

Save Settings

Output Directory

C:\Users\y-pla\OneDrive\Desktop

Output Filename

○ Use Timestamp (hhmm_ss_fff)

Prefix _____ Suffix _____

● Output in sequential numbers

Filename _____ Starting Number 0001

Image Type
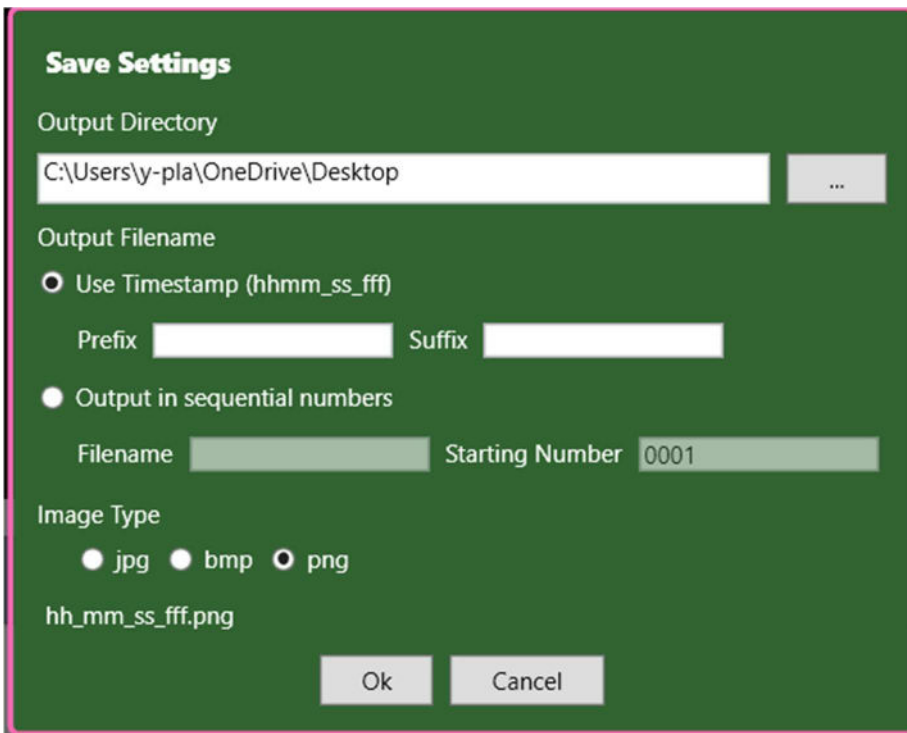
● jpg　● bmp　○ png

hh_mm_ss_fff.png

Ok　　Cancel

Figure65 Image Capture Tool save screen

9. Hot swapping

Hot swapping is to record with a camera disconnected from PC.
Click on the HS Rec button, and hot swapping recording will start (you will need a power supply for the camera).
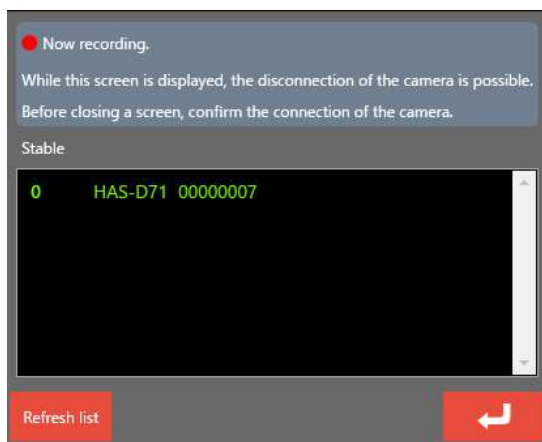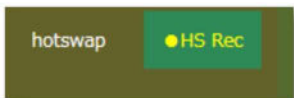

Figure 66 Hot swapping recording

When the dialog shown in **Figure 66** appears, you can safely unplug the USB cable from the camera. Even in this condition, the camera will keep recording.
When the camera receives trigger input, it will stop recording.

When you insert the USB cable to the camera again and click on the button , the camera will go back to the regular status. You will be able to review and save the recordings.

10. Synchronization

More than two cameras can be synchronized and record simultaneously.
Please refer to the synchronization settings in a separate manual.

Please start the HAS-XViewer when all the cameras are synchronized.

10.1. Start application

When you start the application, the monitoring windows will appear on the screen as shown in **Figure 67** based on the number of connected cameras.
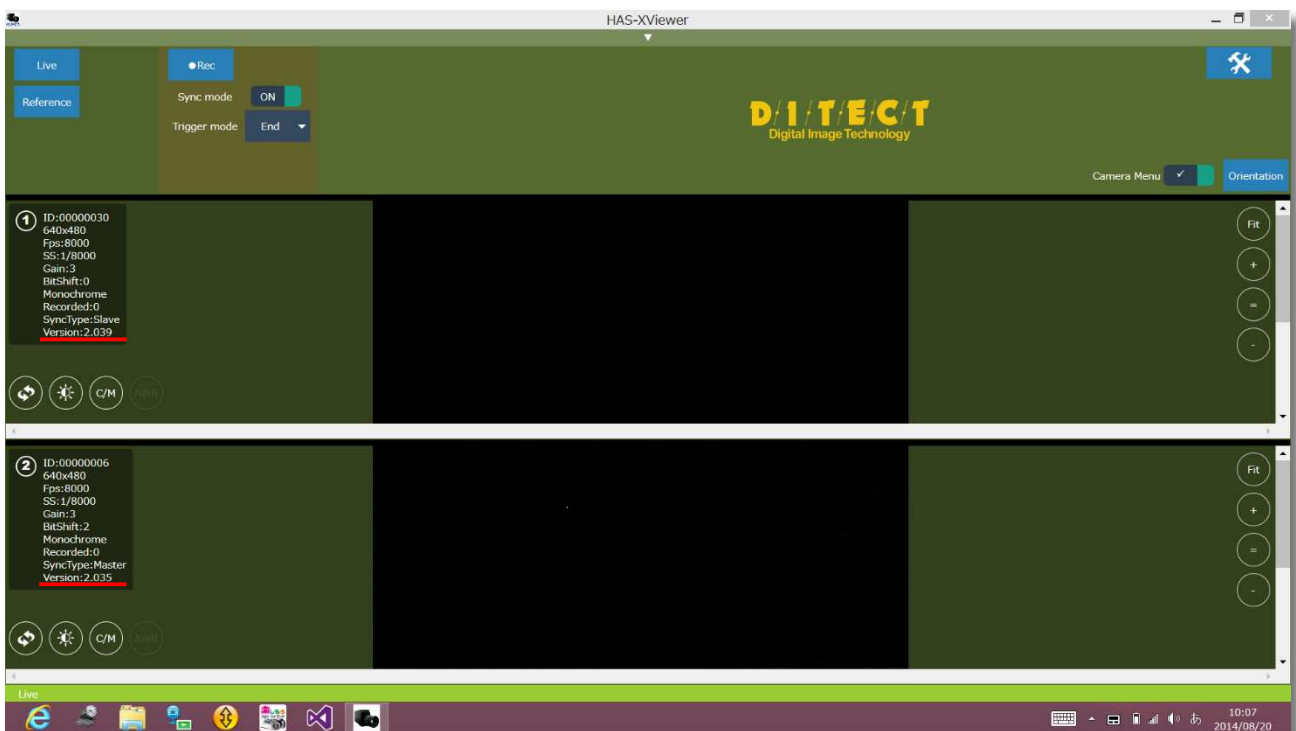You can see which camera is the master and the slave on the status menu: Sync Type.

Figure 67 Two-camera synchronization

10.1.1   Recording

The recording method is the same as when using a single camera. Please use the Rec button to record and make sure to use the trigger button to stop recording instead of using the stop button on the main screen otherwise synchronization could be disordered. When you review the recording, you will see the images from all the connected cameras.

When using multiple cameras with DMA mode, soft trigger or motion trigger are not available to use. You will need a physical trigger switch.

11. Synchronize with external device

It you wish to synchronize your camera with other external devices with a sync cable and want to send the signal and use trigger, please refer to the separate instruction manual.

12. Camera memory mode
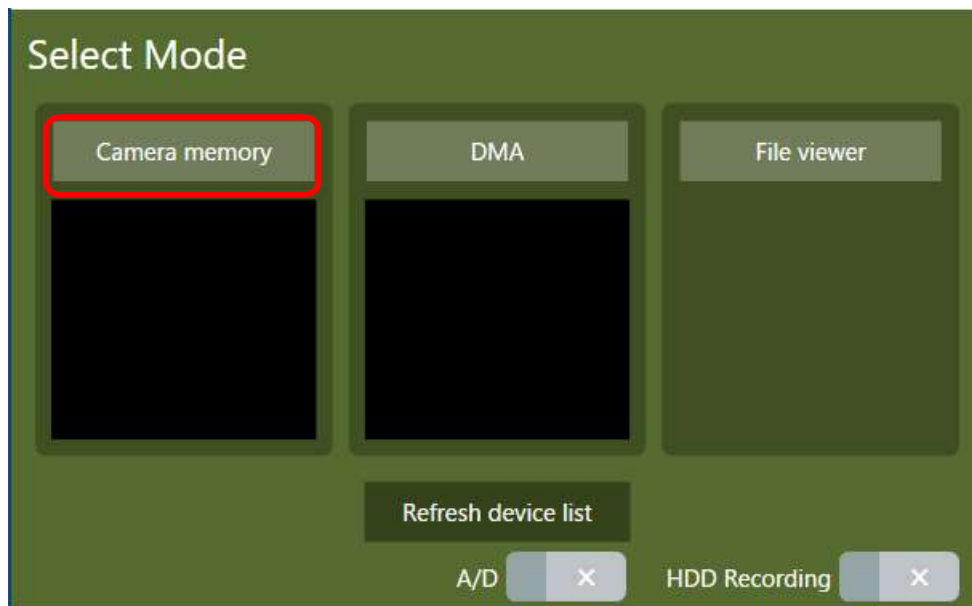
Using the camera internal memory to record.

Figure 80 Camera memory mode

Since data transmission is completed inside the camera, you can make the most of high speed camera specs.
It is available to record with multiple cameras, however it can only record up to the size of the camera internal memory.

13. DMA mode

Recorded images are transmitted to the connected PC while recording.
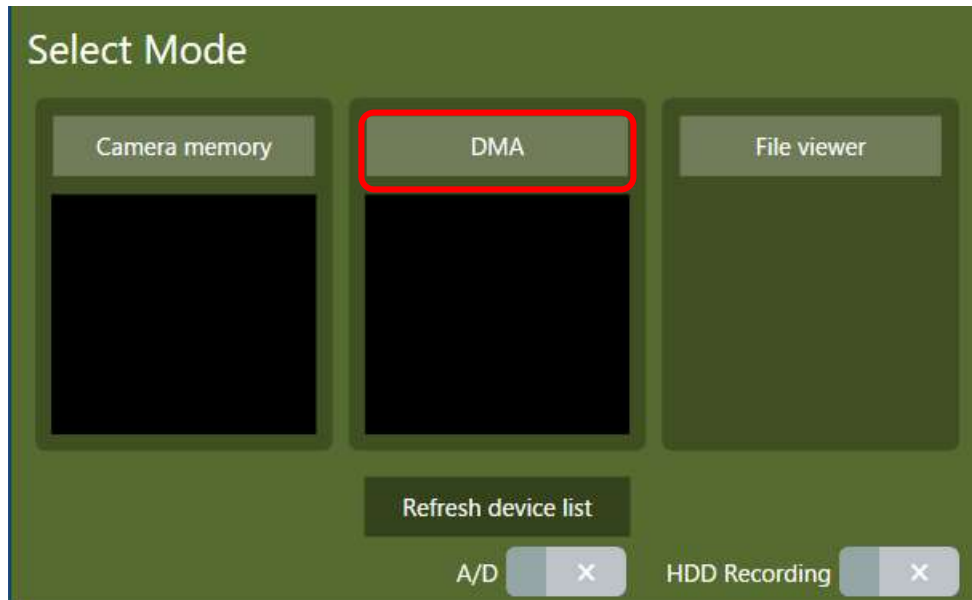

Figure 81 DMA mode

13.1. Recording with PC memory

Use the PC memory while recording.
Using a PC with larger memory than the camera internal memory, it enables to extend a recording time.

Due to transmitting the image data from the camera to PC, recording mode needs to be less than 300MB/s.
With the 32bit OS, the available memory is fairly limited. Using 64bit OS is highly recommended.

13.2. HDD recording

This is the mode to save the recorded image data directly to HDD. *This is an extra-cost option.

Long-time recording is available as long as the HDD storage allows.
Due to transmitting the image data from the camera to PC, recording mode needs to be less than 300MB/s.
Available recording mode depends on the writing speed.

With the HDD mode, the format of the file is always AVI in RAW mode.
Files will be output without any adjustment, such as Gamma correction, brightness correction, contrast, color adjustment, and rotate/flip.
When you use a color camera, monochrome data file in Bayer format will be created.

By using File Viewer mode of HAS-XViewer, RAW images can be converted to the status of when it was recorded.

13.2.1   Use HDD recording

Insert the protect key for the HDD recording to the PC, and check【HDD Recording】on【Select Mode】 dialog.

Not available for the use with multi-camera.
Not available to use with A/D.

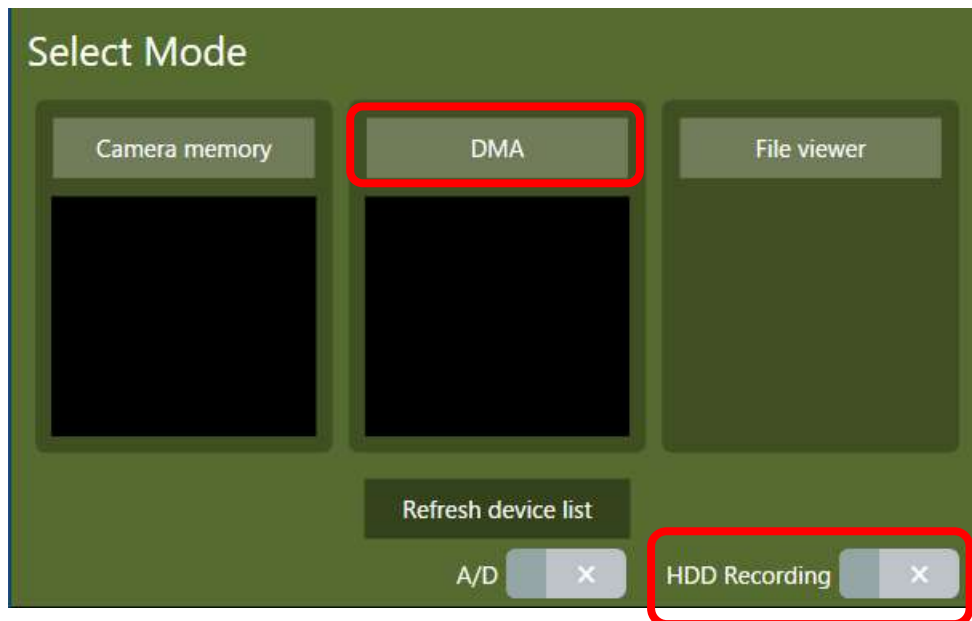**Figure 82 HDD recording**

【DMA】Start the application in DMA mode.
HDD Recording is not available when【Camera memory】or【File viewer】is selected.

After the window is open, click on and open the settings menu.

 button won't appear if you didn't check in the HDD Recording box in the Select Mode dialog.
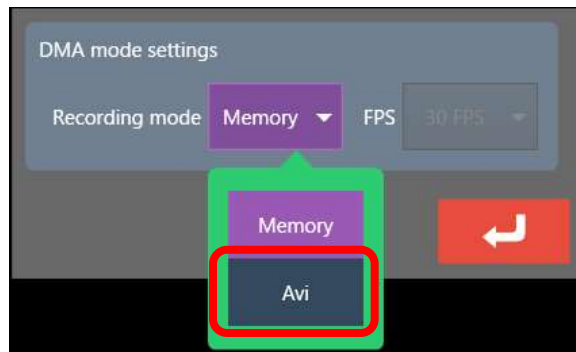
Set【Recording mode】to AVI Recording.

Figure 83 DMA Recording settings

Figure 68 AVI settings

After the screen is switched, set the frame rate to play the AVI file (frame rate to play with a media player) and the directory to save a file.

Click button and apply the settings.

Set the image size and frame rate, and click Rec button to start recording.

Only end trigger is available for the trigger mode.
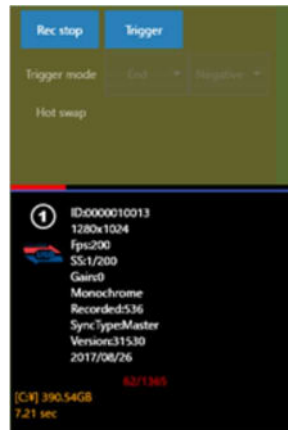Hot Swap is not available either.

Figure 69   Recording progress bar

Red progress bar is the status that the images are being transmitted to the PC memory.

Blue bar is the status of disk writing.

When the blue bar is on the right edge, it means that disk writing speed is fast enough.

When the disk writing speed is slower than the transmitting speed to PC, the blue bar will reach the left edge and recording stops.

When recording stops, it will switch to the play screen. Only the movies saved in the PC memory will be played.

In order to check the whole recording data, use the file saved in the disk.

You can check the movie file with a media player.

When you adjust gamma/contrast etc. or use a color camera, use the File Viewer mode of HAS-XViewer to check the movie.

14. File viewer mode

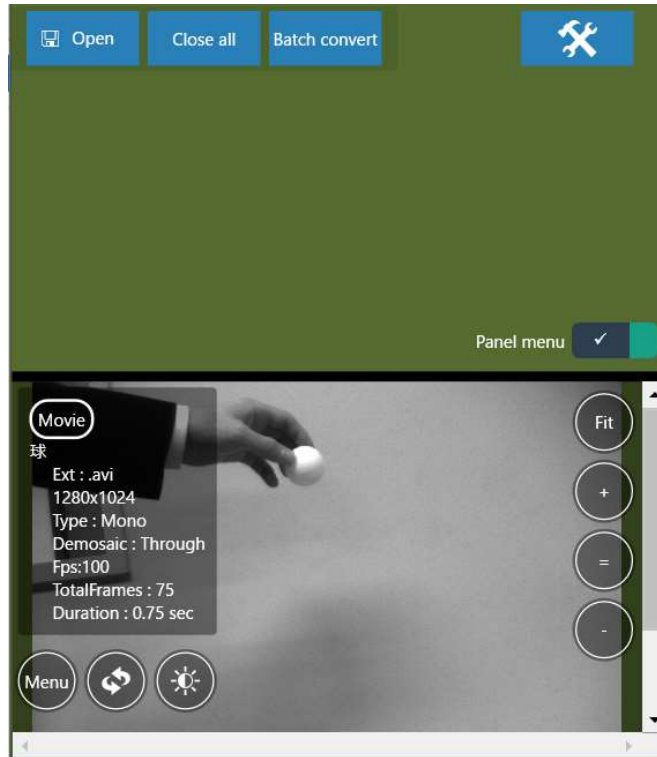You can check and make adjustments to the AVI files saved in HAS-XViewer.

Figure 70 File Viewer mode

 Open a movie file

 Close all the open movie files

 Convert the AVI file saved in RAW mode to a general movie format using HAS-XViewer. Please refer to **14.3 Batch conversion** for more details.

 Check to show the menu on the screen.
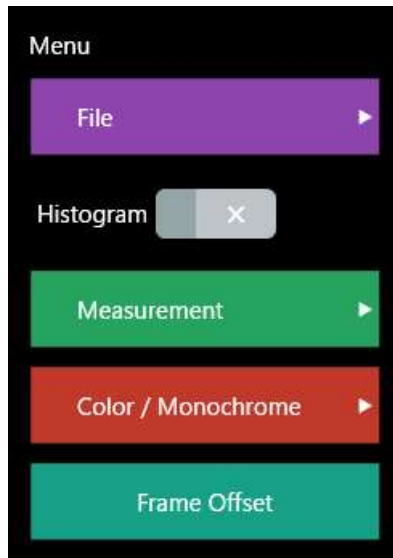
【Menu】

Figure 71 File Viewer menu

   Check to show the histogram.

【File】

   Open AD data created by HAS-XViewer.
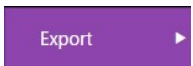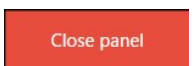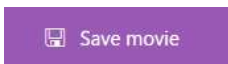
   Select the process to save a file.

   Close a movie file and panel.

【Export】

   Save a movie file.
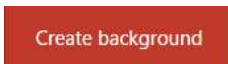
   Save still images.

   Save still images to a clipboard.

   Create a thumbnail image.

Please refer to **Figure 34 Save the thumbnail image settings** for more details.

   Create a background image.

Please refer to **Figure 40 Create background image** for more details.

【Measurement】

Calibration　Process the calibration for distance/velocity measurement.
Please refer to **4.3 Calibration** for more details.

Easy Measure　Process the easy measurements.
Please refer to **4.4 Easy Measure** for more details.

Measure　 Process manual measurements.
Please refer to **4.5 Manual Measurement** for more details.

【Color/Monochrome】

Bayer Demosaicking ✓　Switch between color/monochrome.

Bayer type ▶　Select a Bayer format.
Select a color filter for conversion pattern.

RGGB
BGGR
GBRG
GRBG　Select the color filter for Bayer

One Shot White Balance　Get and apply white balance.

Reset white balance　Reset white balance.

【Frame offset】

Frame Offset
0
Reset

Adjust the frame position in a movie file.

14.1. Load images output from LTRecorderPro

Load a RAW file saved in LTRecorderPro.

Figure 72 Open button

Click [Open] button to select a file to open.
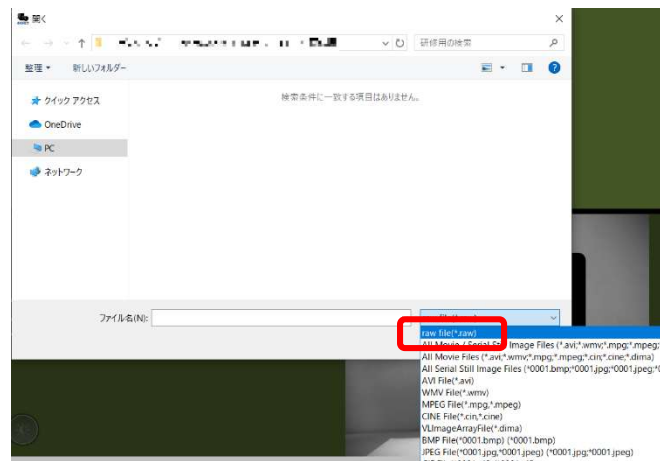
Figure 73 Open a file

Change a file format to "raw file(*.raw)" and select a Raw file saved in LTRecorderPro.
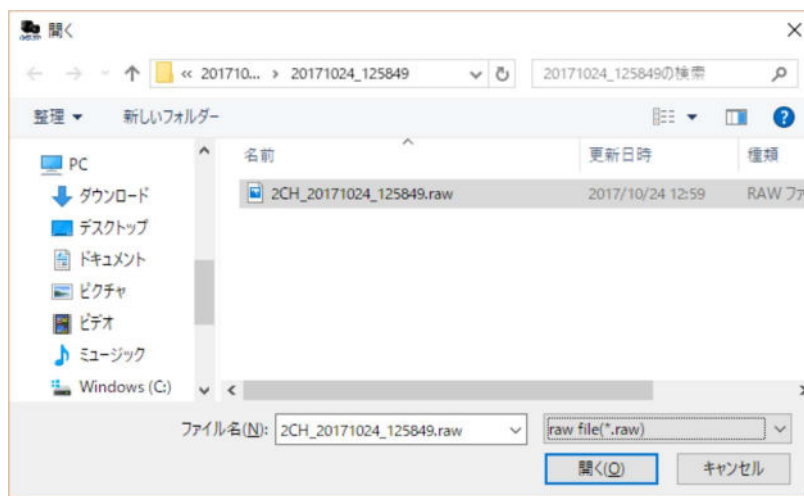
Figure 90 Select RAW file to open

14.2. File viewer settings

Click on [tools icon] button and change the File Viewer settings.

Figure 91 Settings

【Bayer decoding algorithm】
Select the algorithm for Bayer algorithm

【Sequence number in filename】
When there are no sequential still images in open file dialog to load, you can change Start number and Display digit under Sequence number in filename, and load images again.

【Background color】
Change the background color of this application.

14.3. Batch conversion

Click [Batch convert] button and Batch Converter window will appear.

Convert AVI files saved in Raw mode to a general file format using HAS-XViewer.
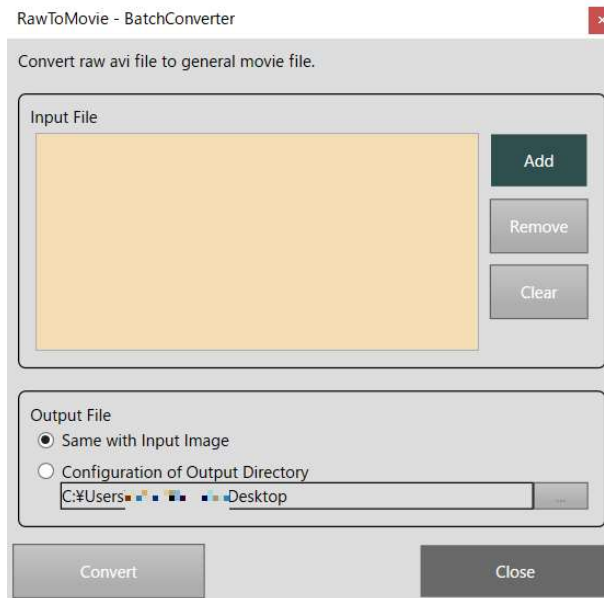
Figure 92 Batch converter window

Select either output to the same directory as an input file or select the output directory.

When Same with Input Image is selected, the file name will automatically be changed if a same file name already exists.

Click on [Add] button to add a compatible file (AVI file saved in Raw mode), and click on

[Convert] button.

You can also add AVI file by drag and drop a file to the Batch Converter window.

Only Raw AVI file created by HAS-XViewer can be added.
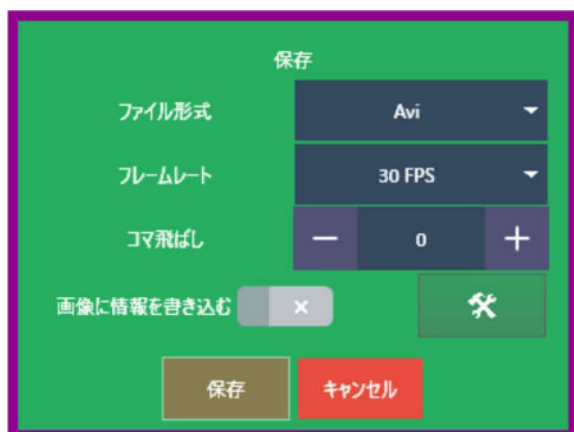
Figure 93 File format settings

Select a file format and click button to start conversion.

15. A/D

When you connect the Contec AIO-160802GY-USB, you can input and record the A/D data simultaneously with camera input. *This is an extra-cost option.

Connect the Protect key for A/D and Contec USB device.
Open the application and check the A/D box.
Not available to use with HDD Recording.

Figure 94 A/D check box

Select either 【Camera memory】or【DMA】.
When the application opens, you can find the A/D control on the screen.
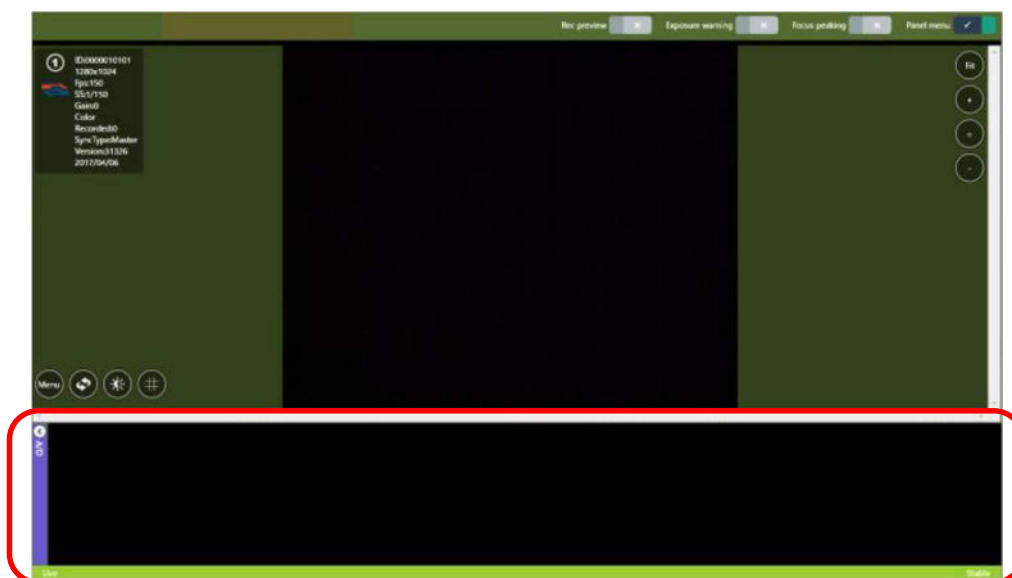
Figure 95 A/D control

15.1. A/D device

This application supports the device below.

Contec   AIO-160802GY-USB
Voltage range: -10V～+10V
Max sampling: 250000Hz
Max number of channels: 8ch
Can be synchronized with an external clock
Resolution: 16bit

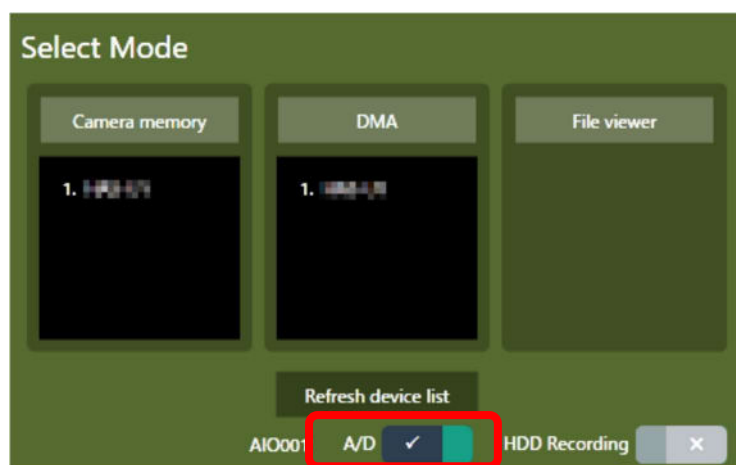| Channels	Sampling frequency	Interval
1ch	250kHz	4µs
2ch	125kHz	8µs
3ch	83kHz	12µs
4ch	62.5kHz	16µs
5ch	50kHz	20µs
6ch	41.6kHz	24µs
7ch	35.7kHz	28µs
8ch	31.25kHz	32µs

*1ch is used for trigger input.
*Maximum sampling frequency won't be available depending on the PC environment.

Figure 74 USB A/D device

15.2. A/D device connection

Please make sure to connect the camera trigger output cable to AI00.
Connect the signal cables to AI01-AI07.

Figure 75 Pin arrangement

When you use this A/D device with a single camera, connect the camera sync output cables to DI02 and DGND.

Application	Device
0ch	AI00
1ch	AI01
2ch	AI02
3ch	AI03
4ch	AI04
5ch	AI05
6ch	AI06
7ch	AI07

15.3. A/D menu

When you click on the purple bar for A/D control on the left, A/D menu will appear.

Figure 76 A/D menu

You can switch among A/D settings, Graph settings, and Misc.

15.3.1 A/D settings
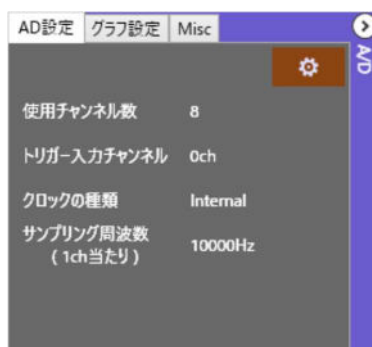
Change the settings of A/D

Figure 77 A/D settings

Click on [⚙] button to open the A/D settings window.

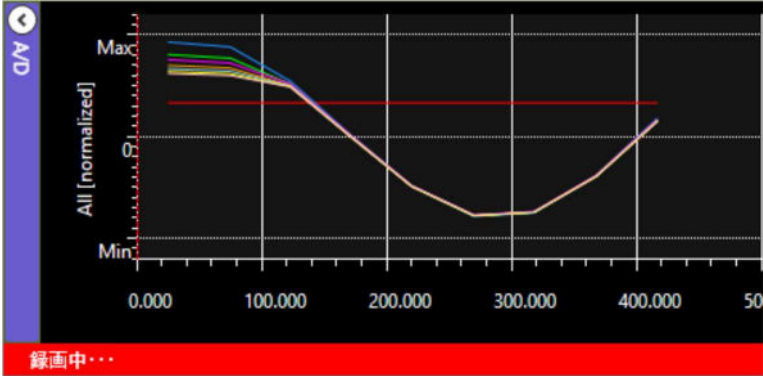| Item	Description
Number of channels to be used	Input the number from 1-8. Sampling rate per channel decreases as the number of input channels increases.
Trigger input channel	Select the channel to be used for trigger input. Select the number from 0-7. Default is 0 channel.
Clock Type	Select either internal/external synchronization. Internal synchronization synchronizes the A/D device internally. External synchronization inputs the camera sync signal to A/D device. A/D data will be saved corresponding to each camera frame.
Clock Polarity	Select the polarity for the external synchronization.

Figure 100 A/D setting window
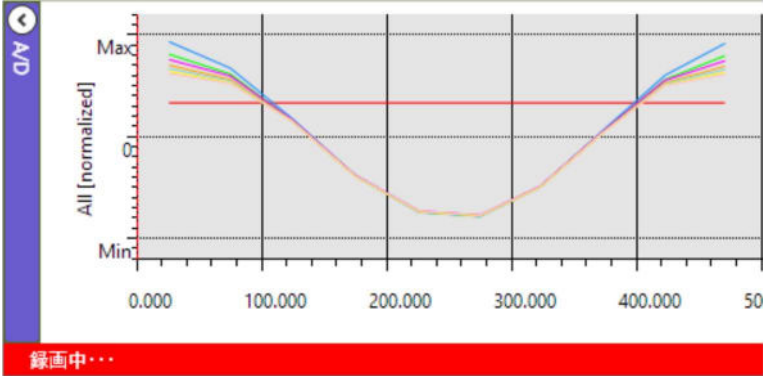
15.3.2   A/D graph settings
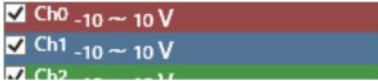
You can change the settings of graph display.

When there is no data exists, there are some buttons that cannot be used. Once the data is saved, those buttons will also be available to use.

Figure 101 A/D Graph display settings

Item	Description
|-> <-| / |<- ->|	Change the time axis range. You can select from 10µsec, 50µsec, 100µsec, 500µsec, 1msec, 5msec, 10msec, 100msec, 500msec, 1sec. |-> <-| is to Expand, and |<- ->| is to Shrink.
Frame	Make the time axis range of the graph the same as the range of camera frame.
分割表示	Select the graph display. ・Cascaded multi-data displayed on one graph ・Split graph display
Head / Mid / All	Select the current position of data from the head (left), in the middle, or the whole graph.

B/W	Switch the color of background and the letter (black/white). Black background White background
☑ 単位変換	Select to convert from voltage and display the unit that is set in A/D settings.
⚙	Display the graph setting window. Change the unit and item names.
☑ Ch0 -10 ~ 10 V ☑ Ch1 -10 ~ 10 V ☑ Ch2	Show each channel's details. Uncheck a box not to display a graph.

Graph setting window

Click on [⚙] button to show the graph setting window

Figure 102 Graph settings for each channel

Item	Description
Channel	Select a channel to change settings.
Data label	Set a data label to be displayed in the legend of the line graph.
Color	Color of the line graph. *Not changeable
Y – Max value	Set the Max value for the line graph. Make no influence on the measurement values. Unit will be set in the unit section.
Y – Min value	Set the Min value for the line graph. Make no influence on the measurement values. Unit will be set in the unit section.
Unit	Select the unit to be displayed.
Calibration	Set the unit per volt. You can select the unit in the unit section. e.g. 3000rpm per 3V 1000kg per 10V

15.3.3   Misc

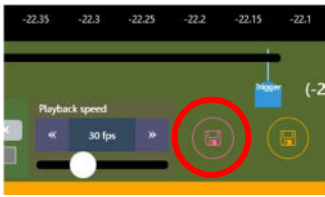Other settings for A/D control.

Figure 103 Misc settings

Item	Description
Save Motion CSV	Output the saved file as DIPP-MotionPro format.
Save Data	Save the data as the HAS-XViewer original binary format. *You can also save the movie file and the data at a time by clicking on button on the main menu. Saved data can be loaded with File Viewer mode of HAS-XViewer. Please refer to **14 File viewer mode** for more information.
Graph Position	Select the position of the graph.
Status	Show the status of A/D device.

A/D data save button on the main menu

Click on the save button.

Check in the A/D data box.

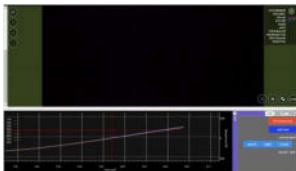When you click on Save, A/D data (.addat format) will also be saved in the same directory as a movie file.

Graph positions are selected from these three below.

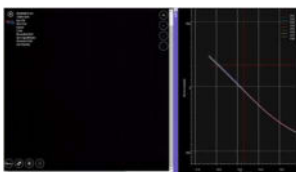*For File Viewer mode, Bottom and Overlay are available.

Bottom   Show the graph at the bottom of the main screen.

Right   Show the graph on the right of the main screen.

Overlay   Show the graph over the camera image (overlaid)

16. Update history

Release data	Version	Release notes
2017/11/27	1.3.0.11	File viewer function / DMA transfer function ● A/D recording function (paid option) ● Added the simple measurement function and HDD recording function (paid option)
2018/07/12	1.3.2.0	● Addition of background image / thumbnail creation function
2018/12/05	1.3.4.2	● Fixed a bug when the last frame of random trigger is missed when HAS-U1 / U2 is used in DMA mode ● Fixed a bug when one more recording than the specified number was recorded when HAS-D71 was used with a random trigger ● Fixed a bug when the AVI file saved by using two or more cameras failed to be read
2019/03/06	1.3.5.0	● Added a stop process function when the free space becomes low during long-time recording ● Fixed a bug when the check box disappears itself if the check is removed when saving AVI ● Added the processing to apply frame average when saving skipped frames (save motion blur) ● Added the concentric distance tool / grid tool ● Added the histogram measurement tool with ROI
2019/10/17	Ver.1.3.9.1	● Fixed a bug in HAS-EF when the screen could be split depending on the PC
2020/01/23	Ver.1.3.10.2	● Changed the resolution of 1280x1024 to 1280x1028 for the following models: of HAS-DX and HAS-D73
2020/11/04	Ver.1.4.0.4	● Changed the frame rate of HAS-D73 model
2021/08/03	Ver.1.4.0.12	●Added luminance trigger for HAS-EF
2022/03/09	Ver.1.4.0.16	Changes: ● Save CSV file bug fixed in HAS-X Viewer AD ● Low frame rate AVI files saving feature is added

Operation Manual Rev:2.19

17. Contact

Please visit our website for detailed information about DITECT products. You can access all product descriptions as well as obtain information about exhibitions, and you can make a request for information and other inquiries.

*Price, technical specification, and appearance are subject to change without prior notice.

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