Photron FASTCAM Viewer

for High Speed Digital Imaging

User's Manual

Ver.3 Revision 2.01E

Operation section

Photron

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Introduction

Thank you for purchasing your Photron FASTCAM series high-speed camera system.
This manual contains the operating instructions and warnings necessary for using the Photron FASTCAM Viewer (referred to as PFV).
Please read the entire manual before using the software.
If any part of this manual is unclear, contact Photron using the contact information printed at the back of this manual.

Manual Notation

The following icons and symbols are used in the explanations in this manual.

Icon/Symbol	Description
	This symbol indicates content that should always be read.
	This symbol indicates instructions that should always be followed when using the software, or things to be careful of when using the software.
	This symbol indicates supplementary items to be aware of when using the software.
	This symbol indicates the location of a reference.
	This symbol indicates a space for you to use for making notes.
“ ”	This symbol is used to indicate the names of items on a screen, references, dialog names, and keyboard keys.
[ ]	This symbol is used to indicate screen names, button names, and menu names.
< >	This symbol is used to explain operating procedures in diagrams and supplementary items.

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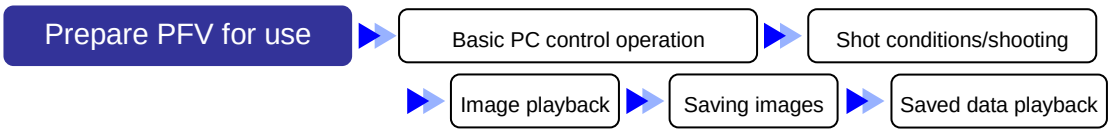
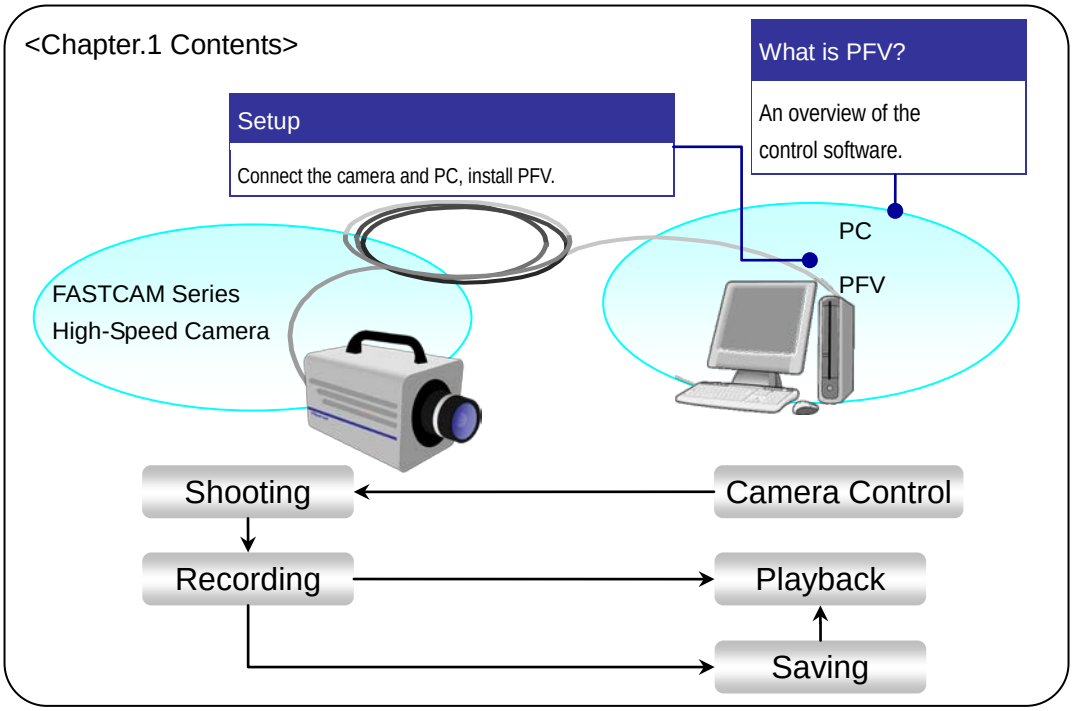
MEMO

Chapter. 1 **Before Use**



The following describes what to do before using the PFV for the first time.



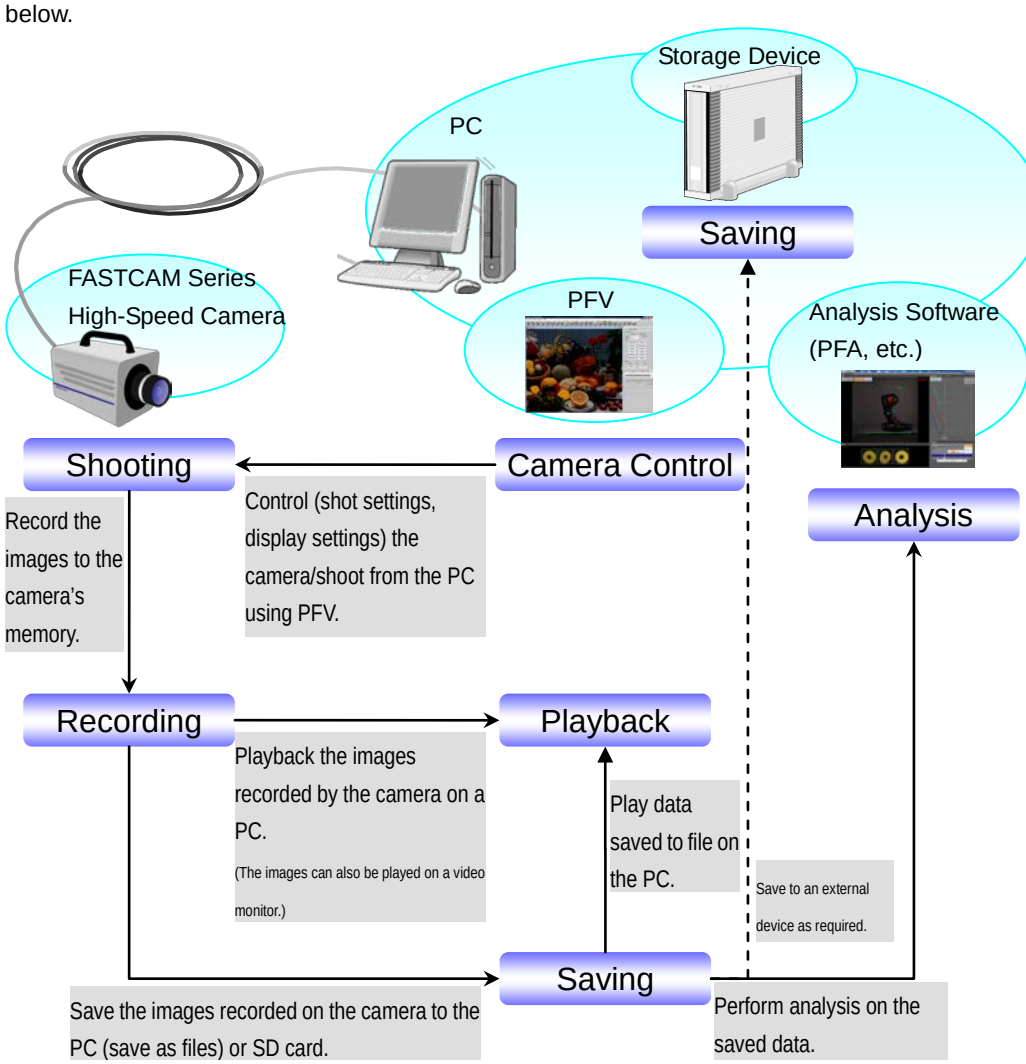
1.1. Photron FASTCAM Viewer Overview

1.1.1. What Is PFV?

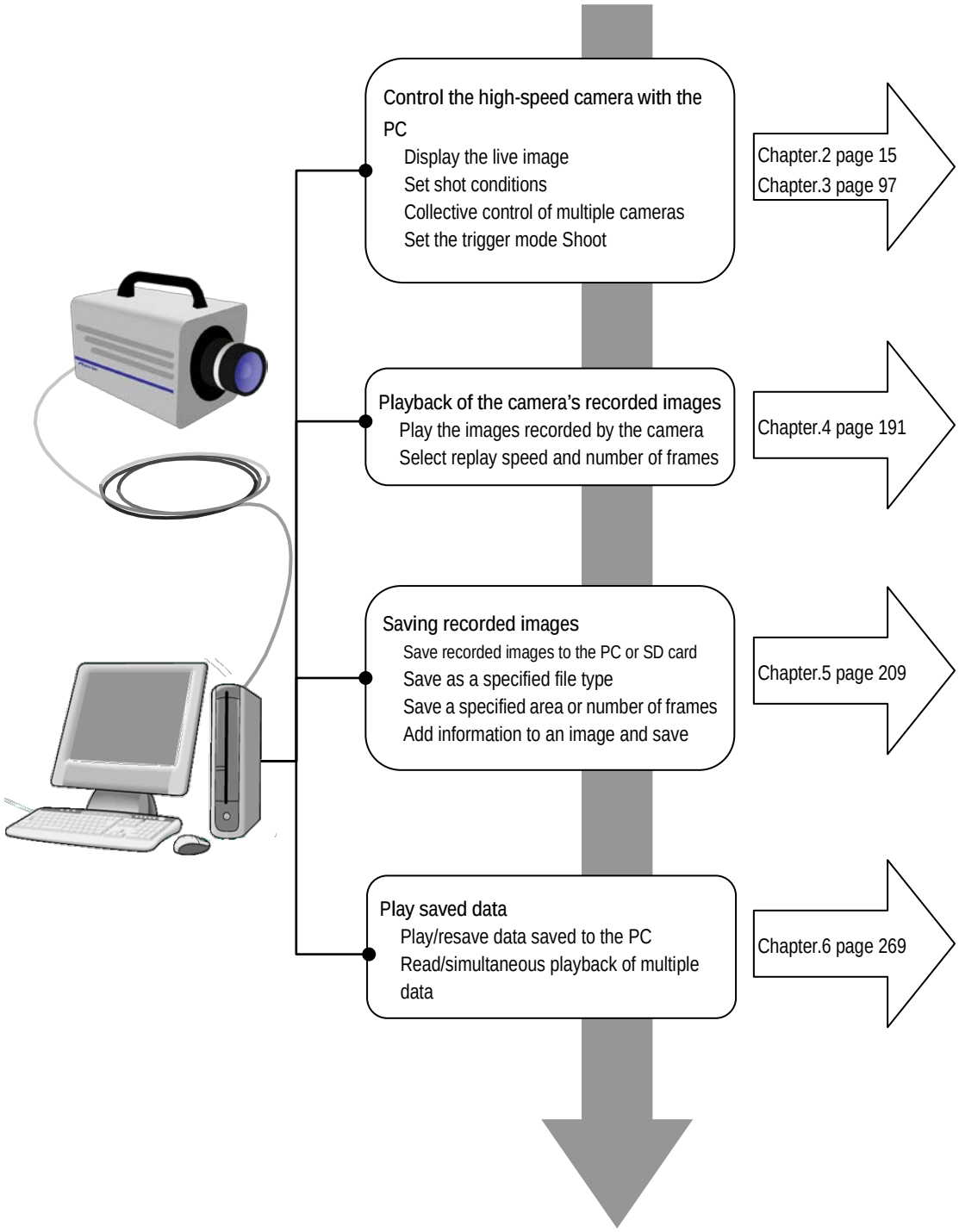
PFV is software used to control Photron FASTCAM series high-speed cameras from the PC. Operations such as setting camera options, shooting, and saving recorded data to the PC can be accomplished with PFV.
This manual covers PFV Ver. 3.

1.1.2. System Components

The basic system components when using a FASTCAM series high-speed camera are shown below.



1.1.3. What PFV Does



1.1.4. FASTCAM Series High-Speed Camera Capability Chart 1

Function / Model Name	FASTCAM SA-Z	FASTCAM Mini UX100	FASTCAM Mini UX50	FASTCAM SA-X2	FASTCAM SA8
Variable Frame Rate / Resolution	√	√	√	√	
Auto Exposure	√			√	
Low-Light Mode	√	√	√	√	√
Shading Correction	√			√	
Pixel Gain Correction	√	√	√	√	√
Edge Enhancement Correction	√	√	√	√	√
Sensor Gain					
Dual-Slope Shutter	√			√	
External I/O Port	√	√	√	√	√
Event Marker	√	√	√	√	√
IRIG Input	√	√	√	√	
IRIG Synchronization	√			√	
IRIG Live Display	√	√	√	√	
MCDL Input					
Video Output	√			√	√
Video Out Setting During Memory Playback	√			√	
Color Temperature Setting(Color Only)	√	√	√	√	√
Pre-LUT Adjustment	√	√	√	√	√
Split Partition	√	√	√	√	√
Discretionary Partition Division					
Recording Memory Size Setting					
Partition Auto-Increment By Camera	√			√	√
Signal Delay Setting	√	√	√	√	√
Signal Width Setting	√	√	√	√	√
Programmable Switch	√			√	√
Shutter Lock Mode	√	√	√	√	√
SYNC OUT Times Setting	√	√	√	√	√
Output 8bit Select	√	√	√	√	√
Head Exchange					
Maximum Frame Rate Switching					
Auto Play	√			√	
Factory Defaults Setting	√	√	√	√	√
Resolution Lock Mode	√	√	√	√	
Shutter Speed u Seconds Notation	√	√	√	√	√
Switch Number of Record Bits	√			√	
Color Enhancement	√	√	√	√	√
Store Preset	√	√	√	√	√
Switch Hardware Recording Type	√			√	√
Status Indicator LEDs On/Off	√	√	√	√	√
FPGA Rewrite					
Shading Type					
Black Clip Level (Color Only)					
Synchronization with a variable frequency	√	√	√	√	
Frame Rate Mode	√			√	
Device Date/clock	√			√	
Lens Control	√			√	
Record During Save	√			√	
SD Card	√			√	
Hardware Image Trigger	√			√	
FAN Control	√				

FASTCAM SA7	FASTCAM SA-X	FASTCAM SA6	FASTCAM SA4	FASTCAM BC2 HD	FASTCAM SA5	FASTCAM SA2	FASTCAM SA3	FASTCAM CT3
	√	√	√	√	√	√	√	√
	√	√	√	√	√	√	√	
√	√	√	√	√	√	√	√	√
	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
	√	√	√		√	√	√	√
	√	√	√		√	√	√	
	√		√		√			
		√	√		√	√	√	
	√	√	√	√	√	√	√	√
	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√		√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√		√	√	√	√
√	√	√	√	√	√	√	√	√
					√			
	√		√		√			
√	√		√		√			
	√	√		√		√		
√	√	√	√	√	√	√	√	√
	√	√			√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√	√	√
√	√	√	√	√	√	√		
√	√		√		√			
				√				
				√				
	√							
	√				√	√	√	
	√							
	√	√						
	√							
	√							

1.1.5. FASTCAM Series High-Speed Camera Capability Chart 2

Function / Model Name	FASTCAM SA11	FASTCAM SA1	FASTCAM APX RS	FASTCAM MC2.1
Variable Frame Rate / Resolution	√	√	√	
Auto Exposure	√	√	√	
Low-Light Mode	√	√		√
Shading Correction	√	√	√	
Pixel Gain Correction	√	√	√	
Edge Enhancement Correction	√	√	√	√
Sensor Gain				√
Dual-Slope Shutter	√	√	√	
External I/O Port	√	√	√	√
Event Marker	√	√	√	
IRIG Input	√	√	√	
IRIG Synchronization	√	√	√	
IRIG Live Display	√	√		
MCDL Input	√	√	√	
Video Output	√	√	√	√
Video Out Setting During Memory Playback	√	√		√
Color Temperature Setting(Color Only)	√	√	√	√
Pre-LUT Adjustment	√	√	√	√
Split Partition	√	√	√	
Discretionary Partition Division				
Recording Memory Size Setting				
Partition Auto-Increment By Camera	√	√	√	
Signal Delay Setting	√	√		√
Signal Width Setting	√	√		√
Programmable Switch	√	√		√
Shutter Lock Mode	√	√	√	√
SYNC OUT Times Setting	√	√		√
Output 8bit Select	√	√	√	
Head Exchange				
Maximum Frame Rate Switching	√			
Auto Play	√	√		√
Factory Defaults Setting	√	√		√
Resolution Lock Mode				√
Shutter Speed u Seconds Notation	√	√	√	√
Switch Number of Record Bits				
Color Enhancement	√	√	√	√
Store Preset	√	√	√	√
Switch Hardware Recording Type	√	√		√
Status Indicator LEDs On/Off	√	√		
FPGA Rewrite				
Shading Type				
Black Clip Level (Color Only)				
Synchronization with a variable frequency				
Frame Rate Mode				
Device Date/clock				
Lens Control				
Record During Save				
SD Card				
Hardware Image Trigger				
FAN Control				

FASTCAM MC2	FASTCAM MH410K	FASTCAM MC1	FASTCAM – APX	FASTCAM - Ultima 512
√	√	√		
			√	√
			√	√
√	√	√		
√	√	√		√
			√	
√	√	√	√	√
	√		√	√
			√	√
			√	√
√	√	√	√	√
√	√	√		
√	√	√	√	√
√	√	√	√	√
			√	√
			√	√
√	√	√		
√	√	√		
√	√	√		
√	√	√	√	√
√	√			
			√	√
			√	√
√	√			
√	√			
√	√			
√	√	√		
√	√	√		
√	√	√		
√	√	√		

1.1.6. FASTCAM Series High-Speed Camera Capability Chart 3

Function / Model Name	IDP-Express R2000	IDP-Express R2000-F	FASTCAM - 1024PCI	FASTCAM - 512PCI
Variable Frame Rate / Resolution			√	
Auto Exposure				
Low-Light Mode				
Shading Correction	√	√	√	
Pixel Gain Correction	√	√	√	√
Edge Enhancement Correction	√	√	√	√
Sensor Gain	√	√		√
Dual-Slope Shutter			√	
External I/O Port	√	√	√	√
Event Marker				
IRIG Input				
IRIG Synchronization				
IRIG Live Display				
MCDL Input				
Video Output				
Video Out Setting During Memory Playback				
Color Temperature Setting(Color Only)	√	√	√	√
Pre-LUT Adjustment	√	√	√	√
Split Partition	√	√	√	√
Discretionary Partition Division	√	√	√	√
Recording Memory Size Setting	√	√		
Partition Auto-Increment By Camera				
Signal Delay Setting				
Signal Width Setting				
Programmable Switch				
Shutter Lock Mode	√	√		
SYNC OUT Times Setting				
Output 8bit Select			√	√
Head Exchange				
Maximum Frame Rate Switching				
Auto Play				
Factory Defaults Setting				
Resolution Lock Mode	√	√		
Shutter Speed u Seconds Notation	√	√	√	√
Switch Number of Record Bits				
Color Enhancement	√	√	√	
Store Preset				
Switch Hardware Recording Type				
Status Indicator LEDs On/Off				
FPGA Rewrite		√		
Shading Type				
Black Clip Level (Color Only)				
Synchronization with a variable frequency				
Frame Rate Mode				
Device Date/clock				
Lens Control		√		
Record During Save				
SD Card				
Hardware Image Trigger				
FAN Control				

1.2. Setup

Installing the PFV Software.

1.2.1. Necessary Items

Ready the PFV software installation DVD.
Photron cameras compatible with PFV Ver. 3 are listed below.

Product Name	Connection Method	Compatible OS
FASTCAM SA-Z	Gigabit Ethernet(1000Base-T)	Windows 8.1,Windows 8, Windows 7, Windows Vista, Windows XP
FASTCAM Mini UX100		
FASTCAM Mini UX50		
FASTCAM SA-X2		
FASTCAM SA8		
FASTCAM SA7		
FASTCAM SA-X		
FASTCAM SA6		
FASTCAM SA4		
FASTCAM BC2 HD		
FASTCAM SA5		
FASTCAM SA2		
FASTCAM MC2.1		
FASTCAM MC2		
FASTCAM SA3		
FASTCAM CT3		
FASTCAM SA1.1		
FASTCAM MH4-10K		
FASTCAM-APX RS	Gigabit Ethernet(1000Base-T)	Windows 8, Windows 7, Windows Vista, Windows XP
	IEEE1394 Photron Optical	Windows 7, Windows Vista, Windows XP (IEEE1394 is only 32-bit compatible)
FASTCAM-APX	IEEE1394 Photron Optical	
FASTCAM-Ultima 512		
FASTCAM MC1	Gigabit Ethernet(1000Base-T)	Windows 8.1, Windows 8, Windows 7, Windows Vista, Windows XP
FASTCAM SA1		
IDP-Express R2000	PCI Express x8	Windows 8, Windows 7, Windows Vista,Windows XP
IDP-Express R2000-F		
FASTCAM-1024PCI	PCI	Windows 7, Windows Vista, Windows XP
FASTCAM-512PCI		

1.2.2. Verify the Operating Environment

Verify that the host system has the required environment for using PFV.

Compatible PC	PC/AT Compatible Computer
Operating System	Windows 8.1 Professional, Windows 8.1 Enterprise, Windows 8.1, Windows 8 Professional, Windows 8 Enterprise, Windows 8, Windows 7 Ultimate, Windows 7 Enterprise, Windows 7 Professional, Windows 7 Home Premium, Windows Vista Ultimate, Windows Vista Enterprise, Windows Vista Business, Windows Vista Home Premium, Windows Vista Home Basic Windows XP Professional, Windows XP Home, The "DDraw video playback" function is not supported on Windows 8.1, Windows8, Windows 7. IEEE1394 is not supported on 64-bit versions of Windows. Windows 8.1, Windows 8, Windows 7, Windows Vista, Windows XP 32-bit/64-bit (x64) supported. To output AVI 1.0 files on Windows Vista, you must install an update with Windows Update (update number KB938979) or install Windows Vista SP1. To output MOV files, you must install QuickTime Player 7.5.5 or higher.
CPU	Intel Pentium III or compatible CPU 1GHz or higher Multi-core processor recommended
Memory	256MB or higher 1GB or higher is recommended
Hard Disk	UltraATA100 compatible 80MB or higher (during installation)
Display Resolution	1024x768, 24-bit color or higher 1280x1024, 24-bit color or higher is recommended
Other	・A high-capacity hard disk or removable media drive for saving recorded image data ・A DVD-ROM drive (for use during installation) ・When using the Gigabit Ethernet connection, a 1000Base-T capable NIC with “Jumbo Frame” support is recommended ・When using the Photron Optical connection, a Photron Optical interface PCI board is necessary ・SD Card Reader（for replaying images saved on an SD card）

1.2.3. Connecting the Camera and PC

Before installing the software connect the camera to the PC.
For detailed information on connecting the camera, refer to the camera's hardware manual.

- Items to prepare
  - ・Camera
  - ・PC
  - ・Cable appropriate to the connection method

Connection Method	Cable
Gigabit Ethernet	LAN cable (category 5e or higher)
PCI Express x8	-
PCI	-
IEEE1394	IEEE1394 cable
Photron Optical	Optical fiber cable

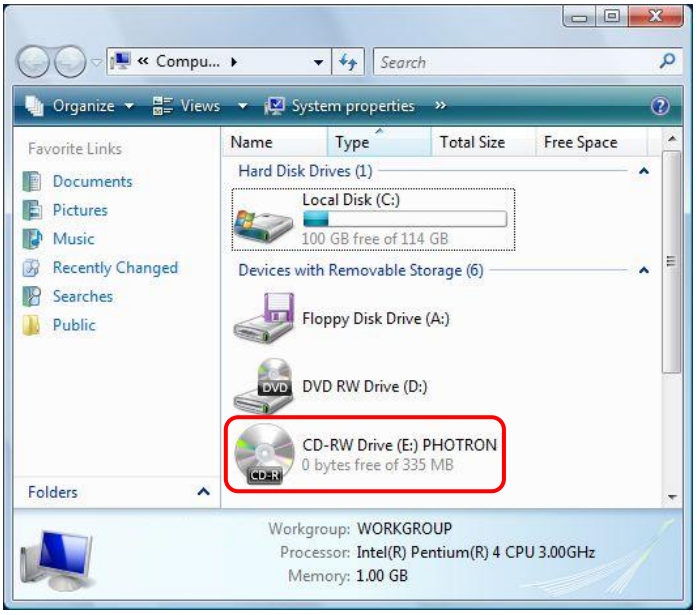
Supplement

- You must install the appropriate drivers for the connection method.

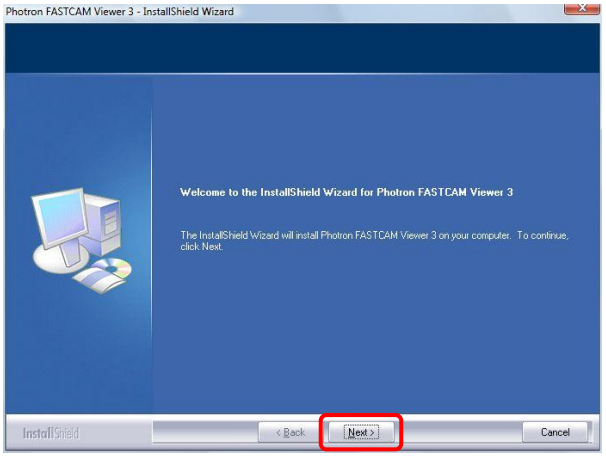
1.2.4. Installing PFV

Install PFV using the procedure shown below.

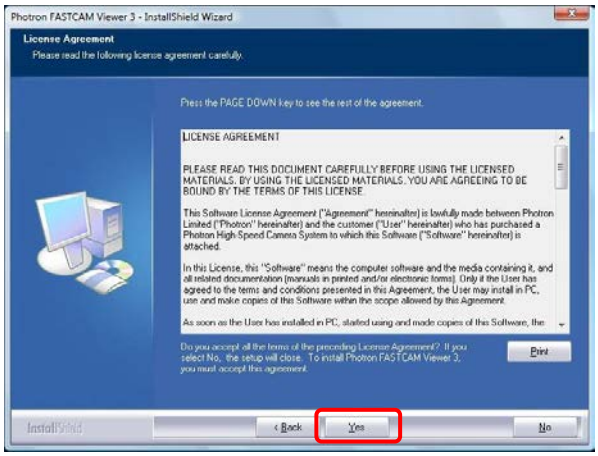
1. Insert the PFV installation DVD in the DVD drive and open that drive form “Computer”.



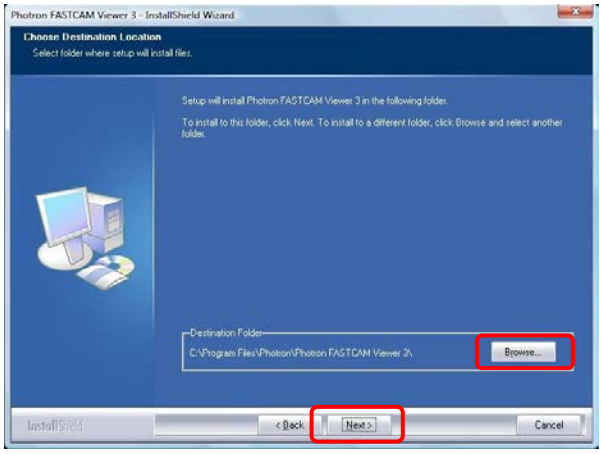
2. For a 32-bit version of Windows, open the "PFV Setup32" folder and double click "Setup.exe". For a 64-bit version of Windows, open the "PFV Setup64" folder and double click "Setup.exe".
The setup program starts and the dialog box below is displayed.
Click the [Next] button.



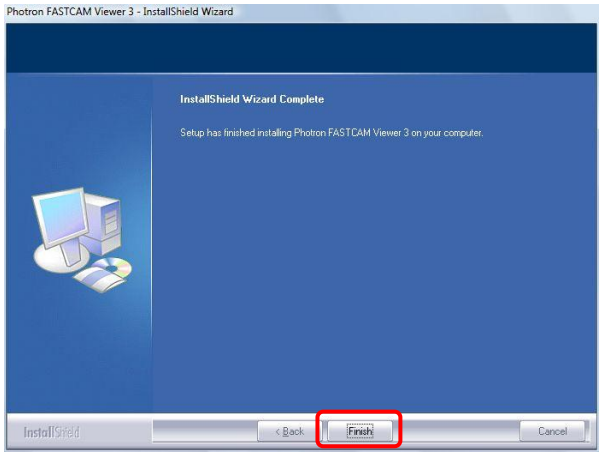
3. The license agreement is displayed. Confirm the contents and click the [Yes] button.



4. Specify the installation location. The default setting for the installation location is "C:\Program Files\Photron\Photron FASTCAM Viewer 3".
When necessary, click the [Browse] button and change the installation location to your preferred location.
After specifying the installation location, click the [Next] button.

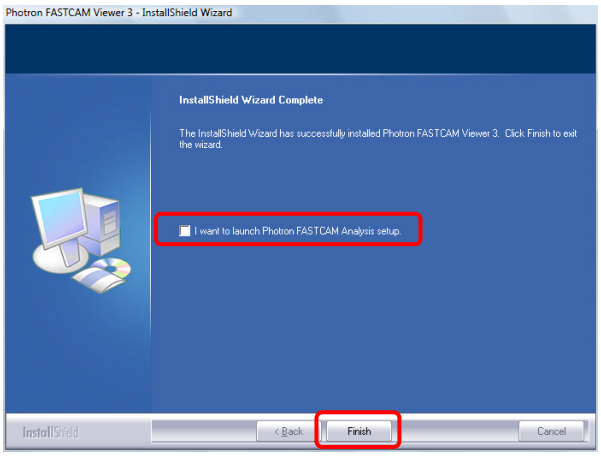


5. The installation starts, when it is completed, the screen below is displayed.
Click the [Finish] button.



6. Click the [Finish] button and installation of Photron FASTCAM Analisys (trial version) starts..

If you do not wish to install, remove the check mark in the checkbox of ”I want to launch Photron FASTCAM Analysis setup” and click the [Finish] button.



Supplement

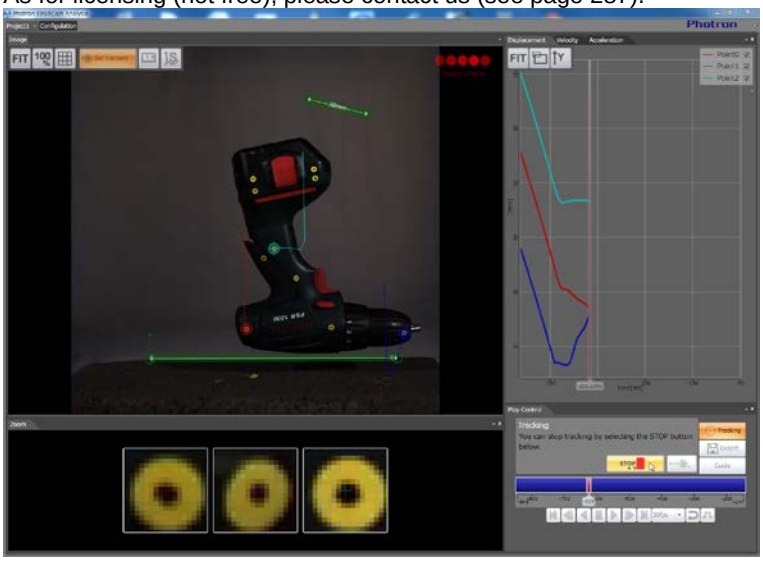
- PFA (Photron FASTCAM Analysis)”

  PFA is a two-dimensional video motion analysis software that adds video analysis function to the high-speed camera control software, Photron FASTCAM Viewer (PFV).

  Based on our vision to improve accessibility to motion analysis, it has optimal specifications for novice users.

  You can download and install a 90 days trial version.

  As for licensing (not free), please contact us (see page 287).

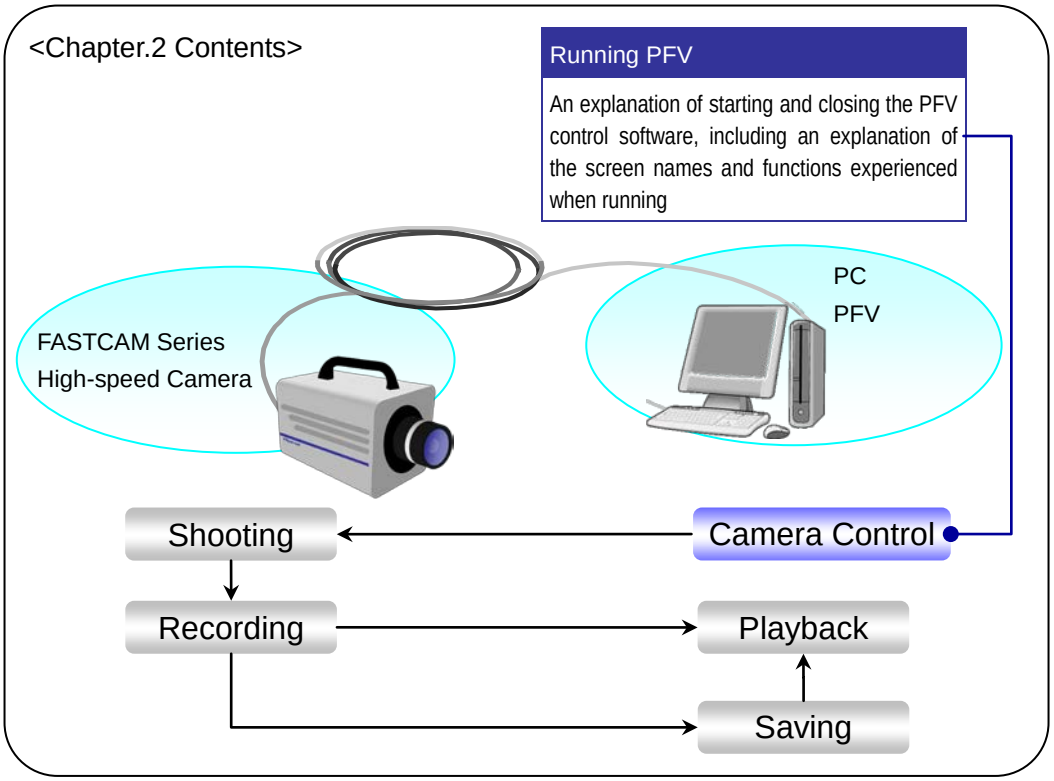


Reference

- For the details of the Photron FASTCAM Analysis, refer to ”PFA Installation Manual”.

Chapter. 2 **Basic Operation**

The following describes the basic operation of the PFV.



2.1. Starting and Closing PFV

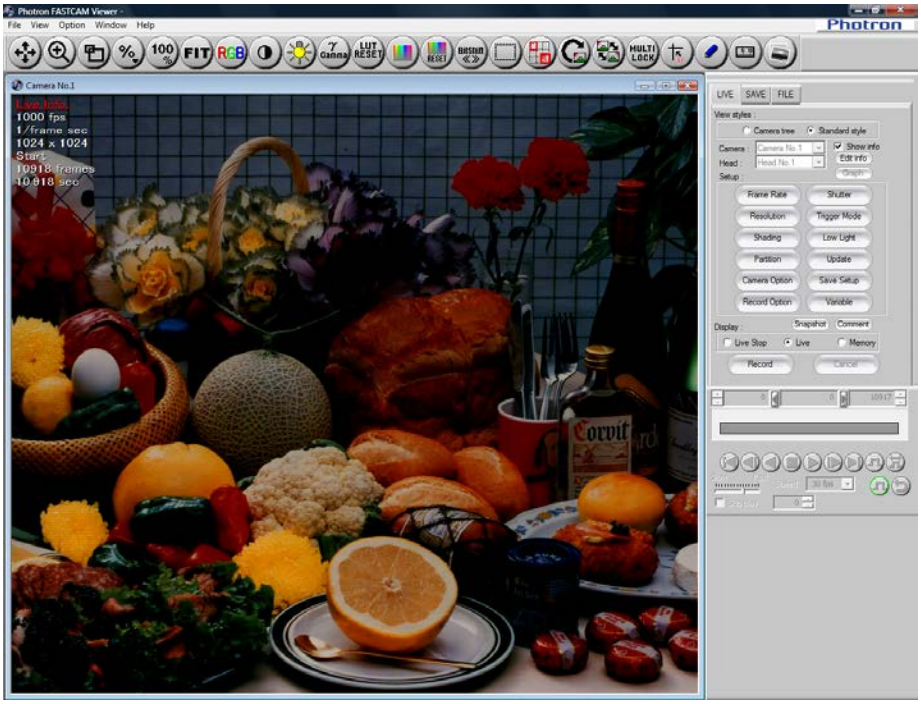
Before starting PFV, verify that the camera is connected to the PC and that the power on the camera is turned on.

2.1.1. Starting PFV

1. Click on [start] button - “All Programs” - “Photron FASTCAM Viewer 3” - “PFV Ver.3”.

   Or double-click on the desktop.

2. PFV starts.



Caution

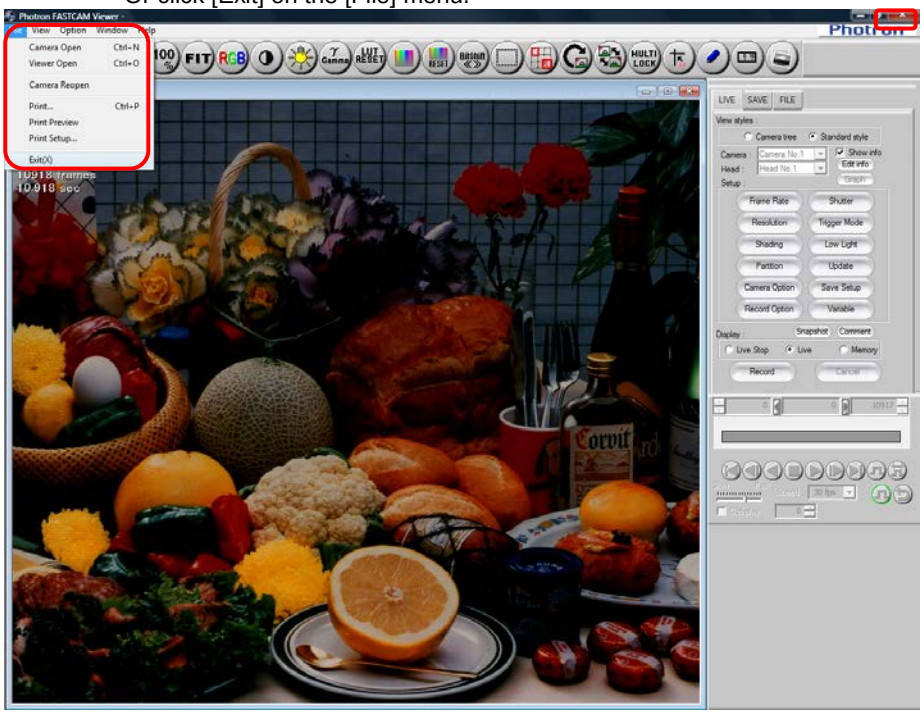
- When the camera is not connected, an image will not be displayed.

Reference

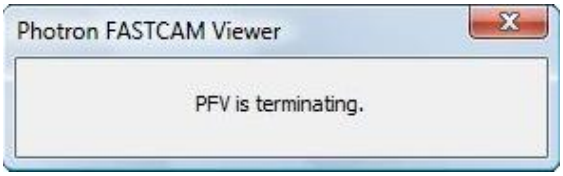
- When an image is not displayed, refer to “2.3. Displaying the Live Image”, page 20.

2.1.2. Closing PFV

1. Click the [X] button in the upper right of the screen.
   Or click [Exit] on the [File] menu.

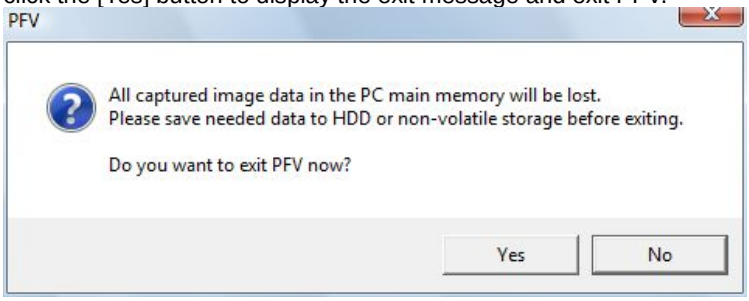


2. The exit message is displayed. Do not turn off the camera's power while this message is displayed.



Caution

- For IDP-Express, the following message is displayed. After confirming the details of the message, click the [Yes] button to display the exit message and exit PFV.



2.2. Screen Description

When PFV is started with the camera connected, the screen below is displayed.
Verify the name of the parts.

Menu Bar
Contains the menus to start and stop PFV, display/hide the view windows, and the configuration settings.

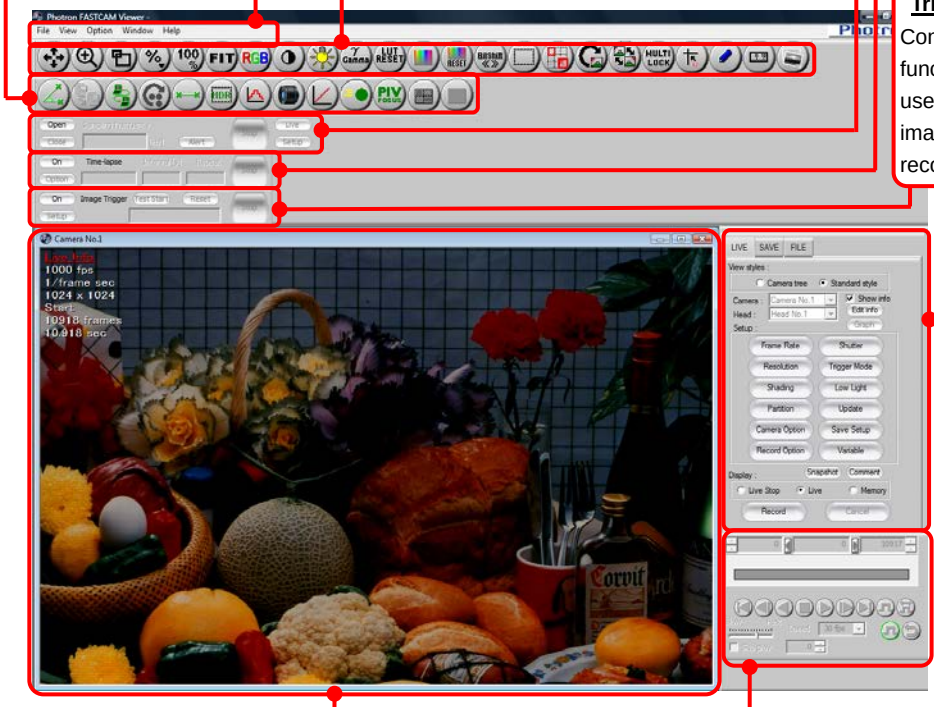
Toolbar
Contains the functions related to the image displayed in the View Window.

Waveform Input Board Bar
Contains functions related to the waveform input board.
(Only displayed when the waveform input board

Plug-in Bar
Contains additional functions for measurements to be used on the view window.

Time-lapse Bar
Contains functions related to time-lapse recording.

Image TriggerBar
Contains functions to use during image trigger recording.



View Window
Windows that display the live images from open cameras (camera window) and the recorded image (file viewer). The window can also be opened from the [File] menu.

Play Control Panel
Contains the functions used when playing images.

Control Panel
Contains settable functions split into three tabs: camera settings/shooting, save data, and load file.

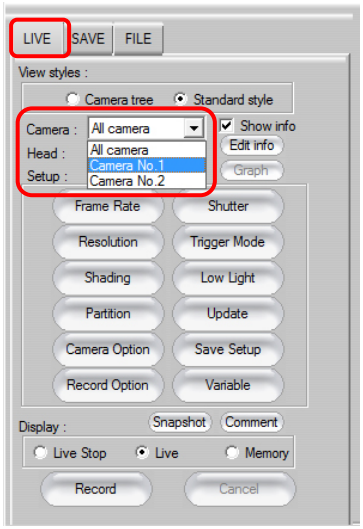
Supplement

- Options to display/hide the control panel, playback control panel, toolbar, and plug-in bar are available on the [View] menu.
  To return to the normal display from the full-screen display, hold the “Alt” key and press the “Enter” key.

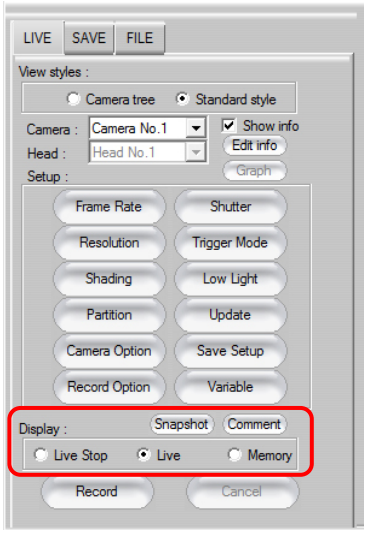
2.3. Displaying the Live Image

With PFV, the image being shot by the camera can be displayed as-is (displayed in live mode) on the PC screen when the camera is connected to the PC.

1. Display the “LIVE” tab on the control panel and select the camera to display the live image. Click the “Camera” option’s [▼] button and select the camera to display from the list.

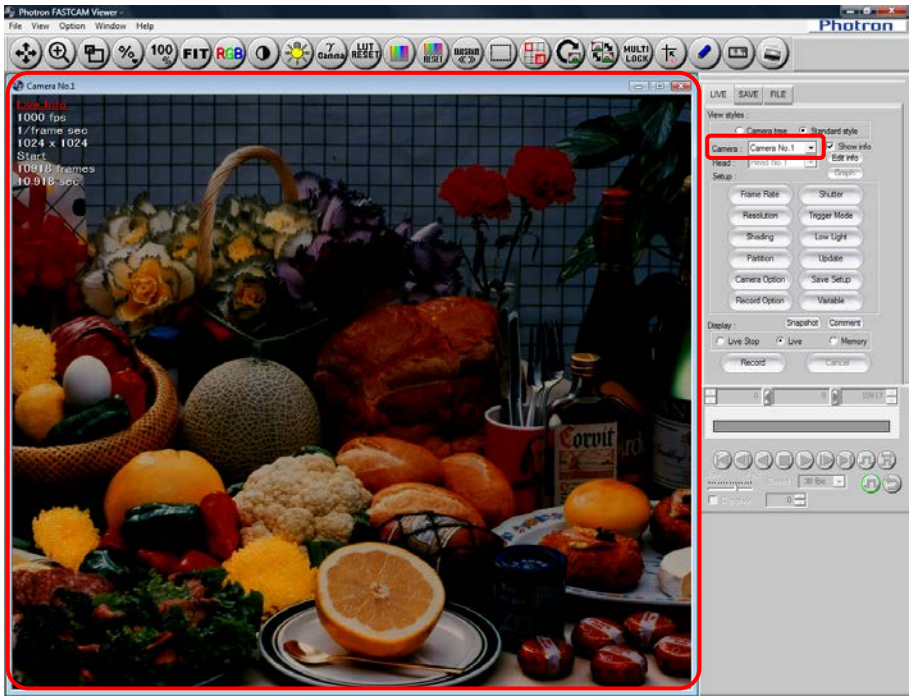


2. Select “Live” for the “Display” option.



Item	Description
Live Stop	Display an image the camera takes at the time of selection. This can lessen the transmission burden between the camera and PC.
Live	Display the image being captured by the camera as-is.
Memory	Used when playing back the images recorded on the camera.

3. The selected camera's live image is displayed in the view window.



Caution

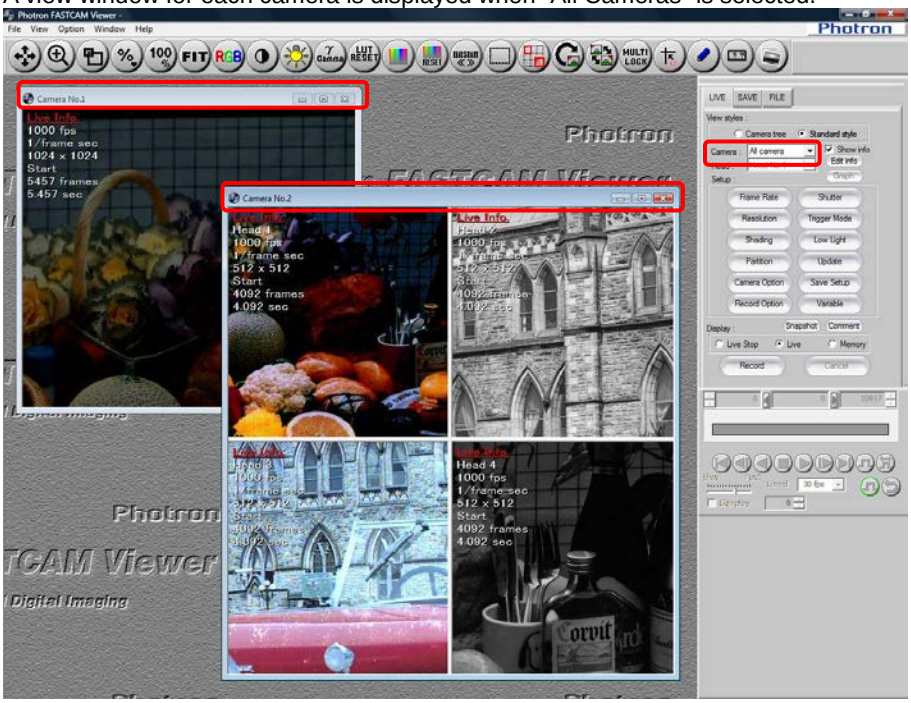
- Try the following operations if an image is not displayed.
  - Verify that the camera and PC are connected correctly.
  - Close PFV once and after cycling the power on the camera, restart PFV when the hardware initialization has completed (this may take ten to sixty seconds).
    PFV will not operate correct if it is started during camera initialization. After turning the camera's power on, start PFV after waiting for a period of tens of seconds.
  - Verify the camera's IP address setting.
    For how to verify the IP address, refer to "1.1.3. Set/Verify the Camera's IP address" in Configuration section.
  - Check the camera lens aperture is open.
  - Check the shutter speed or frame rate setting (see if the image will display when the speed is lowered).

Reference

- To deal with the invisibility of images, see "GigabitEthernet I/F Camera and Connection Manual".

2.3.1. When Multiple Cameras Are Connected

When multiple cameras are connected, the “Camera” list will display “All Cameras”.
A view window for each camera is displayed when “All Cameras” is selected.



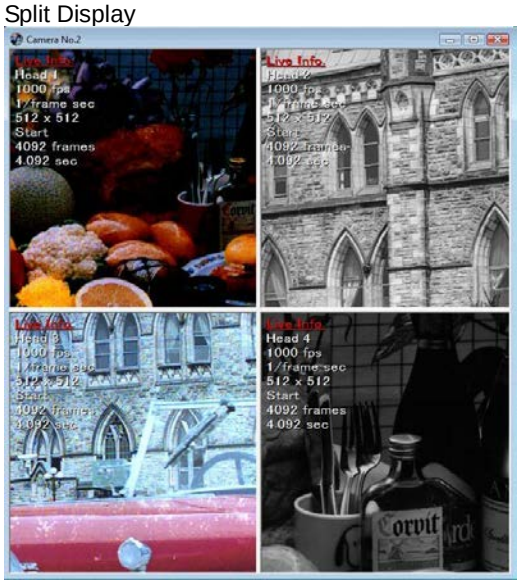
Supplement

- The view window can be closed with the [X] button in the upper right hand corner of each window. The view window can be opened again with [File] menu – [Camera Open].

2.3.2. When Connected To A Multi-Head Camera

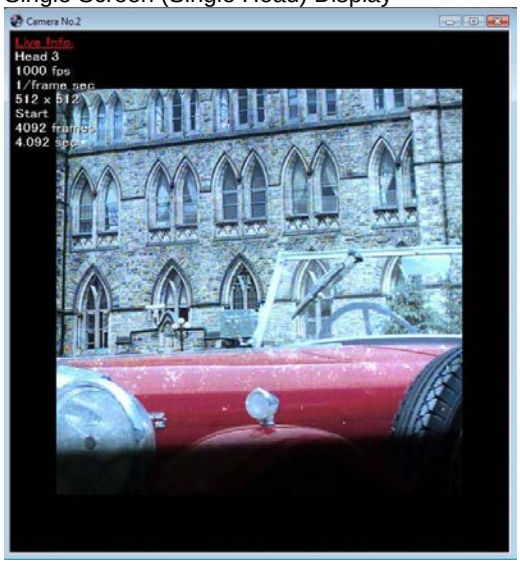
When the live image is displayed from a multi-head camera, each camera head's image is divided and displayed in a separate view window.
By double clicking on the desired split screen in the view window, the display can be switched to the whole screen (single head live image) display. When in single screen display (single head live image), by double clicking again, the display will switch back to the split screen display.

- Split Display



Double-click on the desired camera head view

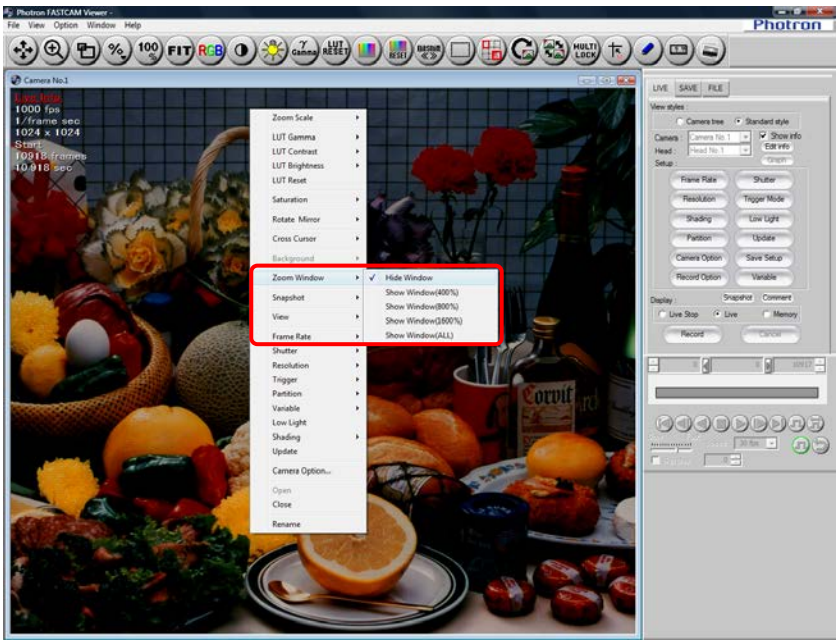
- Single Screen (Single Head) Display



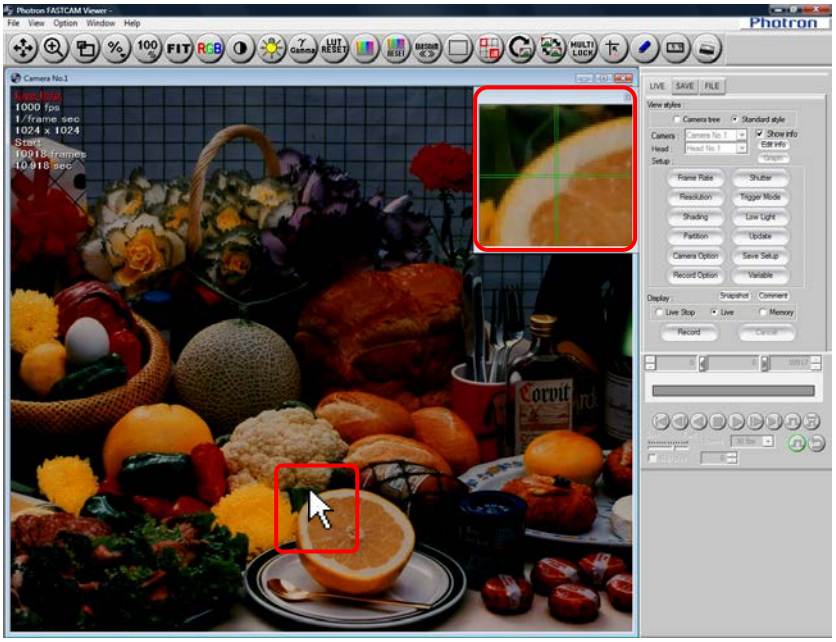
2.3.3. Zoom Window Display

You can display the desired area enlarged in a separate window on the view window.

1. Right click on the view window and click on the desired display scale factor under [View Window Display].



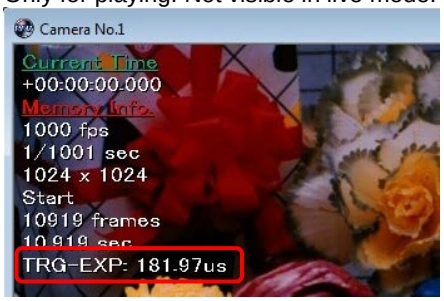
2. The zoom window is displayed.
   The area you point at is displayed enlarged in the zoom window.



3. If you wish to fix the position of a display area, just click on the spot where you wish to have the display area to be located.

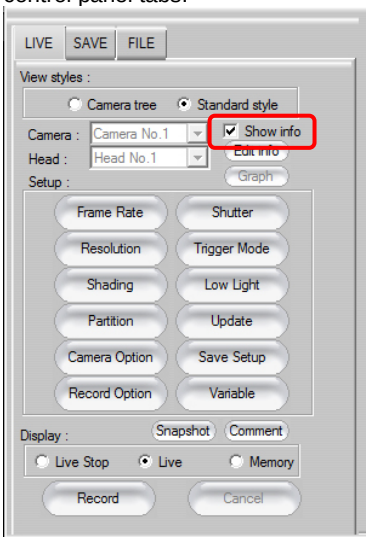
2.3.4. View Window Information

Various camera settings (view window information) are displayed in the upper left of the view window.

Display Info Sample	Description
1000fps	Frame rate
1/frame sec	Shutter speed
1024×1024	Resolution
Start	Trigger mode
5457 frames	Maximum recordable frame count
TRG-EXP	The time from trigger input to exposure start Only for playing. Not visible in live mode. 
LUT:000,000,1.05	Reading from the left; contrast: -100 to 100 (default 0), brightness: -100 to 100 (default 0), gamma 0.1 to 2.0 (default 1.0). When the values are the default, nothing is displayed. The RGB plane info is displayed by the currently selected RGB plane.

Changing Show/Hide

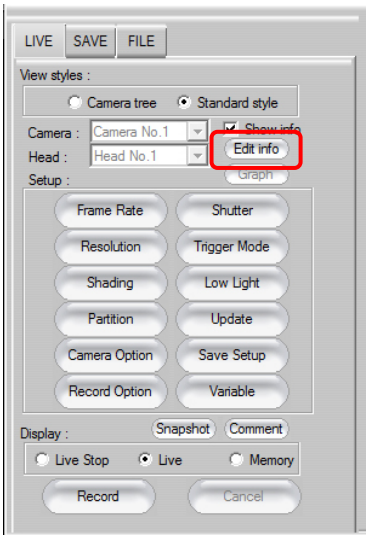
The view window information can be shown or hidden by checking the “Show Info” option on each of the control panel tabs.



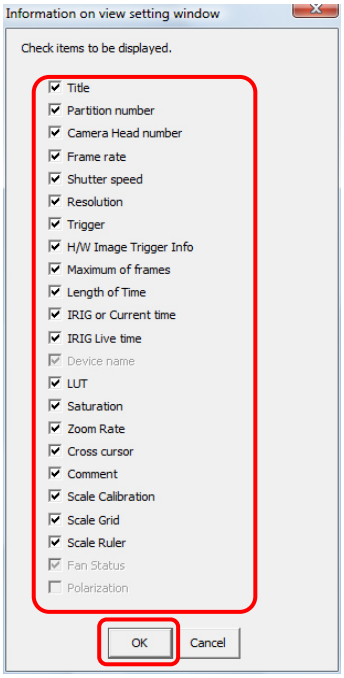
Customize Display Information

The displayed information can be customized.

1. Click the [Edit Info] button located on each one of the control panel tabs.



2. Select and check the information to display and click the [OK] button.



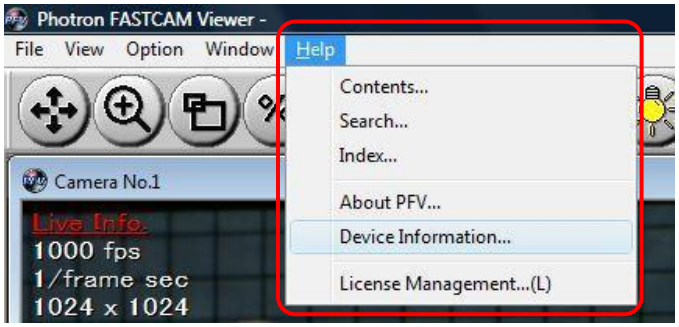
Caution

- Time codes are only displayed during playback. They are not displayed in live mode.
- IRIG codes are displayed even in live mode only for models compatible with IRIG live display. Incompatible models display IRIG codes only during playback, not in live mode.
- The device name is displayed when a file is opened.

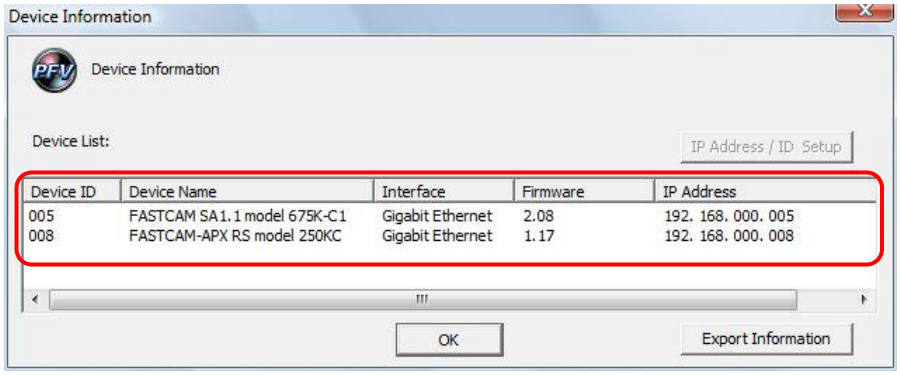
2.3.5. Display Device Information

The information for the device (camera, etc.) that is connected can be checked. Also, the IP address setting may be changed to any IP address. After changing the IP address setting, shut down and restart the PFV to make the new setting effective.

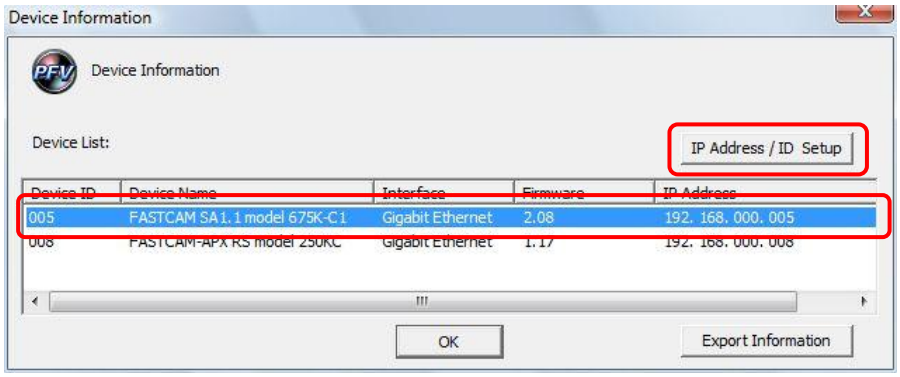
1. Click on [Help] menu – [Device Information].



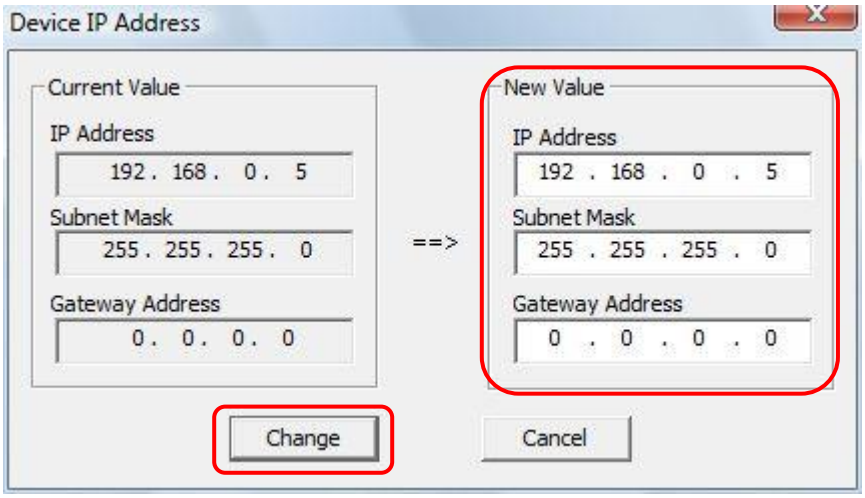
2. The information for the devices connected is displayed.



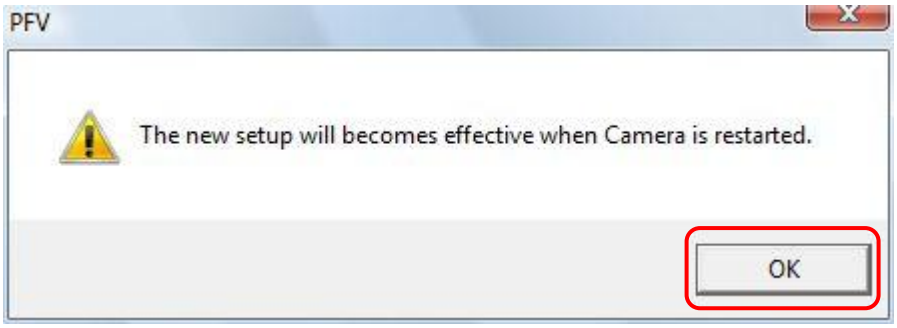
3. To change IP addresses, first click the device to be changed and then click the [Change IP address/ID] button.



4. Enter a new IP address in the [New value] field and click the [Change] button.



5. Click the [OK] button.
Shut down and restart the PFV, and the new settings are reflected.

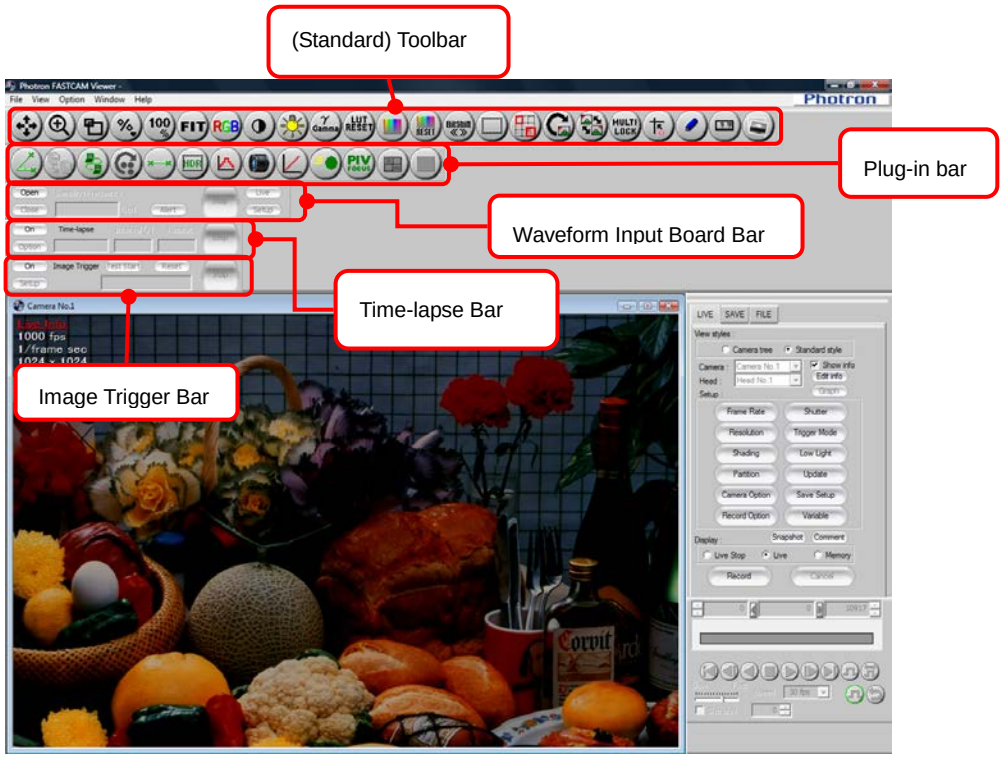


Caution

- Changing the IP address is only possible when a connection between the PC and camera is established.

2.4. Toolbar

The standard toolbar is displayed when PFV starts. In addition, PFV has other toolbars such as the plug-in bar, the waveform input board bar, the time-lapse bar, and the image trigger bar.



2.4.1. Standard Toolbar

Operations such as enlarging/shrinking the display and adjusting the contrast can be performed by using the toolbar buttons.
The settings are displayed in the view window information.

Button	Button Name/Function
	Pan or Move After clicking this button, dragging on the view window will scroll the display image in the direction dragged.
	Zoom After clicking this button, dragging up on the view window will enlarge the display, dragging down will shrink the display.
	Zoom Area After clicking this button, drag the cursor to draw a rectangle over the portion of the view window to display, and the specified area will be enlarged.

Button	Button Name/Function
	Set Scaling Factor After clicking this button, select the optional scaling factor from the displayed list, and the display will be scaled by that factor.
	Same Pixel Size Display the image in the view window set to the same pixel size as that of the PC screen.
	Fit Automatically adjust the scaling of the display image to fit the image within the view window.
	Select Color Plane Select the color plane to reflect the contrast/gamma/brightness settings. The select plane is changed in R, G, B, RGB order with each click of the button. This function cannot be used with a monochrome camera.
	Contrast Adjusts the contrast of the view window display. After selecting the color plane, by clicking the [Contrast] button and dragging on the view window, the contrast for the selected color is adjusted. The change is reflected in the data saved to the PC, but not the data in the camera.
	Brightness Adjusts the brightness of the view window display. After selecting the color plane, by clicking the [Brightness] button and dragging on the view window, the brightness for the selected color is adjusted. The change is reflected in the data saved to the PC, but not the data in the camera.
	Gamma Adjusts the gamma of the view window display. After selecting the color plane, by clicking the [Gamma] button and dragging on the view window, the gamma for the selected color is adjusted. The change is reflected in the data saved to the PC, but not the data in the camera.
	LUT Reset Reset the contrast, brightness and gamma to the default settings. Default setting values are not displayed in the view window information. Post-LUT (the LUT set for the view window) is the function being reset.
	Color Saturation Adjustment Adjusts the color saturation of the view window display. After Clicking the button, dragging up and down on the view window adjusts the color saturation. The change is reflected in the data saved to the PC, but not the data in the camera. Can be used for color cameras.

Button	Button Name/Function
	Reset Color Saturation Adjustment Resets the set color saturation to the default setting.
	Software Binning This function can be used with monochrome cameras. After clicking the button, dragging up and down on the view window changes the binning processing mode from OFF (normal), to 2x2 (resolution is 1/2 horizontally and vertically) → 4x4(resolution is 1/4 horizontally and vertically) →1x2 (resolution is 1/2 only vertically) → 1x4 (resolution is 1/4 only vertically) → 2x4 (resolution is 1/2 horizontally, 1/4 vertically), in that order. Be aware that sensitivity is virtually increased by the binning setting, but the resolution decreases.
	Output 8bit select Click to display the “Output 8-bit select” dialog box. The bit shift can be changed by dragging the slide bar. By checking the checkbox of “Specify area” in the dialog box, you can specify the area and change the bit shift.
	Save Area Only save the data within the area (portion) selected using the mouse. After clicking the button, select the area by dragging the cursor on the view window to draw a rectangle. Then, by clicking the [Save] button on the control panel’s “SAVE” tab, the selected portion is saved as the specified file format. The selected portion can also be copied as an image.
	Navigation Mode When clicked, the view window is divided into 9 regions and separate settings can be changed in each of these regions.
	Rotate After clicking the button, dragging up on the view window turns the image 90 degrees to the right, dragging down turns the image 90 degrees to the left.
	Mirror After clicking the button, dragging up on the view window flips the image horizontally, dragging down flips the image vertically.
	Multilock Click this button to activate the function. New settings entered from the standard toolbar are applied to all the view windows being displayed.

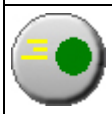
Button	Button Name/Function
	Crosshair Cursor Click this button to activate the crosshair cursor (cursor 1). A crosshair cursor is displayed when the mouse pointer moves onto the view window. The coordinates and RGB values of a position pointed by the crosshair are displayed in the view window. Click the mouse with the crosshair (cursor 1) on any position within the view window, the crosshair (cursor 1) is fixed at that position. Double click on the view window to display cursor 2. Double click on the view window again and you can return the operational subject to cursor 1. Click the [Crosshair Cursor] button again to hide the cursor. For this procedure, refer to "2.6. Crosshair Cursor", page 46.
	Show/Hide the Drawing Toolbar Click this button to display the drawing toolbar. Click it again to hide the drawing toolbar. For the drawing toolbar function, refer to “2.7.1. Drawing Toolbar”, page 48.
	Scale Display Click this button to be able to configure settings related to the scale display. For how to display, refer to "2.8. Scale Display", page 54.
	File Image Overlay You can display the live image or open image on top of a saved image used as the background. For this procedure, refer to "2.9. Live Image and File Image Overlay Display", page 57.

Reference

- For individual camera settings, refer to “3.8. Other Settings”, page 135.
- For saving, refer to “5.1.2. Saving Files”, page 214.
- For the navigation mode, refer to “2.5. Navigation Mode”, page 38.

2.4.2. Plug-in Bar

In addition to buttons on the plug-in bar to measure angles and distances, buttons have also been prepared to display a histogram or line profile.

Button	Button Name/Function
	Angle Measurement Measures the angle between lines that are arbitrarily assumed within the view window. First click this button to activate the function. Click on the view window to draw an angle to measure, and the measurement result is shown in radian and degrees in the lower right corner of the window.
	Cycle View All frames of a movie file can be displayed in an array. The number of images to be displayed in a row can be specified.
	RS-232C Control Control an RS-232C connection-compatible device with PFV. Settings related to the connection and control settings can be configured.
	Distance Measurement Click to specify two points - start and end points, and set a reference value. The result of measuring the distance between the two points is displayed in the lower right corner of the view window.
	HDR Using image data shot with 10 or 12 bits, a highly dynamic 8-bit pseudo image can be generated.
	Histogram After clicking the button, drag on the desired range in the view window to display a histogram (a graph showing the distribution of brightness values) for the specified range.
	Lens Control The aperture and focus of an EF mount lens can be remotely controlled.
	Line Profile Displays a line profile for adjusting the focus. Click on the start and end points to display a line profile on the specified line.
	Motion Detector By comparing an image against a reference background image, difference in luminance is detected, based on which a moving object is extracted.
	PIV Focus Mode This button is used for focus readjustment when shooting PIV images. A triggered image only is repeatedly displayed as a pseudo live image.
	Batch Data Converter Can convert and save multiple files to a different file format in batch.

Button	Button Name/Function
	Polarized Light Measurement The plug-in for polarized light high speed camera control. For details, refer to the "Polarized Light Plug-in Manual".
	Pseudo Color Monochrome images can be displayed wih pseudo colors.
	PFV Mobile Live images can be viewed with mobile devices including iPhone via Wi-Fi.

Caution

- [Lens Control] is capable of controlling the lens only when the EF mount lens (optional) is equipped.

Reference

- For plug-in bar display settings, refer to “1.3.5. Setting Plug-in Bar” in Configuration section.
- For details, refer to “2.11 Plug-in Bar Operations”, page 61.

2.4.3. Waveform Input Board Bar

When the waveform input board is connected, the waveform input board bar is displayed and displays the state of the waveform input board.

Button	Button Name/Function
	Open Puts the waveform input board in a useable state. You can set various options on the screen displayed after clicking this button.
	Close After clicking this button, click [OK] on the displayed dialog box and the currently used waveform input board is closed.
	Alert When there is an error in a waveform input board setting, this button is displayed in red. If you click the button, a message box is displayed and you can confirm the content of the alert.
	Stop/Waiting Trigger/Recording Displays the recording state.
	Live Live display of the voltage value in a separate window.
	Setup Displays the settings screen of the currently used waveform input board.

Caution

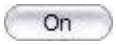
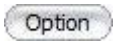
- The waveform input board bar is displayed after the driver is installed.

Reference

- Refer to the "Waveform Recording Manual" for more on the waveform input board.

2.4.4. Time-lapse Bar

Click [View] – [Time-lapse Bar] on the menu to display the time-lapse bar.
Configure to automatically trigger the camera at a fixed interval.

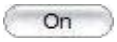
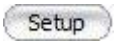
Button	Button Name/Function
	On/Off Click to enable time-lapse recording. Switches On/Off with each click.
	Option Displays the setup screen for time-lapse recording.
	Stop/Recording/Waiting Trigger Displays the time-lapse recording state.

Reference

- For time-lapse recording, refer to “3.11.3. Time-lapse Recording”, page 169.

2.4.5. Image Trigger Bar

Click [View]-[Image Trigger Bar] to display the image trigger bar.
Use the image trigger bar to apply a trigger or stop playback with an image.

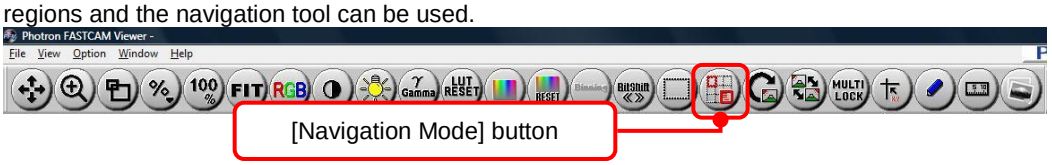
Button	Button Name/Function
	On/Off Click to enable an image trigger. Turn on/off with each click.
	Setup Displays the setup screen for the image trigger.
	Test Start/Test Stop Starts and stops the image trigger test. Start/stop with each click.
	Reset When "Background subtraction" is selected under the setup screen's "Detection method", the background image first obtained is discarded and a new background image is obtained.
	Stop/Ready/Acquiring Background/Waiting Trigger/Running Displays the recording state with the image trigger.

Reference

- For the image trigger, refer to "3.11.4. Recording by the Image Trigger", page 176.
- For stopping playback by an image trigger, refer to "4.8. Stop Playback by Image Trigger", page 203.

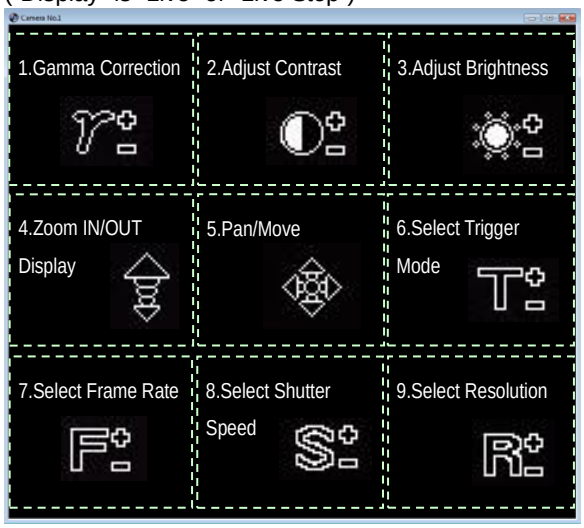
2.5. Navigation Mode

When the [Navigation Mode] button on the toolbar is clicked, the view window is divided into 9 regions and the navigation tool can be used.

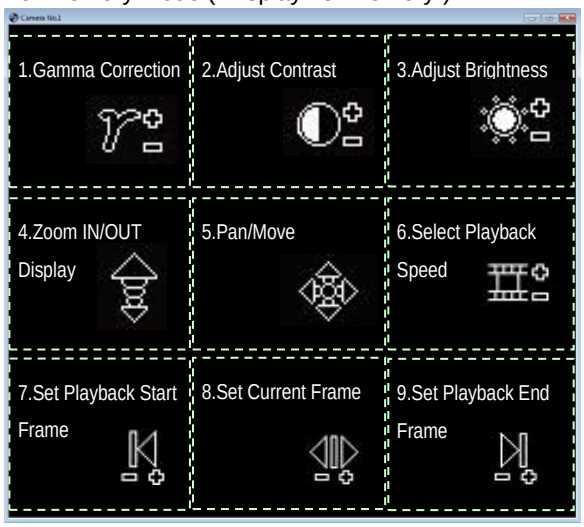


The divided regions contain functions such as zoom or pan/move. By using the navigation tool, each of the settings can be made on the view window without using the toolbar buttons.
By dragging the mouse in the divided region, that region's navigation tool for that setting is displayed, and the details of the setting are displayed in the lower right of the screen.
The functions contained in the regions differ depending on the control panel's "Display" selection.

- For live mode, live stop mode
  ("Display" is "Live" or "Live Stop")

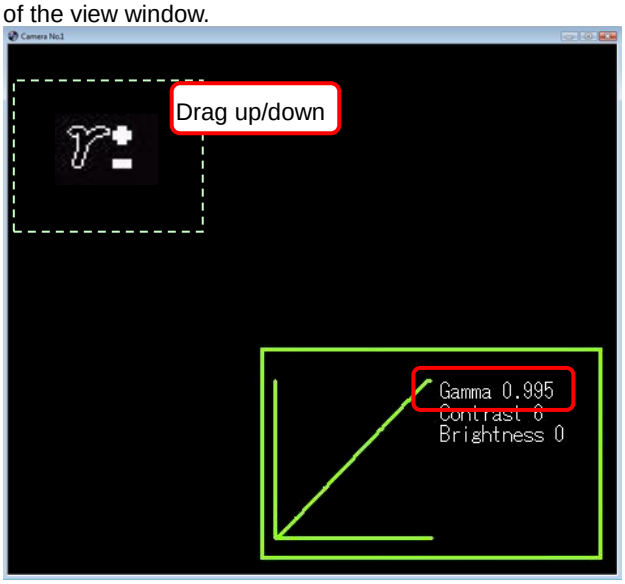


- For memory mode ("Display" is "Memory")



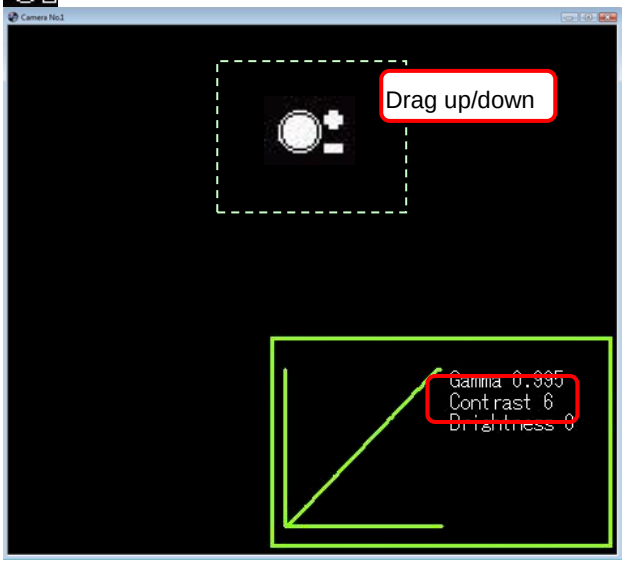
2.5.1. Gamma Correction

When the mouse cursor is in the upper left region of the view window, the cursor changes to .
Drag the mouse to correct while checking the gamma value displayed in the guide in the lower right of the view window.



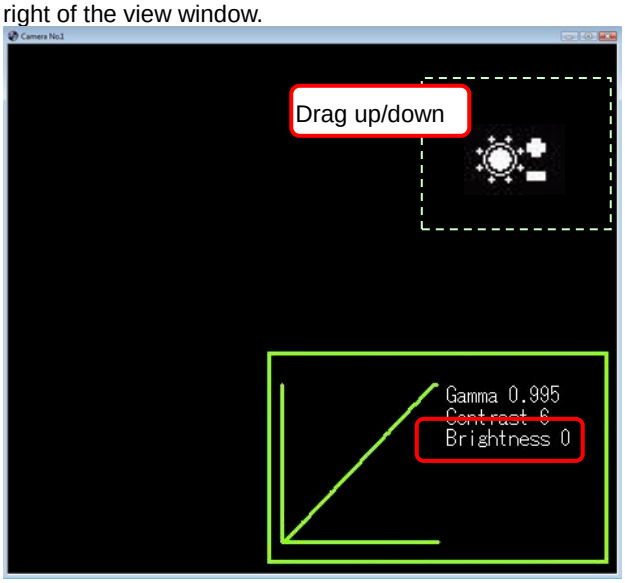
2.5.2. Adjust Contrast

When the mouse cursor is in the upper center region of the view window, the cursor changes to .



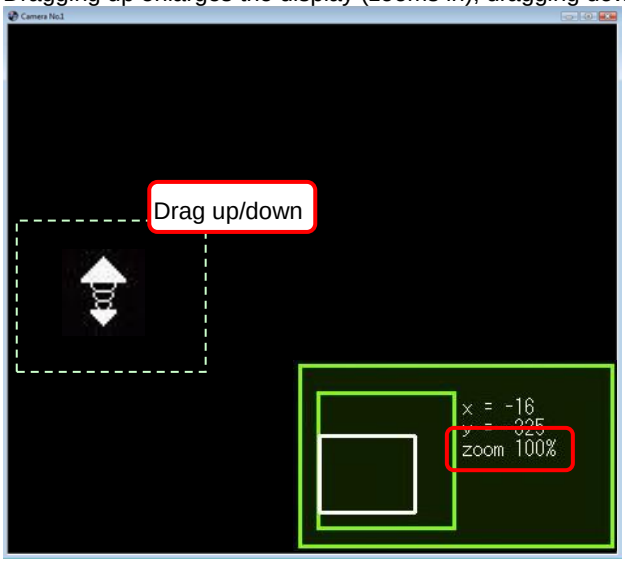
2.5.3. Adjust Brightness

When the mouse cursor is in the upper right region of the view window, the cursor changes to .
Drag the mouse to adjust while checking the brightness value displayed in the guide in the lower right of the view window.



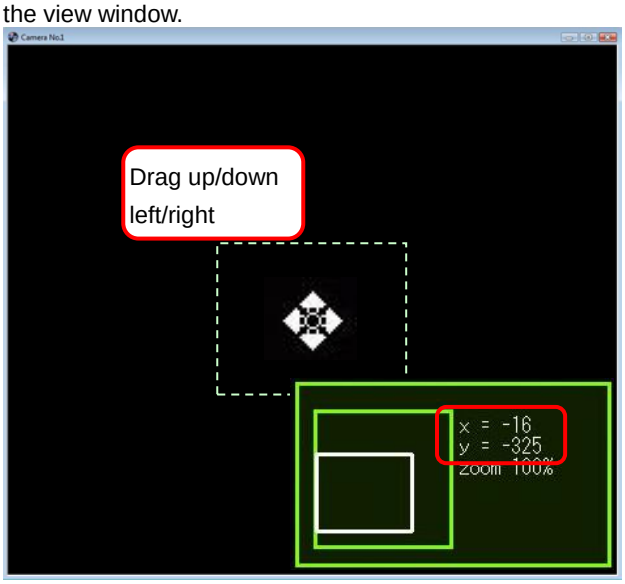
2.5.4. Zoom IN/OUT Display

When the mouse cursor is in the center left region of the view window, the cursor changes to .
Drag the mouse to set while checking the zoom value displayed in the guide in the lower right of the view window.
Dragging up enlarges the display (zooms in), dragging down shrinks the display (zooms out).



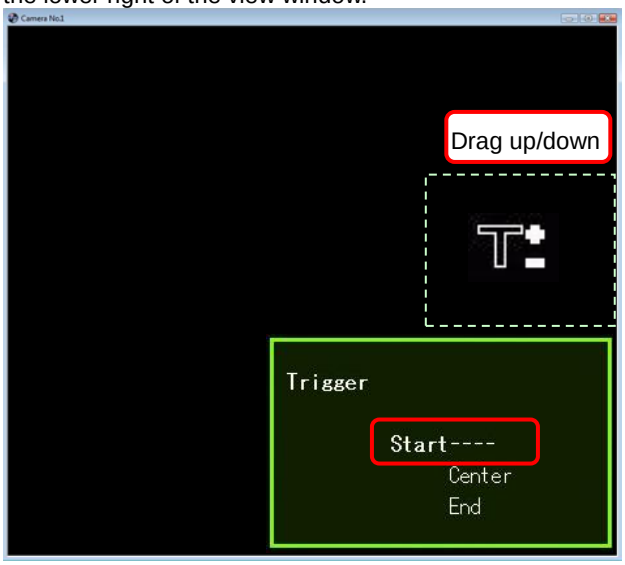
2.5.5. Pan/Move

When the mouse cursor is in the center region of the view window, the cursor changes to .
Drag the mouse to set while checking the current position displayed in the guide in the lower right of the view window.



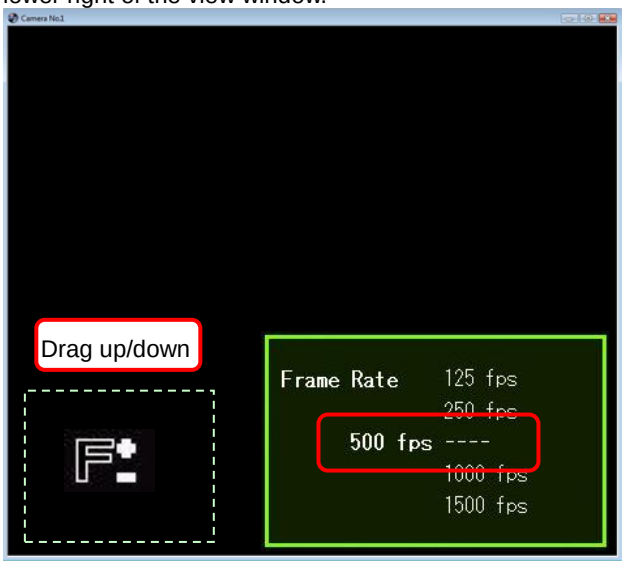
2.5.6. Select Trigger Mode (Live Mode, Live Stop Mode)

When the mouse cursor is in the center right region of the view window, the cursor changes to .
Drag the mouse to set while checking the currently selected trigger mode displayed in the guide in the lower right of the view window.



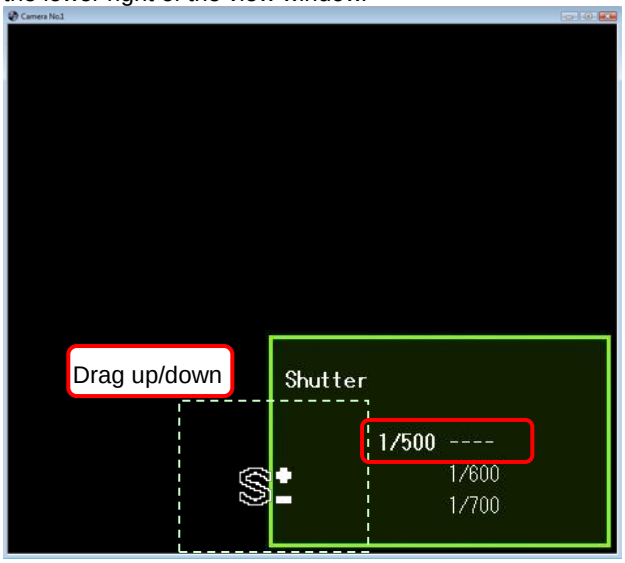
2.5.7. Select Frame Rate (Live Mode, Live Stop Mode)

When the mouse cursor is in the lower left region of the view window, the cursor changes to .
Drag the mouse to set while checking the currently selected frame rate displayed in the guide in the lower right of the view window.



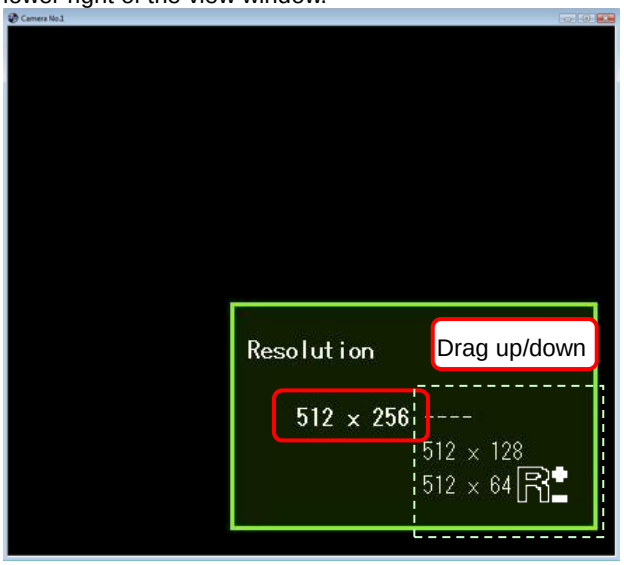
2.5.8. Select Shutter Speed (Live Mode, Live Stop Mode)

When the mouse cursor is in the lower center region of the view window, the cursor changes to .
Drag the mouse to set while checking the currently selected shutter speed displayed in the guide in the lower right of the view window.



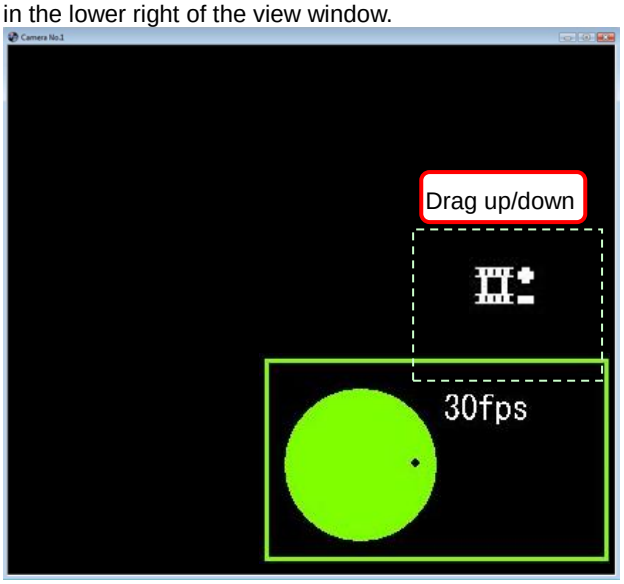
2.5.9. Select Resolution (Live Mode, Live Stop Mode)

When the mouse cursor is in the lower right region of the view window, the cursor changes to . Drag the mouse to set while checking the currently selected resolution displayed in the guide in the lower right of the view window.



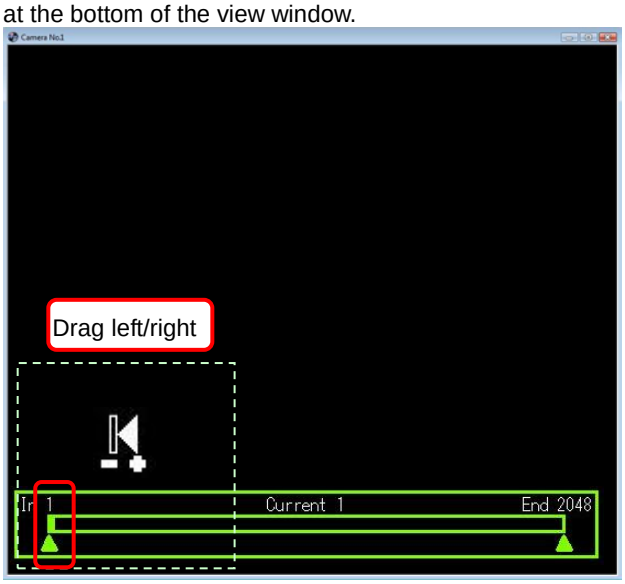
2.5.10. Select Playback Speed (Memory Mode Only)

When the mouse cursor is in the center right region of the view window, the cursor changes to . Drag the mouse to set while checking the currently selected playback speed displayed in the guide in the lower right of the view window.



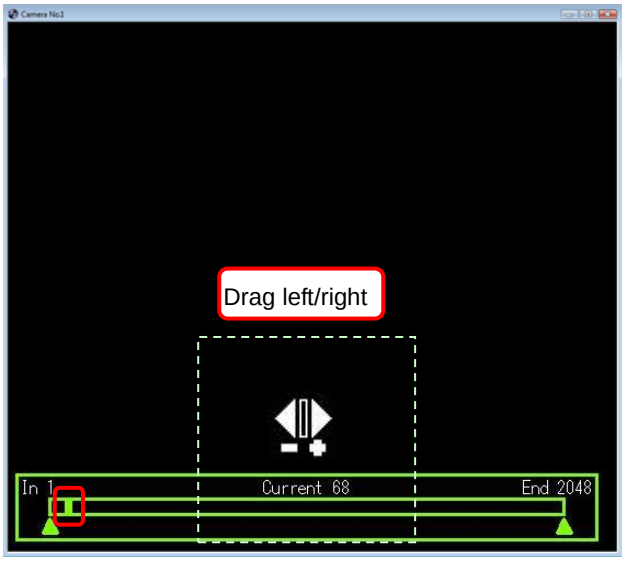
2.5.11. Set Playback Start Frame (Memory Mode Only)

When the mouse cursor is in the lower left region of the view window, the cursor changes to .
Drag the mouse to set while checking the position of the playback start frame displayed in the guide at the bottom of the view window.



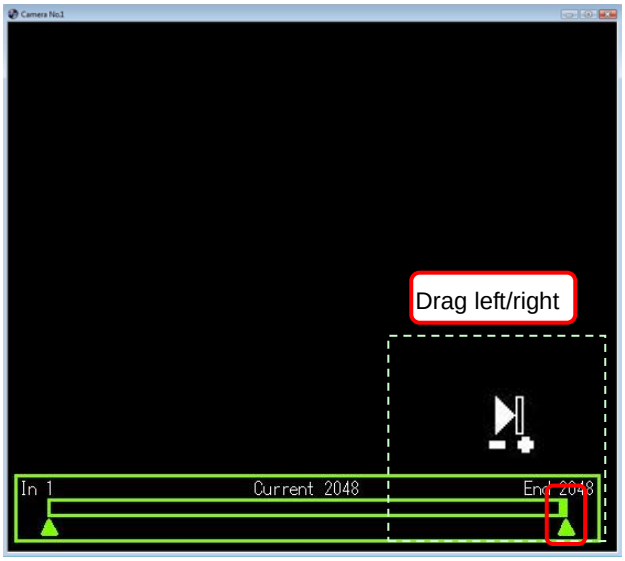
2.5.12. Set Current Frame (Memory Mode Only)

When the mouse cursor is in the lower center region of the view window, the cursor changes to .
Drag the mouse to set while checking the position of the current frame displayed in the guide at the bottom of the view window.



2.5.13. Set Playback End Frame (Memory Mode Only)

When the mouse cursor is in the lower right region of the view window, the cursor changes to .
Drag the mouse to set while checking the position of the playback end frame displayed in the guide at the bottom of the view window.

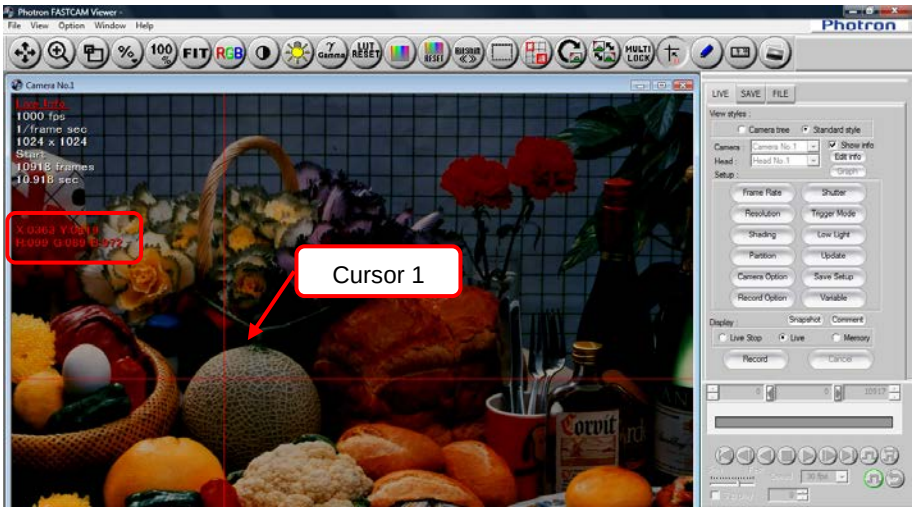


2.6. Crosshair Cursor

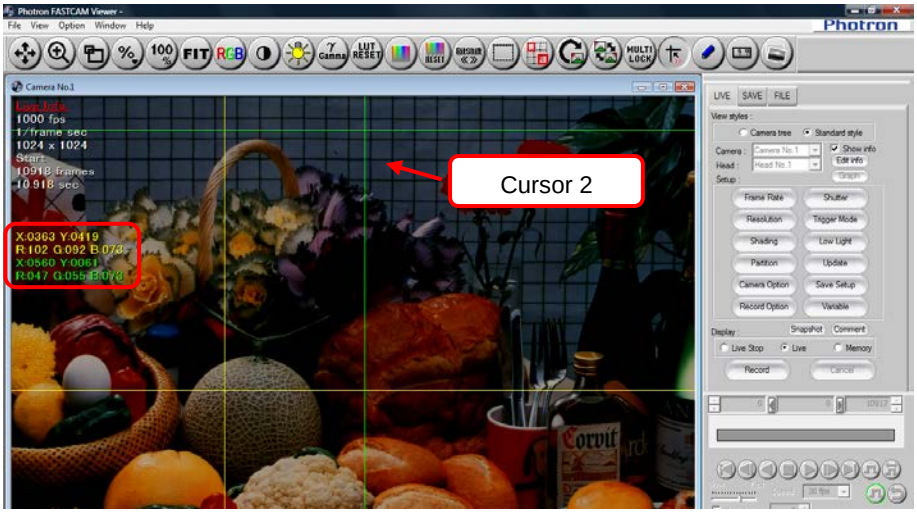
This function can display the crosshair cursor on the frame (on the view window). The coordinates and RGB value of the location pointed at are displayed in the view window information.

1. Click the [Crosshair Cursor] button on the standard toolbar.

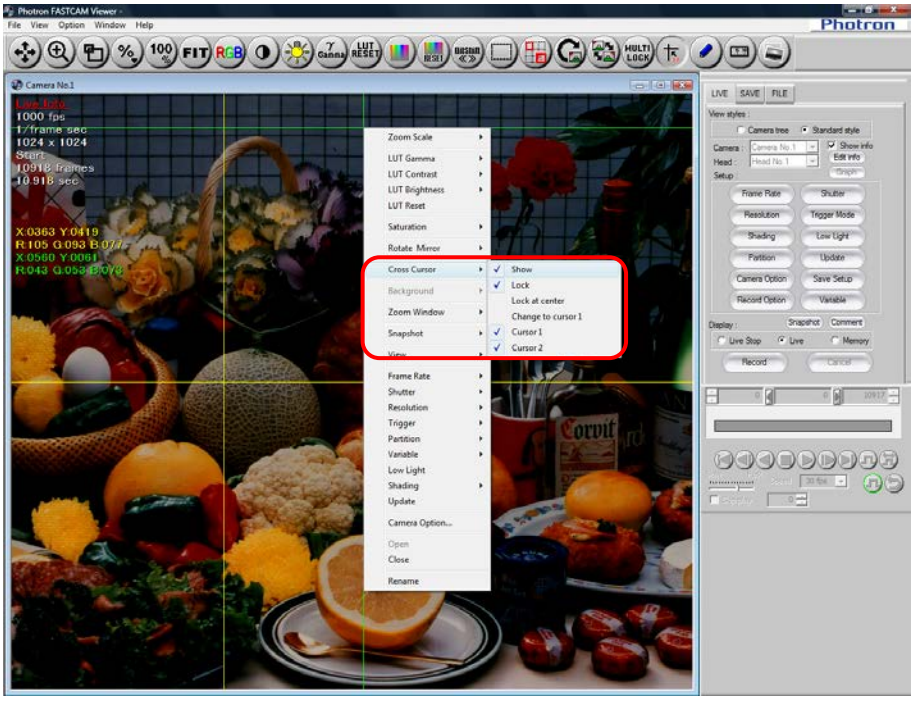
2. Cursor 1 is displayed when you move the mouse pointer on the view window and the information is displayed in the view window information.



3. Double click on the view window to display cursor 2. Cursor 1 operations cannot be performed when cursor 2 becomes the operational subject.
Double click on the view window again to return the operational subject to cursor 1.



4. To hide the displayed cursor, right click on the view window and remove the check next to the cursor under [Cross Cursor].



Supplement

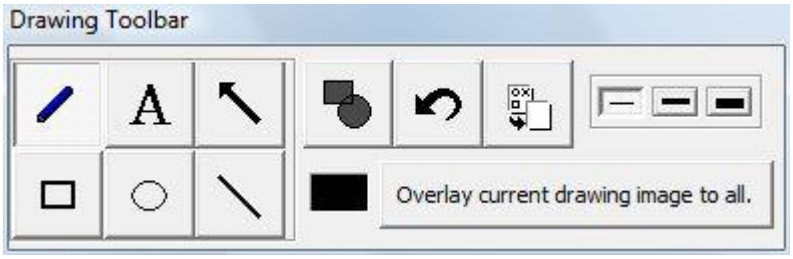
- You can show or hide the crosshair cursor by clicking on the [Crosshair Cursor] button on the standard toolbar.

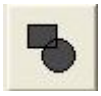
2.7. Drawing Text/Graphics

This function draws text and graphics on the frame (on the view window). The graphics are only reflected in the frame that was drawn on, but with the [Overlay current drawing image to all.] button, you can also reflect the graphics in all frames.

2.7.1. Drawing Toolbar

The drawing toolbar contains functions to draw text and graphics.

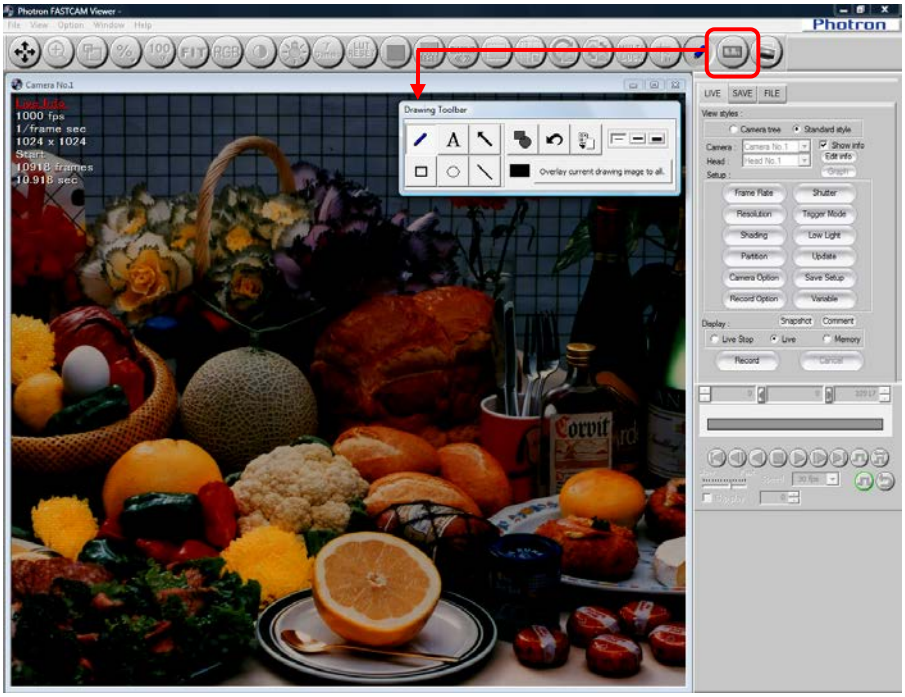


Button	Button Name/Function
	Free Drawing After clicking this button, if you drag the cursor on the frame (on the view window), it draws a line just as you dragged it.
	Text Box After clicking this button, if you click on the frame (on the view window), the text input screen is displayed. Click the [OK] button after entering the text and the text is displayed at the location clicked. You can set the font size and text color with the “Font” dialog box by clicking the [Font] button on the text input screen.
	Arrow After clicking this button, dragging the cursor at the desired location on the frame (on the view window) draws an arrow.
	Rectangle After clicking this button, dragging the cursor at the desired location on the frame (on the view window) draws a rectangle.
	Oval After clicking this button, dragging the cursor at the desired location on the frame (on the view window) draws an oval.
	Line After clicking this button, dragging the cursor at the desired location on the frame (on the view window) draws a line.
	Fill After clicking this button, the rectangle or oval drawn on the frame (on the view window) is filled with color.
	Undo Undo the last graphic drawn.

Button	Button Name/Function
	Erase Erase all of the graphics drawn.
	Color You can specify the fill or drawing line color. The palette is displayed when this button is clicked. Click the desired color to specify it and that color is reflected in the graphic when drawing.
	Line Thickness Specifies the thickness of border to draw. After clicking the button of the desired thickness, graphics are drawn with the specified thickness.
	Overlay current drawing image to all Reflects the graphics that are currently being edited on all frames. After clicking this button, you cannot edit the graphics. To re-edit the graphics, click this button again to turn off the overlay on all frames.

2.7.2. Drawing on a Frame

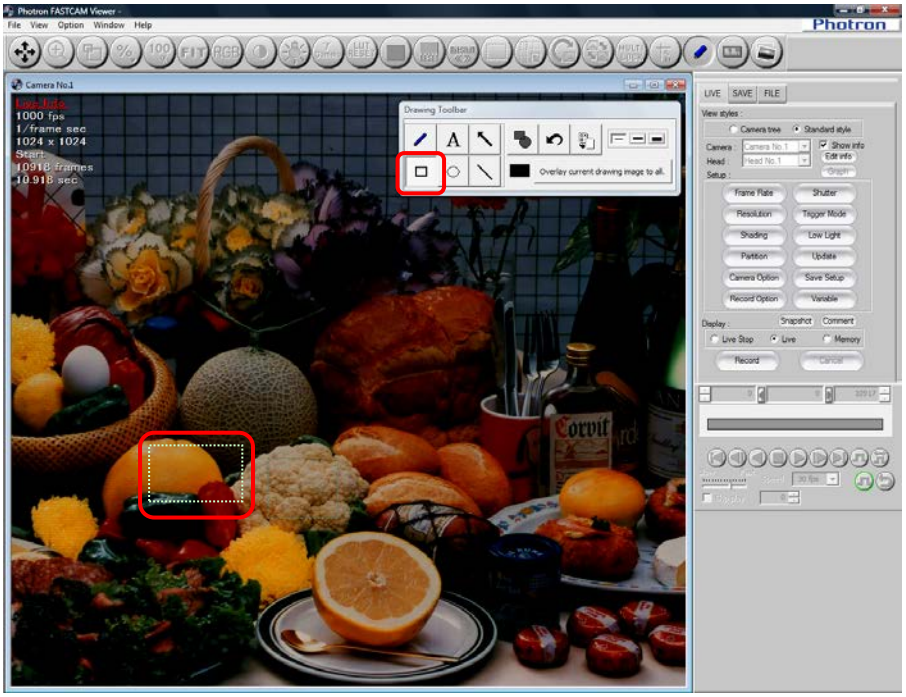
1. Click the [Show/Hide Drawing Toolbar] button on the standard toolbar to display the drawing toolbar.



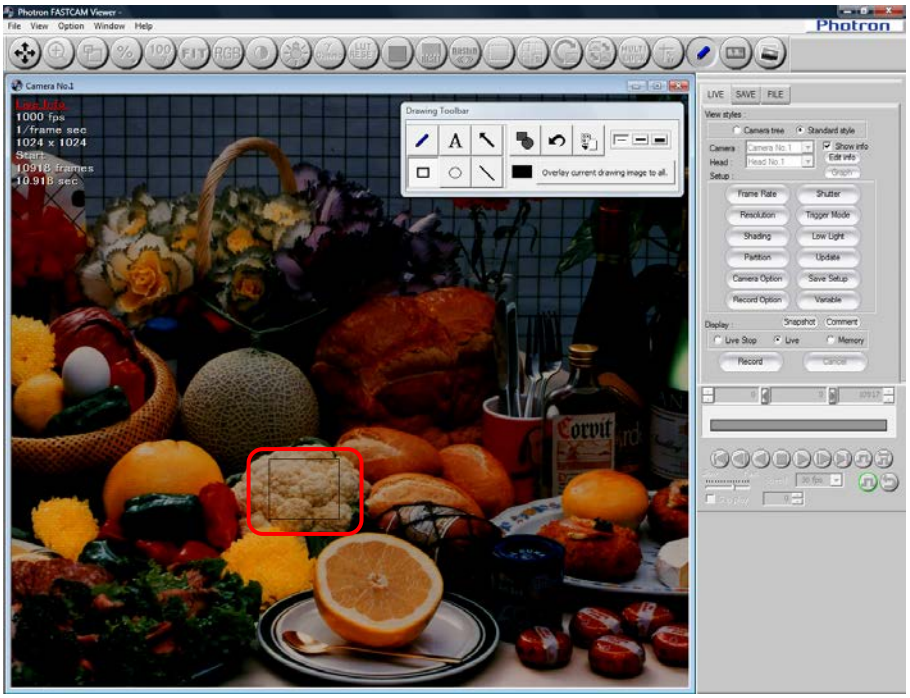
Caution

- When the drawing toolbar is displayed, only the [Pan or Move] button on the toolbar can be used.

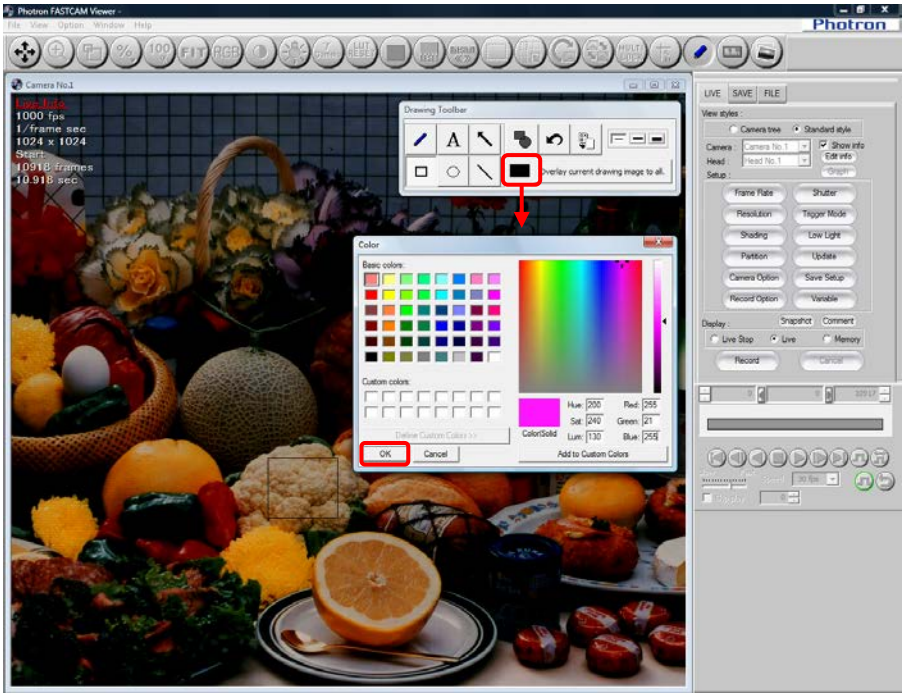
2. Click the button of the graphic to draw and draw by dragging the cursor at the desired location on the view window.



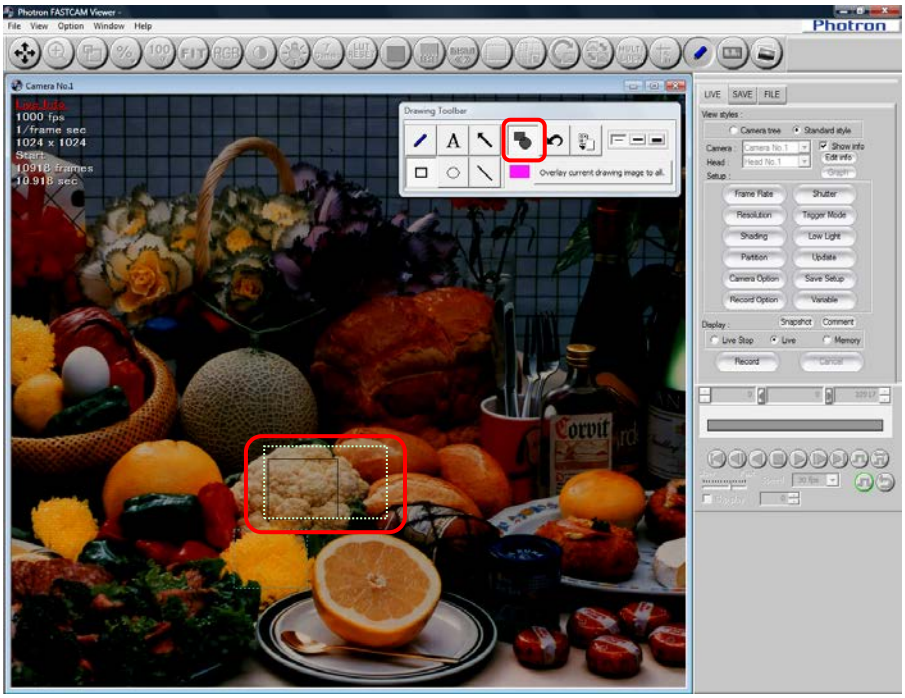
3. The graphic is drawn.



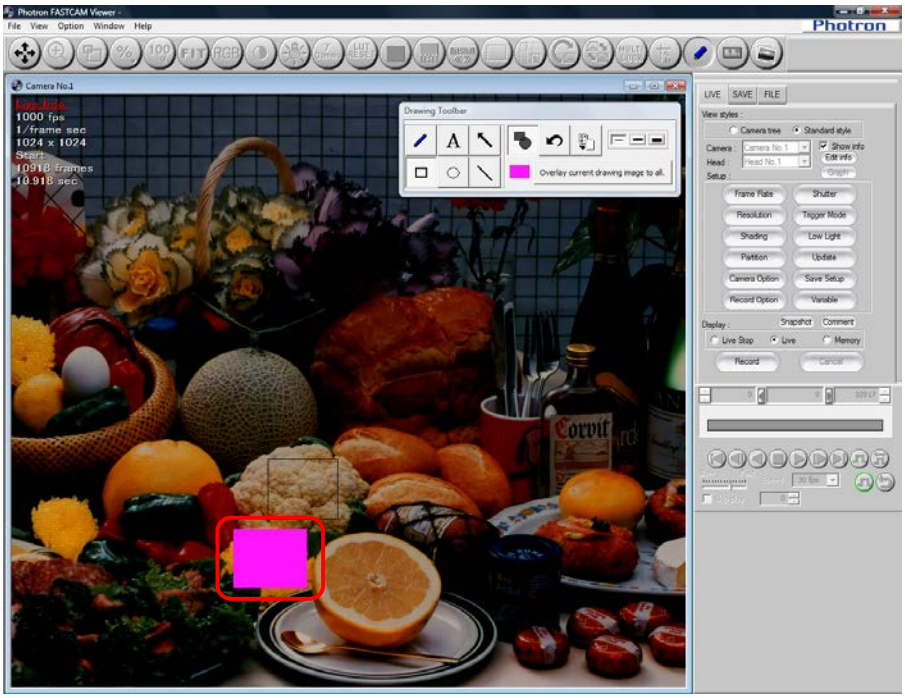
4. When drawing a graphic to be filled with the desired color, click on the desired color with the [Color] button and after clicking the [OK] button, draw the graphic.



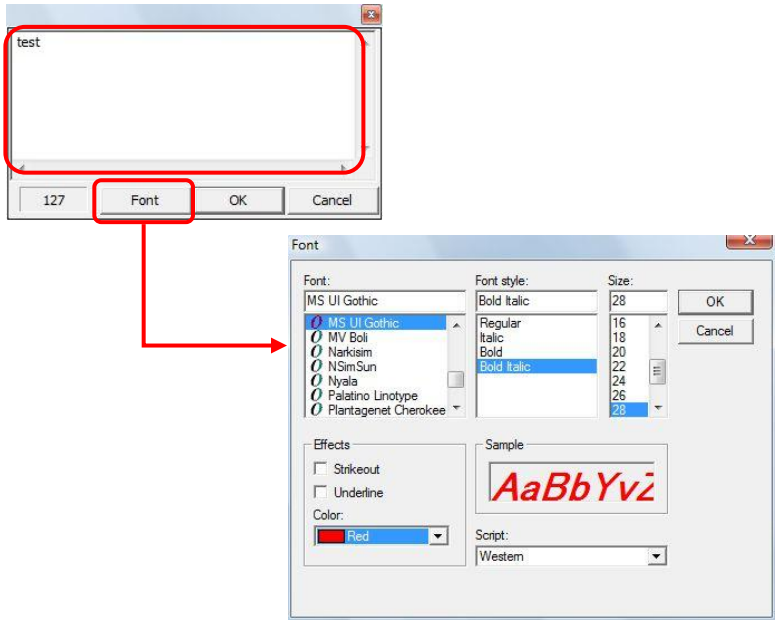
5. After clicking the [Fill] button on the drawing toolbar, draw a graphic.



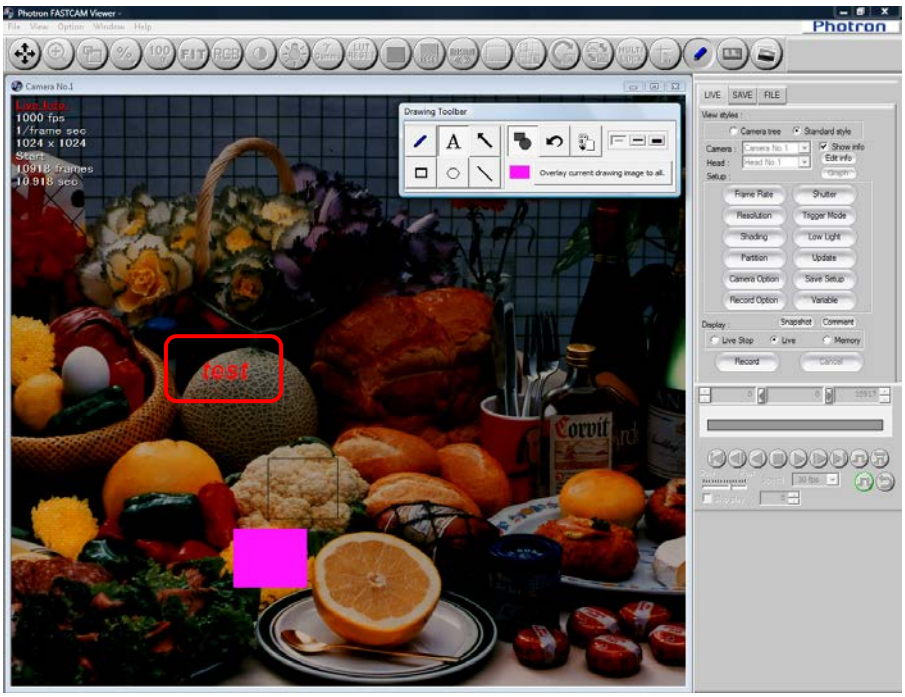
6. The graphic is drawn filled with the specified color.



7. When drawing text, after clicking the [Text Box] button, click at the desired location on the frame (on the view window) and enter the text with the displayed dialog box.
You can specify the text color, font, and size with the [Font] button.
After the text is entered, click the [OK] button.



8. The entered text is drawn at the location clicked.



Supplement

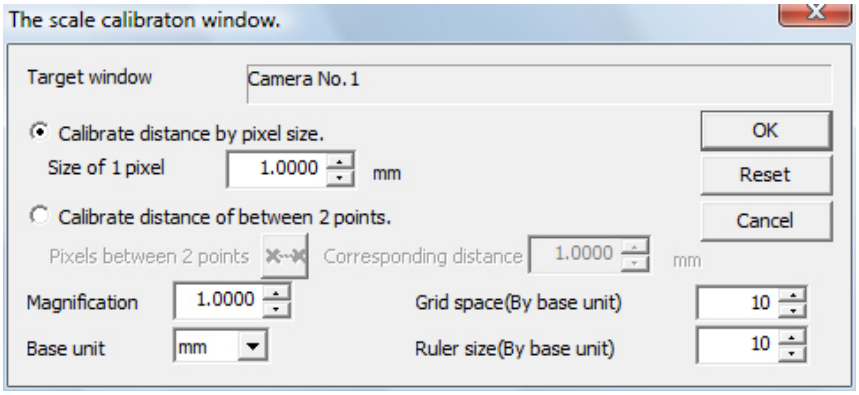
- If you save the image recording, the drawn graphics are also saved together with it.
- When you save monochrome images (frames shot in monochrome), the graphics are also saved as monochrome.
- When reflecting the graphics drawn in all frames, after drawing the graphics, click the [Overlay current drawing image to all.] button on the drawing toolbar.

2.8. Scale Display

The scale display shows a ruler or grid lines on the frame (view window).
You can display a ruler or grid lines with a reference value of the desired length. The set value is reflected in the reference value for distance measurements.

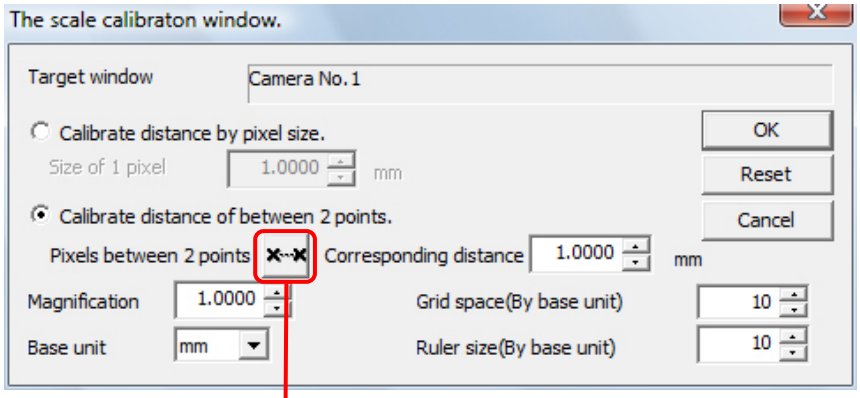
1. Click the [Scale Display] button on the standard toolbar.

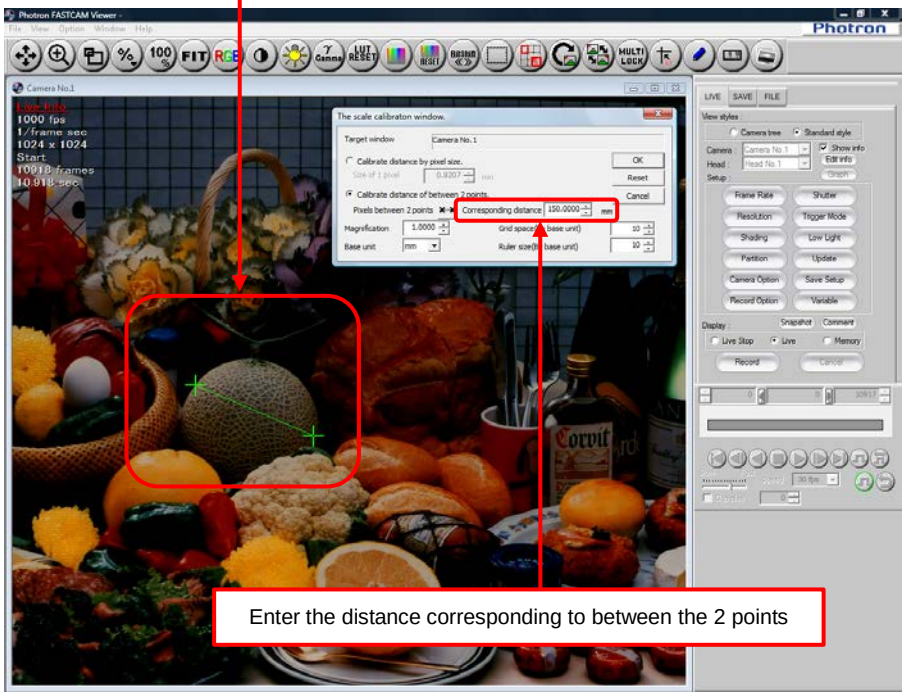
2. "The scale calibration window" dialog box is displayed. Configure the reference value.



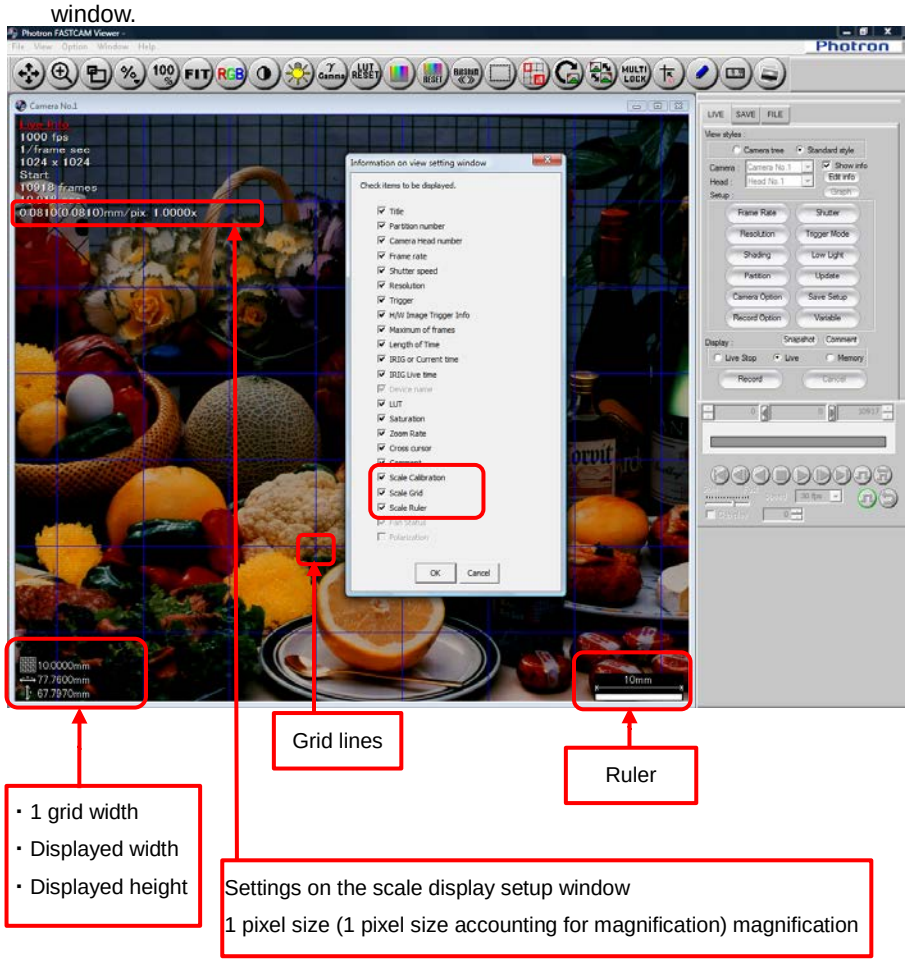
Item	Description
Target Window	The scale settings are applied to this window.
Calibrate distance by pixel size	Enter the pixel size and the distance measurement plug-in calculates distance based on that data.
Calibrate distance of between 2 points	Set the distance corresponding to the distance between 2 points clicked on the image. The distance measurement plug-in calculates distance based on that data.
Magnification	Set the optical magnification.
Grid space (By pixel units)	When displaying a uniformly spaced grid on the image, enter that spacing in pixels.
Base unit	Enter the distance unit. The following units can be set. (cm, mm, um, nm, inch)
Ruler size (By base unit)	Enter the length of the ruler displayed in the lower-right of the window. The unit is the value set in the basic distance unit. (If the basic distance unit is "mm" and the entered value is "10" then a 10 mm ruler is displayed.)
OK	Click to conclude the settings.
Reset	Return to the data before making changes.
Cancel	Discards the changed settings and closes the window.

3. When "Calibrate distance of between 2 points" is selected, click the button to the right of "Pixel between 2 points". Click on any two points on the image (the start point and the end point) and after confirming the pixels, enter the desired value in "Corresponding distance".





4. Click the "Edit Info" button on the control panel and check "Scale Calibration", "Scale Grid", "Scale Ruler" to display the measurement result, grid lines, and ruler on the view window.



Supplement

- After configuring the settings, they are saved in the CIH file when the image is saved. When the saved file is opened, the image is displayed with the settings applied to it.
- The [Distance Measurement] function on the plug-in bar measures distance based on the distance set with the "The scale calibration window".
- The values for "Size of 1 pixel", "Magnification", "Corresponding distance" are handled up to four decimal places. Errors may occur because the result of these values when multiplied is rounded to four decimal places.

Reference

- For distance measurements between two points, refer to “2.11.2 Distance Measurement between Two Points”, page 63.
- For saving images, refer to”5.1 Saving Images Recorded On the Camera to the PC”, page 210.

2.9. Live Image and File Image Overlay Display

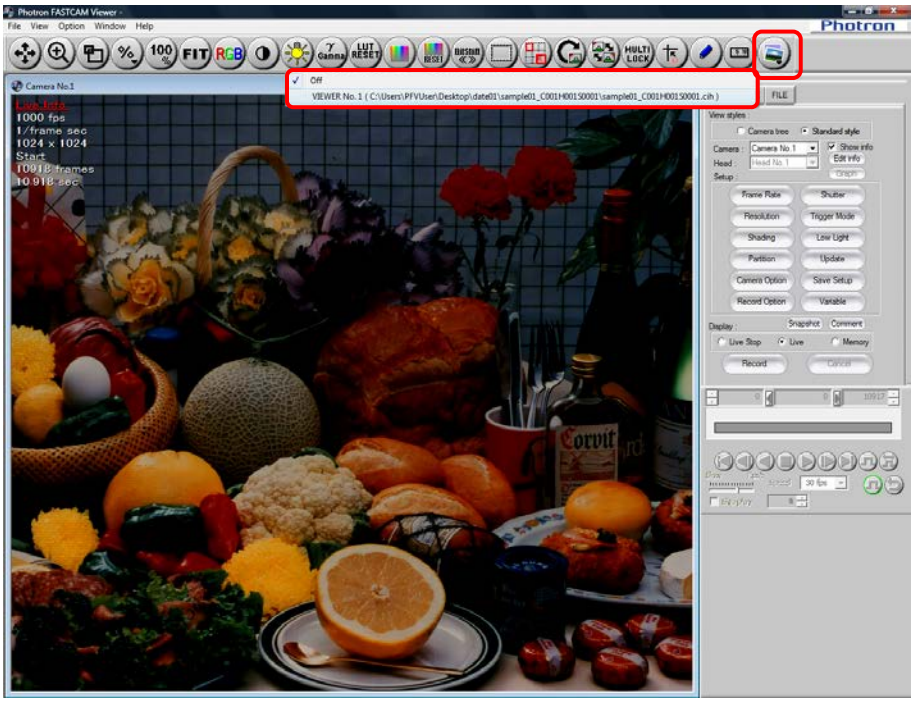
You can display the live image on top of a saved image used as the background. The image overlay function can be used to adjust the angle of view in situations where you need to record a scene with the same angle of view as it was previously recorded.
Also, you can overlay an image recorded in the camera over a filed image, or a filed image over another filed image.

1. Display the "FILE" tab and open the image to use as the background for the live or opened image.

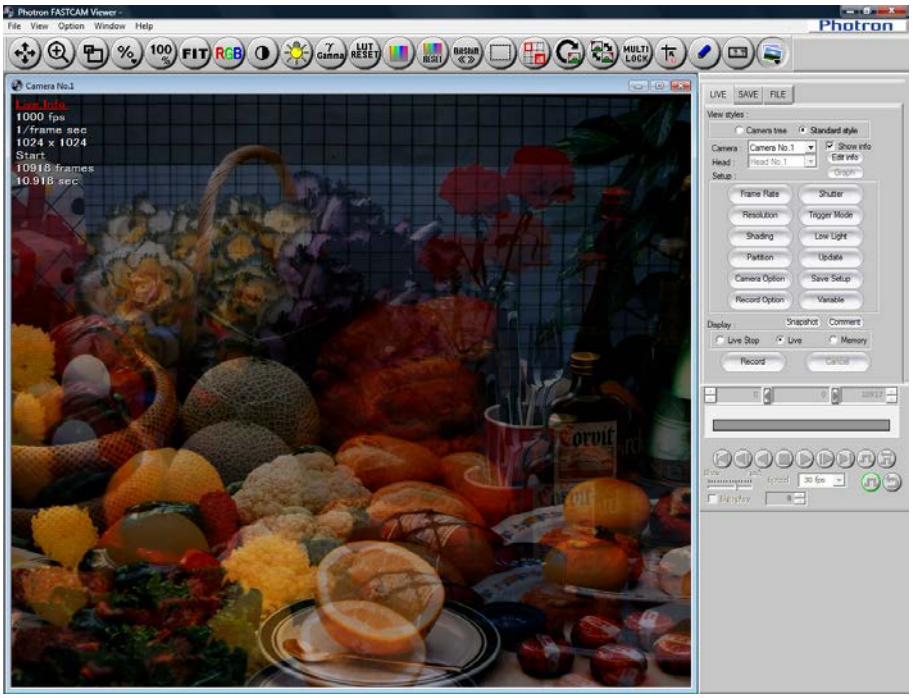
Reference

- For how to open files, refer to "6.1.1. Open Saved Data", page 270.

2. After displaying the "LIVE" or “FILE” tab, click the [Image Overlay] button on the standard toolbar. Select the image file to use as the background for the live image on the displayed list.



3. The selected image is displayed as the background.
In the view window, drag up to increase the transparency of the live or opend image.
Drag down to decrease its transparency.



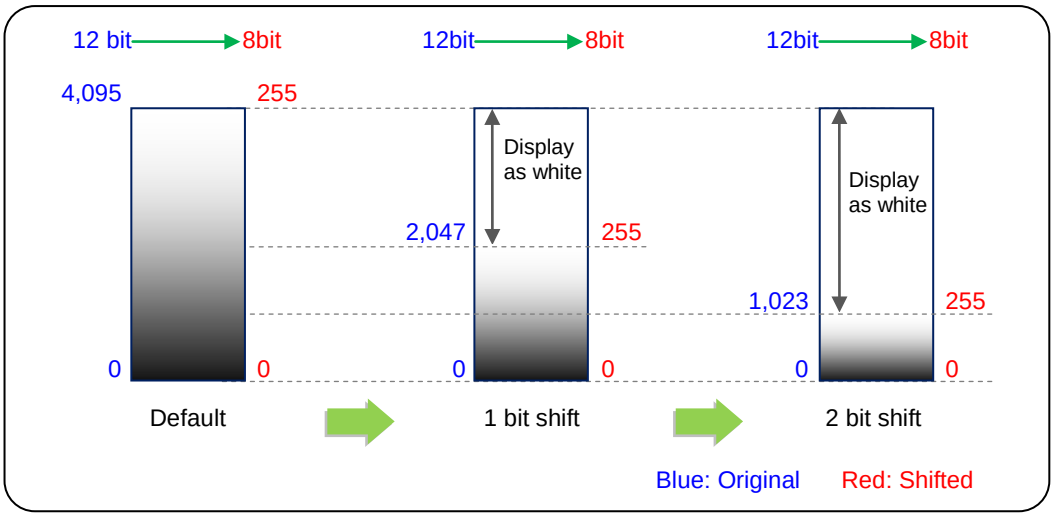
Caution

- The overlaid live image cannot be saved.
- Images being played back can also be overlaid. However, the images may flicker and performance may decrease.

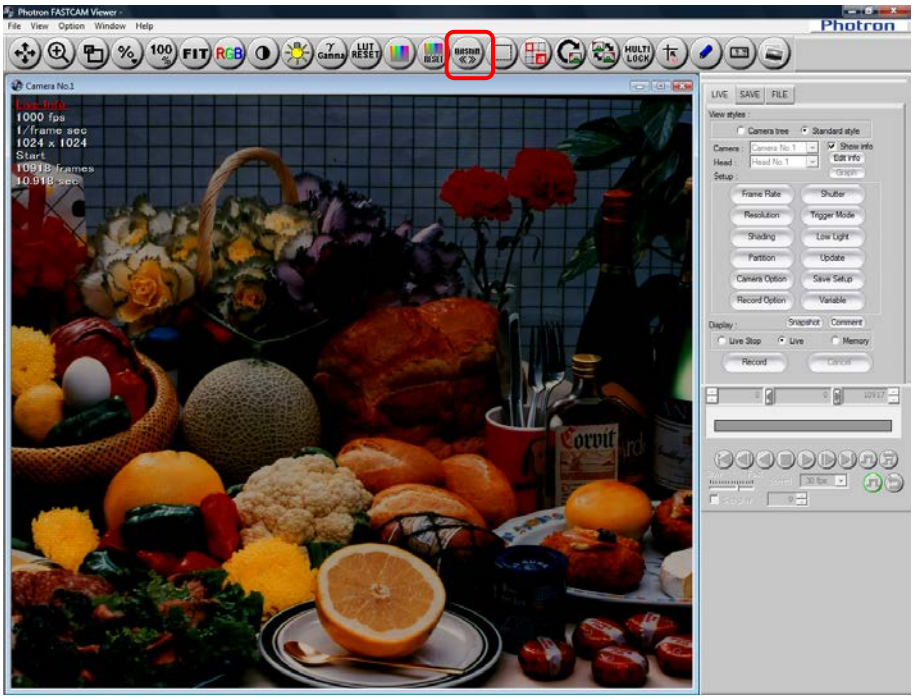
2.10. Bit-Shift Display

The apparent brightness of the image being displayed can be increased.
When displaying 8-bit format images that were shot with 12-bit or 10-bit resolution ,you can select the range of displayed area.

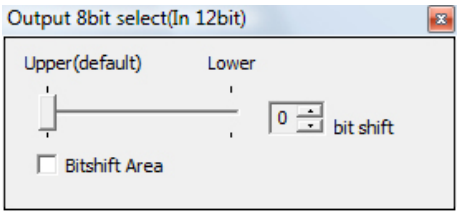
Even though the apparent brightness of the image doubles every time a shift of one bit is made, the range of the displayed area is halved at a shift.



1. Click the [Select 8-bit output] button in the standard tool bar.

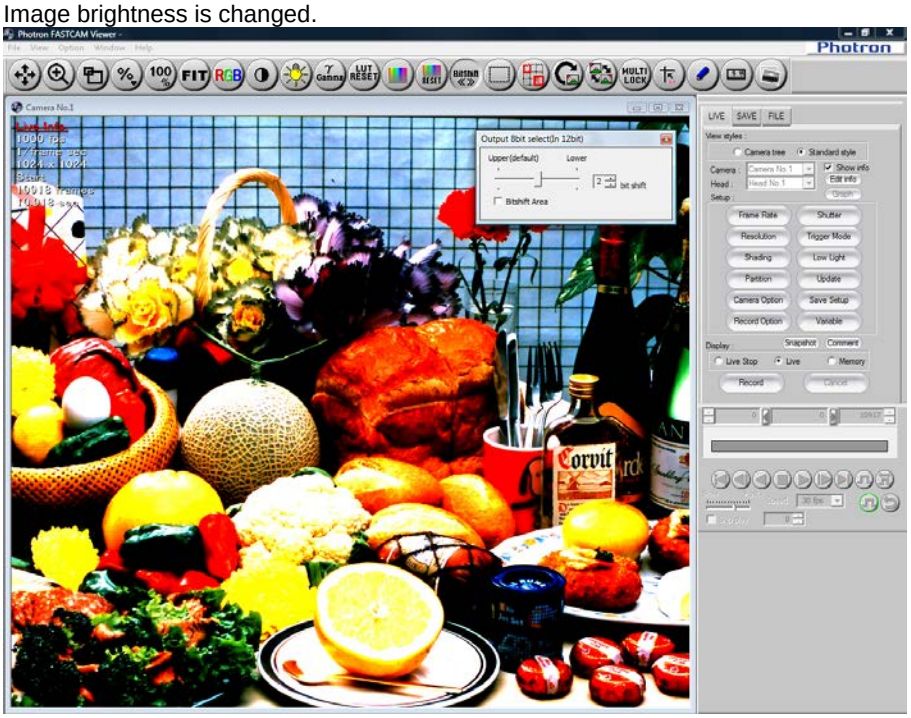


2. [Output 8bit select (In 12bit)] dialog box appears.
Set the bit shift.



Item	Description
Bit shift	Specify the number of bits to shift (Max 4 bits for 12-bit images; 2 bits for 10-bit images).
Bitshift Area	Check the Bitshift Area box if you wish to specify the area for shiftbit.

3. Image brightness is changed.



Supplement

- To specify the area for bitshift, drag at any position within the view window.

2.11. Plug-in Bar Operations

You can readjust and/or measure the images.

Caution

- Plug-in bar functions cannot be combined and used such as measuring distance while measuring an angle.

Supplement

- When specifying the desired location, the zoom window can be used.

Reference

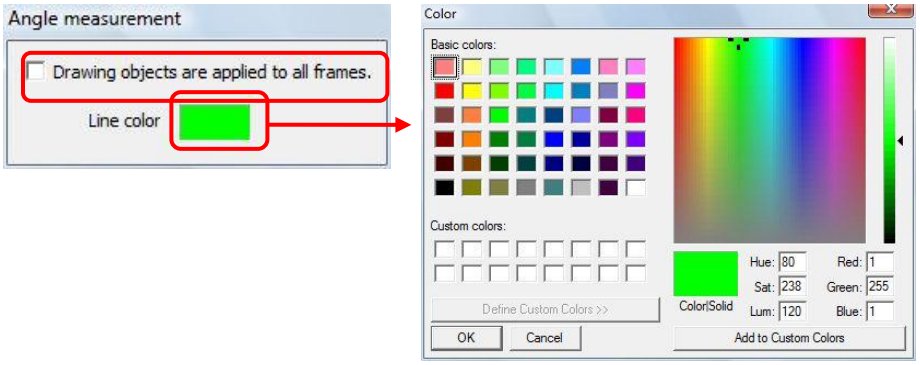
- For the zoom window display, refer to "2.3.3. Zoom Window Display", page 24.
- For the [Polarized Light Measurement] button, refer to the "Polarized Light Plug-in Manual".

2.11.1. Angle Measurement

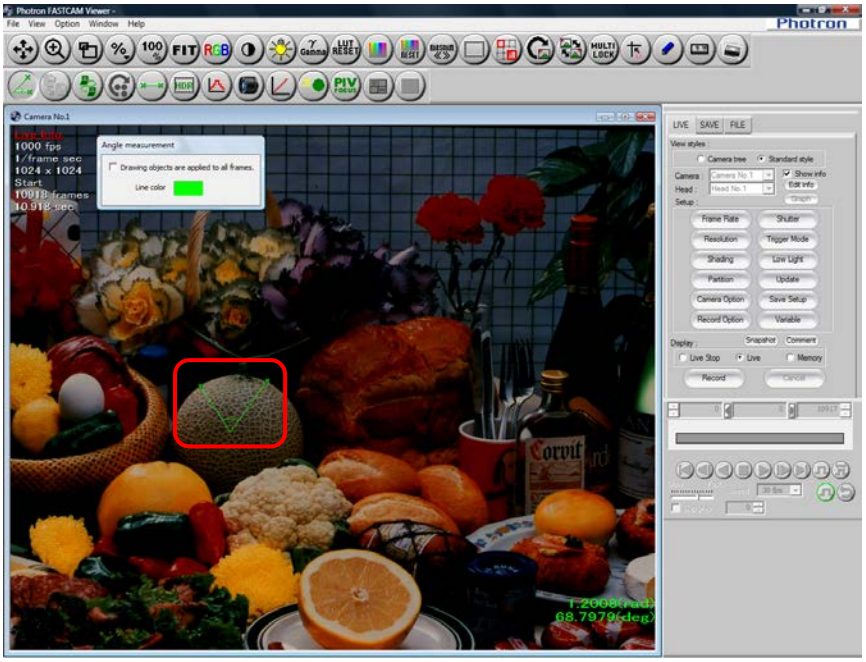
Any angle formed by three points within the view window can be measured by this function.

1. Click the [Angle measurement] button on the plug-in bar to activate the function.

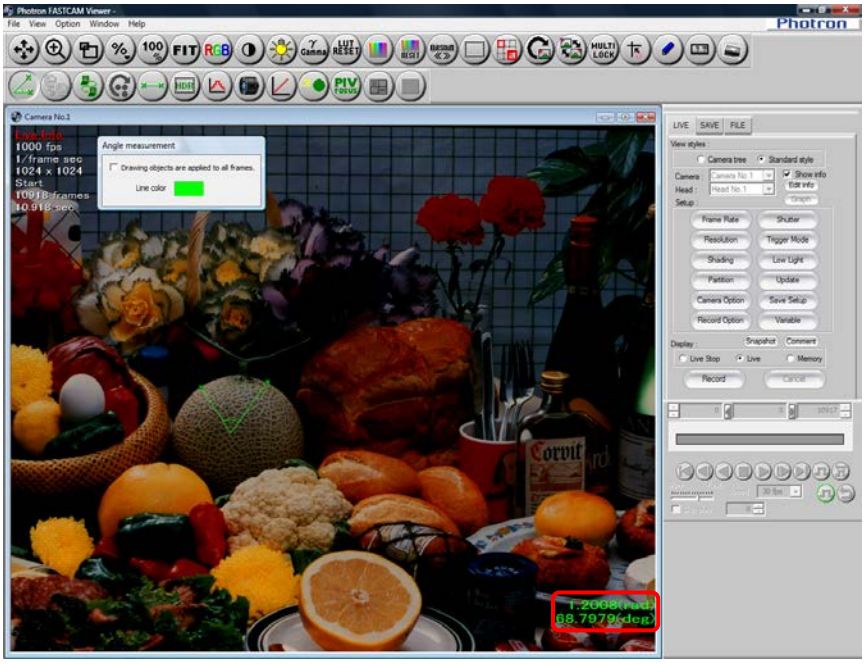
2. The “Angle measurement” dialog box is displayed.
   To reflect the measurement results on all frames, check “Drawing objects are applied to all frames”.
   To change the color of the measurement result, click the color displayed to the right of “Line color” to change.



3. Click on three points – start point (A), vertex of angle (O) and direction point (B) – to draw two lines forming an angle to be measured on the view window.



4. The angle is measured and the result is displayed in the lower right corner. The angle is measured in the clockwise direction from the line between points O and A.



5. To end angle measurement, click the [Angle measurement] button on the plug-in bar again. The measurement is also deleted when measurement ends.

Supplement

- When recording data is saved, measurements are also saved with it.

2.11.2. Distance Measurement between Two Points

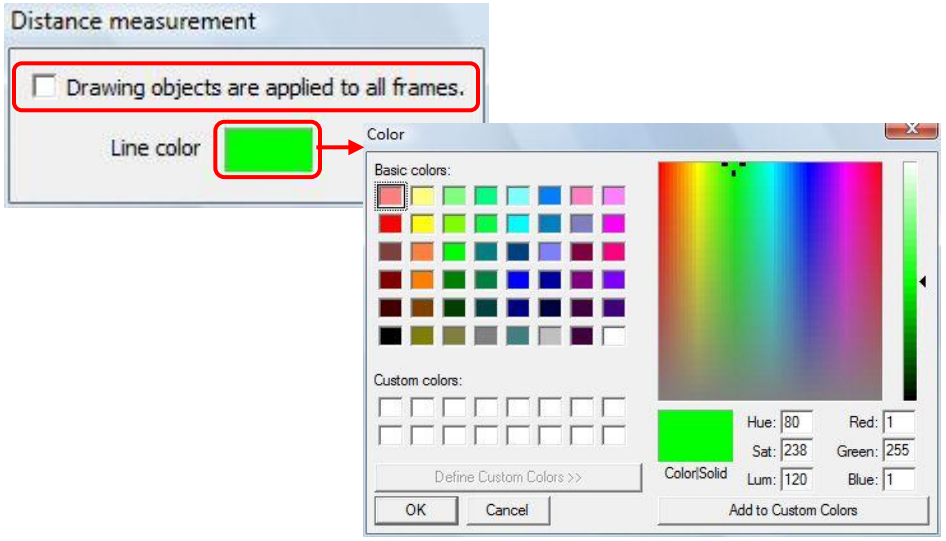
Measures the distance between two arbitrary points based on the reference value. The reference value is 1 mm/1 pixel (default value). To change this value, set the scale under the scale display.

Reference

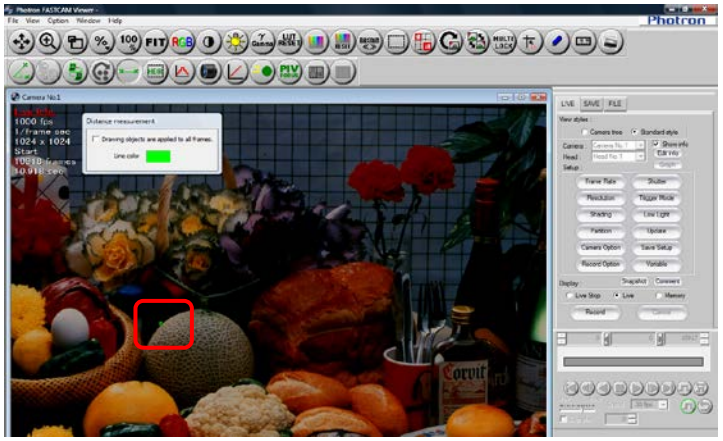
- For the scale display, refer to "2.8. Scale Display", page 54.

1. Click the [Distance measurement] button on the plug-in bar.

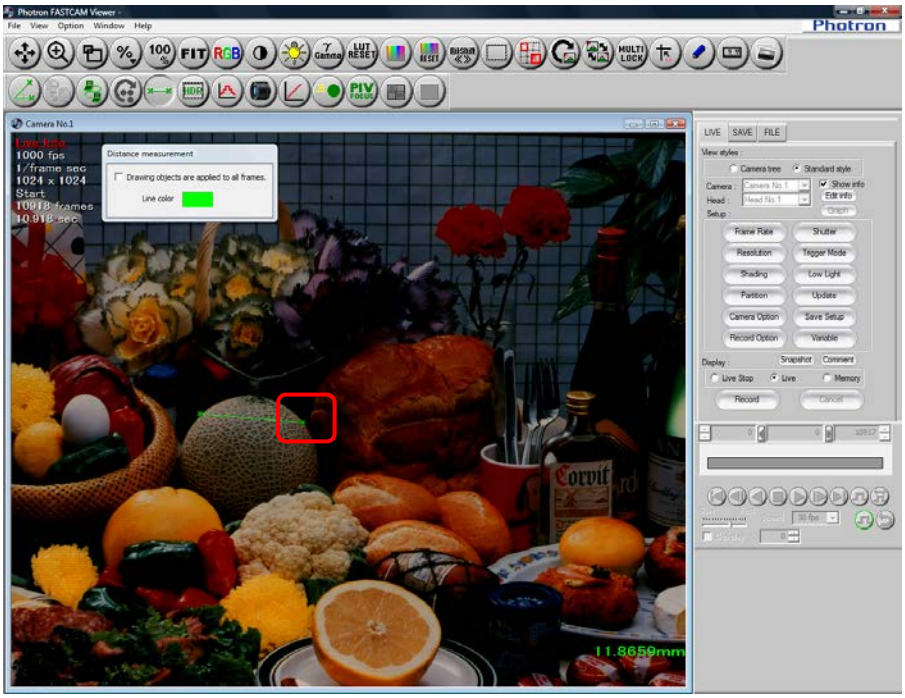
2. The “Distance measurement” dialog box is displayed.
To reflect the measurement results on all frames, check “Drawing objects are applied to all frames”.
To change the color of the measurement result, click the color displayed to the right of “Line color” to change.



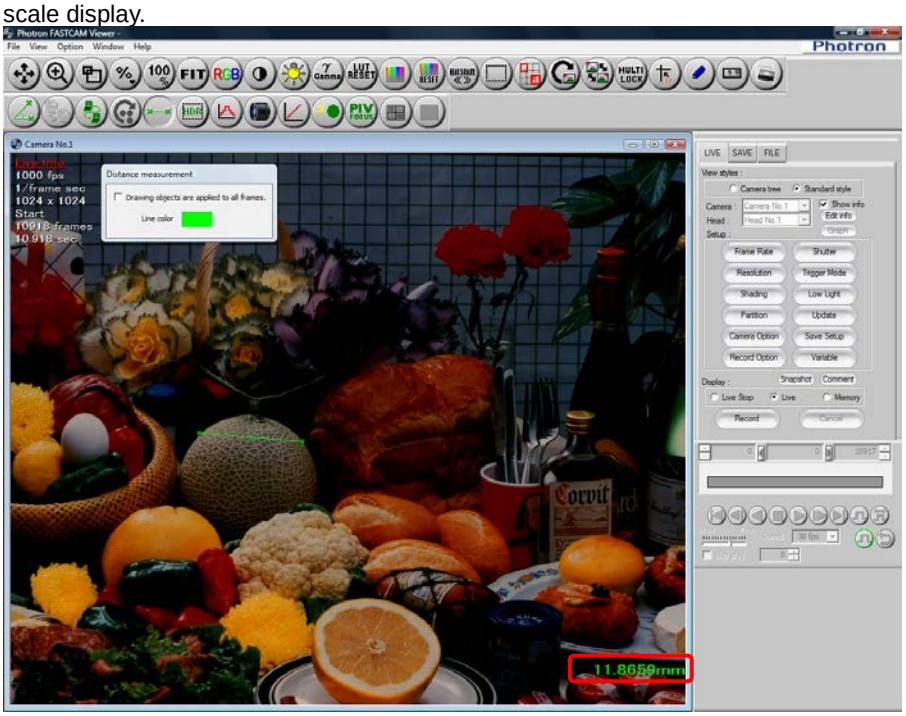
3. Click at a point within the view window, which is the start point of measurement.



4. Click at another point within the view window, which is the end point of measurement.



5. The distance between two points is calculated based on the scale setting and displayed in the lower right.
The reference value is 1 mm/1 pixel (default value). To change this value, set it under the scale display.



Reference

- For the scale display, refer to "2.8. Scale Display", page 54.

6. To end distance measurement, click the [Distance measurement] button on the plug-in bar again.
   The measurement is also deleted when measurement ends.

Supplement

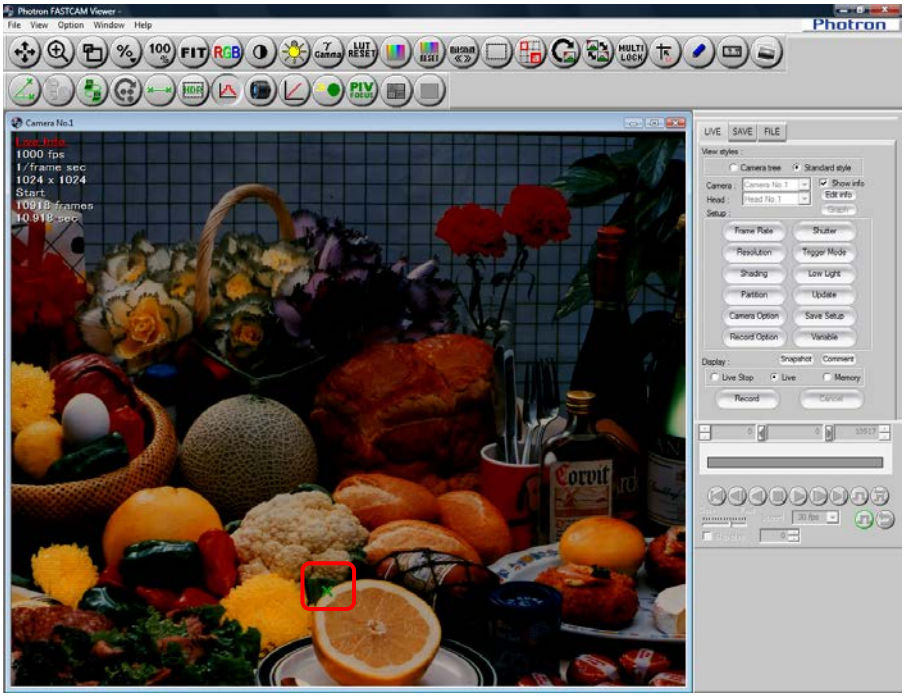
- When recording data is saved, measurements are also saved with it.

2.11.3. Histogram Display

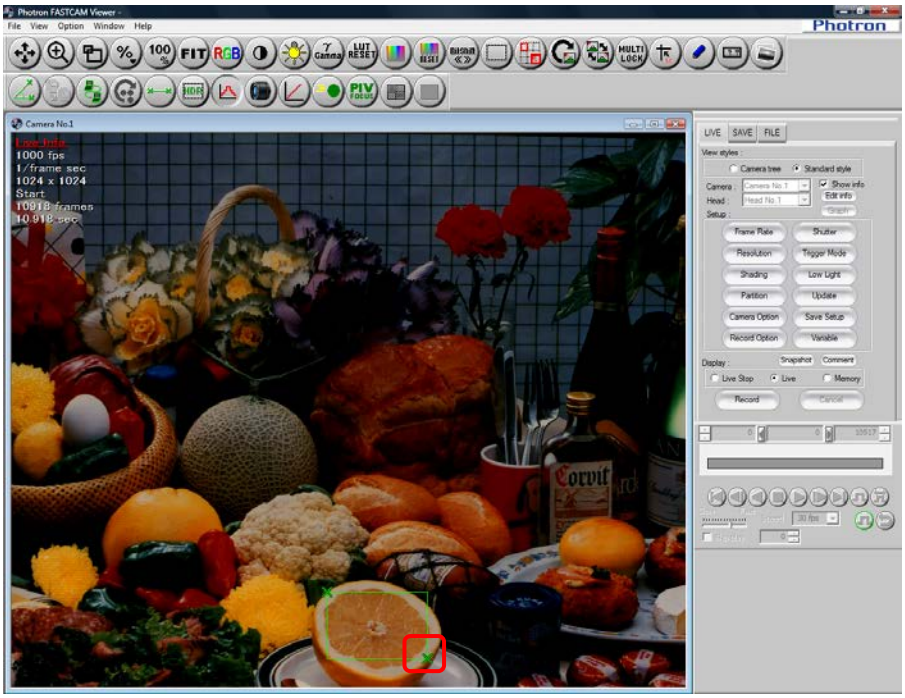
Shows a histogram (graph of brightness values) of the desired range on the view window.

1. Click the [Histogram] button on the plug-in bar to activate the function.

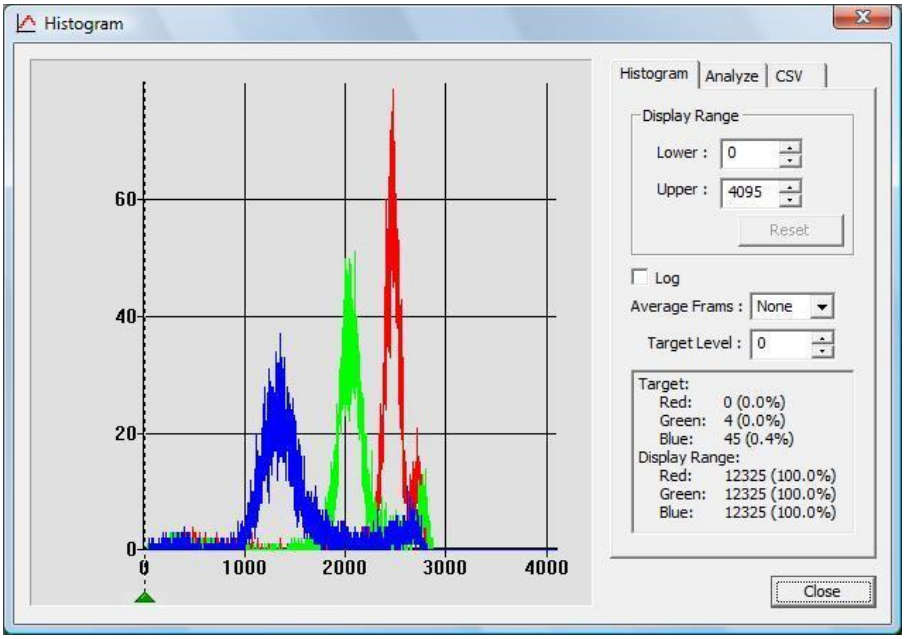
2. Specify the range to measure on the view window.
   Click the upper left which will be the starting point of the range.

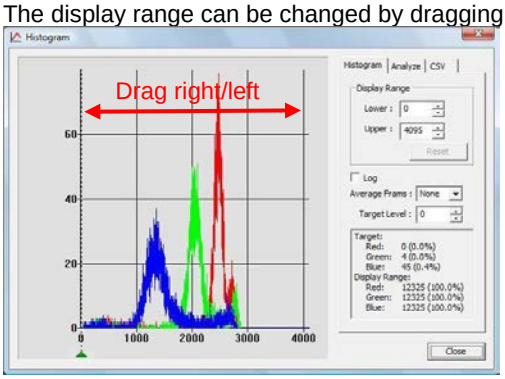
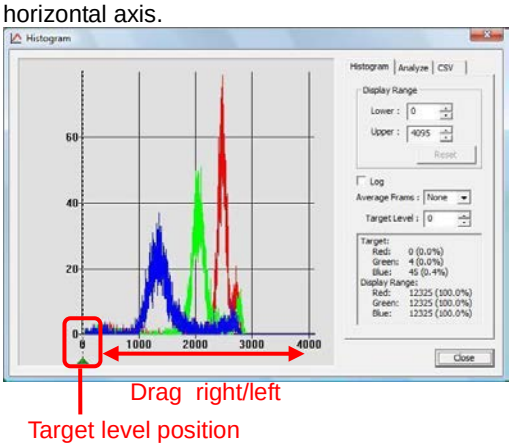


3. Click the lower right which will be the end point of the range.

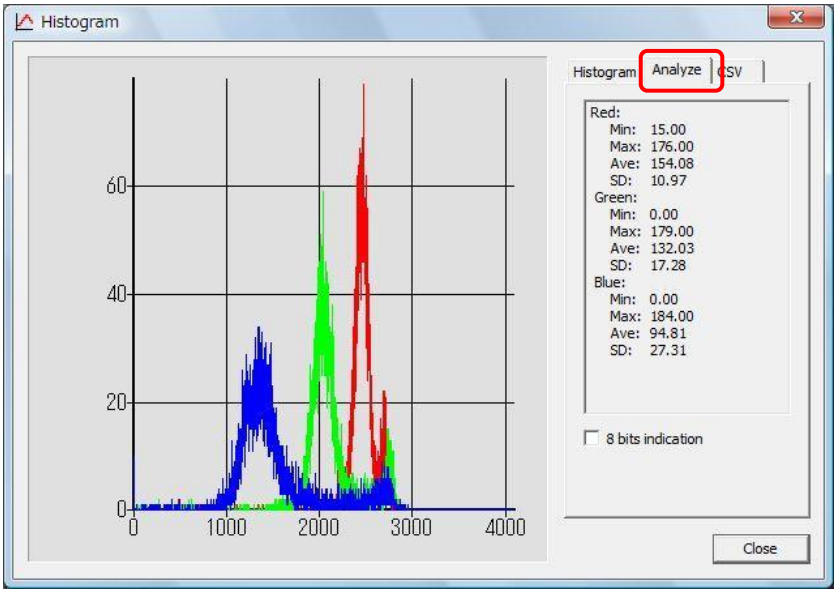


4. The histogram is displayed.



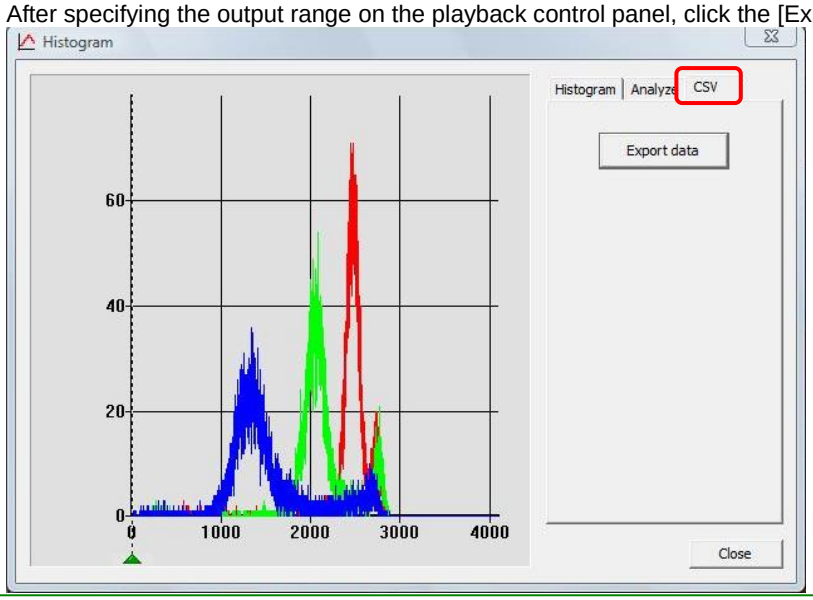
Item	Description
Graph	Shows the histogram. The horizontal axis shows each RGB level value, the vertical axis shows the frequency.
Display Range	Sets the display range of the horizontal axis. Shown in the range from Lower to Upper. This example shows 12-bit (4096 levels). The display range can be changed by dragging on the graph.  Click the [Reset] button to set the camera (file) to the standard range.
Log	Check to change the vertical axis to a logarithmic display. It is normally the number of pixels (when not checked).
Average Frames	A function in live mode. Measures the live image in time after averaging it by the specified frame count (2 to 10 frames). No averaging is performed when “None”.
Target Level	Displays the specified level's frequency in the information display area below “Target Level”. The target level position can be moved by dragging it below the graph's horizontal axis. 
Information display area	Shows the frequency information for the target level and the total frequency for the range displayed in the graph.

5. On the “Analyze” tab, you can check the maximum, minimum, and standard deviation values after conversion. To display in 256 levels, check “8 bits indication”.



Supplement

- On the "CSV" tab, you can output the histogram to a CSV file. (The histogram cannot be output in live mode.)
  After specifying the output range on the playback control panel, click the [Export data] button.



Caution

- You may not be able to save correctly. While saving, do not perform any other operations.

Reference

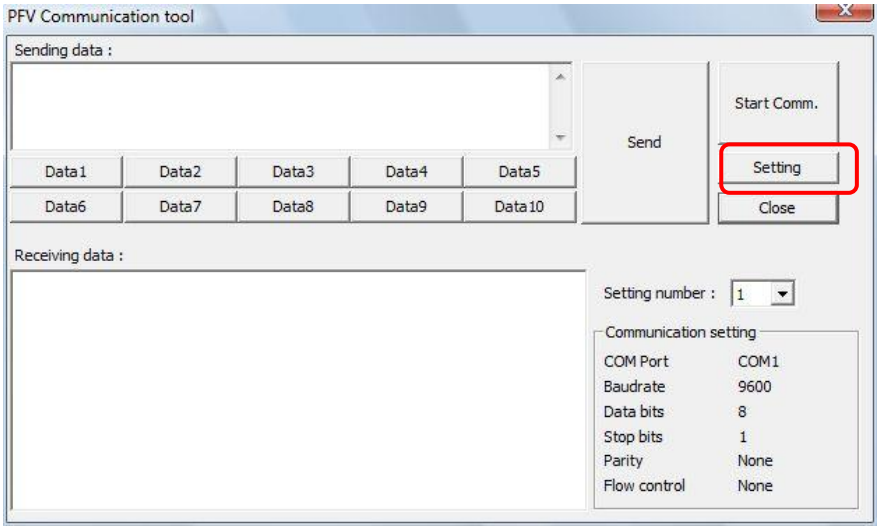
- For the playback control panel, refer to "4.1. Playing Images Recorded On the Camera", page 192.

2.11.4. RS-232C Control

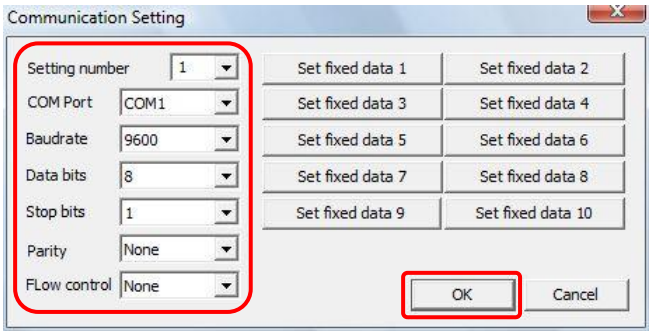
RS-232C control configures the connection settings between the PC and the device connected via RS-232C and the control settings.

1. Click the [RS-232C Control] button on the plug-in bar to activate the function.

2. The “PFV Communication tool” dialog box is displayed.
Configure the connection settings with the connected device. Click the “Setting” button.

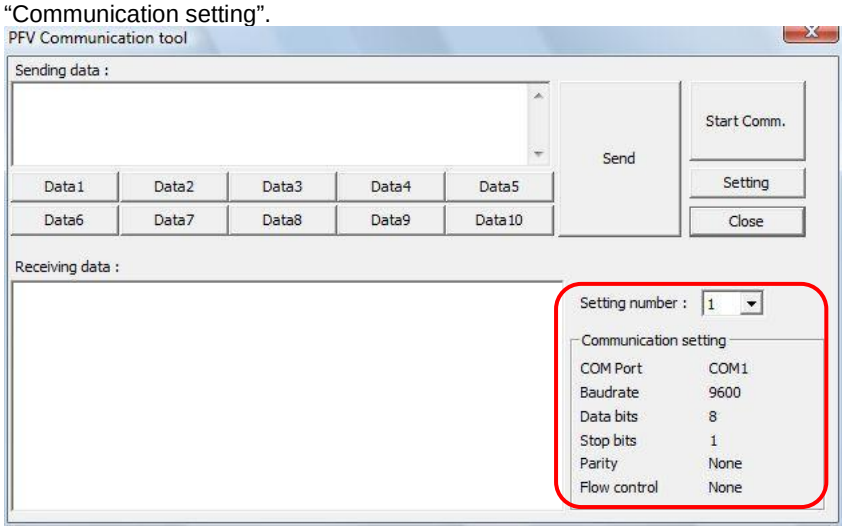


3. Select “Setting number” and after filling in the necessary settings, click the [OK] button. Per "Configuration number", a maximum of 10 communications settings can be configured.

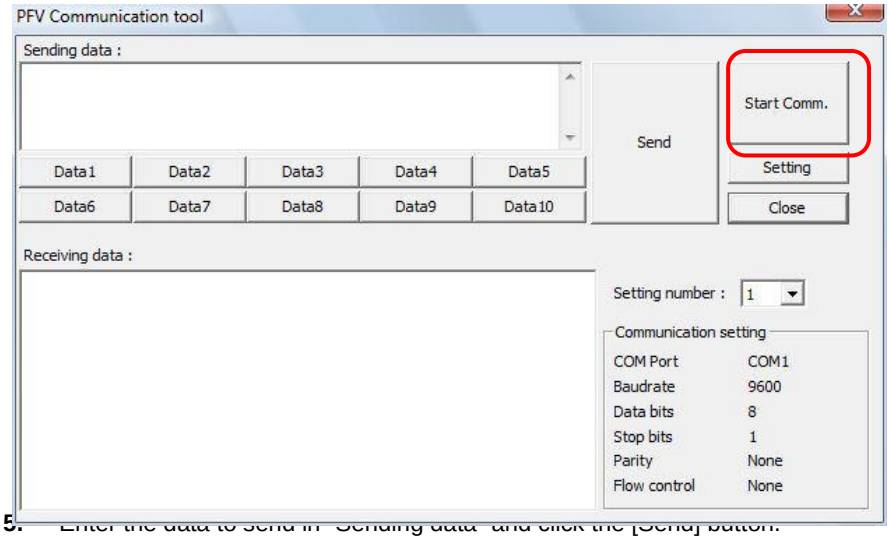


Supplement

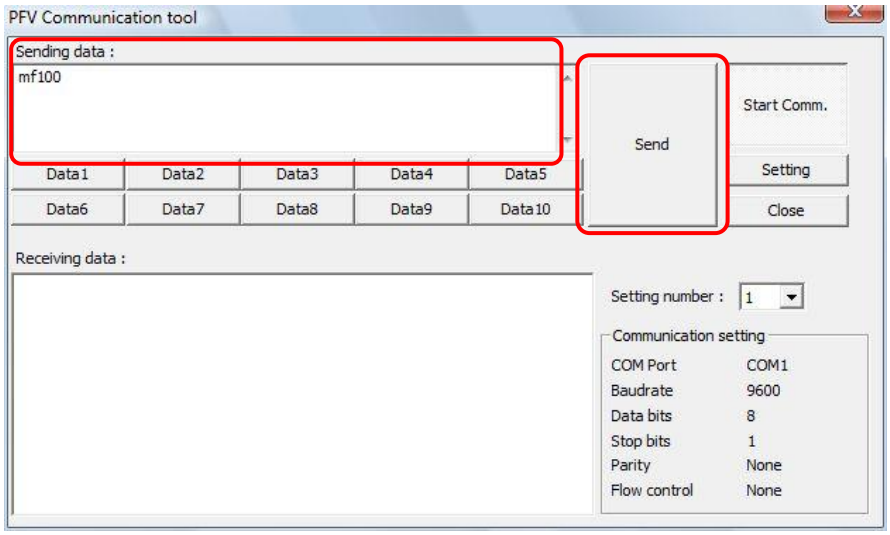
- After registering the settings, “Setting number” on the “PFV Communication tool” dialog box can be used. The settings registered to the selected configuration number are displayed in “Communication setting”.



4. Click the [Start Comm.] button.



5. Enter the data to send in "Sending data" and click the [Send] button.



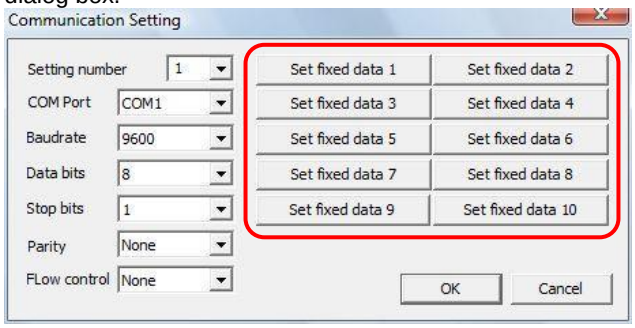
Supplement

- Data that can be sent is listed below.
  ・ASCII strings
  ・For a decimal ASCII code appended after the ASCII character "\", send the string corresponding to that ASCII code
  Example: To send the string "POWER ON" followed by a carriage return,
  Enter "POWER ON \13" and click the [Send] button.

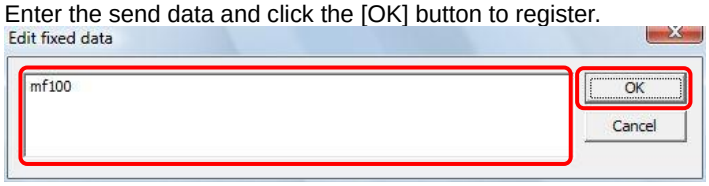
6. When data is received from the connected device, that data is displayed in “Receiving data”.

Supplement

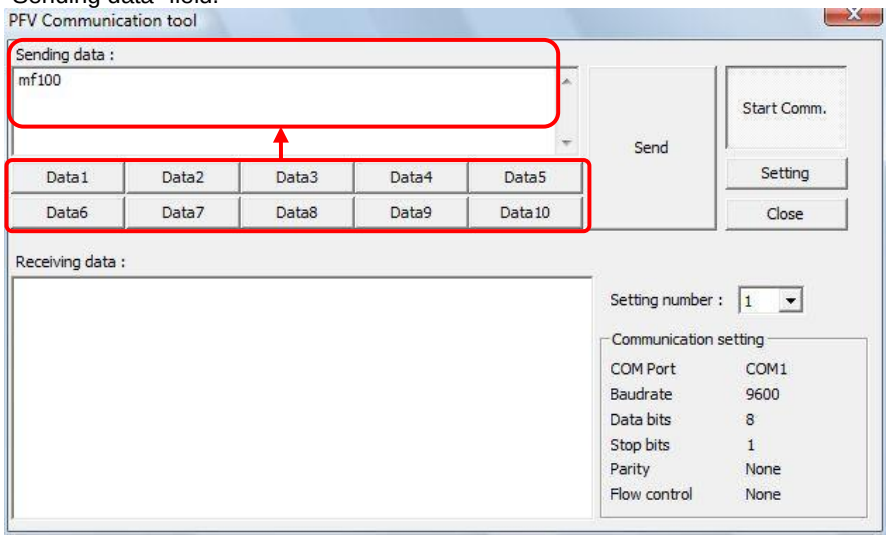
- Send data can be registered in advance.
  1. Click the desired numbered [Set fixed data] button on the “Communication Setting” dialog box.



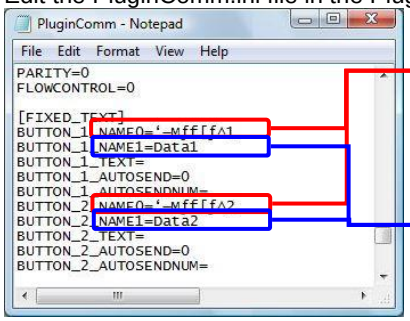
  2. Enter the send data and click the [OK] button to register.



  3. After registering, if you click on the desired [Set fixed data] button on the “PFV Communication tool” dialog box, the registered send data is entered in the “Sending data” field.



- You can change the name of the "Data1" through "Data10" buttons in the "PFV Communication tool" dialog box.
  Edit the PluginComm.ini file in the Plug-in folder under the PFV installation folder.



The string after "NAME0=" is the button name displayed for a Japanese OS

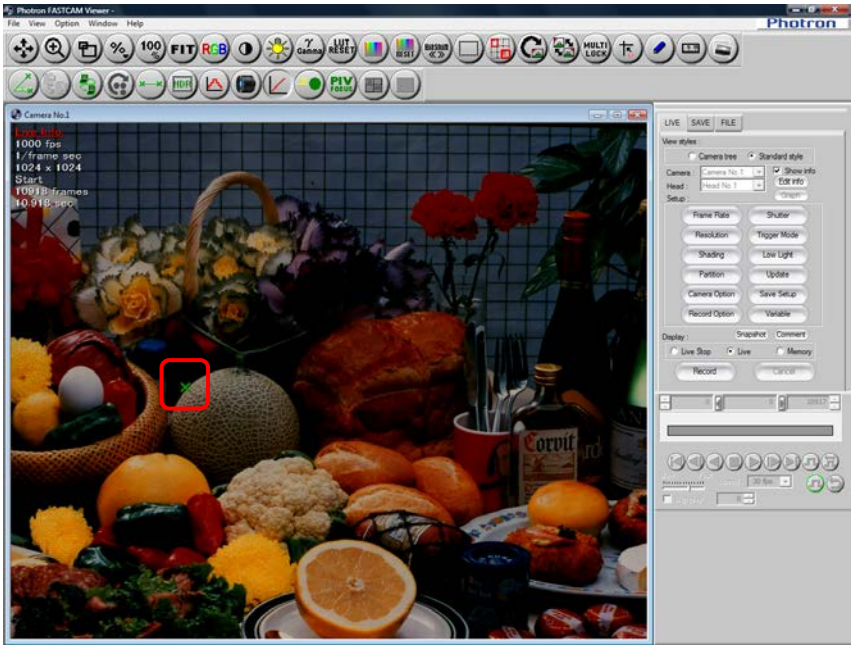
The string after "NAME1=" is the button name displayed for a non-Japanese OS

2.11.5. Line Profile Display

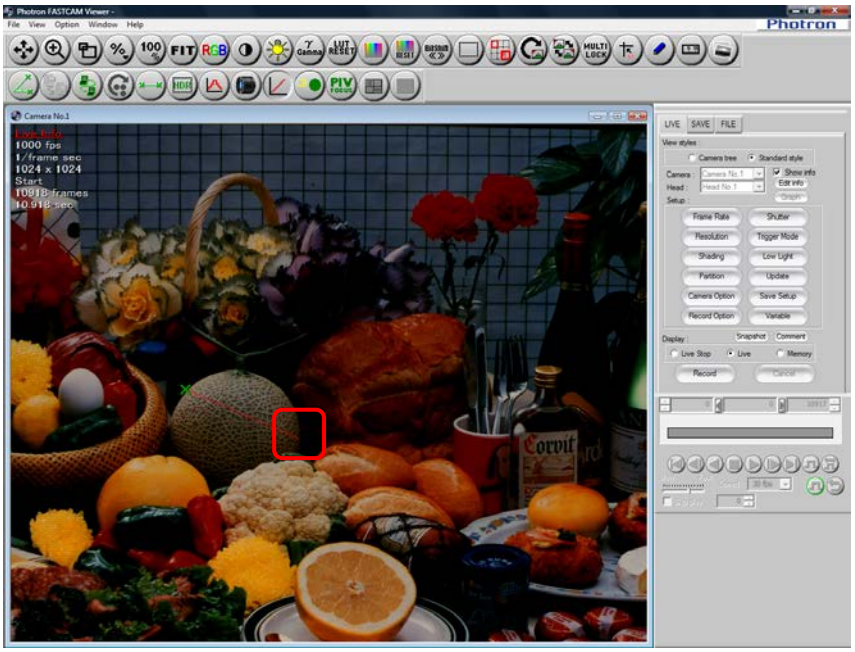
This function displays a line profile on the desired line to use for adjusting the focus.

1. Click the [Line Profile] button on the plug-in bar.

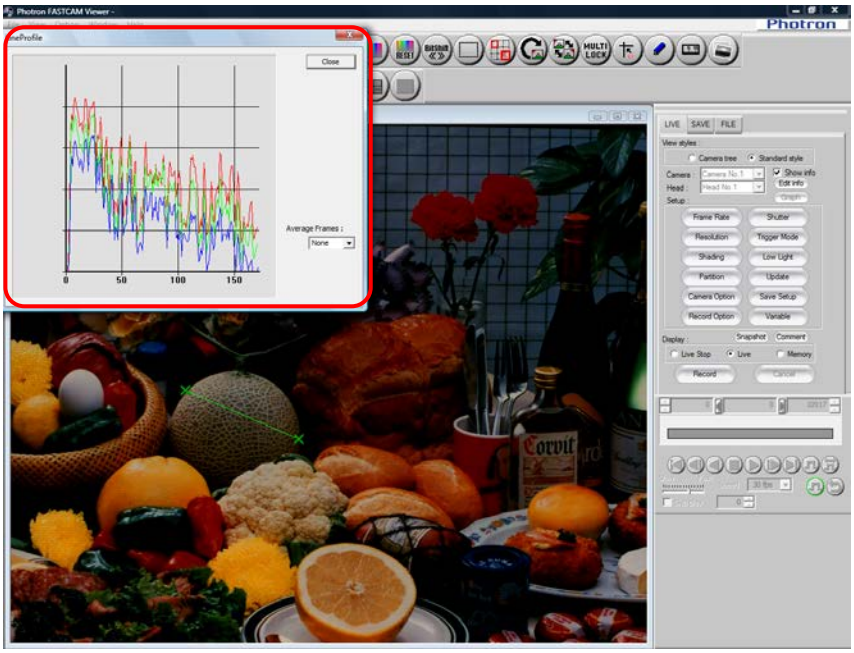
2. Click at the location to be the start point to measure on the view window.



3. Click at the location to be the end point to measure on the view window.



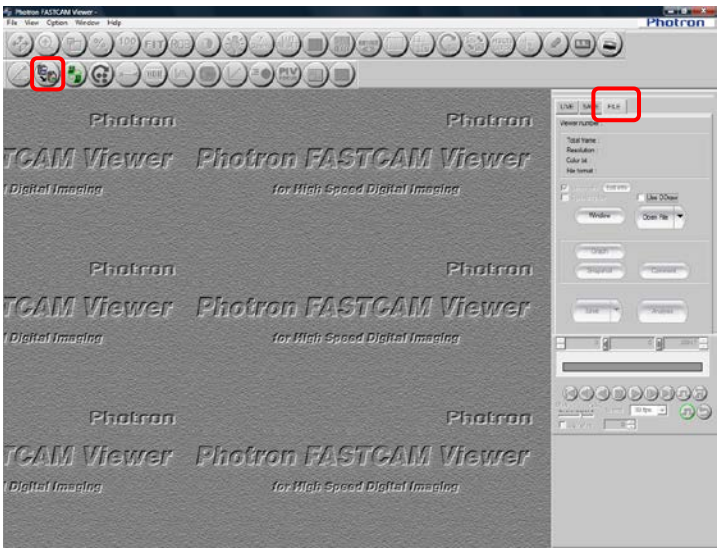
4. The line profile of the specified line is displayed.



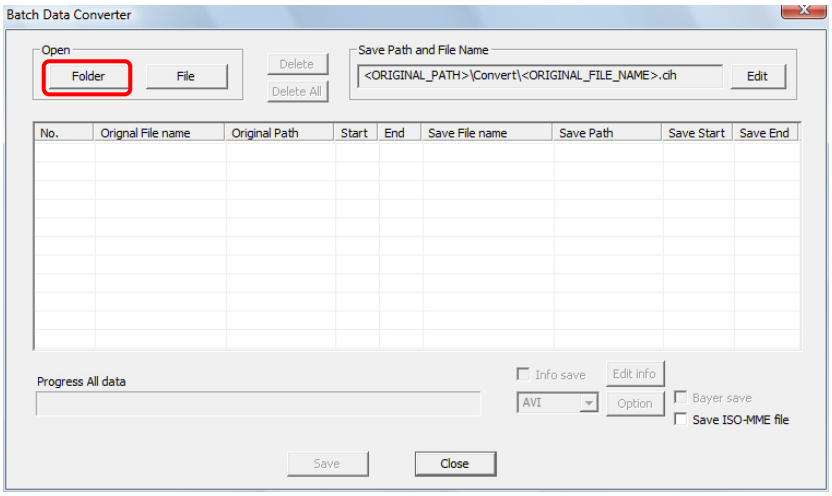
2.11.6. Batch Data Converter

This function converts and saves multiple files to a specific file format in batch.
When recording, you can save images in a file format that downloads quickly such as the RAW Bayer format, the RAWW Bayer format, and the MRAW Bayer format, then later you can convert them all to AVI or another format.

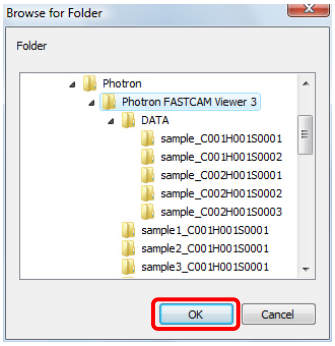
1. Display the "FILE" tab on the control panel and click the [Batch Data Converter] button on the plug-in bar.



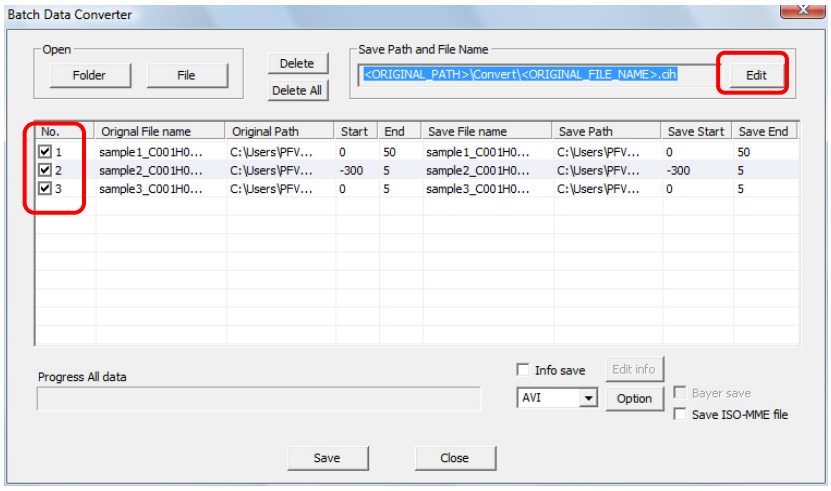
2. The "Batch Data Converter" dialog box is displayed.
Click the [Folder] button.
To directly select files, click the [File] button.



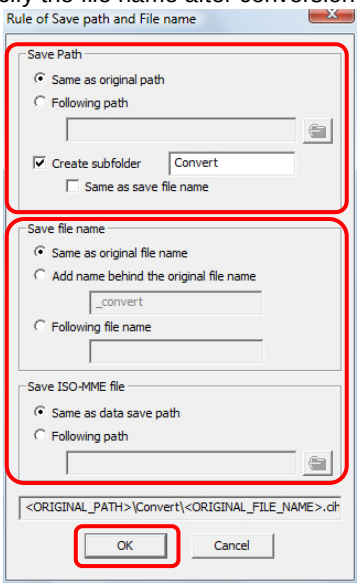
3. Select the folder where the files to convert are saved and click the [OK] button.



4. The CIH files in the selected folder are displayed in the list.
For files to not batch convert, uncheck the file to remove and click the [Edit] button.
To delete a file in the list, select the file to delete and click the [Delete] button. To delete all the files in the list, click on the [Delete All] button.

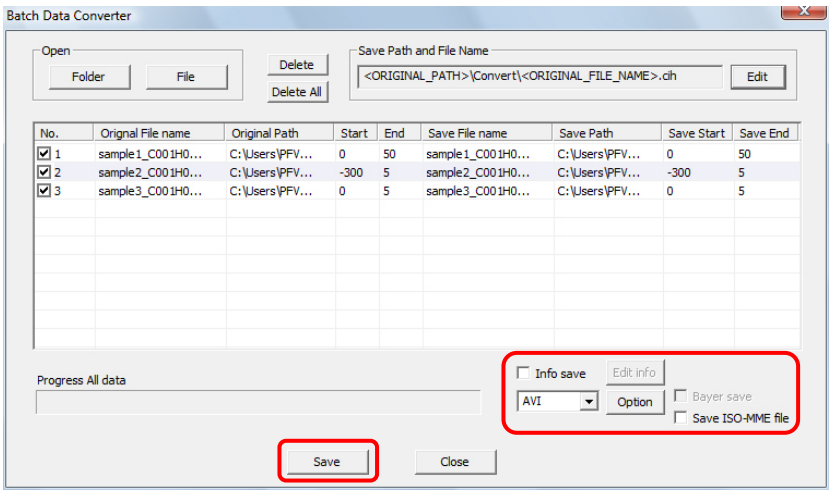


5. Specify the save location and save file name.
To change the save location, select "Following path" and specify the save location with the [Browse] button.
To save files in a new subfolder in a specific save location, check "Create subfolder" and enter the desired subfolder name. (Or check "Same as save file name".)
Specify the file name after conversion with "Save file name" and click the [OK] button.

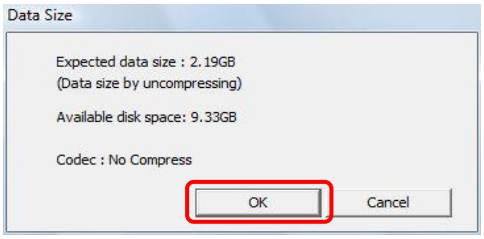


6. Specify the save file format from the dropdown box at the bottom-right of the screen and then click the [Save] button.
Depending on the format, you can configure detailed settings when saving such as the compression ratio with the [Option] button.
To save in the Bayer format, check "Bayer save".

To save the information added to the image, check the [Info save] checkbox.
To save the ISO-MME file, check the [Save ISO-MME file] checkbox.

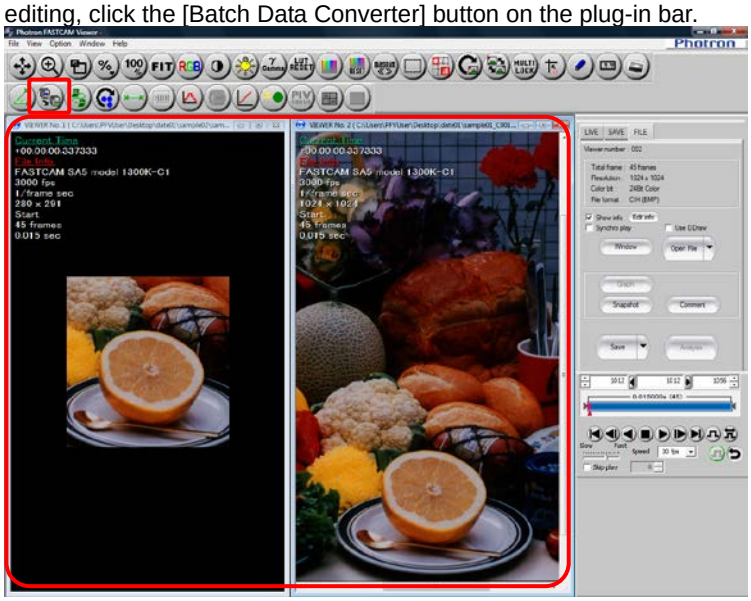


7. The "Data Size" dialog box is displayed. Click the [OK] button.

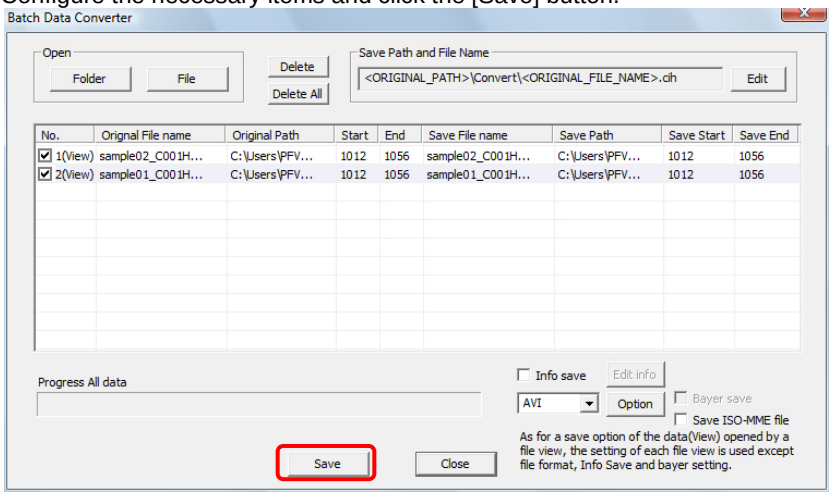


Supplement

- You can also batch convert after opening multiple files.
  1. From the "FILE" tab on the control panel, open all the files to batch convert.
     To edit then save, such as saving only the desired range, edit each file in advance. After editing, click the [Batch Data Converter] button on the plug-in bar.



  2. The "Batch Data Converter" dialog box is displayed.
     Configure the necessary items and click the [Save] button.



Caution

- When opening files first and batch converting them, the following save data is not applied.
  - Layout save
  - Bayer format save (The "Batch Data Converter" dialog box setting is applied.)
  - File format (The "Batch Data Converter" dialog box setting is applied.)
  - File format options (The "Batch Data Converter" dialog box setting is applied.)

Reference

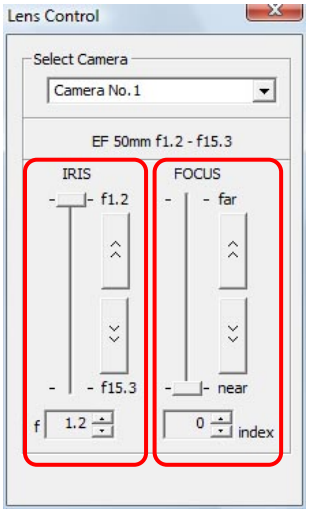
- For how to open multiple items of data, refer to “6.1.2 Open Multiple Saved Data”, page 273.
- For how to edit when saving, refer to “Chapter. 5 Saving Images to the PC”, page 209.

2.11.7. Lens Control

This function remotely controls the aperture and focus of an EF mount lens.

1. Click the [Lens Control] button on the plug-in bar to activate the function.

2. The "Lens Control" dialog box is displayed.
Adjust "IRIS" and "FOCUS".

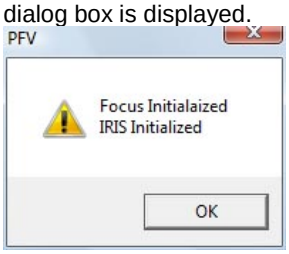


Caution

- [Lens Control] is capable of controlling the lens only when the EF mount lens (optional) is equipped.
- If you replace the lens after PFV has been started, you must restart PFV.

Supplement

- [IRIS] and [FOCUS] are initialized only the first time the camera is started and the "Lens Control" dialog box is displayed.

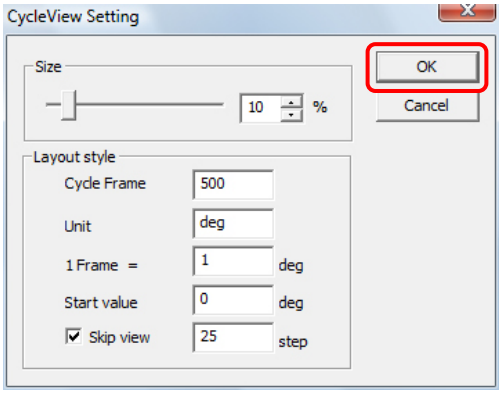


2.11.8. Cycle View

This function displays frames of a movie file in an array.
By specifying the number of frames to display, you can have images for one cycle displayed in a row.

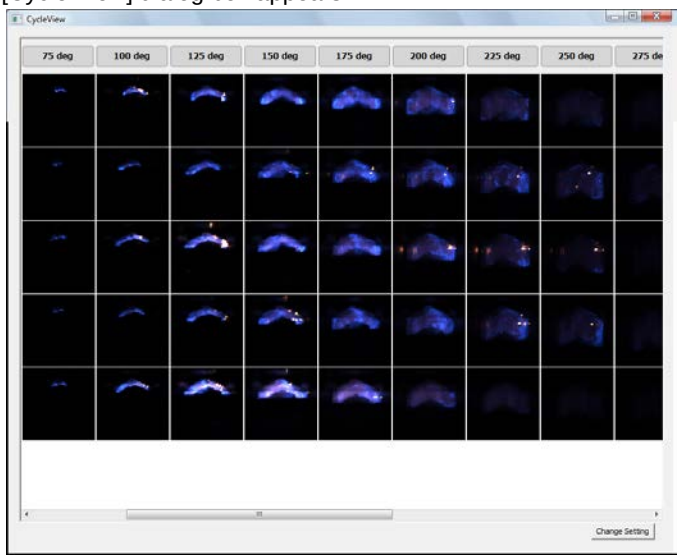
1. Click the [Cycle view] button in the plug-in bar.

2. [CycleView Setting] dialog box appears.
Set all necessary items and click the [OK] button.

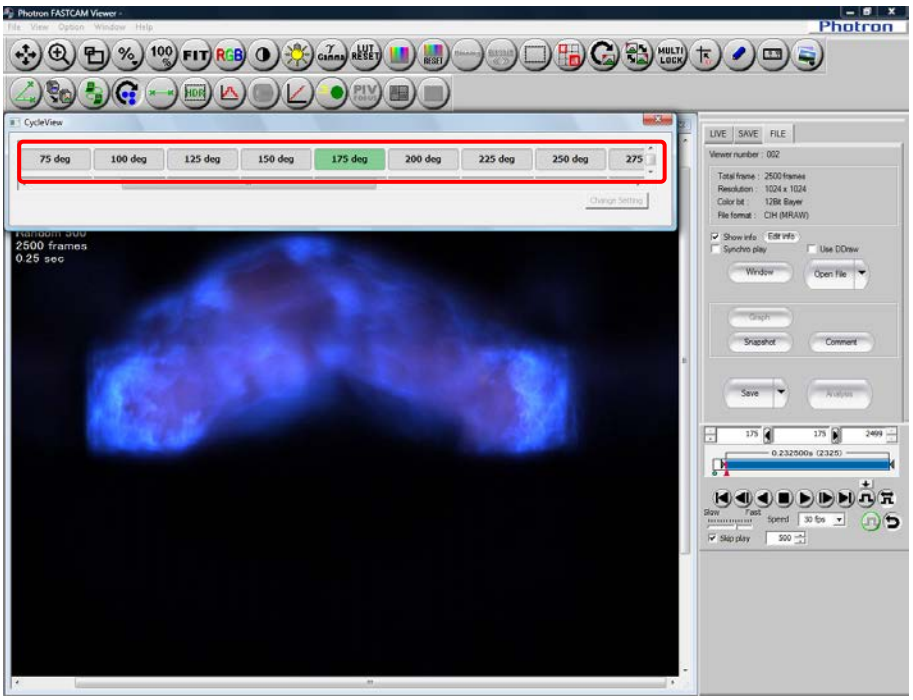


Item	Description
Size	Sets the display size of image in percentage.
Cycle Frame	Enters a number of frames to be displayed in one cycle.
Unit	Enters the unit for the frame count.
1Frame =	Sets the separation between frames in the specified unit.
Start value	Enters the frame number to start display with.
Skip view	Sets this mode when you wish to skip frames to display. Checks the check box and enters the number of frames to skip.

3. [Cycle View] dialog box appears.



4. Double click on the header of a column allows you to play back and save images in that column.



5. Double click the selected header again and the display returns to the original.

2.11.9. HDR

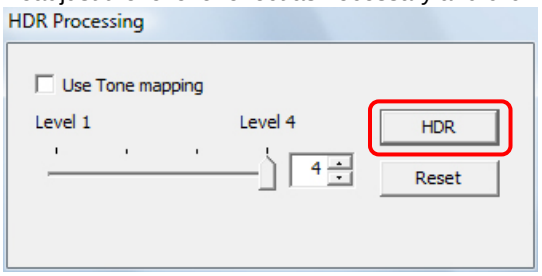
Out of images shot by a 12-bit or 10-bit camera, this function generates 3 to 5 bit-shifted images with different brightness, and then finally produces a high-dynamic 8-bit image.
This function is effective and useful on an image that has a darker part when a normal image of upper bits is displayed, and the exposure of that darker part is corrected when the image is bit-shifted but all other parts become overexposed.

Caution

- This function cannot be used on images shot by an 8-bit camera.
- Because this process is applied by software after the image is shot, it does not work on ranges that cannot be captured by the camera (any part that is too dark or too bright even after being bit-shifted).

1. Click the [HDR] button in the plug-in bar.

2. [HDR Processing] dialog box appears.
Readjust the level of effect as necessary and click the [HDR] button.

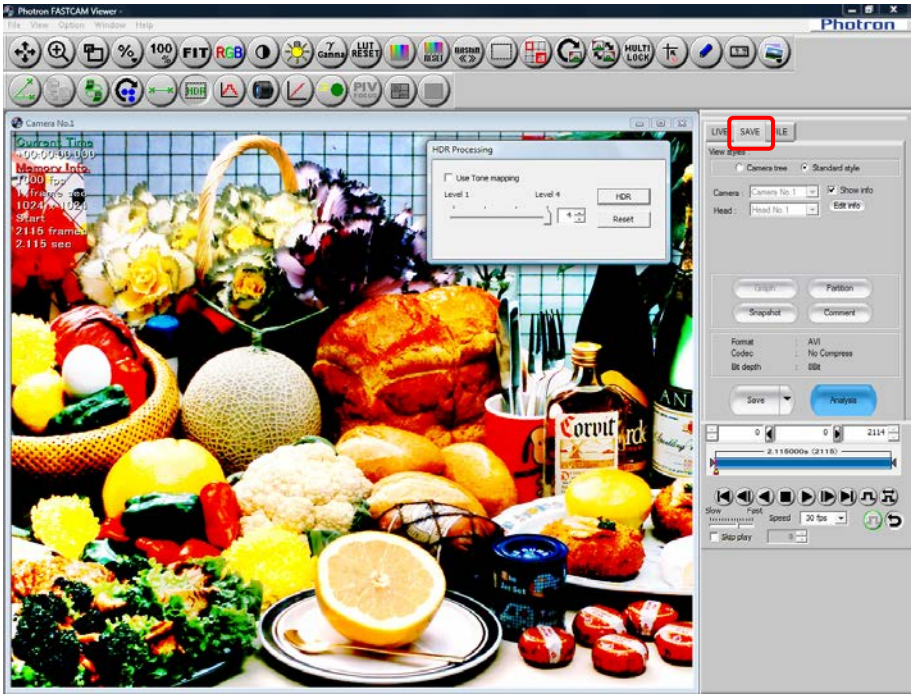


Item	Description
Use Tone mapping	If checked, image processing is applied so that a more natural-looking image can be obtained. (Depending on the nature of the image, a natural looking image may not be obtained)
Level	Sets the level for HDR image processing. Leve 1: 2 images of bitshift 0 to 1 are used for processing. Use this level for a 4-bit shift when there is noise in the lower bits. Level 2: 3 images of bitshift 0 to 2 are used for processing. Level 3: 4 images of bitshift 0 to 3 are used for processing. Level 4: 5 images of bitshift 0 to 4 are used for processing.

Caution

- Because this process is time consuming, the HDR image is displayed as a still picture.
  If you click the [HDR] button during a live shooting, a still picture is displayed with the camera as if its live shooting is suspended.
  With images stored in memory or those output from an image file, the HDR image returns to the original image when played back.
  Stop playback and then click the [HDR] button.

3. If the image is saved while the HDR image is being displayed, an HDR-processed image is saved in all the frames.



Reference

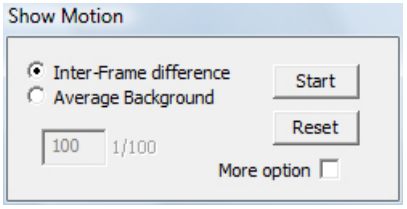
- For saving files, refer to “5.1.2. Saving Files” in page 214.

2.11.10. Extracting moving objects

Moving objects are extracted by specifying a background image and extracting portions with luminance different from the specified background.

1. Click the [Extract moving objects] button in the plug-in bar.

2. [Show Motion] dialog box appears.
Select the way for extraction.



Item	Description
Inter Frame difference	Compares images between frames, and based on the detected difference, updates the background image once every 2 frames. Extracts the difference between the background and the current image in the frame as a moving object. Works well especially when the change of the background is subtle.
Average Background	First generates a background image by averaging the specified number of images and displays the difference between the background and the current image in the frame. Works well when the background is stationary.

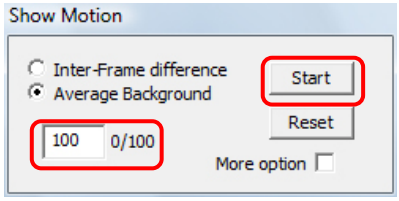
- When [Inter Frame difference] is selected:

When live images are displayed. Image extraction is carried out between frames.
When images are being played back, image extraction is carried out as the [Playback] button is clicked.

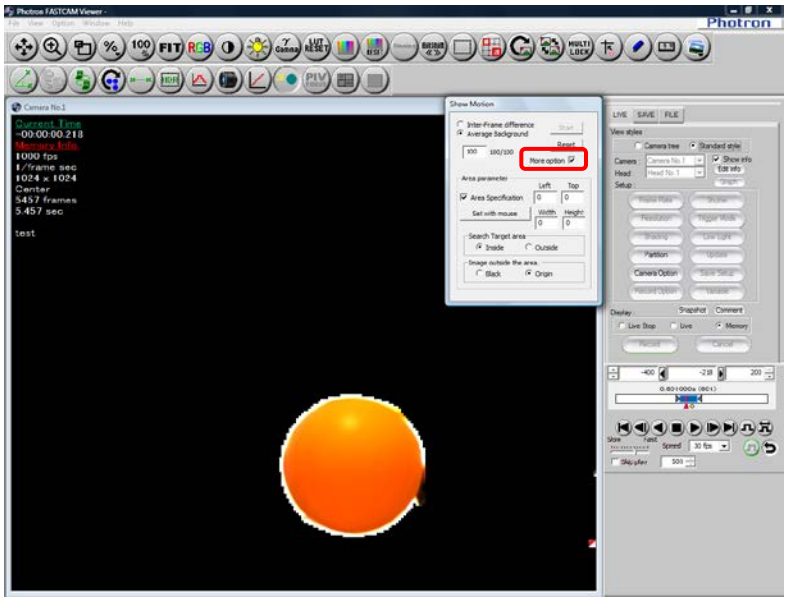
- When [Average Background] is selected:

When live images are displayed, the background image is acquired and the moving object is extracted after acquisition of a background image.
When images are being played back, a background image is acquired at a click on the [Play] button and extraction of moving image is carried out after acquisition of a background image.

Enter the number of images to be used for averaging and click the [Start] button.



If you check the [More option] checkbox, you can specify the method of image display in the extraction area and outside the area.



Item		Description
Area Specification		To specify the extraction area, check the [Specify area] checkbox. If you click the [Specify area by mouse drag] box, you can specify an area by dragging the view window with the mouse.
	Left/Top	Enter the start position of an area in the left-hand side (horizontal direction) and in the right-hand side (vertical direction). When an area is specified by a mouse drag, the position is automatically set.
	Width/Height	Enter the desired width and height. When an area is specified by a mouse drag, the width and height are automatically set.
Search Target area		Selects an area to be extracted in “inside” or “outside” of the specified area.
Image outside the area		Sets the image to be displayed outside the extracted area a “black image” or “original image”.

2.11.11. PIV Focus mode

For the focus and image angle to be readjusted when shooting PIV, the system repeatedly displays only the triggered image frame as a pseudo live image.
When framing in sync with a laser illuminator, the system makes it easy for the operator to readjust focus by inputting a trigger to the camera every time the laser is actuated displaying laser-illuminated images only.

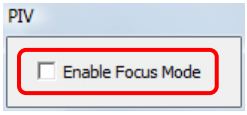
Caution

- PIV Focus Mode is only activated in “Start mode”, “Random mode” and “Random reset mode”. In other trigger modes, the system temporarily operates in the Start mode.

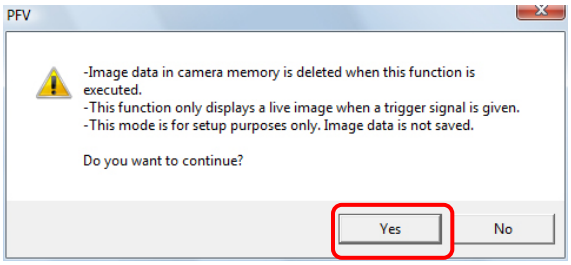
1. Input trigger signals continuously.

2. Click the [PIV focus] button in the plug-in bar.

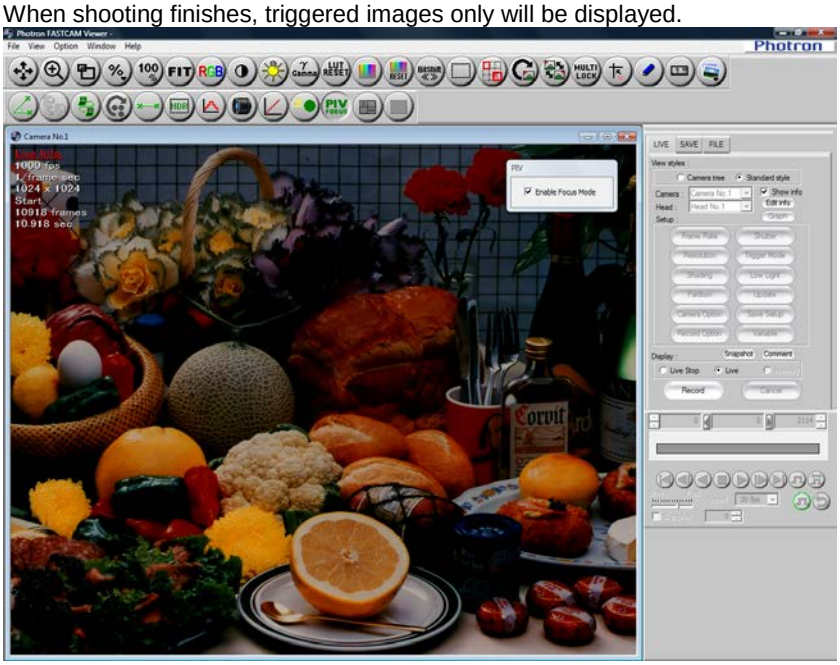
3. [PIV] dialog box appears.
Check the [Enable Focus Mode] box.



4. Confirmation message is displayed.
Click the [Yes] button and the system starts shooting.



5. When shooting finishes, triggered images only will be displayed.

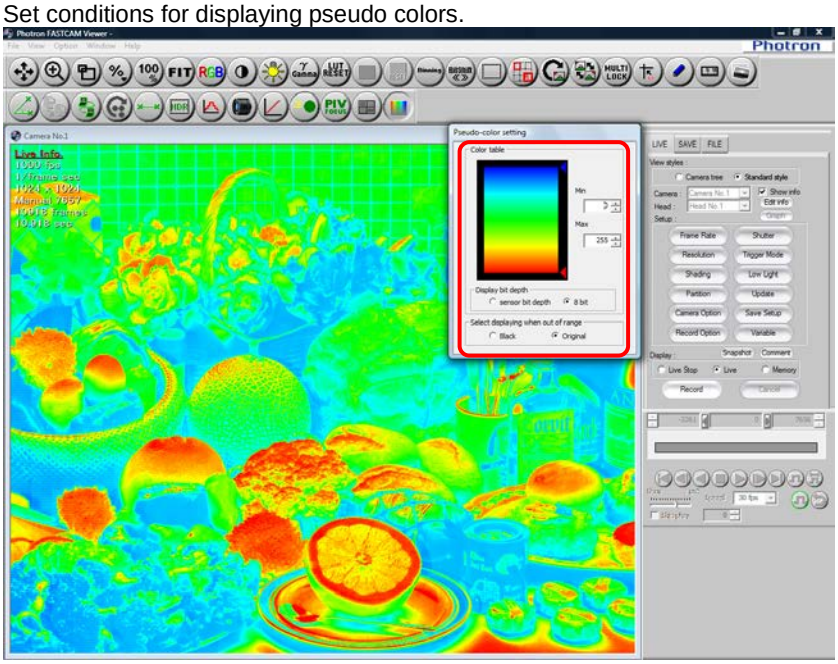


2.11.12. Pseudo color display

Monochrome images can be displayed with pseudo colors, which make it easier to visually tell the luminance difference.

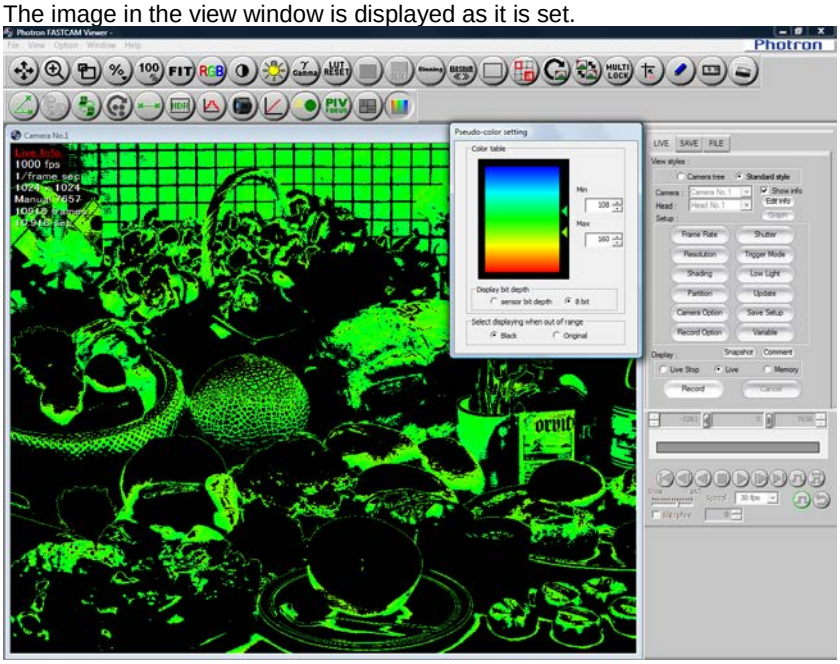
1. Click the [Pseudo Color] button on the plug-in bar.

2. [Pseudo color setting] dialog box appears.
Set conditions for displaying pseudo colors.



Item		Description
Color table		Sets the range of display. Input the maximum and minimum values of color tone to display, or adjust the tone using the ◀ button placed beside the color table.
	Display bit depth	Selects a value to use for specifying the display range of the color table. To specify by the bit number of the camera, select “Sensor bit depth”, or to specify by the 8-bit format, select “8 bits”.
Select displaying when out of range		Sets the image to be displayed outside the specified range a “black image” or “original image”.

3. The image in the view window is displayed as it is set.



2.11.13. PFV Mobile

Live images can be viewed with the web browsers on the mobile devices including iPhone via Wi-Fi.

Caution

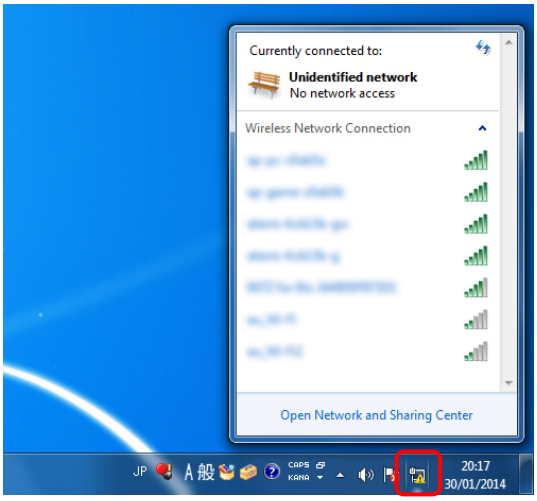
- Using various types of Wi-Fi routers is recommended.
  AdHoc Wi-Fi connection using laptop or the like is not recommended.
- The recommended mobile device is iPhone (iOS6 or later).
- Connecting (including wiring) multiple network devices to the router slows down communication speed and may deteriorate the performance of PFV Mobile.
  Keeping the number of devices to the minimum necessary is recommended.

◆ Setting Wi-Fi connection on PC

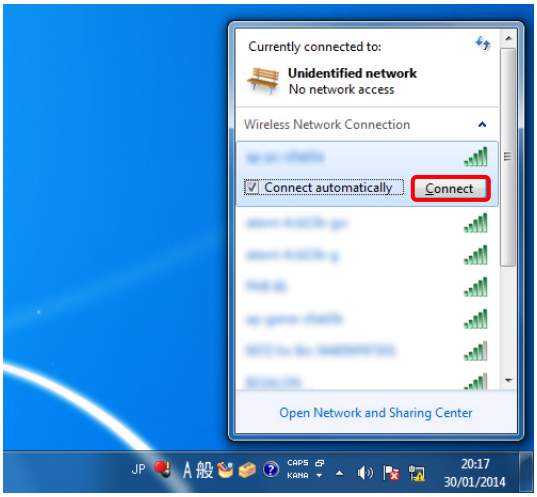
The following is an example using Windows 7.

1. Turn on the router.

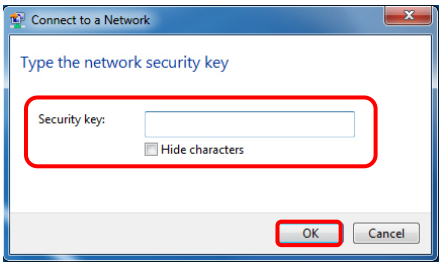
2. Click the wireless network icon on the task bar.



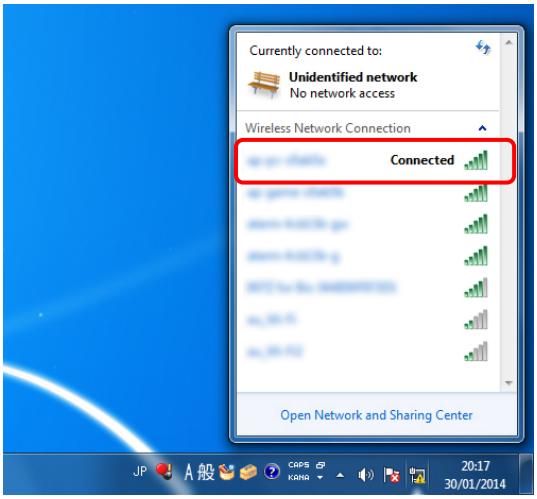
3. Select the router to be connected and click [Connect].



4. Enter the security key and click [OK].



5. When connection is established, [Connected] is displayed on the selected router field.



◆ Setting Wi-Fi connection on iPhone

The following is an example using Windows 7.

1. Tap the [Settings] icon on your iPhone's Home screen.

2. Tap [Wi-Fi] and select a network.

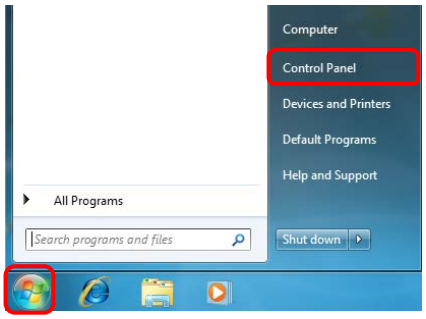
3. Enter the password and tap [Connect].

4. Wi-Fi icon will be displayed in the upper left side of the Home screen.

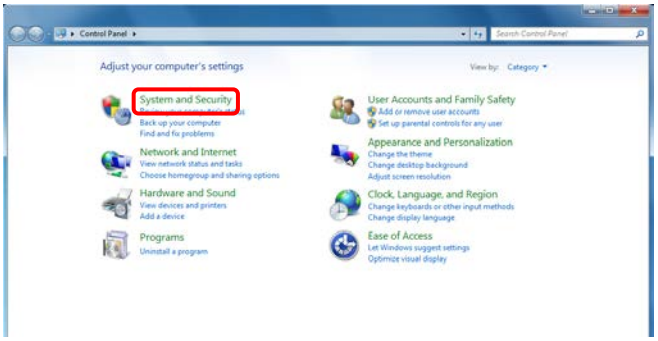
◆ Setting up a firewall on PC

The following is an example using Windows 7.

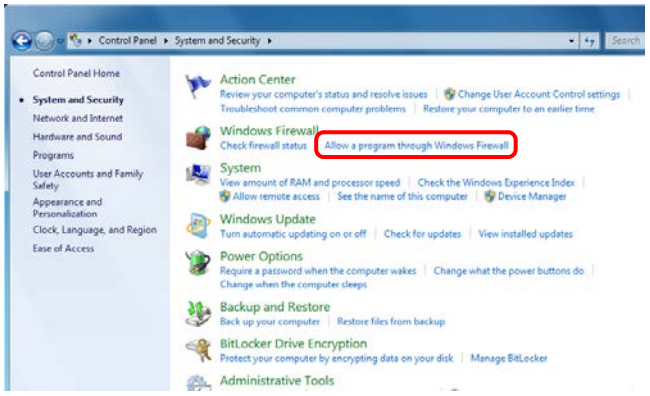
1. Click [Start] and then [Control Panel].



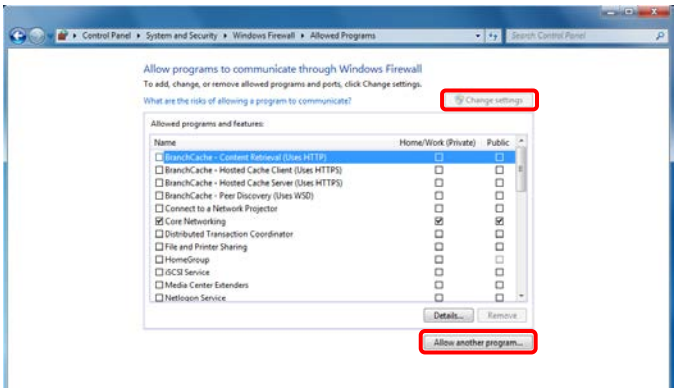
2. Click [System and Security].



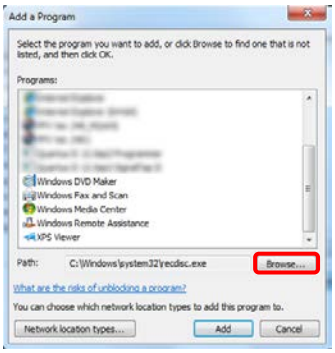
3. Click [Allows a program through Windows Firewall].



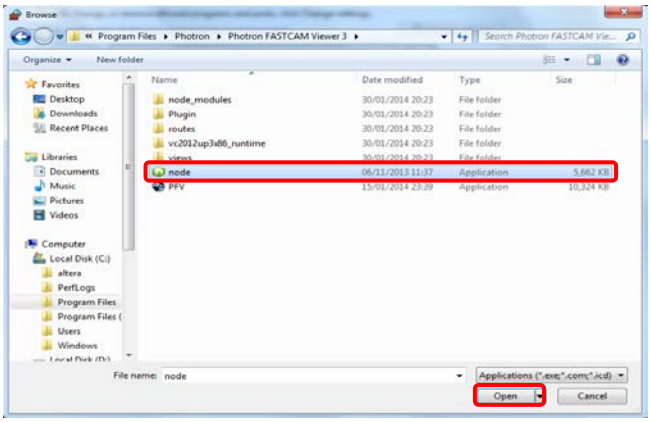
4. Click [Change settings] and then [Allow another program…].



5. Click [Browse…].



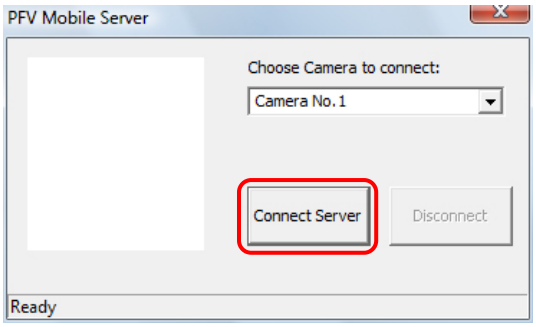
6. Select node.exe in the folder PFV.exe is located and click [Open].
By default, PFV.exe is located at: C:\Program Files\Photron\Photron FASTCAM Viewer 3.



◆ Launching PFV mobile with iPhone

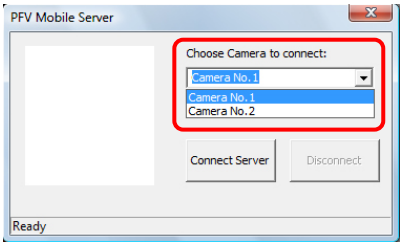
1. Click [PFV Mobile] on PFV.

2. Click [Connecting Server].

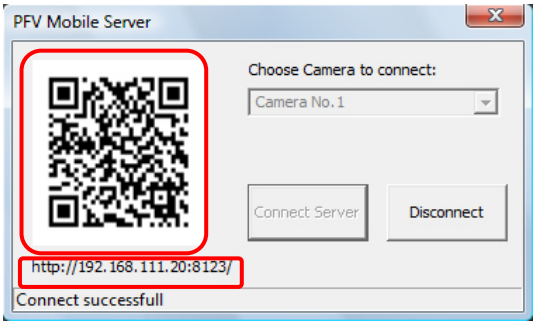


Supplement

- When two or more cameras are connected, select one you want for iPhone live display on the “PFV Mobile Server” dialog box.



3. QR code and URL leading to the destination are displayed.
Launch the web browser on iPhone and enter the URL.
Example) http://192.168.111.20:8123/



Supplement

- Alternatively you can access the live image by reading the QR code on the dialog box with a QR code reading application.

4. Check the live image displayed on iPhone.

Caution

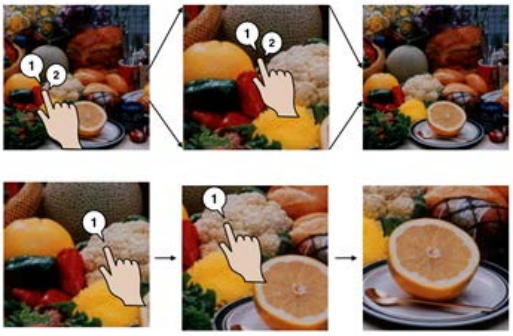
- While viewing with a mobile device, PFV operations are inhibited.

■ iPhone operations

iPhones can be operated with the buttons displayed with a tap on the screen.

Button	Function	Button	Function
	View live image.		Stop live view.
	Switch to low light mode.		Switch off low light mode.
	Move buttons right.		Move buttons left.

To zoom live images, double-tap the screen.
Zoomed images can be scrolled by dragging.
To return to normal display, double-tap the screen again.



Caution

- Pinching is not available for zoom in/out.

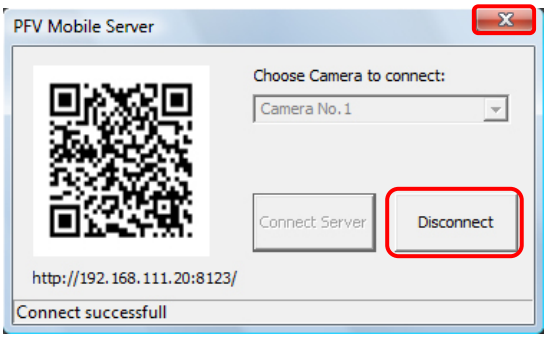
Supplement

- When live view is stopped or the buttons are disappeared, reset the browser and reload the images. Make the iPhone screen vertical and tap the reload icon on the right side of the URL address field.

- Current refresh rate of the images is indicated as the icons in the upper right hand corner. (It is the display rate, not the frame rate set by PFV.)

Icon					
Rate	＞10fps	6 ～ 10 fps	1 ～ 5 fps	＜1fps	Not live

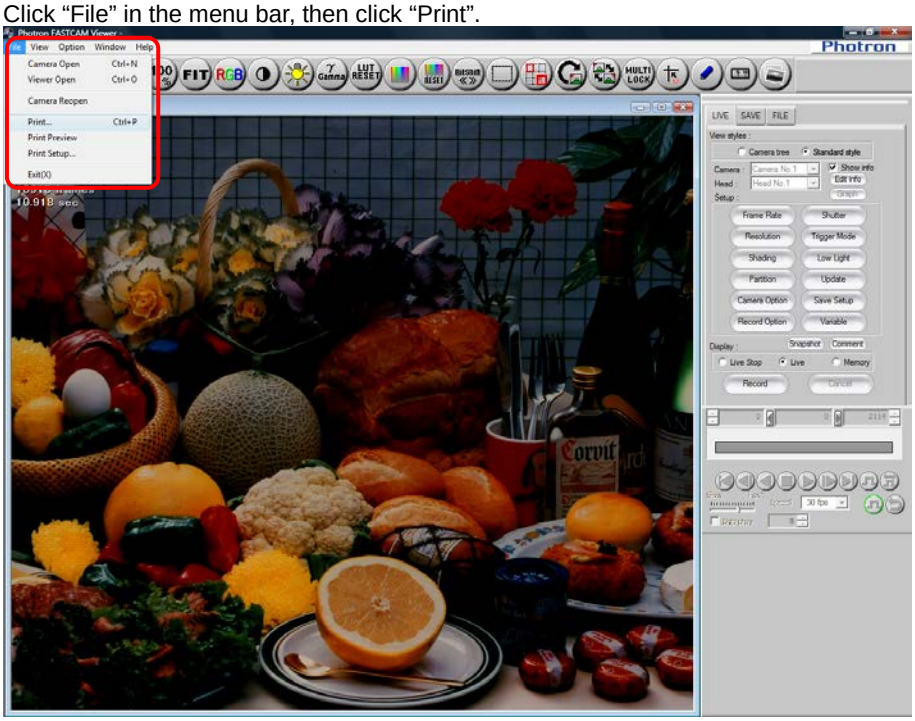
5. After checking the images, click the [Stop Server] button and then the [X] button in the upper right hand corner to close the dialog box.



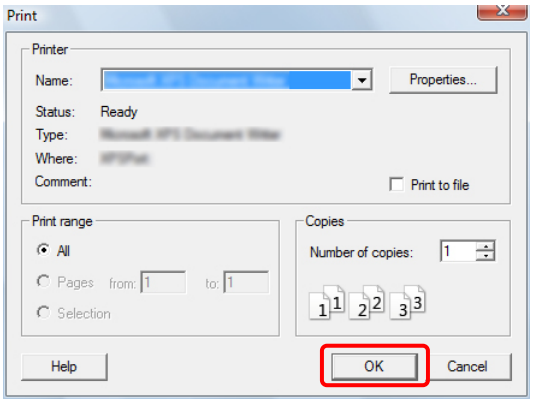
2.12. Printing images

You can print the displayed image.

1. Click “File” in the menu bar, then click “Print”.



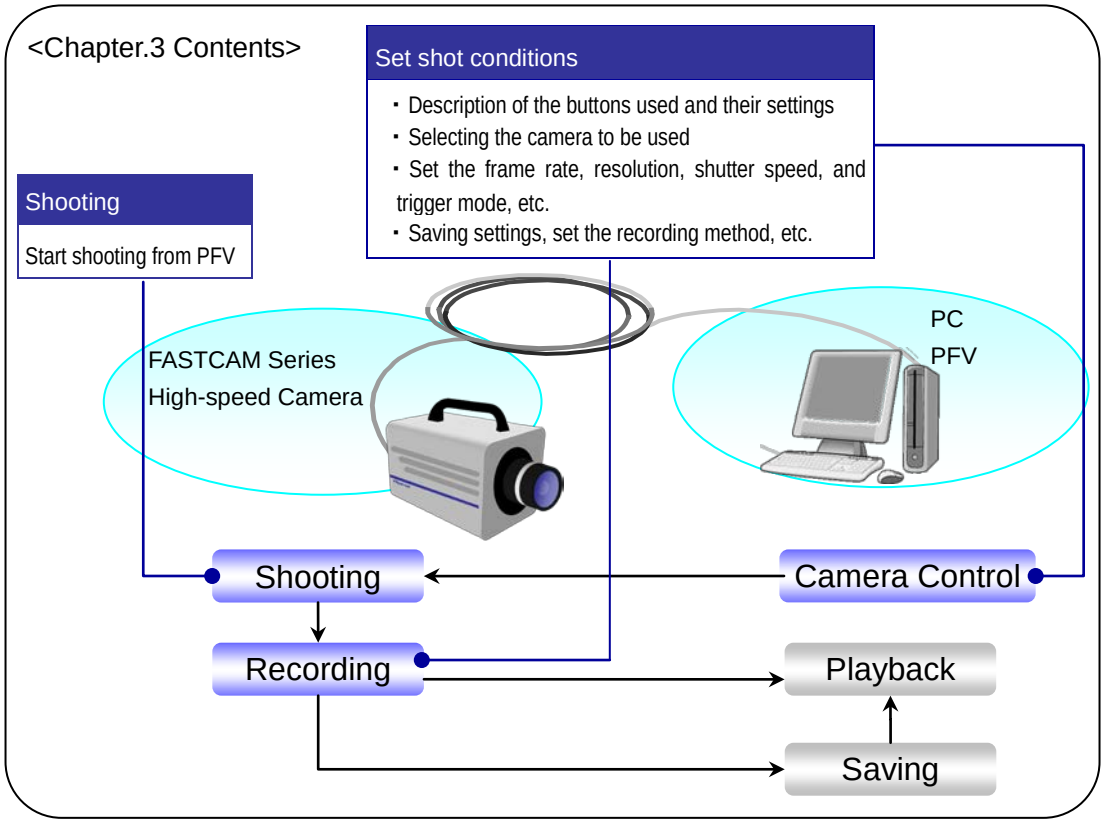
2. “Print” dialog box appears.
Set conditions for printing and then click “OK”.
Printing starts.



Chapter. 3 Setting Shot Conditions/Shooting

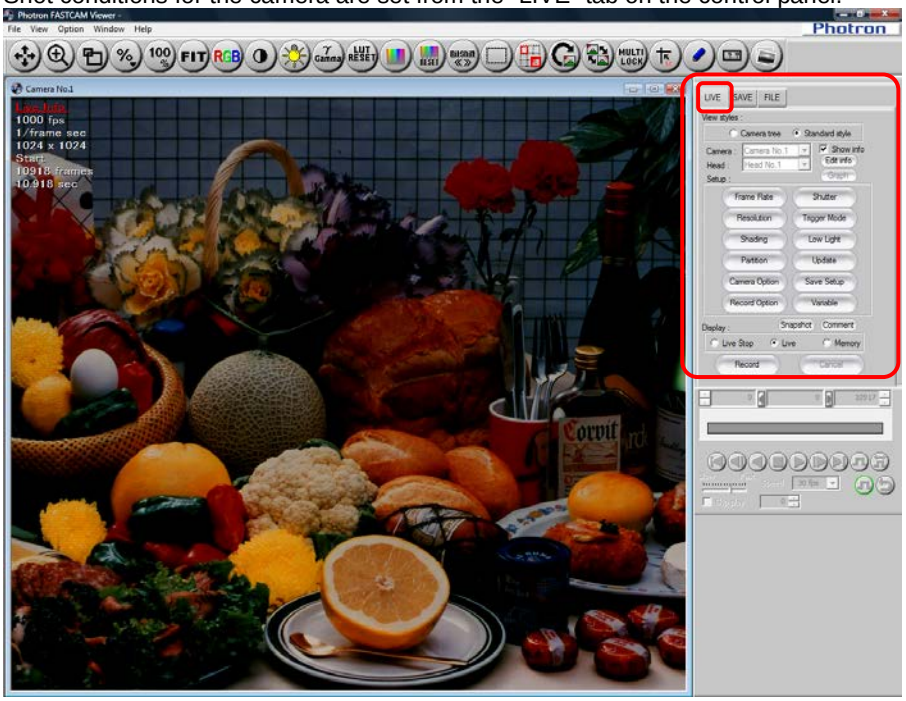
Prepare PFV for use → Basic PC control operation → **Shot conditions/shooting** → Image playback → Saving images → Saved data playback

The following describes the possible settings for shots and how to make a recording.



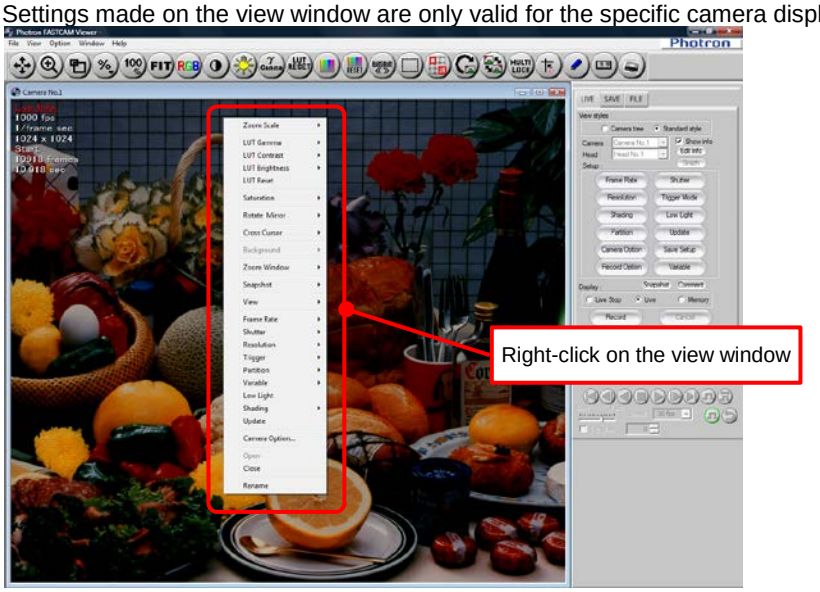
3.1. Buttons Used To Set Shot Conditions

The conditions for the shot, such as the frame rate, shutter, and resolution, must be set before the recording the subject.
Shot conditions for the camera are set from the “LIVE” tab on the control panel.



Supplement

- By right-clicking on the view window, a list of often used settings are displayed, the settings can also be made from this displayed menu.
  Settings made on the view window are only valid for the specific camera displaying the image.

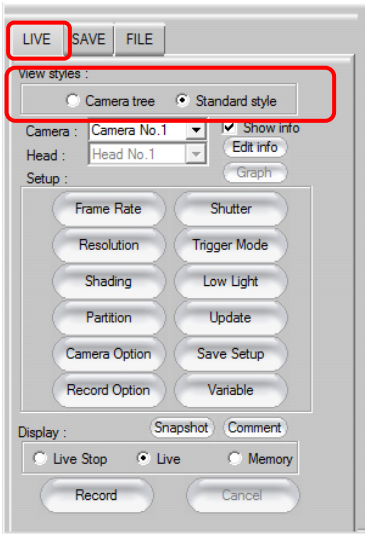


3.2. Select the Camera

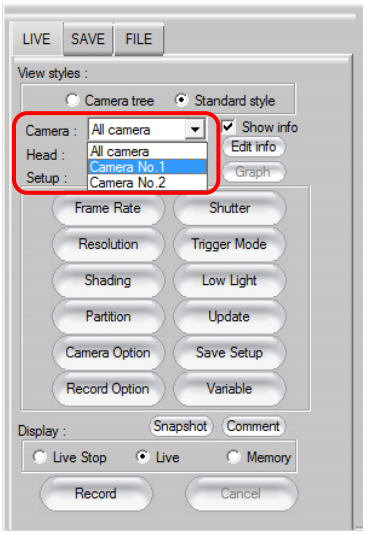
Select the camera to be used for shooting.

3.2.1. Select With the “Standard Style”

1. Display the “LIVE” tab on the control panel and select “Standard Style” on the “View styles” option.

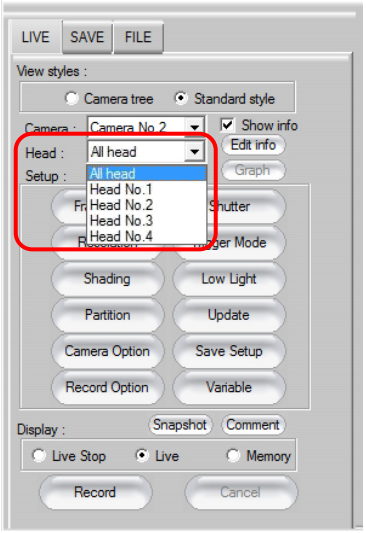


2. Click the “Camera” [▼] button and select the camera to use from the list.



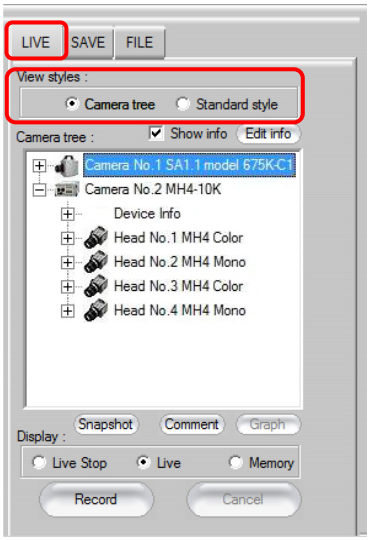
Supplement

- When a multi-head camera is connected, after selecting “Camera”, click the “Head” [▼] button, and select the head to use from the list.

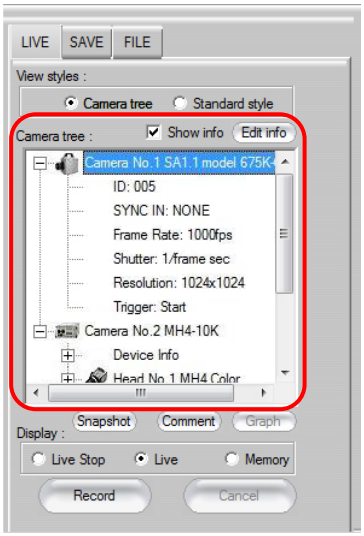


3.2.2. Select With the “Camera Tree”

1. Display the “LIVE” tab on the control panel and select “Camera tree” on the “View styles” option.



2. A list of the cameras that are connected is displayed on the “camera tree”.
On the list, in addition to the camera name, the camera’s settings (device information) are displayed. Click to select the camera to use.



Important

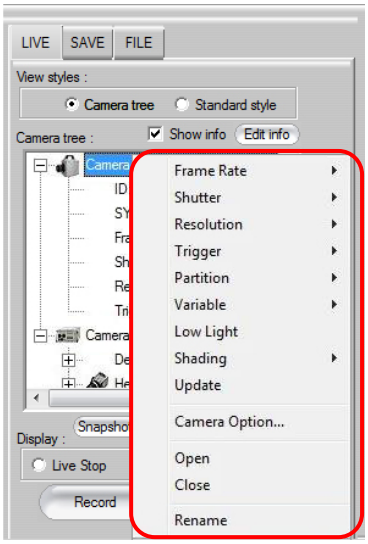
- The camera image displayed in the view window is the shooting target. When multiple view windows are displayed, all the images will be shot simultaneously.
However, for multi-head cameras, the images for all camera heads will be shot simultaneously. Shots cannot be made with individual camera heads.

Caution

- To correctly perform synchronized shots, the vertical synchronization signal must be connected between the cameras in advance, the master (synchronization signal supplier) and slave must be set, and the hardware must be set to the synchronization state. Refer to the camera’s hardware manual for details.

Supplement

- Select “Camera tree” from the “View style” option, right click on a camera, and different settings can be made for that camera.
  Select “Open” and the view window for the selected camera is displayed.
  Select “Close” and the view window for the selected camera is closed.

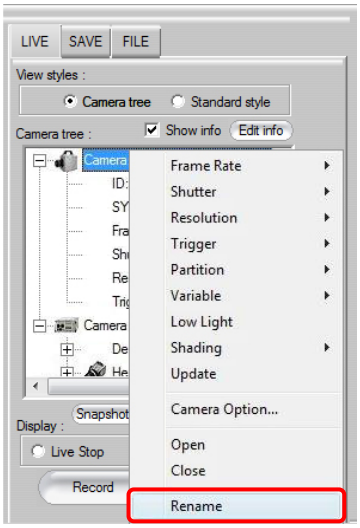


3.2.3. Changing the Camera Name

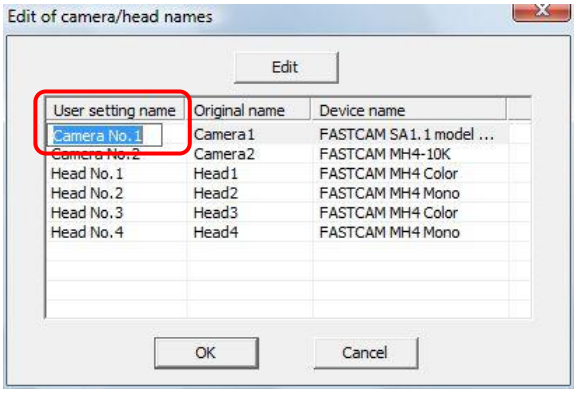
You can change the name of the camera or head.

1. Display the “LIVE” tab and select “Camera tree” under “View styles”.

2. Right click on the desired camera or head and select “Rename”.



3. The “Edit of camera/head names” dialog box is displayed.
Click on the “User setting name” of the camera or head to change and you will be able to edit it.



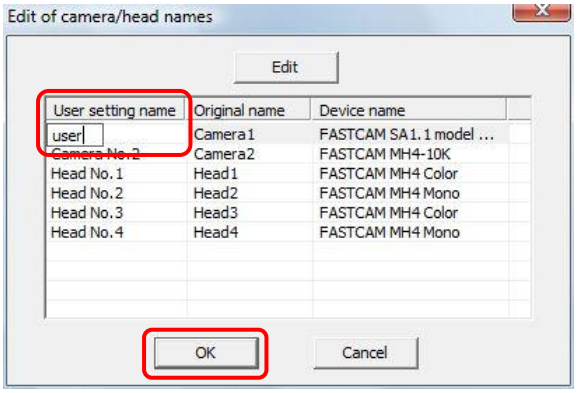
Caution

- If the camera name is configured with an ID or IP address, the camera name cannot be modified.

Reference

- To configure an ID or IP address for the camera name, refer to "1.2.17. Set Camera Name to ID or IP address" in Configuration section.

4. Enter the desired name and click the [OK] button.
The dialog box shows the changed name.



Supplement

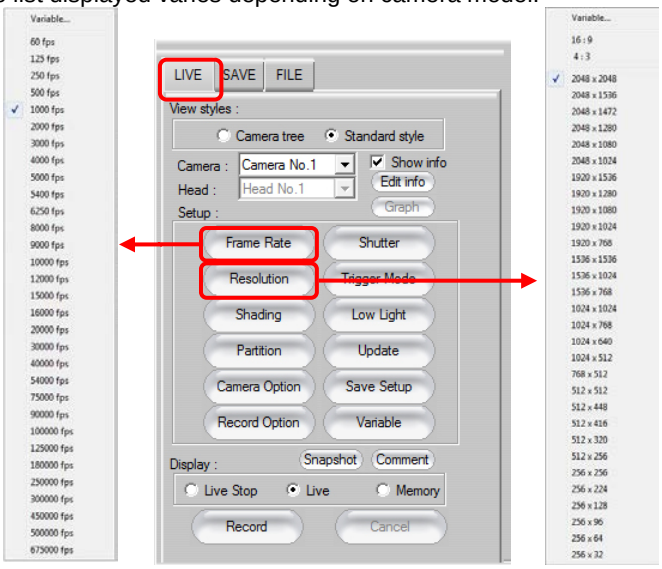
- You can also change the name by double clicking on the camera name.

3.3. Setting and Registering the Frame Rate/Resolution

Set the frame rate and resolution settings.

3.3.1. Set from the List

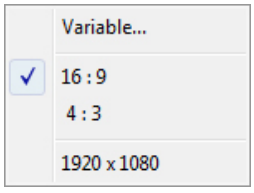
To set the frame rate or the resolution, display the “LIVE” tab on the control panel.
The frame rate setting can be selected from the list by clicking the [Frame Rate] button.
The resolution setting can be selected from the list by clicking the [Resolution] button.
The list displayed varies depending on camera model.



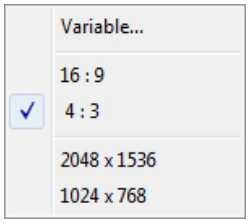
Supplement

- If you select “16:9” or “4:3” which appears when [Resolution] button is clicked, an image that meets the selected aspect ratio only is displayed.

When “16:9” is selected



When “4:3” is selected



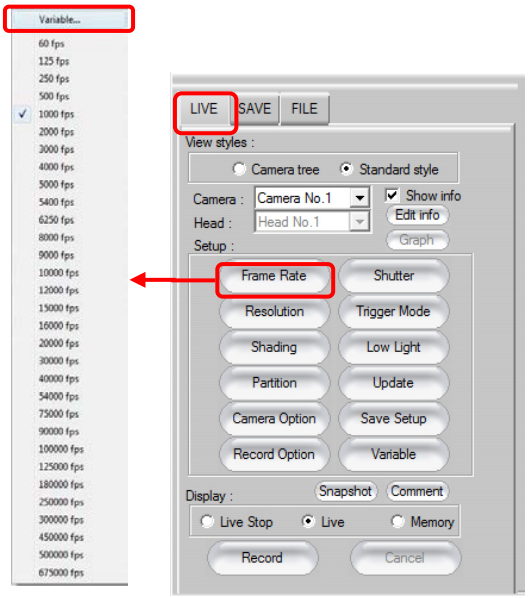
3.3.2. Variable Setting

To make a setting that is not displayed on the list when the [Frame Rate] or [Resolution] button is clicked, select [Variable] and register and use the desired value in the variable resolution list.
Up to 20 settings (20 channels) can be registered.
To use a registered setting, click the [Frame Rate] or [Resolution] button and select “Variable” from the list displayed, or select the setting with the [Variable] button.

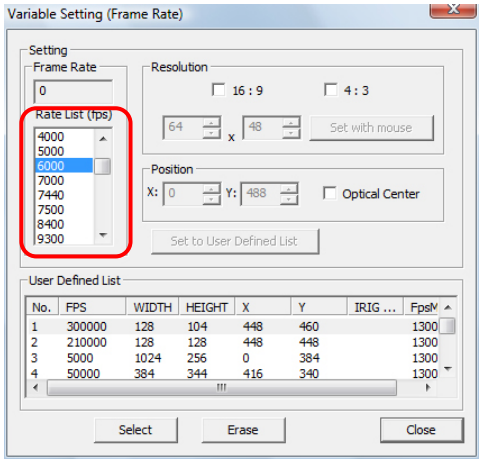
Using variables	
Registration	With “Variable” *Frame Rate *Resolution *Location, etc. Register values in a list
Using a registered number	Select “Variable” from the list, select a registered value and set the “Frame Rate” and “Resolution” Or select and set from the [Variable] button’s list

Variable registration can also be performed from either the “Frame Rate” or “Resolution” button. The example here shows the procedure for setting and registering a frame rate/resolution (6000 fps at 768 x 656 pixels) from the “Frame Rate” button.

1. Display the “LIVE” tab on the control panel and select “Variable” from the [Frame Rate] button.

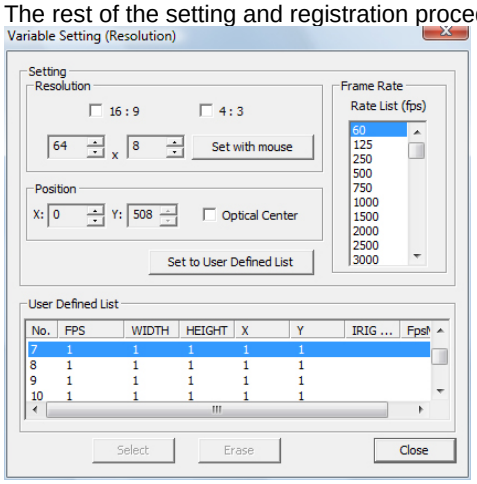


2. A “Variable setting (Frame Rate)” dialog box is displayed.
To set the desired frame rate, double-click on the frame rate on the “Frame Rate”.
Click the [Λ][V] buttons and the list can be scrolled until the desired value is seen, in this case 6000 fps.

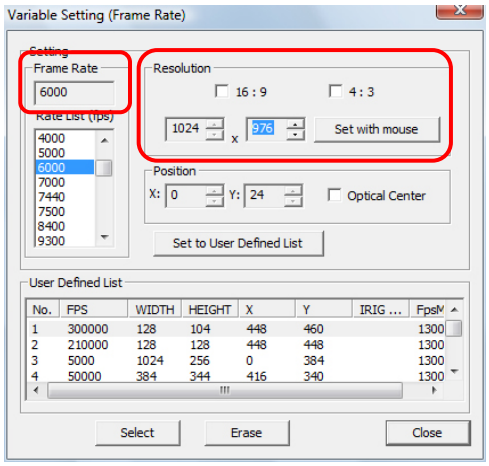


Supplement

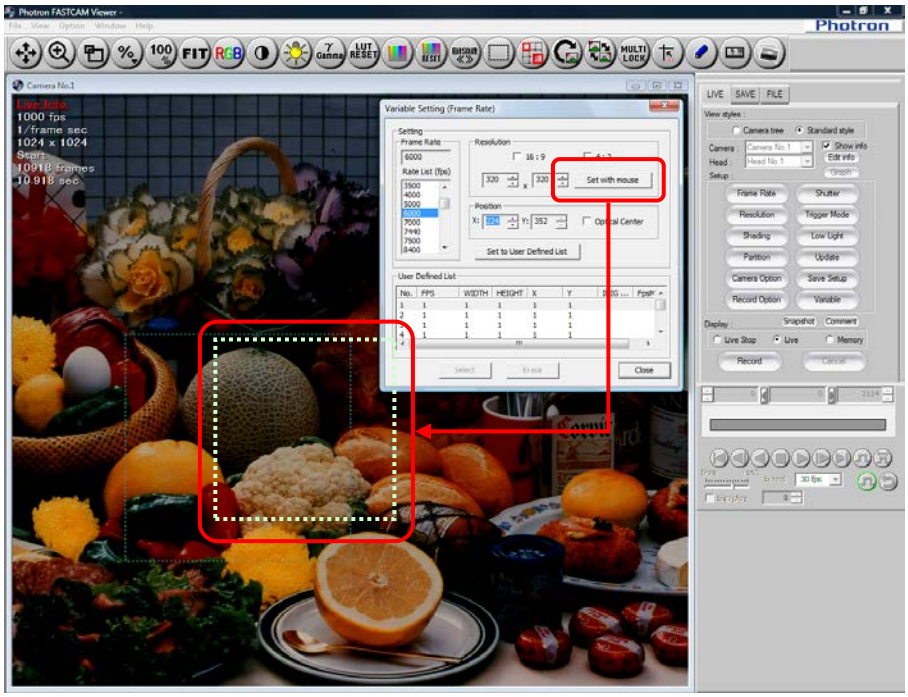
- When “Variable” is clicked from the [Resolution] button, the dialog box below is displayed.
  When making a setting with the [Resolution] button, set the “Resolution” first.
  When the desired resolution is set, the speeds that can be set at that resolution are displayed in “Frame Rate”. Select and set a speed from the list.
  The rest of the setting and registration procedure is the same as the frame rate variable setting.



3. The frame rate is set with the value specified in “Frame Rate” and “Resolution” is automatically set to the largest square resolution at the specified frame rate.
Click the “Resolution” [▲][▼] buttons (the range of values displayed are the values available at the specified frame rate) and the resolution can be changed.



4. The shooting resolution/location window is displayed, according to the settings, as a dotted line in the PFV view window.
The shooting position window can be changed by specifying a value for the “X (horizontal)” and “Y (vertical)” values in the “Position” option.



Caution

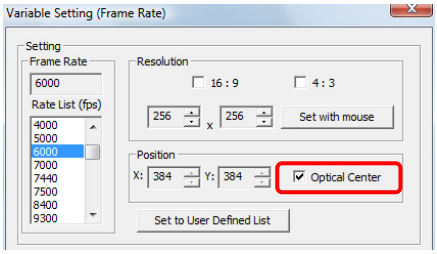
- It is not possible to set a larger resolution decreasing the listed “Frame Rate” value.
- There are locations that cannot be set according to the camera type. Refer to the camera's hardware manual for details.

Reference

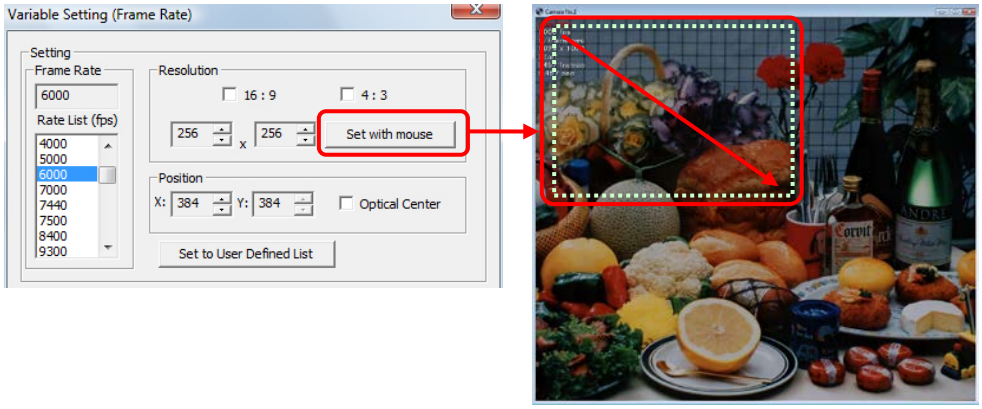
- For the IRIG synchronization and maximum frame rate settings, refer to “3.8.Other Settings”, page 135.

Supplement

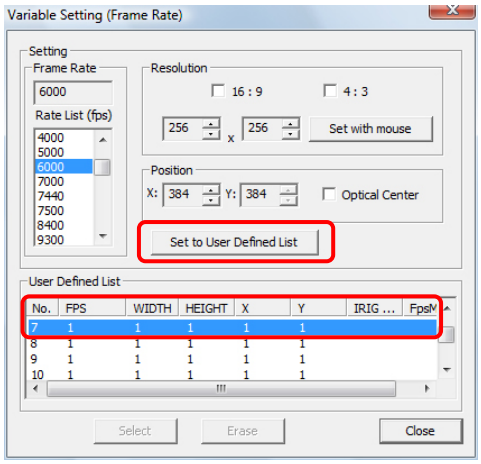
- If the “Optical Center” option is checked, the center of the screen is always fixed and the window sized around the center.



- If the [Set with mouse] button is clicked, the position can be set by dragging the mouse.
  Drag the mouse to draw a rectangle to set the shot area, the resolution and location is set.
  If you check “16:9” or “4:3”, the area you can specify by dragging is limited to the range with the selected aspect ratio

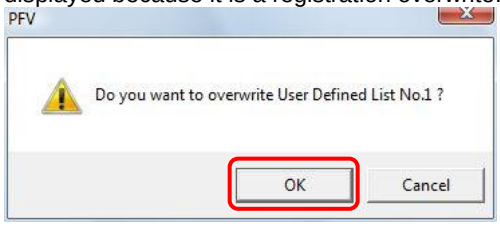


5. After setting the frame rate and resolution, register the settings.
Select the number to register the settings in to the “User Defined list”. Registered settings are displayed in the “User Defined” list.
After selecting the desired channel, click the “Set to User Defined List” button.

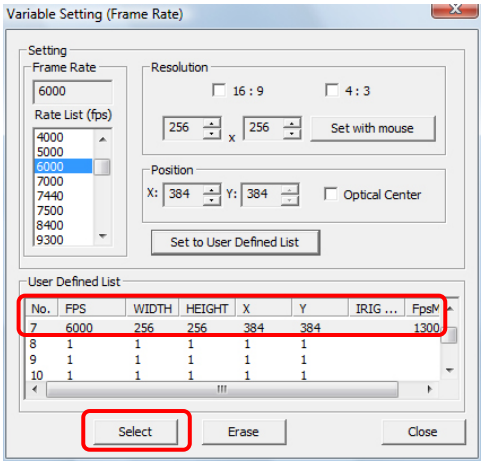


Caution

- When a “User Defined” is selected that has already been registered, a warning message will be displayed because it is a registration overwrite. To overwrite the registration, click the [OK] button.



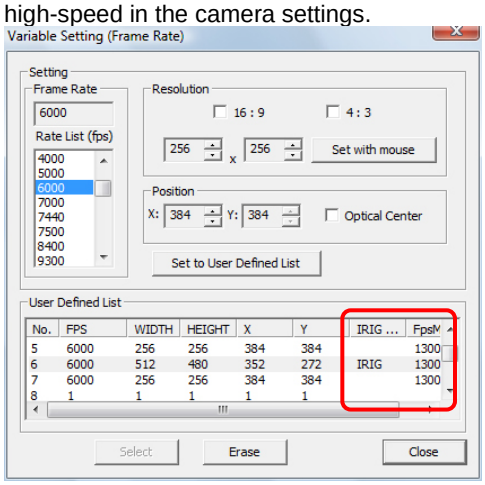
6. The settings are registered to the specified number.
Select the channel to use for the shot conditions and click the [Select] button, the settings registered in number are set as the shot conditions.



Item	Description
No.	A number the user can register. The channels are given a number from 1 to 20.
FPS	Displays the registered frame rate (fps).
WIDTH	Displays the number of pixel in the X direction (horizontal direction) for the registered resolution.
HEIGHT	Displays the number of pixels in the Y direction (vertical direction) for the registered resolution.
X	With the upper-left of the full resolution as the origin (x, y=0, 0), displays the upper-left X coordinate for the registered resolution and displays the position of the resolution set.
Y	With the upper-left of the full resolution as the origin (x, y=0, 0), displays the upper-left Y coordinate for the registered resolution and displays the position of the resolution set.

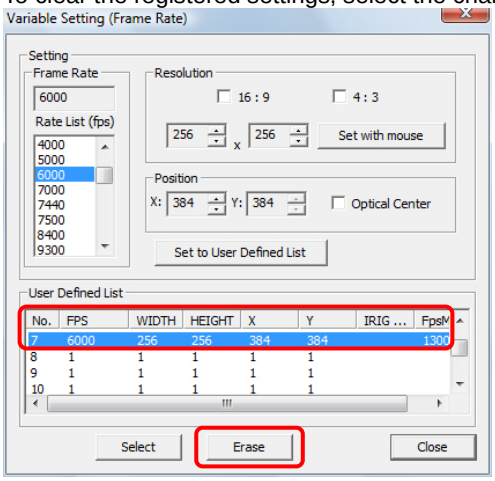
Caution

- When the frame rate is set, the shutter speed and resolution are automatically set to the default value (maximum resolution that can be set at that frame rate) for the frame rate set.
- Channels with the “IRIG Phase Lock” setting can only be selected when IRIG synchronization is enabled in the camera settings.
- Channels with the “Max fps” setting can only be selected when the maximum frame rate is set to high-speed in the camera settings.

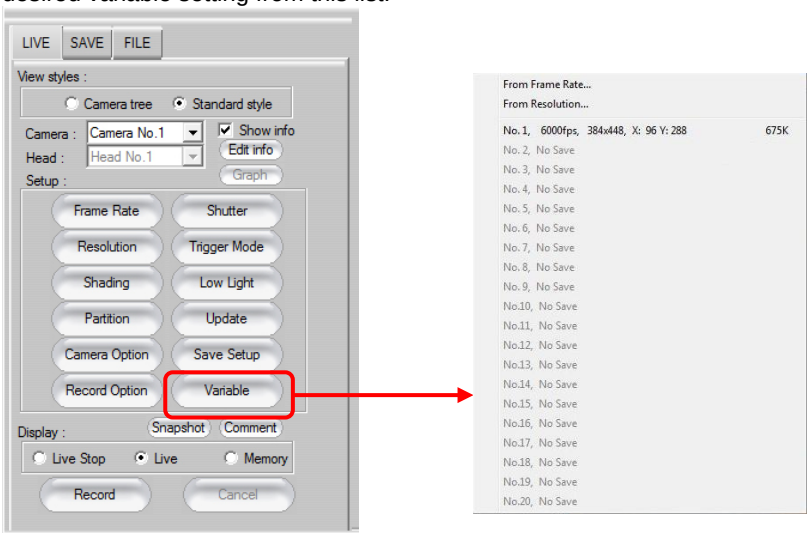


Supplement

- To clear the registered settings, select the channel to delete and click the [Erase] button.



- Variable settings can also be made with [Variable] button on the “LIVE” tab on the control panel. When the [Variable] button is clicked, a list of registered number will be displayed. Select the desired variable setting from this list.



3.4. Setting the Shutter Speed

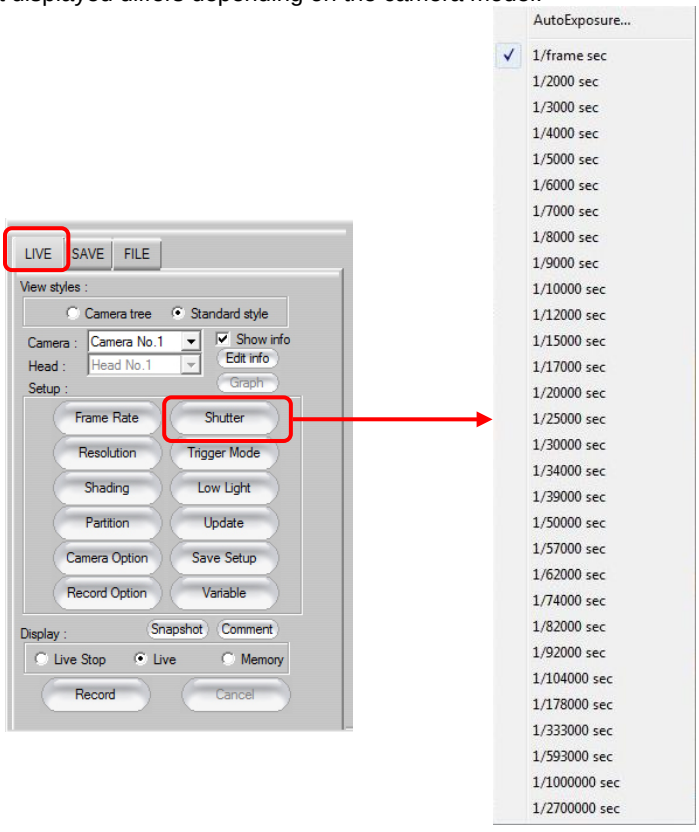
Set the shutter speed.
Since the frame rate setting is given priority, when the frame rate is set after setting the shutter speed, the shutter speed is automatically set to the default value (1/frame sec).
To set the shutter speed so that it is not automatically changed after the frame rate setting, set it with the [Camera Setting] button.

Reference

- For more information on the [Camera Setting] button, refer to “3.8. Other Settings”, page 135.

3.4.1. Setting from the List

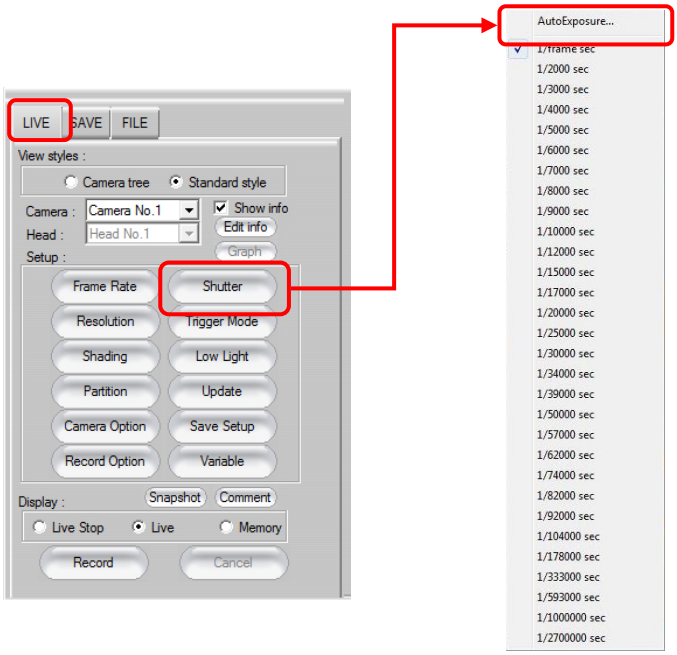
Display the “LIVE” tab on the control panel and click on the [Shutter] button, a list of shutter speeds that can be set on the connected camera will be displayed.
Select the desired speed from the list.
The list displayed differs depending on the camera model.



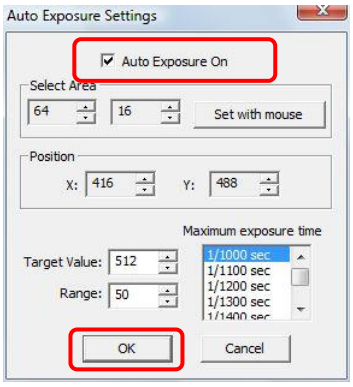
3.4.2. Setting Automatic Exposure Control

When the automatic exposure control function (Auto exposure) is used, in addition to the shutter speed value initially set, the shutter speed will be automatically adjusted to maintain the desired image illumination level.
Use this function in situations when the subject's light will likely change.

1. After selecting the "LIVE" tab on the control panel, click the [Shutter] button and select "AutoExposure" from the list.

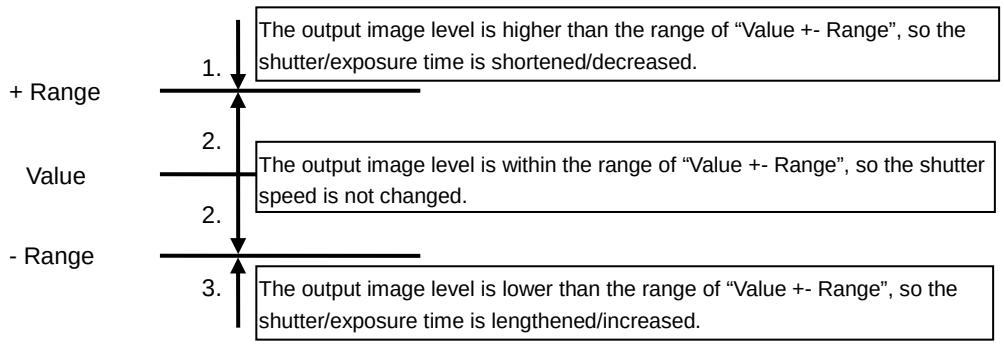


2. Check the "Auto Exposure On" option to active the automatic exposure control function. Set "Select Area", "Position", "Target Value", "Range", and "Maximum exposure time" as necessary and click the [OK] button.



Item	Description
Specify Target Image Area	Set the image area to be used as the standard for the shutter speed setting. By clicking on the [Set with mouse] button, the image area can be set by dragging the mouse over the view window. In this case, an area greater than the currently set recording resolution cannot be set. The set area is displayed with a dotted frame on the live image's view window. The shutter speed is varied in such a way, using the average illumination level in the area specified here, so as to achieve the desired image output level (inside the range of "Value ± Range").
Value	Enter the desired image output level. This value is set as an 8-bit value (0-255) or 10-bit value (0-1023).
Range	Enter the allowed range for the desired image output level ("Value"). This value is set as an 8-bit value (0-255) or 10-bit value (0-1023).
Maximum Exposure Time (sec)	Set the maximum exposure time. This can be set to prevent subject blur resulting from a too long exposure time. A shutter operation with an exposure time longer than the shutter value set here will not be performed.

To settings and their relationships

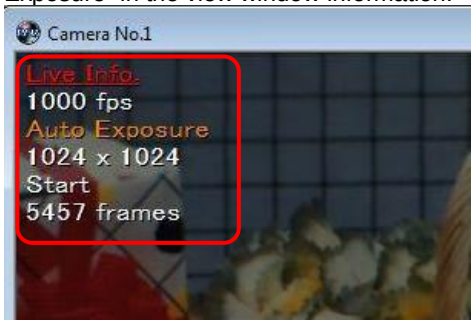


Caution

- If the shutter speed is set with the [Shutter] button when the automatic exposure control function is active, the automatic exposure function will be deactivated.

Supplement

- When the automatic exposure control function is active, the shutter speed is displayed as "Auto Exposure" in the view window information.

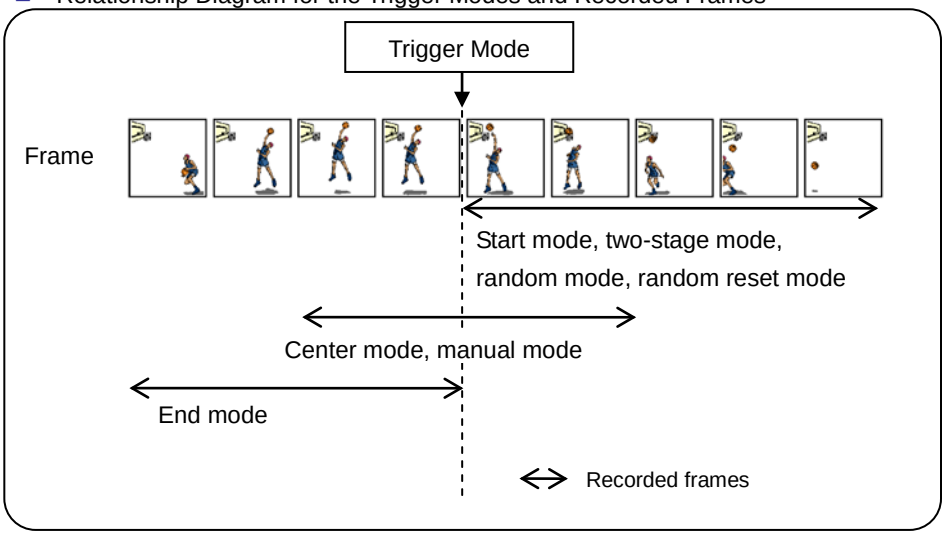


3.5. Setting the Trigger Mode

3.5.1. What Is The Trigger Mode?

Depending on the trigger mode set, the timing of the frames, when they are recorded and the number of frames recorded on the camera when the trigger signal is input will differ.

■ Relationship Diagram for the Trigger Modes and Recorded Frames



■ Record Button

Use the [Record] button on the control panel to start recording.

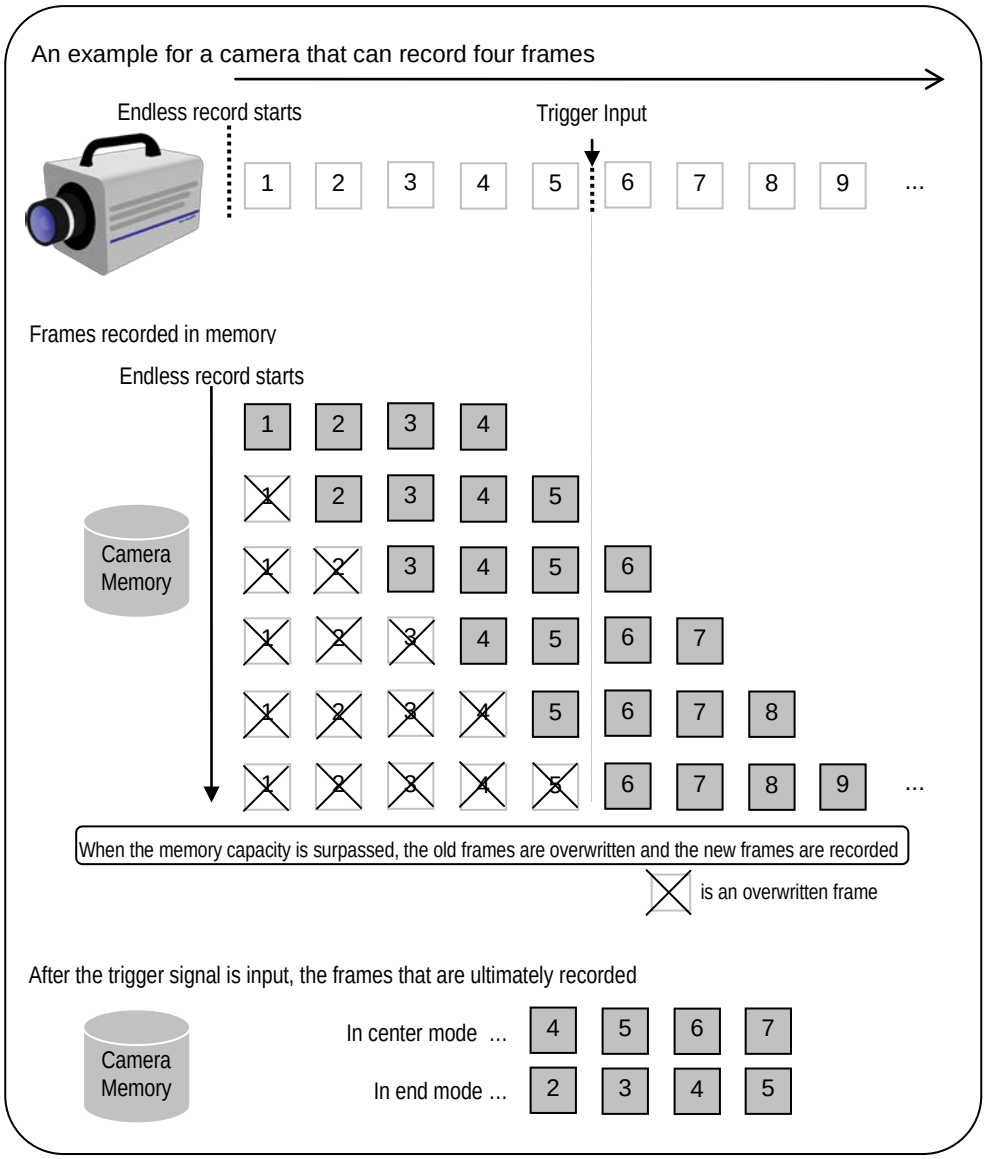
The name of the [Record] button changes according to the camera's state. The button name indicates the current state.

Used Button	Description
Record	Enters the record ready (standby?) state when clicked. (Recording does not start.)
Trigger In	Starts recording when clicked. The system enters the endless recording state and continues recording until the trigger is input. When the storage capacity is surpassed, it overwrites and continues recording.
Endless Rec	The trigger is input when clicked. The scene is recorded according to the trigger mode set using when the trigger was input as the baseline.

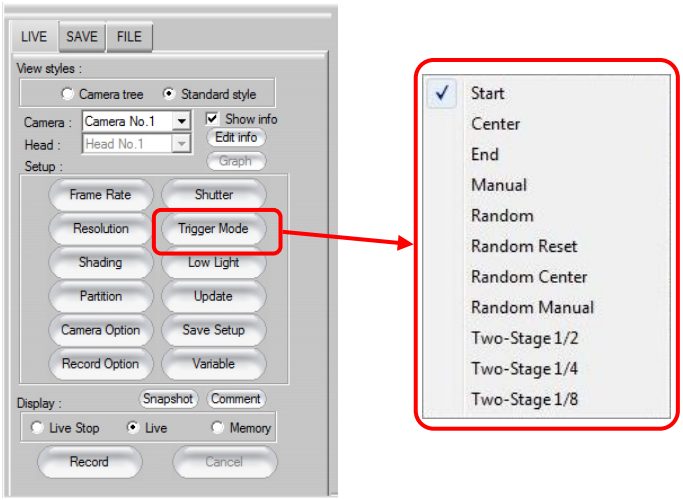
* The trigger is input with the "Trigger In" button in standard mode, The "Endless Rec" button is not used with Two-stage mode, random mode, and random reset mode.

- Endless Record

  When the images directly before the trigger signal input are recorded (recording with center mode, manual mode, end mode), endless recording is performed.
  When the memory capacity is surpassed, the frames are overwritten.



3.5.2. Trigger Mode Types



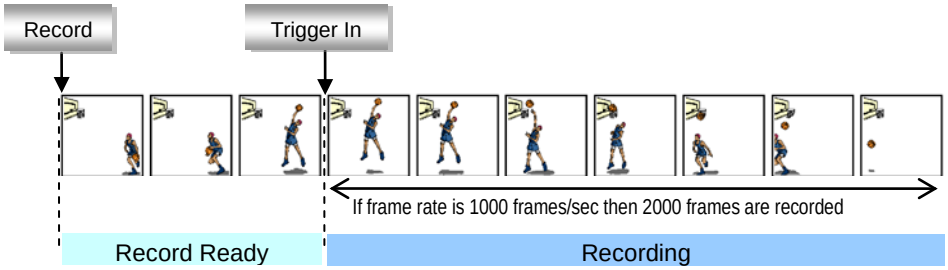
Caution

- Trigger modes available and displayed are dependent on the camera model.

■ Start Mode

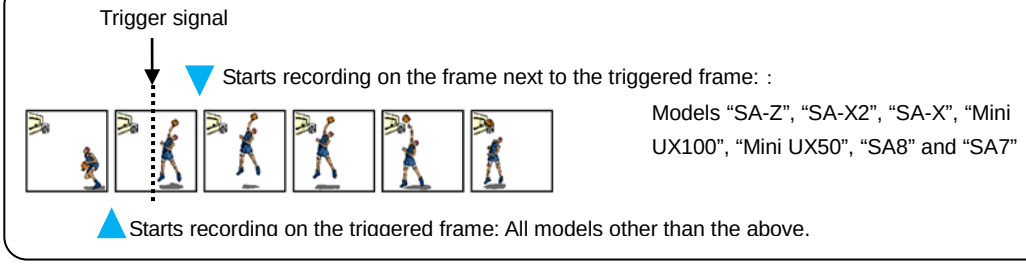
In Start mode, recording starts at the same time the trigger is input.
This mode is suitable for recording a high-speed phenomenon where the event's start point is known in advance.
This mode records until the maximum recordable frame count (camera memory capacity) is reached.

Example: For a camera that can record 2 seconds in total
2 seconds of high-speed images are recorded directly after the [Trigger In] button is clicked.



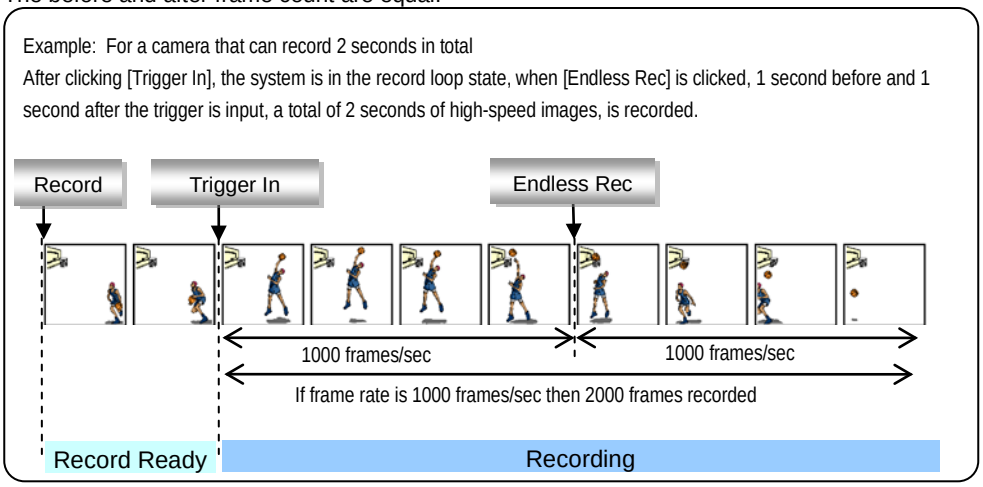
Supplement

- When shooting in the "Start mode", the first frame to be recorded varies by the model.



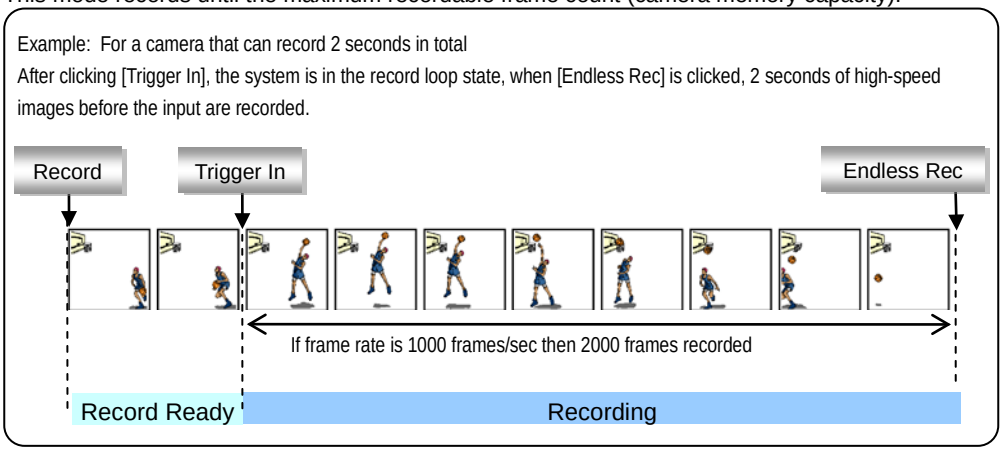
- Center Mode

  In Center mode, the content directly before and after the trigger is input is recorded.
  This mode is suitable for recording before and after an important moment.
  This mode records until the maximum recordable frame count (camera memory capacity).
  The before and after frame count are equal.



- End Mode

  In end mode, the content directly before the trigger is input is recorded.
  This mode is suitable for recording an important phenomenon for which it is difficult to predict when the event will begin and end.
  This mode records until the maximum recordable frame count (camera memory capacity).



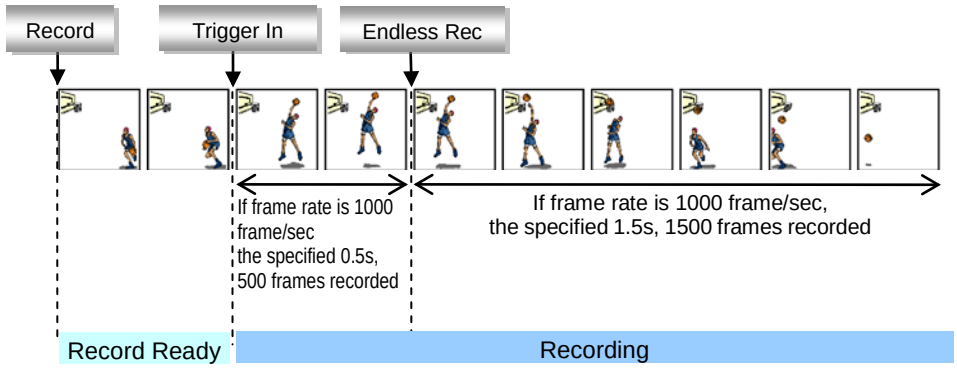
■ Manual Mode

Similar to center mode, this mode records the content directly before and after when the trigger is input.

In center mode, the proportion of the recording before and after the trigger input is equal, but in manual mode, the proportion (seconds or frames) recorded before and after the important moment can be set to the desired value.

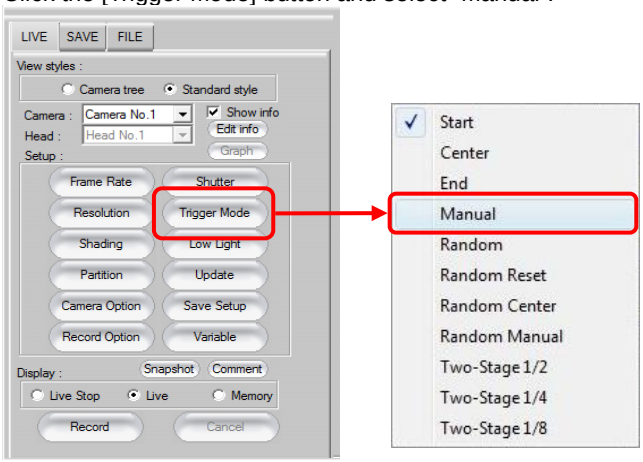
Example: For a camera that can record 2 seconds in total

After clicking [Trigger In], the system is in the record loop state, when [Endless Rec] is clicked, 0.5 seconds before and 1.5 seconds after the input, 2 seconds of high-speed images are recorded.

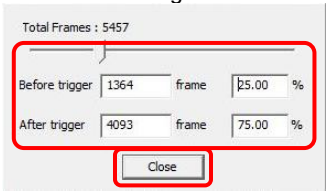


When recording in manual mode, the settings below must be made in prior to beginning the recording.

1. Click the [Trigger Mode] button and select “Manual”.



2. Specify the frame count to record before and after the trigger input.
Drag the “Total Frames” slider or enter the frame count directly.
When the setting is finished click the [Close] button.

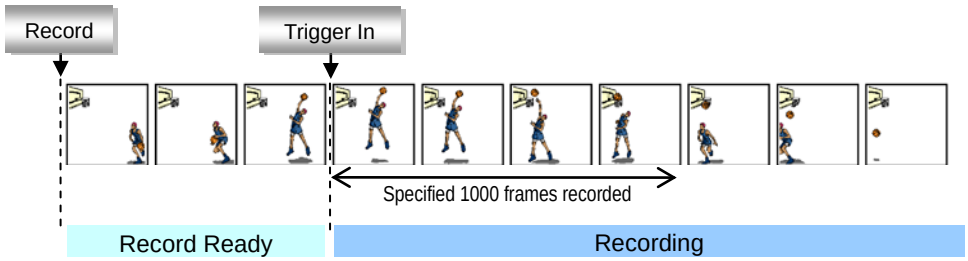


- Random Mode

  In random mode, only a predetermined number of frames are recorded after the trigger is input each time.
  Every time the trigger is input, the predetermined numbers of frames are saved.
  This mode is suitable for a phenomenon that happens irregularly but a trigger can be activated each time to match its critical timing.
  The frame count that can be recorded for 1 trigger input can be set from 1 frame to the maximum recordable frame count, in 1 frame increments.

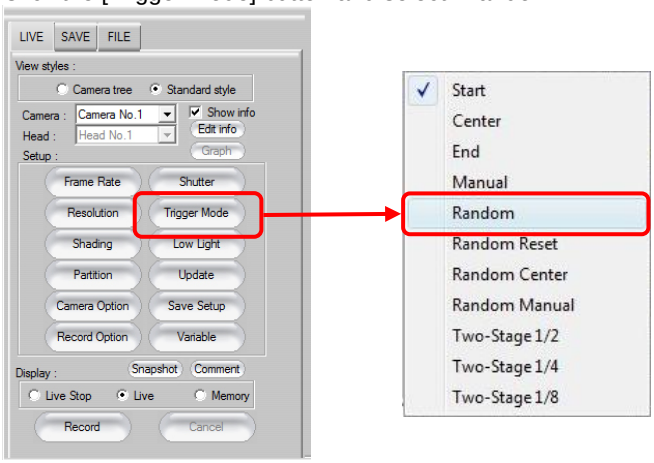
Example: When set to record a frame count of 1000 frames

Immediately after clicking [Trigger In], the specified frame count of high-speed images is recorded.



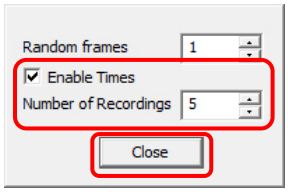
When recording in random mode, the settings below must be made in advance.

1. Click the [Trigger Mode] button and select “Random”.



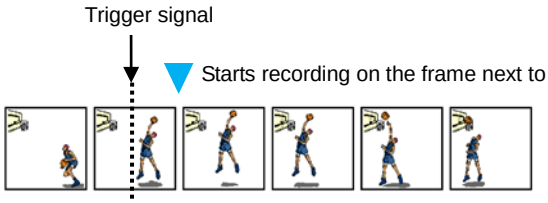
2. Set the frame count to record for each trigger input. Enter the desired value in “Random frames” and click the [Close] button.

3. To specify the maximum number of triggers that can be set, check “Enable Times” and enter the desired value in “Number of Recordings”. When the setting is finished, click the [Close] button.



Supplement

- When shooting in the “Random mode”, the first frame to be recorded varies by the model.



■ Random Center Mode

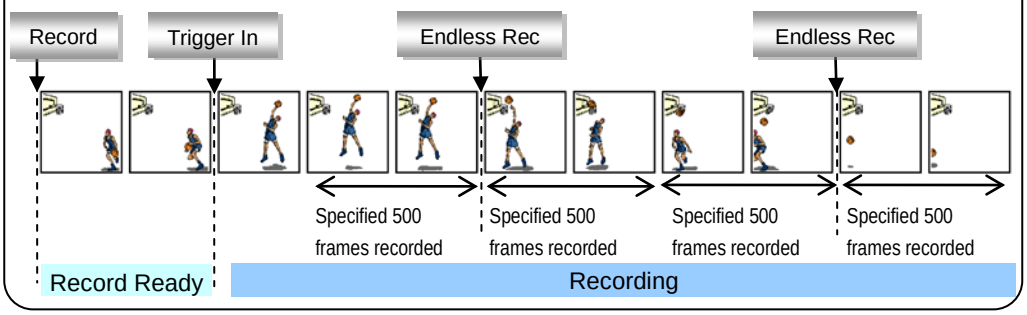
Similar to random mode, this mode records the number of frames specified in advance, for each trigger input.

In random mode, the specified frame count is recorded immediately after when the trigger was input, but in random center mode, the specified frame count is recorded before and after the trigger is input. This mode is suitable for a phenomenon that happens irregularly and a trigger can be set each time to coincide with it occurring and can be used to check before and after the trigger.

The frame count that can be recorded for 1 trigger input can be set from 1 frame to the maximum recordable frame count in 1 frame increments.

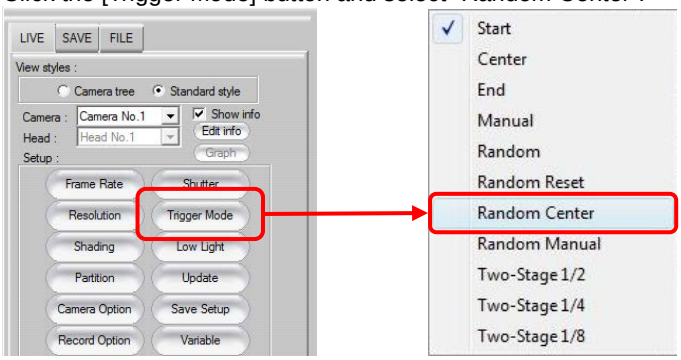
Example: For a camera that can record 2 seconds in total with a frame count of 500 frames specified (1000 frames/sec, maximum number of triggers is 2)

After clicking [Trigger In], the system is in the record loop state, when [Endless Record] is clicked, 500 frames of high-speed images before and after the input are recorded.

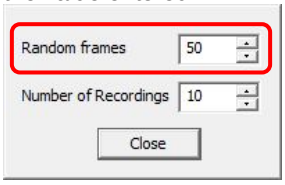


When recording in random center mode, the settings below must be made in advance.

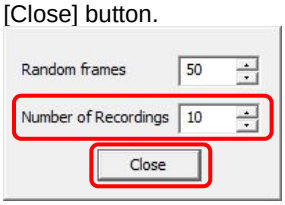
1. Click the [Trigger Mode] button and select “Random Center”.



2. Set the frame count to record for each trigger input. Enter the desired value in “Random frames”.
The before and after frame count will be the same value as the frame count entered, half the value entered.



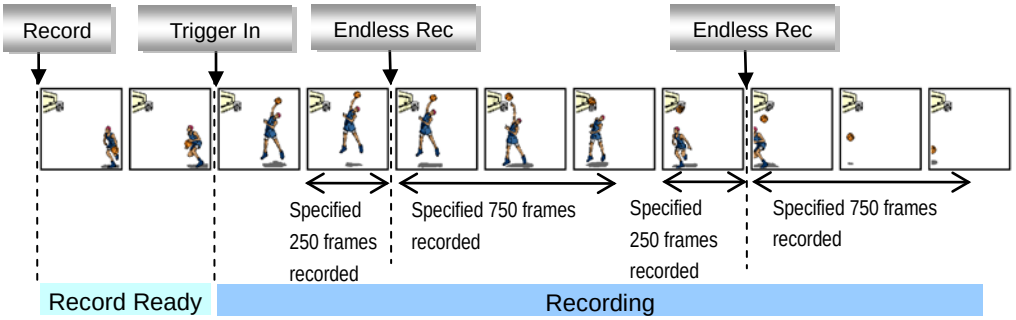
3. Specify the maximum number of triggers that can be set.
Enter the desired value in [Number of Recordings]. When the setting is finished, click the [Close] button.



- Random Manual Mode
  Similar to random center mode, this mode records the number of frames specified in advance before and after when the trigger is input for each input of the trigger. In random center mode, the proportion of the frame count recorded before and after the trigger input is equal, but in random manual mode, the frame count recorded before and after the important moment can be set to the desired value.

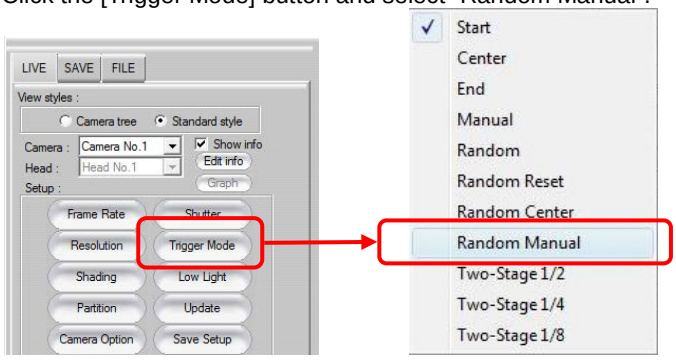
Example: For a camera that can record 2 seconds in total, the frame count specified is 250 frames before, 750 frames after (1000 frames/sec, maximum trigger count 2)

After clicking [Trigger In], the system is in the record loop state, when [Endless Record] is clicked, the specified frame count of high-speed images before and after the input is recorded.

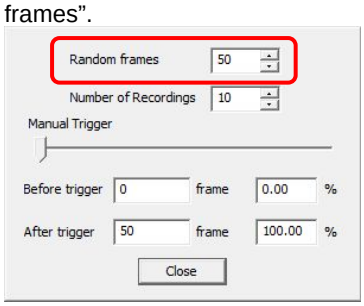


When recording in random manual mode, the settings below must be made in advance.

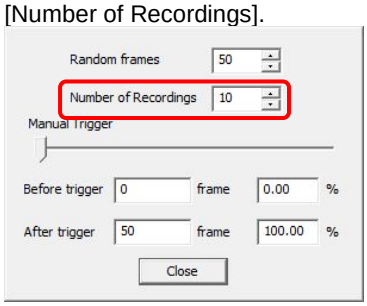
1. Click the [Trigger Mode] button and select “Random Manual”.



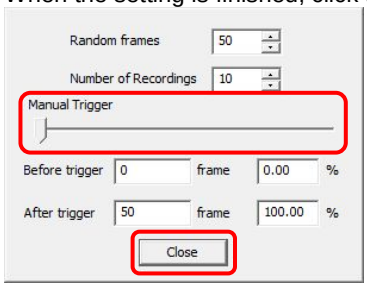
2. Set the frame count to record for each trigger input. Enter the desired value in “Random frames”.



3. Sepcify the maximum number of triggers that can be set. Enter the desired value in [Number of Recordings].

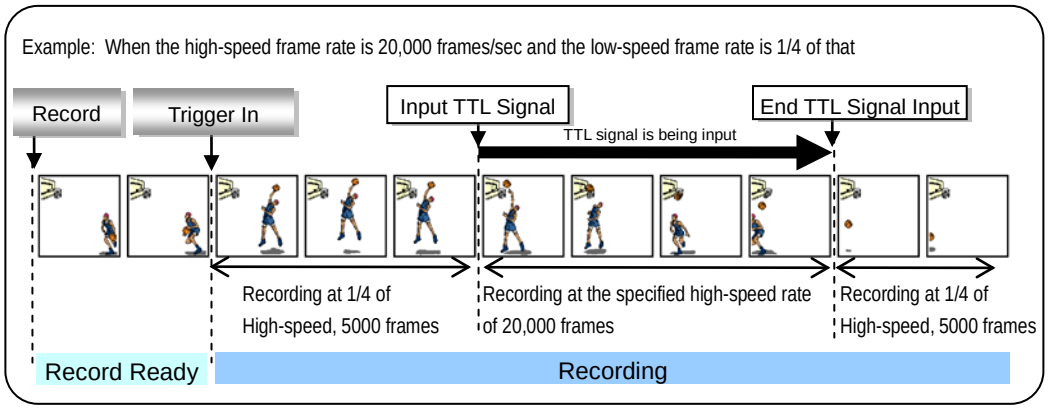


4. Specify the frame count to record before and after the trigger input.
Set by dragging the “Manual Trigger” slider.
When the setting is finished, click the [Close] button.



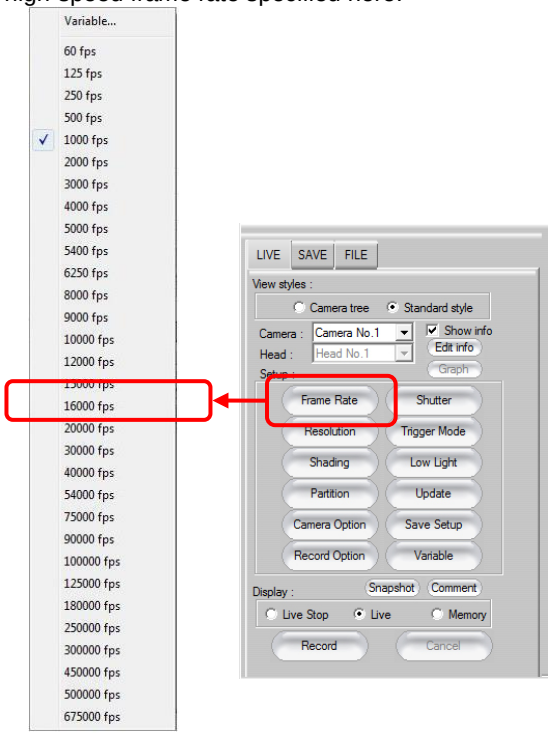
■ Two-Stage Mode

Similar to start mode, recording starts at the same time as the trigger is input, but in this mode, the recording speed is varied when sequential trigger signals are received.
At the desired timing, one of two different frame counts can be specified.
For example, when continuously recording the shot of a basketball player, only the frame count at the instant of the jump will be raised.
Set the trigger mode to Two-Stage mode and record, the frame rate can be switched by inputting a TTL signal. The low-speed section's frame rate can be set as a proportion, half (1/2), one quarter (1/4), or one eighth (1/8) of the high-speed section's frame rate, which is considered the standard.
The frame rate switch cannot be controlled from PFV.

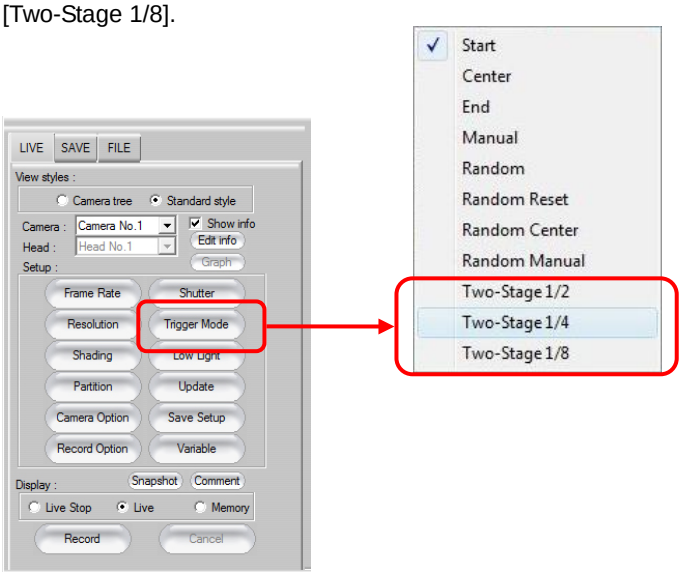


When recording in Two-Stage mode, the settings below must be made in advance.

1. Click the [Frame Rate] button and select the frame rate for the fastest shooting.
The low-speed frame rate can be specified as a proportion, 1/2, 1/4, or 1/8, of the high-speed frame rate specified here.



2. Click the [Trigger Mode] button and select either [Twostage 1/2], [Twostage 1/4], or [Two-Stage 1/8].



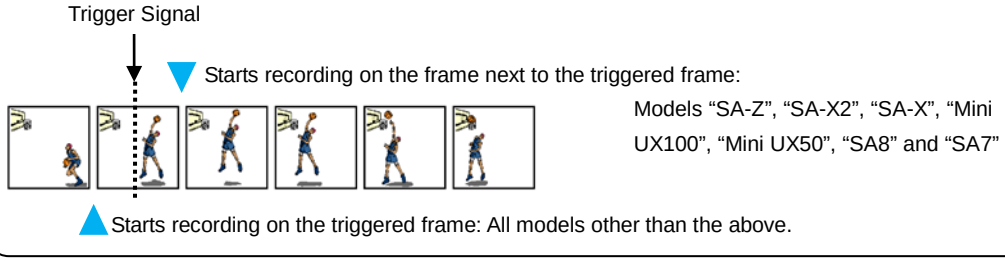
3. Input the a TTL signal to the camera's GENERAL IN input and control the switching between normal recording and restrained recording.
High (+5) is restrained recording, Low (GND) is normal recording (both are positive polarity).

Caution

- When the "Trigger Mode" is "Two-Stage Mode", the event marker cannot be input.

Supplement

- When shooting in the "Two-Stage Mode", the first frame to be recorded varies by the model.



Reference

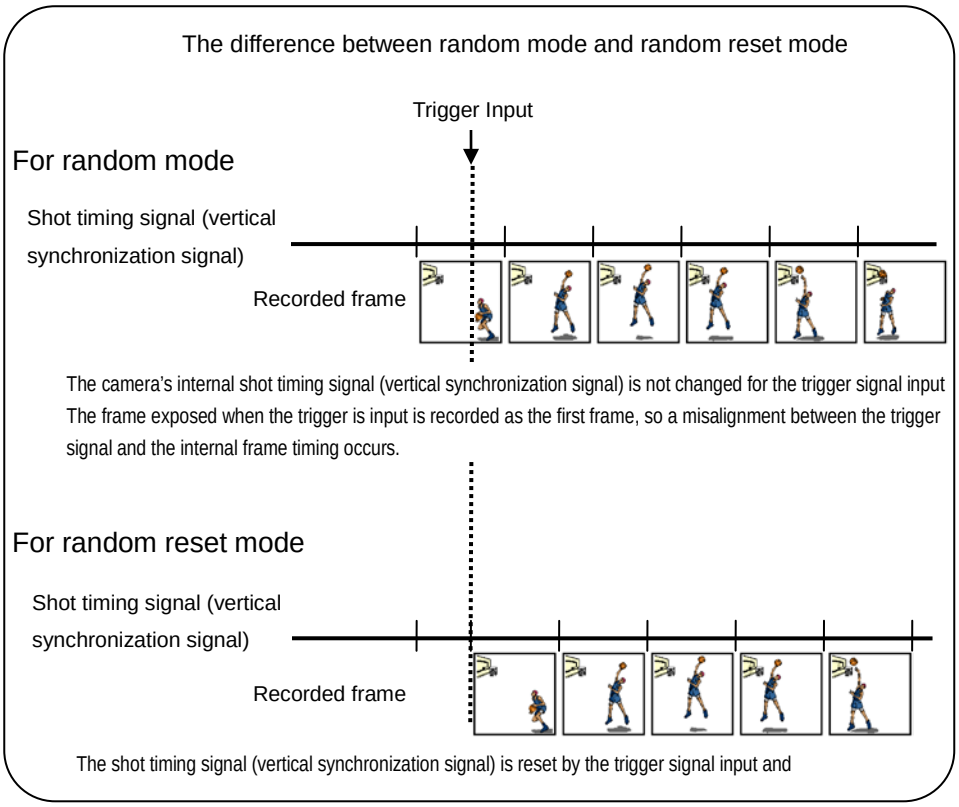
- For more information about event markers, refer to "4.5. Move to an Event Marker", page 200.

■ Random Reset Mode

This mode synchronizes the trigger signal and the vertical synchronization signal and starts recording.

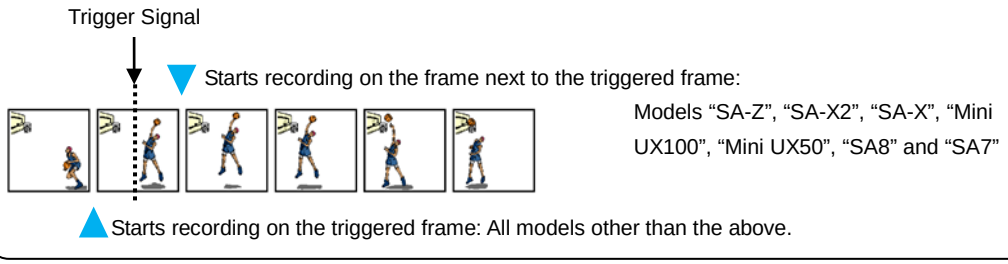
In random mode and start mode, the camera starts recording according to the trigger input, but the camera's internal shot timing signal (vertical synchronization signal) itself operates with no relation to the timing of the trigger input. This causes, according to the situation, the possibility that the start timing for the first frame for the trigger signal will be slightly ahead of the trigger, up to a maximum of 1 frame.

In random reset mode, the camera's internal shot timing is reset by the input of the trigger. In this way, the start timing for the first frame is synchronized for the trigger input, and the timing accuracy is improved.



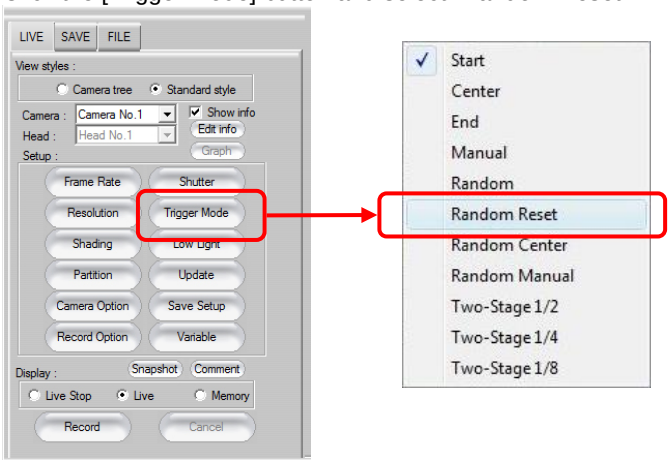
Supplement

- When shooting in the "Random Reset Mode", the first frame to be recorded varies by the model.

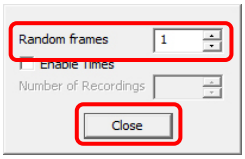


When recording in random reset mode, the settings below must be made in advance.

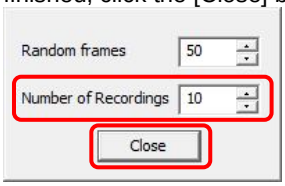
1. Click the [Trigger Mode] button and select “Random Reset”.



2. Set the number of frames to record with each trigger input.
Enter the desired value in “Random frames” and click the [Close] button.

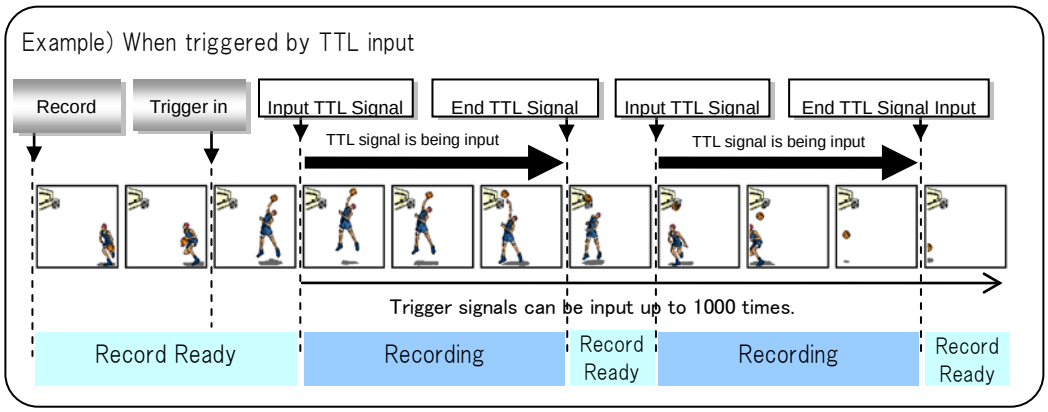


3. To specify the maximum number of triggers that can be set, check “Setting number of recordings” and enter the desired value in “Number of Recordings”. When the setting is finished, click the [Close] button.



■ REC ON CMD mode

In REC ON CMD mode, the content is recorded only while external SW or TTL trigger is input.
Recordings stop when the trigger is interrupted and resume when a new trigger is input.
While the maximum recordable frame count is not changed, the number of trigger inputs is limited to 1000.

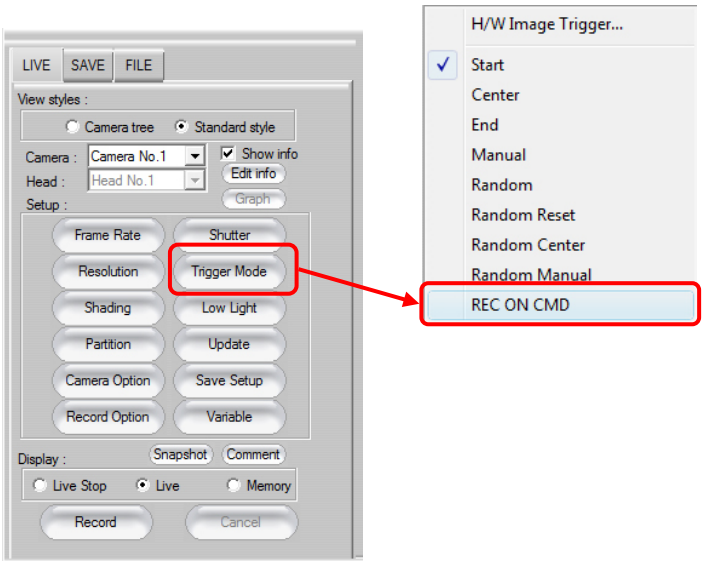


Caution

- In this mode, you can make the system enter the record ready state but cannot input trigger from PFV. Recordings can be triggered only by external inputs.

When recording in REC ON CMD mode, the settings below must be made in prior to beginning the recording.

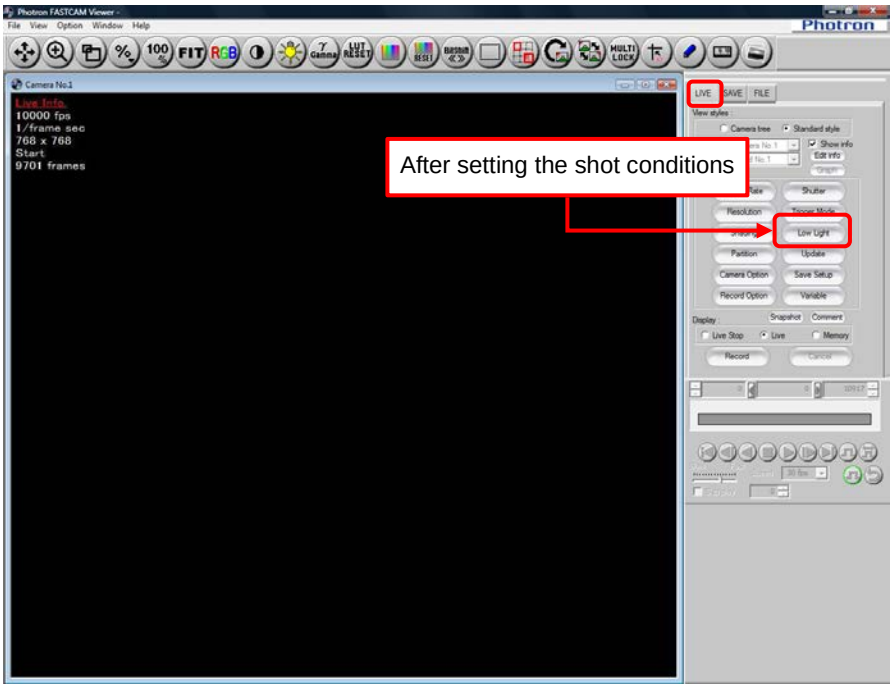
1. Click the [Trigger Mode] button and select “REC ON CMD”.



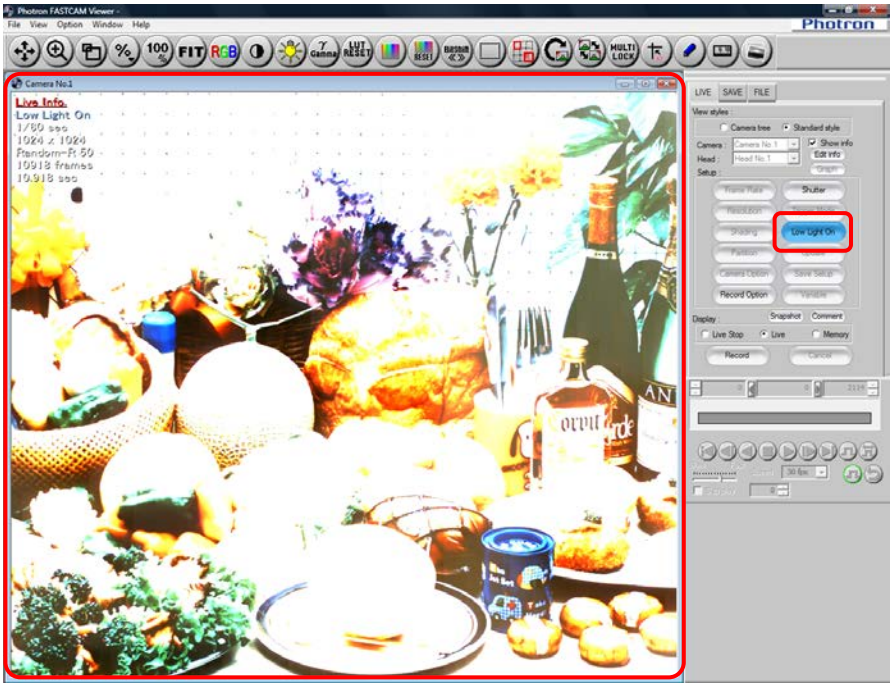
3.6. Using Low Light Mode

The live image being prepared for recording is easier to see by temporarily lowering the frame rate to 60(50) fps.
For high-speed shooting, the live mode display screen may be dark until shooting with the shot conditions that are set, such as high frame rate and short exposure shutter. The low light function can be used in setting up the shot, for example when the lens focus needs to be adjusted.

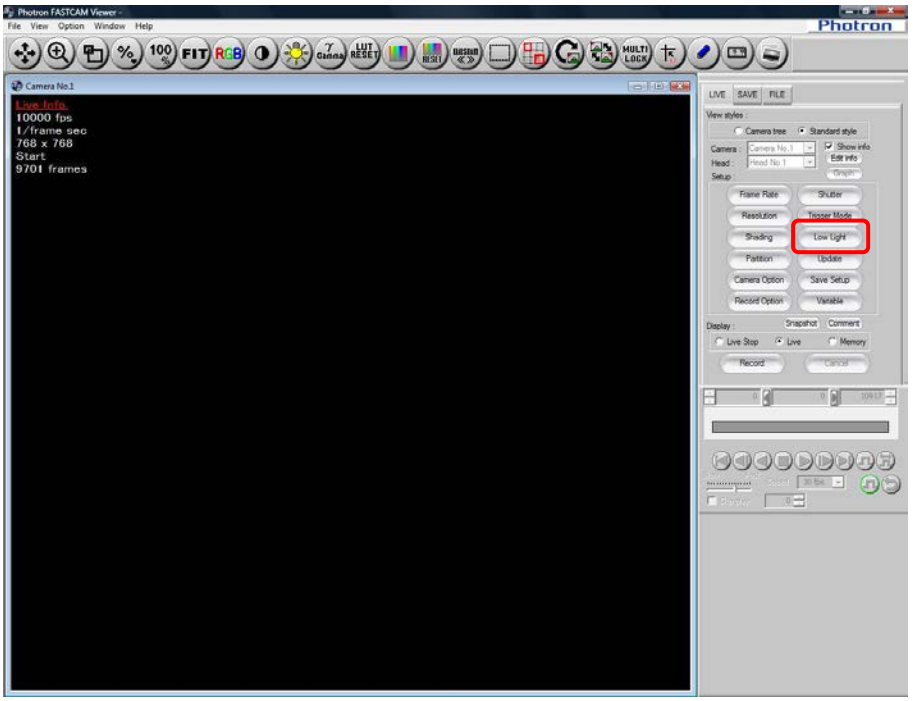
1. After setting the shot conditions, display the “LIVE” tab on the control panel and click the [Low Light] button.



2. Low Light mode turns on, and the live mode display brightens.
Adjust the lens focus, etc.



3. After adjusting, click the [Low Light] button again the low light mode is turned off.



Supplement

- When low light mode is on, only the shutter speed can be set.

3.7. Shading (Black Level) Correction

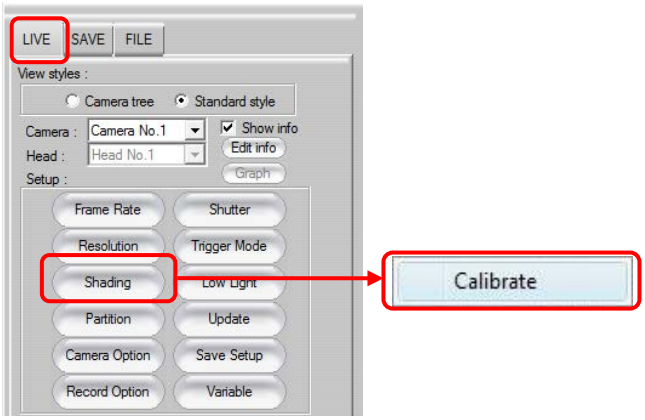
Image sensor shading (black level) correction should be performed immediately before making a recording after a cameras framing rate has been changed.
By using shading correction, the uniformity of each pixels black level in the image is reset.

1. Completely shield the image sensor from the light by using the lens cap.

Supplement

- For cameras with a mechanical shutter, shielding of light is not needed.

2. Display the “LIVE” tab on the control panel and click the [Shading] button. The black level image is recorded on the camera and the shading is corrected.



Supplement

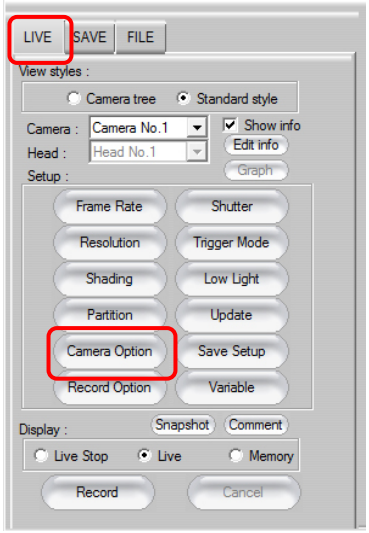
- For even more accurate image recording, it is recommended to perform shading correction:
  “when the frame rate changes”,
  “when the shutter speed changes”,
  “when the resolution changes”,
  “when fixed, horizontal noise appears”,
  “part of the screen is clear, but noise appears around it”
  Shading correction can solve all these problems.
- When “fixed, horizontal noise appears” or “a part of the screen is clear, but noise appears around it”, you can solve these problems with shading correction.
- After executing shading, to save the shading data to the camera, you must click the [Save Camera] button each time under “General setting” on camera option setting. To set to automatically save to the camera, set under configuration.
- For cameras with mechanical shutters, if “Auto Calibration (only mechanical shutter mounted camera)” under “Shading Setting” is checked on the “Configuration” dialog box, changing settings automatically causes shading correction.

Reference

- For automatic saving the shading data, refer to “1.1.6. Shading Setting” in Configuration section.
- As for automatic execution of shading, refer to “1.1.6. Auto Calibration (only mechanical shutter mounted camera)” in Configuration section.

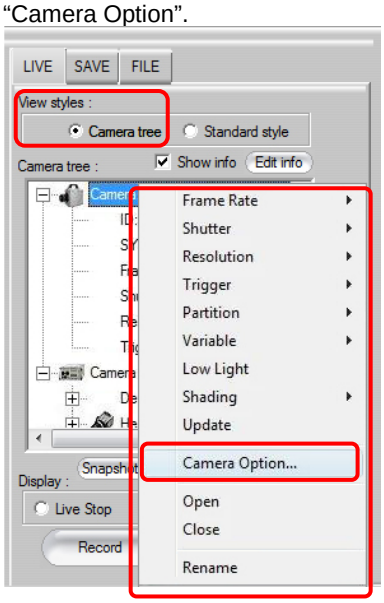
3.8. Other Settings

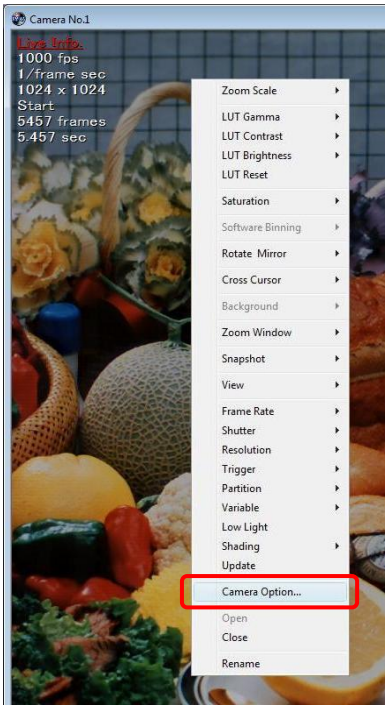
The camera's unique settings can be set from PFV.
Camera settings are made with [Camera Option] button on the "LIVE" tab on the control panel.
After selecting the camera to set with "Camera", click the [Camera Option] button.



Supplement

- When the "LIVE" tab's "View style" option is set to "Camera tree", right-click on the camera to set and click "Camera Option".
  The settings can also be made by right clicking on the view window of the camera and selecting "Camera Option".





The options that can be set are listed below. After making the settings, click the [OK] button.

Supplement

- The settings vary depending on the camera model. For details, refer to the camera's hardware manual.
- When "All Cameras" is selected, settings are made for all of the cameras. In this case, settings those are not applicable for all cameras will be displayed.

General

<table>
<tr><th colspan="2">Left Tree "General"</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Shading</td><td>Sets the image sensor's shading correction (black level correction).
The black level non uniformity for the pixels in the image sensor is reset.
Uncheck "Enable" to not utilize the correction results.
Click the [Calibrate] button. When the shading correction is executed again, the correction results will be reflected and "Activate" will be automatically checked.
<table>
<tr><td>Calibrate</td><td>For shading correction, click to execute.
Acquires the image at the time of selection and applies shading correction.</td></tr>
<tr><td>Load Camera</td><td>Reads the black level image recorded on the camera and applies shading correction.</td></tr>
<tr><td>Save Camera</td><td>Records the current black level image to the camera.</td></tr>
<tr><td>Update</td><td>Update the PFV display image (view window).</td></tr>
<tr><td>Shading Type</td><td>Specify the type of shading correction.
<table>
<tr><td>Normal</td><td>Performs normal (conventional) correction.</td></tr>
<tr><td>Fine</td><td>Performs even more rigorous correction.</td></tr>
</table></td></tr>
</table>
After executing shading, to set to automatically save shading data to the camera, set under configuration. For automatic saving, refer to "1.1.6. Shading Setting" in Configuration section.</td></tr>
<tr><td>Pixel Gain</td><td>Independently adjust the gain for all of the sensor's pixels.
This setting is only valid on PFV. It is not reflected on the camera.
By using shading correction and pixel correction combined, non uniformity in the pixels caused by the camera's lighting conditions, optical system, or image sensor can be eliminated.
This correction is not reflected in the NTSC/PAL video monitor output.
<table>
<tr><td>Calibrate</td><td>Execute pixel shading.
The image at the time of selection is the standard image, the gain correction data is generated and pixel gain correction applied.</td></tr>
<tr><td>File Load</td><td>Read the saved correction data and compensate.</td></tr>
<tr><td>File Save</td><td>Save the current gain correction data.</td></tr>
</table>
Shading correction must be executed first when activating pixel gain correction. For more information, refer to "3.8.1. Pixel Gain Correction", page 148.</td></tr>
</table>

<table>
<tr><th colspan="2">Left Tree ”General”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Edge Enhancement</td><td>Set the image edge enhancement.<table><tr><td>OFF</td><td>No edge enhancement</td></tr><tr><td>LEVEL 1</td><td>Weak</td></tr><tr><td>LEVEL 2</td><td>Medium</td></tr><tr><td>LEVEL 3</td><td>Strong</td></tr></table></td></tr>
<tr><td>Sensor Gain</td><td>Set the sensor sensitivity setting.<table><tr><td>×1</td><td>The gain amount is set to normal.</td></tr><tr><td>×2</td><td>The gain amount is set to double.</td></tr><tr><td>×4</td><td>The gain amount is set to x4.</td></tr><tr><td>×8</td><td>The gain amount is set to x8.</td></tr></table></td></tr>
<tr><td>Dual Slope Shutter</td><td>Set the extended dynamic range mode.
Setting varies by the camera model.
TYPE A:<table><tr><td>OFF</td><td>Extended dynamic range mode is off.</td></tr><tr><td>MODE1</td><td>Set light exposure adjustment to small.</td></tr><tr><td>MODE2</td><td>Set light exposure adjustment to medium.</td></tr><tr><td>MODE3</td><td>Set light exposure adjustment to large.</td></tr></table>TYPE B:
Changes the rate of exposure time between 0% and 95% at an increment of 5%, where 0% represents the extended dynamic range mode being off.</td></tr>
<tr><td>Black Clip Level</td><td>Set the black clip level.
When enabled, set the level matched to the Pre-LUT status.<table><tr><td>OFF</td><td>Disables the black clip level. （LUT DEF1）</td></tr><tr><td>LEVEL 1</td><td>Enables the black clip level. （LUT DEF2）</td></tr><tr><td>LEVEL 2</td><td>Enables the black clip level. （LUT DEF3）</td></tr><tr><td>LEVEL 3</td><td>Enables the black clip level. （LUT DEF4）</td></tr><tr><td>LEVEL4</td><td>Enables the black clip level. （LUT DEF5）</td></tr><tr><td>LEVEL5</td><td>Enables the black clip level. （LUT DEF6）</td></tr><tr><td>LEVEL6</td><td>Enables the black clip level. （LUT DEF7）</td></tr><tr><td>LEVEL7</td><td>Enables the black clip level. （LUT DEF8）</td></tr><tr><td>LEVEL8</td><td>Enables the black clip level. （LUT DEF9）</td></tr></table></td></tr>
</table>

◆ I/O

<table>
<tr><th colspan="2">Left Tree “I/O”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>External Signal I/O Port
GENERAL OUT</td><td>Set the type and polarity of the signal output from the camera’s GENERAL OUT connector.
<table>
<tr><td>SYNC POS</td><td>Output a vertical synchronization signal. (positive polarity)</td></tr>
<tr><td>SYNC NEG</td><td>Output a vertical synchronization signal. (negative polarity)</td></tr>
<tr><td>EXPOSE POS/
EXPOSE HEAD1 POS</td><td>Output the camera’s (camera head 1’s) exposure interval signal. (positive polarity)</td></tr>
<tr><td>EXPOSE NEG/
EXPOSE HEAD1 NEG</td><td>Output the camera’s (camera head 1’s) exposure interval signal. (negative polarity)</td></tr>
<tr><td>EXPOSE HEAD2 POS</td><td>Output camera head 2’s exposure interval signal. (positive polarity)</td></tr>
<tr><td>EXPOSE HEAD2 NEG</td><td>Output camera head 2’s exposure interval signal. (negative polarity)</td></tr>
<tr><td>EXPOSE HEAD3 POS</td><td>Output camera head 3’s exposure interval signal. (positive polarity)</td></tr>
<tr><td>EXPOSE HEAD3 NEG</td><td>Output camera head 3’s exposure interval signal. (negative polarity)</td></tr>
<tr><td>EXPOSE HEAD4 POS</td><td>Output camera head 4’s exposure interval signal. (positive polarity)</td></tr>
<tr><td>EXPOSE HEAD4 NEG</td><td>Output camera head 4’s exposure interval signal. (negative polarity)</td></tr>
<tr><td>REC POS</td><td>Output an interval signal during recording. (positive polarity)</td></tr>
<tr><td>REC NEG</td><td>Output an interval signal during recording. (negative polarity)</td></tr>
<tr><td>TRIG POS</td><td>Output the trigger signal received by the camera. (positive polarity)</td></tr>
<tr><td>TRIG NEG</td><td>Output the trigger signal received by the camera. (negative polarity)</td></tr>
<tr><td>READY POS</td><td>Output a signal to indicate the record ready state. (positive polarity)</td></tr>
<tr><td>READY NEG</td><td>Output a signal to indicate the record ready state. (negative polarity)</td></tr>
<tr><td>IRIG RESET POS</td><td>Output the camera’s internal IRIG reset signal. (positive polarity)</td></tr>
<tr><td>IRIG RESET NEG</td><td>Output the camera’s internal IRIG reset signal. (negative polarity)</td></tr>
</table></td></tr>
<tr><td>External Signal I/O Port
GENERAL IN</td><td>Set the type and polarity of the signal input to the camera’s GENERAL IN connector.
<table>
<tr><td>EVENT POS</td><td>Input the event signal (event marker/Two-Stage trigger vary speed). (positive polarity)</td></tr>
<tr><td>EVENT NEG</td><td>Input the event signal (event marker/Two-Stage trigger vary speed). (negative polarity)</td></tr>
<tr><td>TRIG POS</td><td>Input the TTL trigger signal. (positive polarity)</td></tr>
<tr><td>TRIG NEG</td><td>Input the TTL trigger signal. (negative polarity)</td></tr>
<tr><td>READY POS</td><td>Input the record ready state switch signal (READY ON/OFF). (positive polarity)</td></tr>
<tr><td>READY NEG</td><td>Input the record ready state switch signal (READY ON/OFF). (negative polarity)</td></tr>
</table></td></tr>
<tr><td>External Signal I/O Port
TRIG TTL OUT</td><td>Set the type and polarity of the signal output from the camera’s TRIG TTL OUT connector.
<table>
<tr><td>TRIG POS</td><td>Output the trigger signal received by the camera. (positive polarity)</td></tr>
<tr><td>TRIG NEG</td><td>Output the trigger signal received by the camera. (negative polarity)</td></tr>
<tr><td>TTL IN THRU POS</td><td>Perform TRIG TTL IN through output. (positive polarity)</td></tr>
<tr><td>TTL IN THRU NEG</td><td>Perform TRIG TTL IN through output. (negative polarity)</td></tr>
</table></td></tr>
</table>

<table>
<tr><th colspan="2">Left Tree “I/O”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>External Signal I/O Port
TRIG TTL IN</td><td>Set the type and polarity of the signal input to the camera’s TRIG TTL IN connector.<table><tr><td>TRIG POS</td><td>Input the TTL trigger signal. (positive polarity)</td></tr><tr><td>TRIG NEG</td><td>Input the TTL trigger signal. (negative polarity)</td></tr></table></td></tr>
<tr><td>External Signal I/O Port
SYNC OUT</td><td>Set the type and polarity of the signal output from the camera’s SYNC OUT connector.<table><tr><td>SYNC POS</td><td>Output a vertical synchronization signal. (positive polarity)</td></tr><tr><td>SYNC NEG</td><td>Output a vertical synchronization signal. (negative polarity)</td></tr></table></td></tr>
<tr><td>External Signal I/O Port
SYNC IN</td><td>Set the type and polarity of the signal input to the camera’s SYNC IN or EXT-V IN connector.<table><tr><td>OFF</td><td>Turn external synchronization OFF.</td></tr><tr><td>ON CAM POS</td><td>Conduct synchronization with a camera of the same type. (positive polarity)</td></tr><tr><td>ON CAM NEG</td><td>Conduct synchronization with a camera of the same type. (negative polarity)</td></tr><tr><td>ON OTHERS POS</td><td>Conduct synchronization with an external device (including other Photron products). (positive polarity)</td></tr><tr><td>ON OTHERS NEG</td><td>Conduct synchronization with an external device (including other Photron products). (negative polarity)</td></tr></table></td></tr>
<tr><td>External Signal I/O Port
SYNC OUT TIMES</td><td>Enter a frequency multiplying factor for the vertical sync signal output by the camera.<table><tr><td>×0.5</td><td>Sync signal is output at half the frequency of the recording rate.</td></tr><tr><td>×1</td><td>Sync signal is output at the same frequency as the recording rate.</td></tr><tr><td>×2</td><td>Sync signal is output at twice the frequency of the recording rate.</td></tr><tr><td>×4</td><td>Sync signal is output at four times the frequency of the recording rate.</td></tr><tr><td>×6</td><td>Sync signal is output at six times the frequency of the recording rate.</td></tr><tr><td>×8</td><td>Sync signal is output at eight times the frequency of the recording rate.</td></tr><tr><td>×10</td><td>Sync signal is output at ten times the frequency of the recording rate.</td></tr><tr><td>×20</td><td>Sync signal is output at twenty times the frequency of the recording rate.</td></tr><tr><td>×30</td><td>Sync signal is output at thirty times the frequency of the recording rate.</td></tr></table></td></tr>
<tr><td>Aux In</td><td>Sets IRIG and MCDL Effective/Ineffective.
It may not work depending on the resolution and/or memory capacity. For details, see the hardware manual.</td></tr>
<tr><td>IRIG Phase Lock</td><td>Check when performing IRIG synchronization.
Separately, a frame rate/resolution variable setting must be made.</td></tr>
<tr><td>IRIG Offset</td><td>Set the IRIG signal’s offset value in microseconds.
Maximum 999999 microseconds - -999999 microseconds
The offset value is set when the [Write] button is clicked.</td></tr>
</table>

<table>
<tr><th colspan="2">Left Tree “I/O”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Video Out</td><td>Set the video output format.
<table>
<tr><td>NTSC</td><td>The video output signal format is NTSC.</td></tr>
<tr><td>PAL</td><td>The video output signal format is PAL.</td></tr>
</table>
If excluding OFF is selected in [Video Out during Memory Playback] when a video monitor is connected, image data is displayed on the monitor during a replay from the memory. Default is OFF.
Note that, if video sync output is switched on during memory replay, both the PC storing and memory replay rates are lowered.
<table>
<tr><td>Off</td><td>Video is not displayed on the video monitor.</td></tr>
<tr><td>Memory Sync Playback</td><td>Memory playback video is also output to the video monitor.</td></tr>
<tr><td>Live</td><td>Live video is output to the video monitor.</td></tr>
</table></td></tr>
</table>

◆ Video Out

<table>
<tr><th colspan="2">Left Tree “Video Out”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Video Out</td><td>Set the video output format.
<table>
<tr><td>NTSC</td><td>The video output signal format is NTSC.</td></tr>
<tr><td>PAL</td><td>The video output signal format is PAL.</td></tr>
</table></td></tr>
<tr><td>Video Out Signal</td><td>Set the video output signal.
<table>
<tr><td>VBS</td><td>Outputs composite video signal.</td></tr>
<tr><td>HD-SDI</td><td>Outputs HD-SDI video signal.</td></tr>
</table></td></tr>
<tr><td>HD-SDI Mode</td><td>Set the format HD-SDI video signal.
<table>
<tr><td>1080/60i</td><td>Set to 1080/60i.
Selectable when the video output format is NTSC.</td></tr>
<tr><td>1080/59.94i</td><td>Set to 1080/59.94i.
Selectable when the video output format is NTSC.</td></tr>
<tr><td>1080/50i</td><td>Set to 1080/50i.
Selectable when the video output format is PAL.</td></tr>
<tr><td>1080/30p</td><td>Set to 1080/30p.
Selectable when the video output format is NTSC.</td></tr>
<tr><td>1080/29.97p</td><td>Set to 1080/29.97p.
Selectable when the video output format is NTSC.</td></tr>
<tr><td>1080/25p</td><td>Set to 1080/25p.
Selectable when the video output format is PAL.</td></tr>
<tr><td>1080/24p</td><td>Set to 1080/24p.
Selectable when the video output format is either NTSC or PAL.</td></tr>
<tr><td>1080/23.98p</td><td>Set to 1080/23.98p.
Selectable when the video output format is either NTSC or PAL.</td></tr>
<tr><td>1080/24sF</td><td>Set to 1080/24sF.
Selectable when the video output format is either NTSC or PAL.</td></tr>
<tr><td>1080/23.98sF</td><td>Set to 1080/23.98sF.
Selectable when the video output format is either NTSC or PAL.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th colspan="2">Left Tree “Video Out”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Video Out during Memory Playback</td><td>If excluding OFF is selected in [Video Out during Memory Playback] when a video monitor is connected, image data is displayed on the monitor during a replay from the memory. Default is OFF.
Note that, if video sync output is switched on during memory replay, both the PC storing and memory replay rates are lowered.
<table>
<tr><td>Off</td><td>Video is not displayed on the video monitor.</td></tr>
<tr><td>Memory Sync Playback</td><td>Memory playback video is also output to the video monitor.</td></tr>
<tr><td>Live</td><td>Live video is output to the video monitor.</td></tr>
</table>
</td></tr>
</table>

- Color Adjust(Color Only)

<table>
<tr><th colspan="2">Left Tree “Color Adjust (Color Only)”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Color Temperature</td><td>Set the color temperature.
<table>
<tr><td>5100K</td><td>Set the color temperature to 5100K (daylight color, out doors).</td></tr>
<tr><td>3100K</td><td>Set the color temperature to 3100K (halogen light source).</td></tr>
<tr><td>USER1</td><td>User-defined setting.</td></tr>
<tr><td>USER2</td><td>User-defined setting.</td></tr>
</table>
User-defined settings can be adjusted by selecting “USER1” or “USER2” on the “Mode” option and dragging the slider.
The value will be reset to the default value when the [Reset] button is clicked.
After clicking the [Auto] button, the white balance can be adjusted by dragging the mouse to draw a rectangle to select a white area in the view window that is not washed-out.
If “Software Corrector” is checked, the color temperature can also be changed in memory mode after recording. Whether changed in live mode or memory mode, the change is reflected in all modes and all partitions.
In addition, be aware that corrections via “Software Corrector” are not reflected in video output.</td></tr>
</table>

Color Adjust

<table>
<tr><th colspan="2">Left Tee “Color Adjust”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Pre-LUT</td><td>Set the LUT.
<table>
<tr><td>DEF1
~
DEF9</td><td>Sets the preset LUT set on the camera.</td></tr>
<tr><td>USER</td><td>User-defined setting.</td></tr>
</table>
User-defined settings can be adjusted by selecting “USER” on the “Mode” option and dragging the slider.
If “USER” is selected and “Edit Curves” is checked, you can adjust by directly dragging the graph on the right on the screen. For details, refer to “3.8.4 Pre-LUT Free Edit”, page 156.
The value will be reset to the default value when the [Reset] button is clicked.
The current user-defined setting is transmitted to the camera when the [Write] button is clicked.
The graph on the right side of the screen will vary according to the changes in “Gain”, “Gamma”, “Contrast”, “Brightness”, and “Positive/Negative”.
The LUT (Pre-LUT) set with [Camera Settings] is also reflected in the video output.
The LUT (Post-LUT) set on the view window is only reflected on the view window and when the file is saved.</td></tr>
<tr><td>Color Enhancement</td><td>Sets color enhancement.
<table>
<tr><td>OFF</td><td>Turns color enhancement OFF.</td></tr>
<tr><td>LEVEL 1</td><td>Sets color enhancement to x0.5.</td></tr>
<tr><td>LEVEL 2</td><td>Sets color enhancement to x1.0 (standard).</td></tr>
<tr><td>LEVEL 3</td><td>Sets color enhancement to x1.5.</td></tr>
<tr><td>LEVEL4</td><td>Sets color enhancement to x2.0.</td></tr>
</table></td></tr>
</table>

Partition

<table>
<tr><th colspan="2">Left Tree “Partition”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>–</td><td>Display the partition setting.
When partitioning the memory, enter the number of partitions in “Number”.
<table>
<tr><td>Number</td><td>Sets the number of memory partitions (camera memory partitions).</td></tr>
<tr><td>Hardware Partition Increment Mode</td><td>After recording, automatically move to the next partition.
The automatic movement is controlled on the camera.
Set when the camera will shoot independently without using PFV. Do not use this setting when shooting from PFV.</td></tr>
</table>
There are also cameras where individual partition sizes can be set to a desired setting. For how to divide partitions, refer to “3.8.2. Dividing Partition”, page 152.
There are also cameras that can set the recording memory size as desired. For how to set the recording memory size, refer to "3.8.3. Setting the Recording Memory Size", page 155.</td></tr>
</table>

Signal Delay Settings

Left Tree “Signal Delay Settings”	
Item	Description
Signal Delay Setting TRIG TTL IN	Set the amount of time to delay recognizing the signal input to the TRIG TTL IN connector. A value higher than the limit cannot be set.
Signal Delay Setting GENERAL IN	Set the amount of time to delay recognizing the signal input to the GENERAL IN connector (excluding READY). A value higher than the limit cannot be set.
Signal Delay Setting Vertical Synchronization Signal Output	Output the vertical synchronization signal delayed by the amount of time set. A value higher than the limit cannot be set.
Signal Delay Setting Exposure Interval Signal Output	Output the exposure interval signal delayed by the amount of time set. A value higher than the limit cannot be set.
Signal Width Setting TTL Trigger Output	Set the pulse width of the output TTL trigger signal. A value higher than the limit cannot be set
Signal Width Setting Vertical Synchronization Signal Output	Set the pulse width of the output vertical synchronization signal. A value cannot be set higher than the limit.
Signal Delay Setting GENERAL IN	Set the amount of time to delay recognizing the signal input to the GENERAL IN connector (excluding READY). A value higher than the limit cannot be set.

Programmable Switch

<table>
<tr><th colspan="2">Left Tree “Programmable Switch”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>USER SW
USER1～USER4</td><td>Assign the programmable switches on the camera with the desired function.
<table>
<tr><td>Change Frame Rate</td><td>Raise the frame rate.</td></tr>
<tr><td>Change Resolution</td><td>Lower the resolution.</td></tr>
<tr><td>Change Shutter Speed</td><td>Increase the shutter speed.</td></tr>
<tr><td>Change the Trigger Mode</td><td>Change the trigger mode.</td></tr>
<tr><td>Change Video Output Head</td><td>Change the number of the camera head for video output.</td></tr>
<tr><td>Image Fit</td><td>Adjust the size of the image displayed on the video output screen to be the maximum for the screens current resolution.
The same function as the “FIT” key on the keypad.</td></tr>
<tr><td>Status Display</td><td>Display the status of the camera settings on the video output.
The same function as the “STATUS” key on the keypad.</td></tr>
<tr><td>Switch LIVE/MEMORY</td><td>Switch between LIVE and MEMORY states.
The same function as the “LIVE” key on the keypad.</td></tr>
<tr><td>Record Ready</td><td>Set the record ready state.
The same function as the “REC READY” key on the keypad.</td></tr>
<tr><td>Record</td><td>Start recording.
The same function as the “REC” key on the keypad.</td></tr>
<tr><td>Low-Light</td><td>Turn low-light mode ON/OFF.
The same function as the “LOW LIGHT” key on the keypad.</td></tr>
<tr><td>Shading</td><td>Performs shading calibration (black level calibration).
The same function as the "CALIBRATE" key on the keypad.</td></tr>
<tr><td>Show/Hide OSD</td><td>Shows and hides the OSD (video output screen text).</td></tr>
<tr><td>Off</td><td>Disables the programmable switch function.</td></tr>
</table>
</td></tr>
</table>

- Head Exchange

Left Tee “Head Exchange”	
Item	Description
Head Information	Use with cameras that have the camera body and camera heads separate. Select the type of camera head. After setting, exit PFV and cycle the power to reflect the setting.

- SD

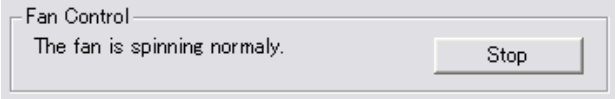
Left Tree “SD”	
Item	Description
Memory Mode	Specify if the shooting duration is limited within the SD card’s capacity. This setting can be made before shooting. Normal: Shooting is allowed to the full capacity of the camera memory. Fit: Shooting duration is limited within the SD card’s capacity.
Slot 1 Slot 2	Each camera has two slots for SD cards. You can do format/save individually for each slot. And the status when connected is also displayed within the frame. Data List: Shows the list of the stored data. Format: When storing the camera data to a new SD card, click this button to format it. And the button can also be used to delete the stored data.

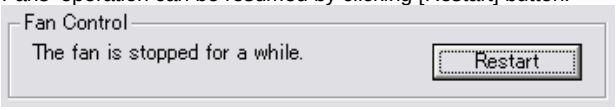
- Additional Features 1

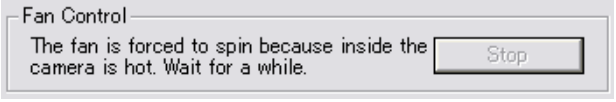
<table>
<tr><th colspan="2">Left Tree “Additional Features 1”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Shutter Mode</td><td>Normally, when the frame rate is changed, the shutter speed is automatically changed to 1/frame sec. Check this option to preserve the shutter speed selected before the frame rate was changed, so if the shutter speed is valid when the frame rate is changed, it won’t be changed to 1/frame sec.</td></tr>
<tr><td>Output 8bit select</td><td>With cameras having a grayscale of eight bits or more, the upper eight bits are displayed and saved. Any specified eight consecutive bits are output.
Note that any bits higher than those specified are electrically clipped.</td></tr>
<tr><td>Preset</td><td>Click the [Store] button after setting [Preset Mode], and current settings for the recording conditions are memorized in the camera.
This function emulates the PRESET button on the camera keypad and the settings are memorized in the channels specified by [Preset Mode].</td></tr>
<tr><td>Maximum Frame Rate</td><td>Changes the list of frame rates to be displayed.
The frame rate (for the 675K, 675,000 fps) listed becomes the maximum frame rate.
After setting, exit PFV and cycle the power on the camera to reflect the setting.</td></tr>
<tr><td>Frame Rate Mode</td><td>Changes the frame rate at full resolution.
To change the frame rate, check the speed displayed on the screen (for the 12.5K, 12,500 fps).</td></tr>
<tr><td>Hardware Recording Type</td><td>Set to control the recording start timing with the camera itself.
Specify the recording start timing.
<table>
<tr><td>READY AND TRIG</td><td>Input the “REC” trigger after the camera is in the “READY” state.</td></tr>
<tr><td>DIRECT TRIG</td><td>Start recording immediately when the “REC” trigger is input.</td></tr>
<tr><td>DIRECT START</td><td>Change to the endless recording state when the "READY" signal is input.</td></tr>
</table>
Functions when triggers are input via hardware. This setting is ignored when triggers are input from PFV.</td></tr>
<tr><td>Rec Bit Depth</td><td>Switches the number of record bits. After setting, exit PFV and cycle the power to reflect the setting.</td></tr>
<tr><td>FPGA</td><td>Rewrites the IDP-Express FPGA data.</td></tr>
</table>

- Additional Features 2

<table>
<tr><th colspan="2">Left Tee “Additional Features 2”</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Resolution Mode</td><td>Normally, when the frame rate is changed, the resolution is automatically changed to the maximum resolution for the changed frame rate. Check when you wish to maintain the set resolution if that resolution is possible for the changed frame rate (when you do not want the resolution automatically changed).</td></tr>
<tr><td>Auto Play</td><td>Sets the operating mode after recording finishes.
Valid when recording with a single camera. Not reflected in recording operations from PFV.
<table>
<tr><td>OFF</td><td>Live mode display.</td></tr>
<tr><td>MOVE TO MEM MODE</td><td>Displays the trigger frame in memory mode.</td></tr>
<tr><td>AUTO PLAY</td><td>Automatic playback in memory mode.</td></tr>
</table></td></tr>
<tr><td>LED Mode</td><td>This item can turn off the status indicator LEDs on the rear panel.</td></tr>
<tr><td>Factory Defaults</td><td>Resets the camera's settings (frame rate, resolution, etc.) to the factory default state. The reset is performed when PFV closes. After PFV closes, for approximately 20 seconds, do not turn off the camera's power. After that, restart the camera.</td></tr>
<tr><td>Expose Signal Extension</td><td>Configures whether or not to include the exposure instability period in the shutter speed display and the output period for the EXPOSE signal output. Check to include the exposure instability period.</td></tr>
<tr><td>Device Data/Clock</td><td>Sets the date and time for the camera from the PC.
To set an arbitrary value, change the date and time and click the [Apply] button.
To set camera to the PC's date and time, click the [Set by the PC] button.</td></tr>
<tr><td>Fan Control</td><td>Camera fans can be stopped. This function is effective only for a camera which has the fan stop function. And the functional condition is limited as within a safe temperature.

Fans can be stopped by clicking [Stop] button.
 

Fans’ operation can be resumed by clicking [Restart] button.
 

Fans are operated forcibly when a camera is heated up. And this function is disable until the internal camera temperature falls down to under a threshold.
 
</td></tr>
</table>

3.8.1. Pixel Gain Correction

When applying pixel gain correction, shading correction must be executed in advance.
After executing shading correction, activate the pixel gain correction.

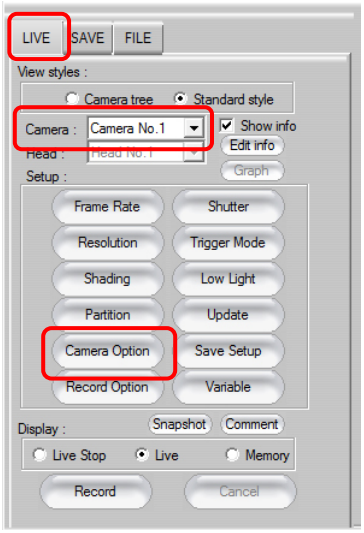
Reference

- For details on shading correction, refer to “3.7. Shading (Black Level) Correction”, page 133.

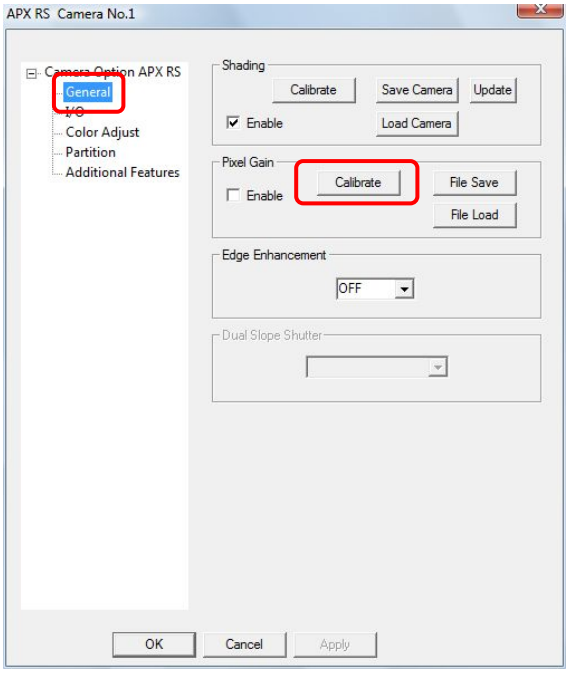
1. In order to acquire the white level image, prepare a light source that uniformly fills the screen, or a uniform subject (such as a white wall uniformly lit).

2. Adjust the light source or the optical system’s aperture.
   Adjust the amount of light being displayed to a brightness level that is not washed-out and saturated.

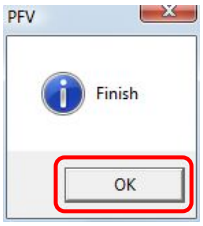
3. Select the camera to adjust with the “LIVE” tab on the control panel and click the [Camera Option] button.



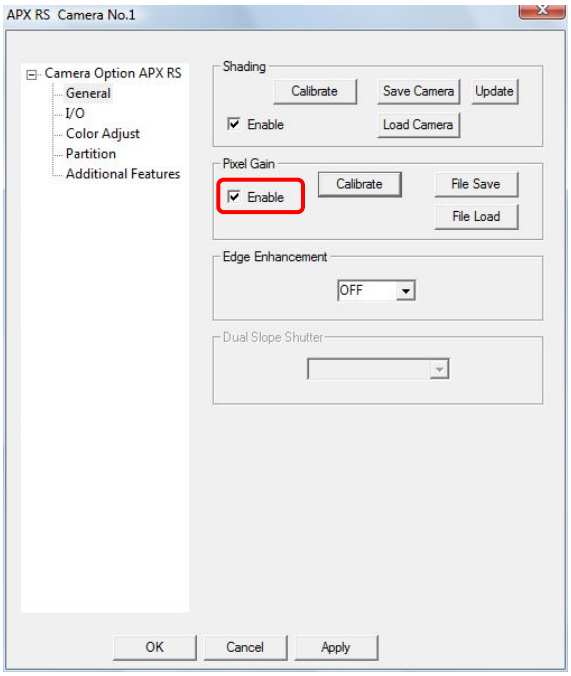
4. Click “General” from the tree on the left, and then click the [Calibrate] button on the “Pixel Gain” option.



5. The image capture for the correction is executed.
The image capture and calculation executes for about 10 seconds and setting data is saved for each camera in the folder where PFV is installed.
When finished, the screen below is displayed, click the [OK] button.



6. “Enable” is automatically checked and the corrected pixel gain is active.

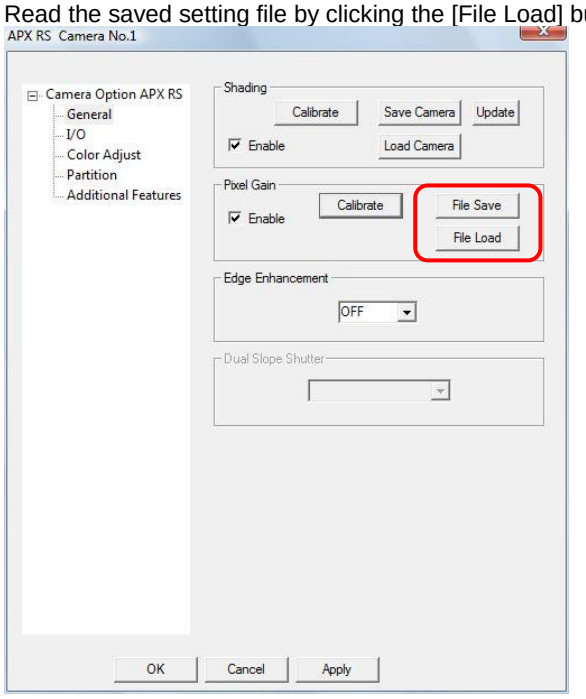


Caution

- Once pixel gain is enabled (by checking "Enable"), the enabled setting is maintained even if PFV or the camera itself are restarted without storing.

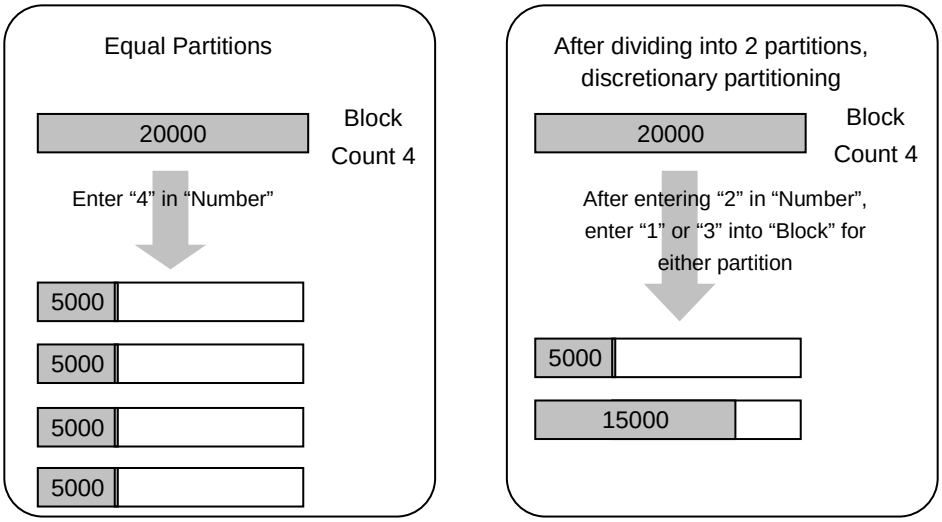
Supplement

- To deactivate the pixel gain correction, uncheck the “Enable” option.
- When creating correction data for each change in the lighting conditions or optical system, click the [File Save] button and the white level image can be saved as a setting file (extension: .gdf). Read the saved setting file by clicking the [File Load] button.

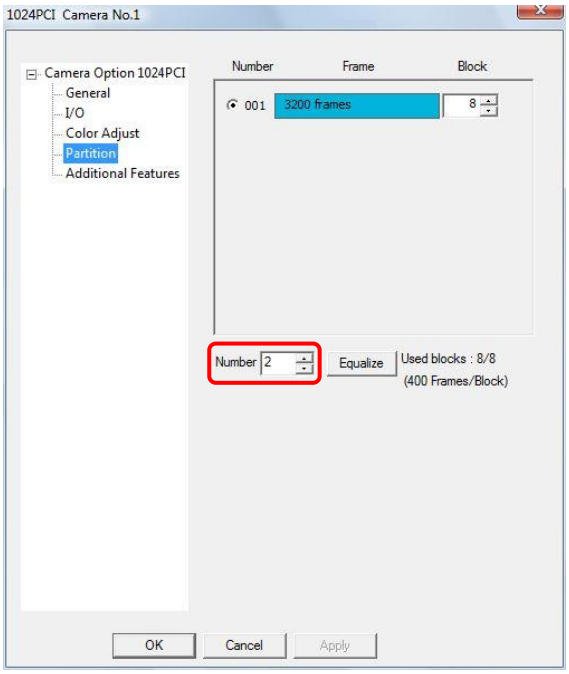


3.8.2. Dividing Partition

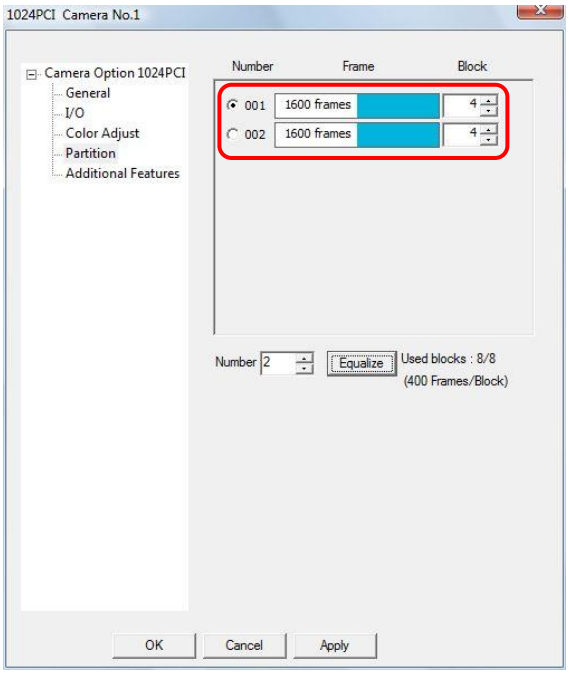
This option divides the camera memory (partition division).
By specifying the number of partitions, the memory is divided equally into the specified number of partitions.
When partitioning to a desired size, enter the desired value in “Block”.



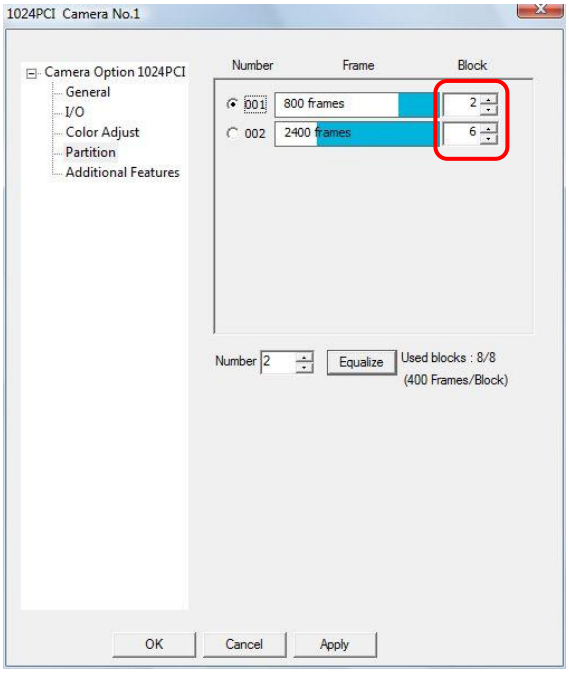
1. Enter the number of partitions to divide the memory into in “Number”.



2. The memory is divided into the number of partitions entered in “Number”.
When a total of 3200 frames of memory is divided into 2 partitions, the memory is divided into 2 partitions of 1600 frames.



3. Enter the desired number of blocks in “Block”.
The size of the partition is changed to the size “total size／number of blocks × entered value”.
Divide a total of 3200 frames of memory into 2 partitions, and when dividing the partitions into 800 frames and 2400 frames, first change (decrease) one partition's size to 800 frames, then change (increase) the other partition's size to 2400 frames.

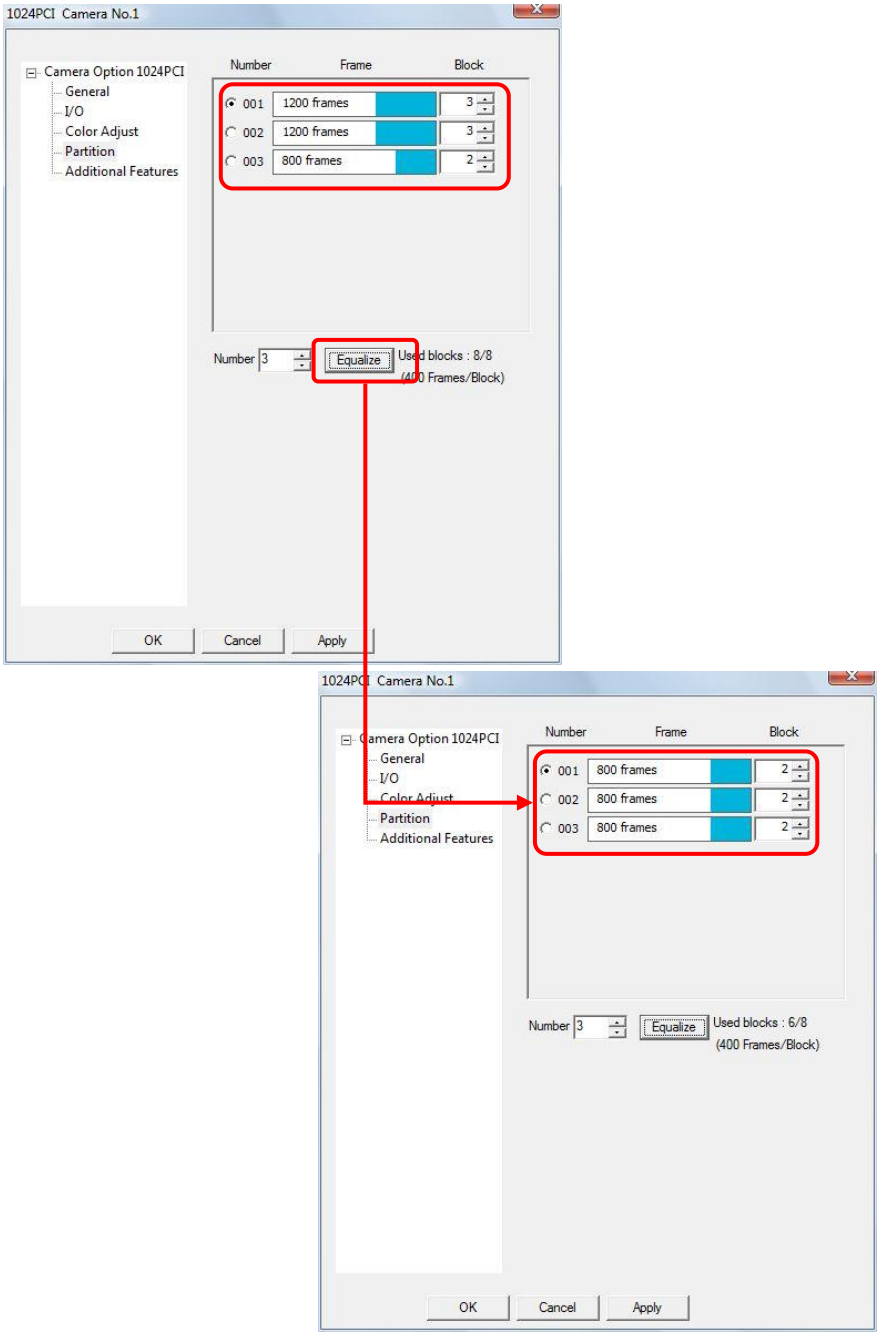


Caution

- Discretionary partition division is only possible on cameras that support it.

Supplement

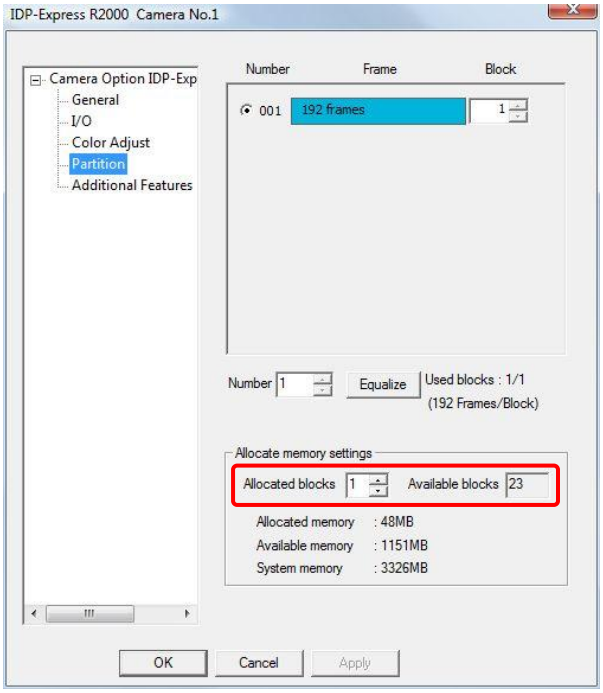
- There may be cases where the number of blocks is not equal according to the number of partitions entered. After dividing the partitions, the number of blocks is equalized if you click the [Equalize] button.



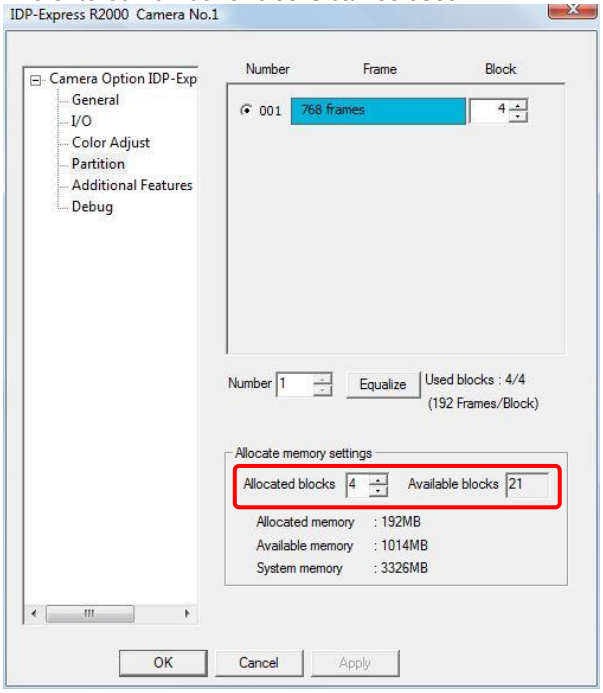
3.8.3. Setting the Recording Memory Size

This option sets the recording memory size. The recording memory size can be set by specifying the number of blocks.

1. Enter the number of blocks to use in "Allocated blocks".



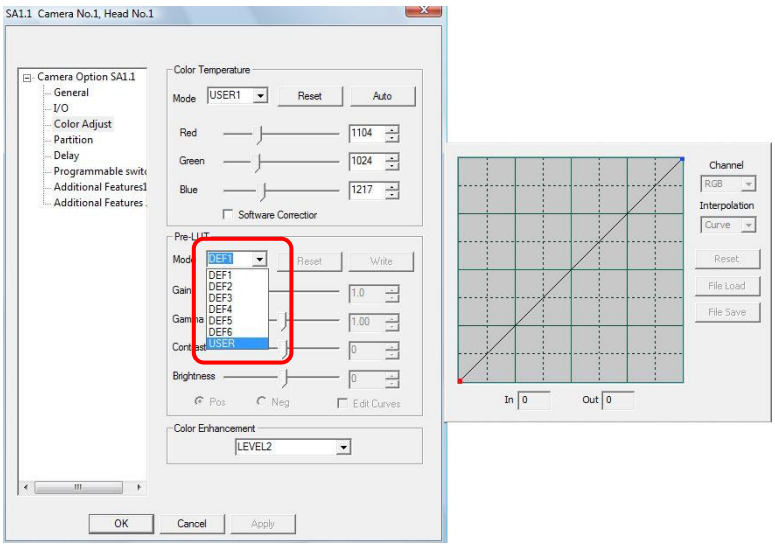
2. The entered number of blocks can be used.



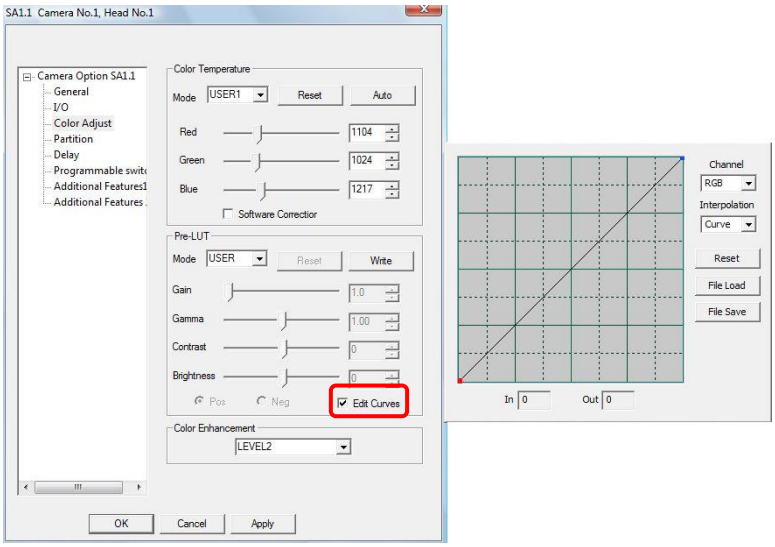
3.8.4. Pre-LUT Free Edit

You can specify the Pre-LUT setting value by dragging the graph displayed on the right side of the Pre-LUT setup screen.

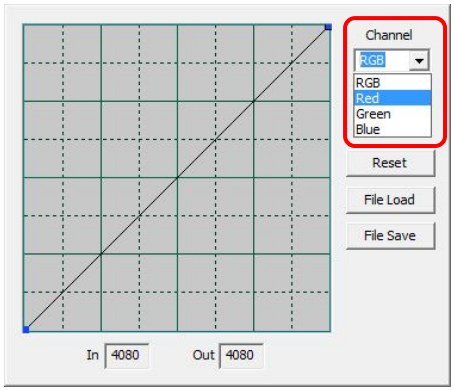
1. Select “USER” under “Mode”



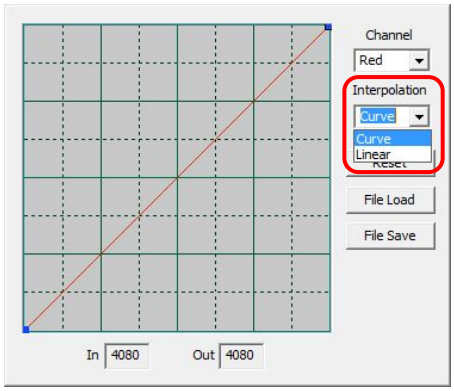
2. Check “Edit Curves”.



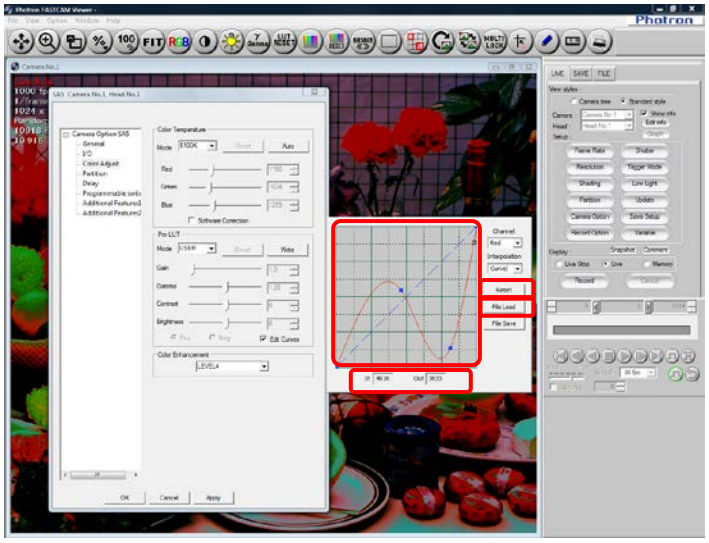
3. Select the channel (curves) to edit.
For color cameras, three channels, RGB, are displayed.



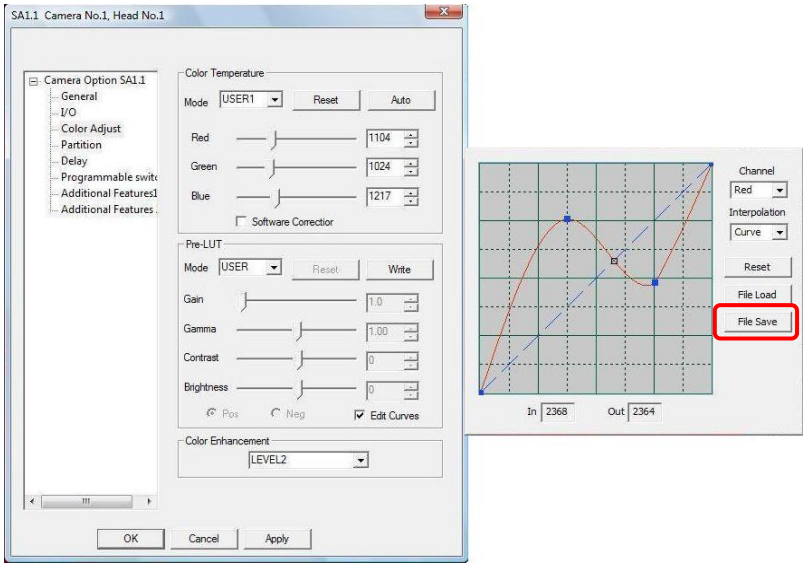
4. Select the interpolation method.



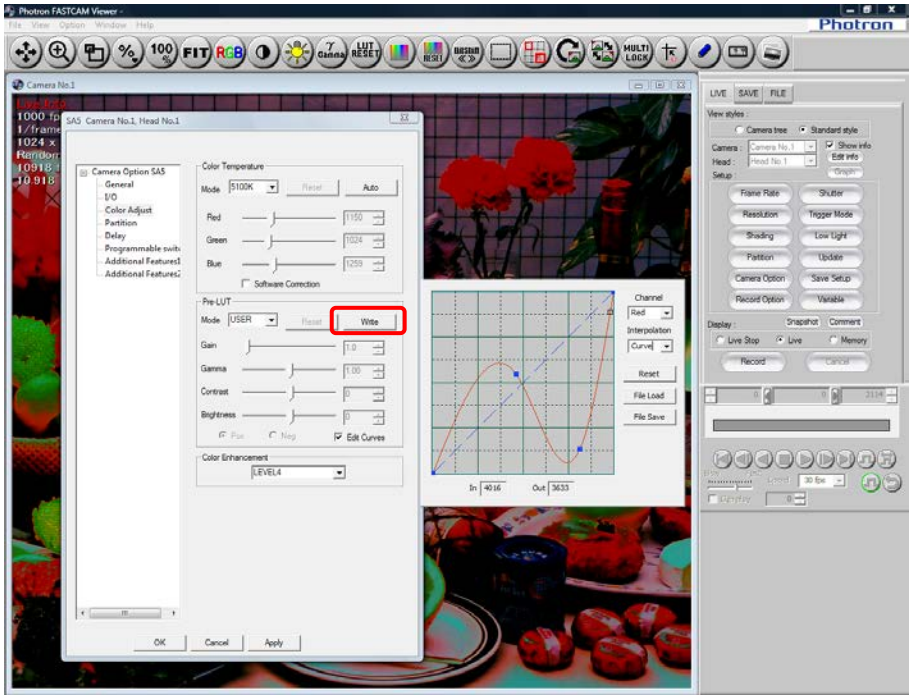
5. Drag the curve in the desired manner to adjust. The adjustment is reflected in the view window.
The X-axis indicates input, the Y-axis indicates output, and the selected position is shown in “In” and “Out”.
To reset the LUT, click the [Reset] button.
To load saved settings, click the [File Load] button.



6. To save the settings, click the [File Save] button.



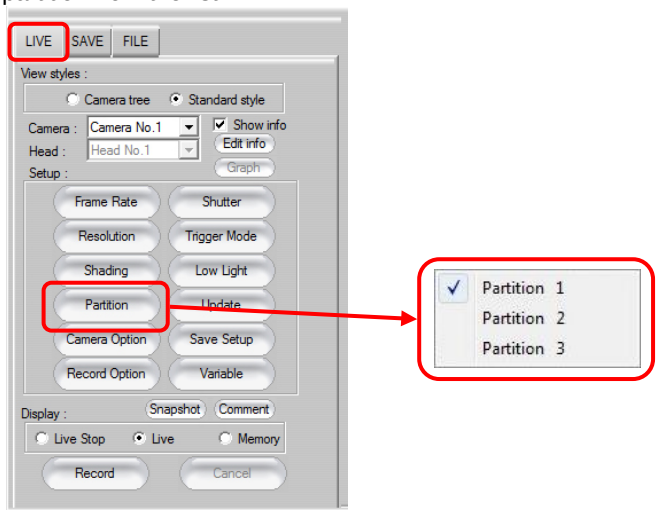
7. After adjusting, click the [Write] button to transfer the adjustment to the camera.



3.9. Partition Settings

Specify the target partition for recording when the camera's memory is partitioned.
The partition can be specified when the partitions have been created in advance.
This setting cannot be used on a camera that lacks the partition function or once a recording has been made.

Specify the target partition for recording.
After displaying the "LIVE" tab on the control panel, click the [Partition] button and select the desired partition from the list.



Reference

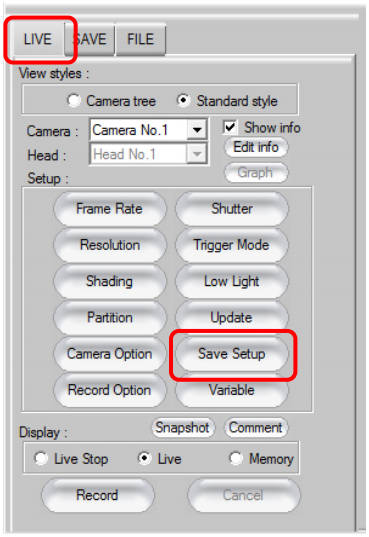
- For details about partition settings, refer to "3.8.2. Dividing Partition", page 152.

3.10. Saving and Using Set Shot Conditions

The shot conditions (frame rate, shutter, etc.) that have been set can be saved as a settings file. By loading the settings file, the shot conditions can be reloaded.

3.10.1. Creating a Settings File

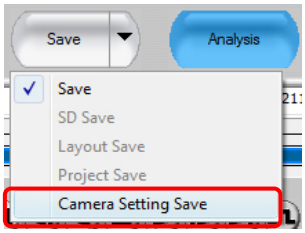
1. After setting the shot conditions, display the “LIVE” tab on the control panel and click the [Save Setup] button.



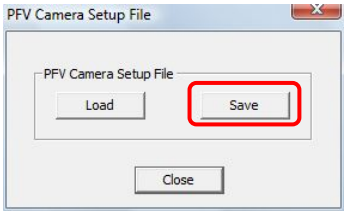
Supplement

- Alternatively, you can save the settings as a file by clicking the [▼] on the right of the [Save] button and selecting “Camera Setting Save”.

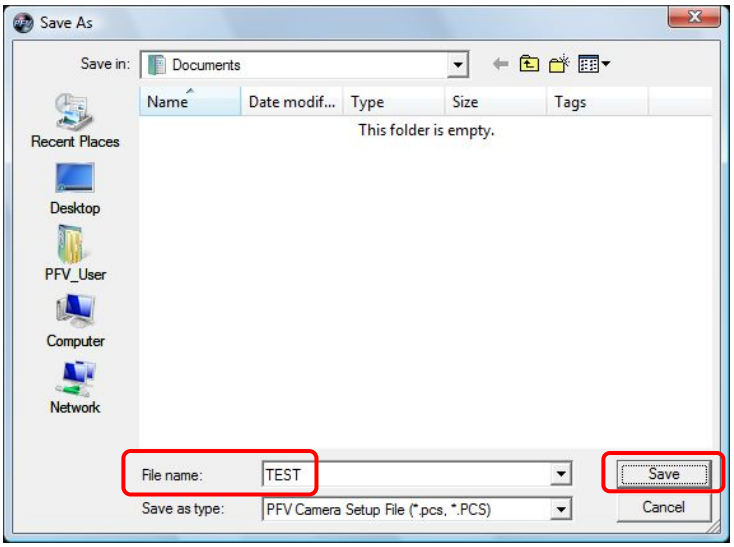
  But the “PFV Camera Setup File” dialog box in step 2 will not be displayed then..



2. Click the [Save] button.

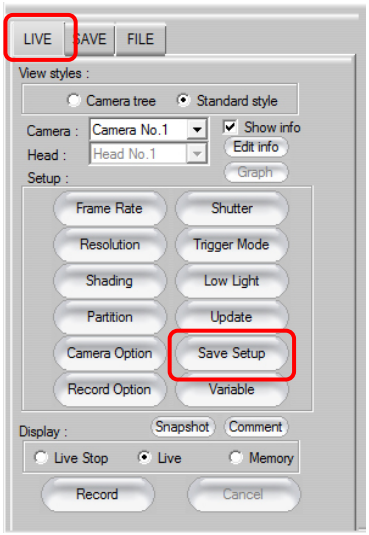


3. After specifying the desired location, enter the desired filename in “File name” and click the [Save] button.
The file is saved with the .pcs extension.

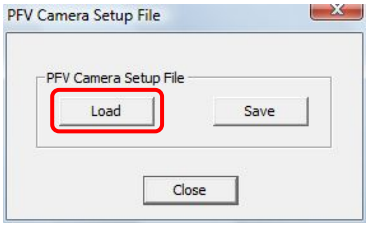


3.10.2. Loading a Settings File

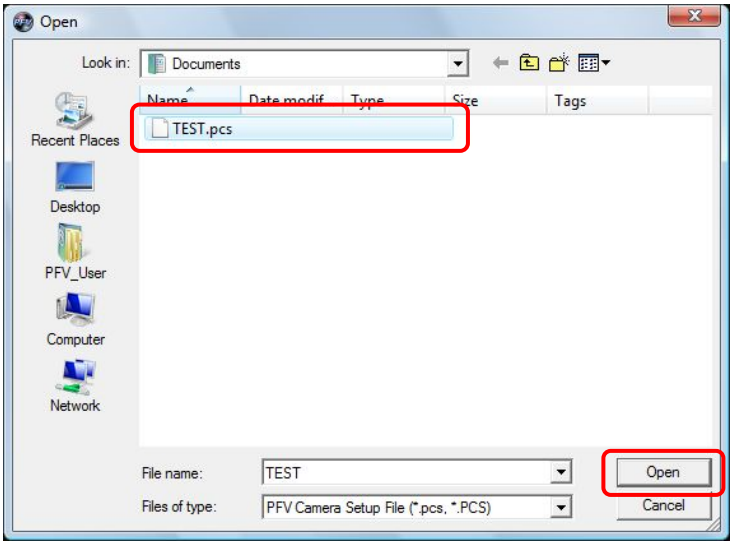
1. After starting PFV, display the “LIVE” tab on the control panel and click the [Save Setup] button.



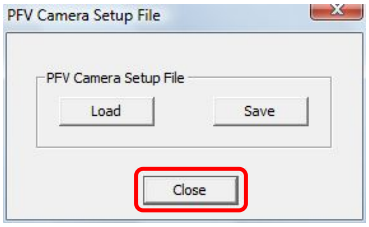
2. Click the [Load] button.



3. After specifying the location where the file was saved and specifying the file to read, press the [Open] button.
The contents of the file are loaded and the settings on the camera and PFV are automatically updated.

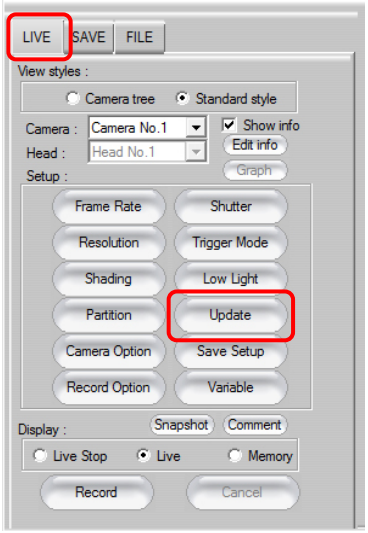


4. After reading the settings, click the [Close] button.



3.10.3. Updating Settings

Make change to the cameras settings using keypad and then, to update them in the PFV, just click the [Update] button on the “LIVE” tab on the control panel.



Important

- When making the camera settings independently (when not making the settings from PFV), the settings on the camera and software will differ and the system status may become unstable until they are updated. Make the camera settings using PFV.

3.11. Making a Recording

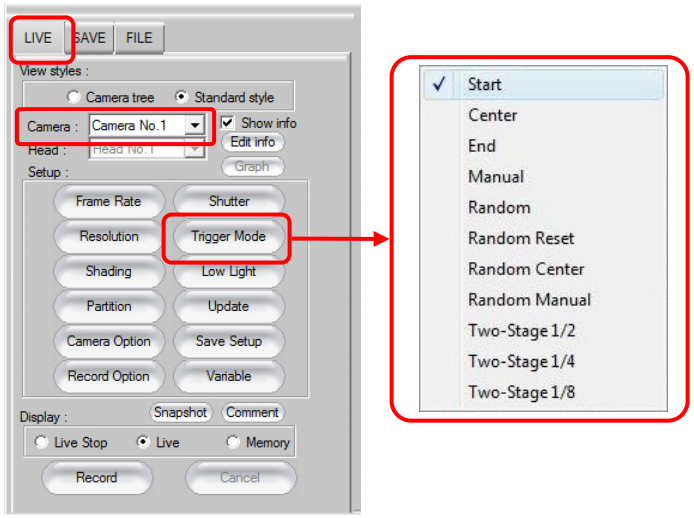
After setting the shot conditions, make a recording.
Shooting is performed with the [Record] button on the “LIVE” tab on the control panel. The label on the [Record] button changes according to the status. The label also differs depending on the trigger mode set.

Reference

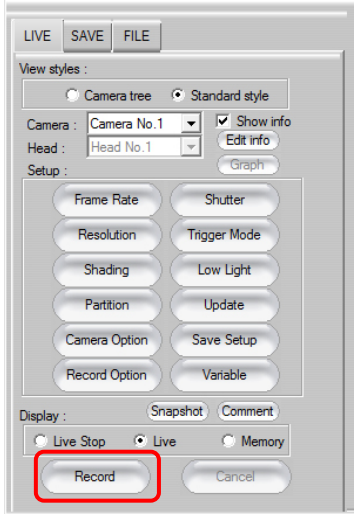
- For information on the [Record] button, refer to “3.5.1. What Is The Trigger Mode?”, page 116.

3.11.1. For Start, Two-Stage, Random, And Random Reset Modes

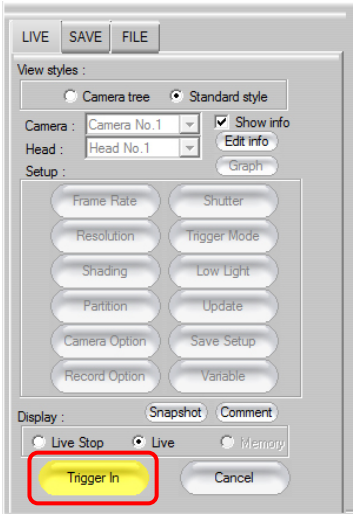
1. Display the “LIVE” tab on the control panel and after selecting the camera to use from the “Camera” option, click the “Trigger Mode” button and select the desired trigger mode.



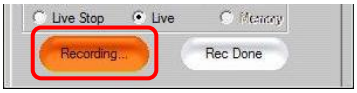
2. Click the [Record] button.



3. The system enters the record ready state and the [Trigger In] button is displayed.
When the [Trigger In] button is clicked, shooting begins and the image is recorded on the camera.



4. The [Recording] button is displayed.
When recording ends, the view window display switches to memory mode, and the trigger frame image is displayed in the view window.

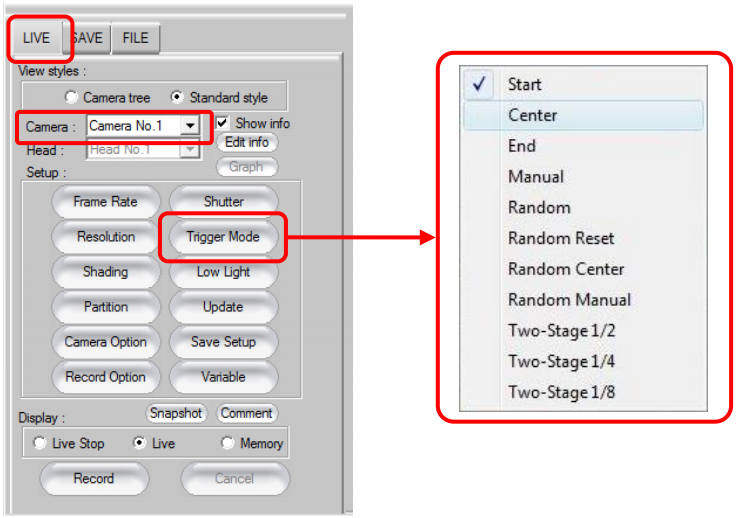


Supplement

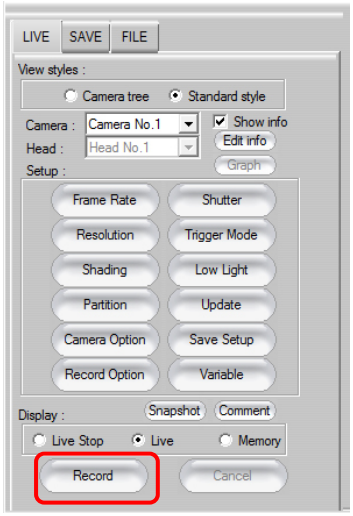
- When using the waveform input board, the recording state of the waveform input board is displayed on the waveform input board bar.

3.11.2. For Center, End, And Manual Modes

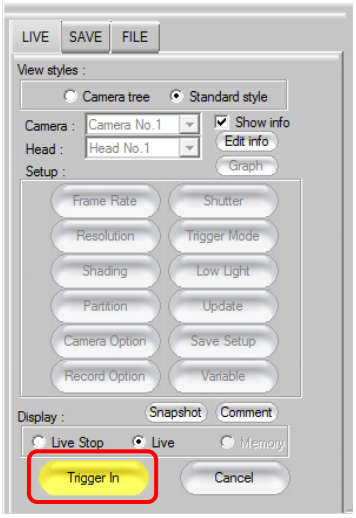
1. Display the “LIVE” tab on the control panel and after selecting the camera to use with the “Camera” option, click the “Trigger Mode” button and select the desired trigger mode.



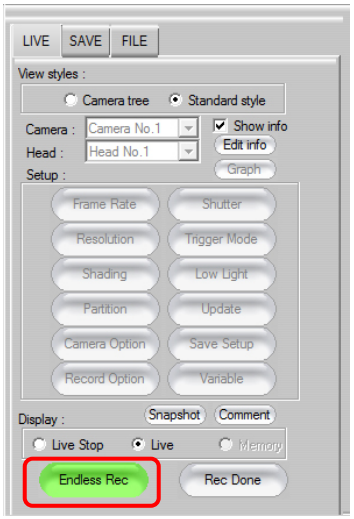
2. Click the [Record] button.



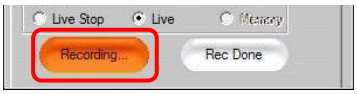
3. The system enters the record ready state and the [Trigger In] button is displayed. When the [Trigger In] button is clicked, the system enters the recording loop state (recording start) and the [Endless Rec] button is displayed.



4. Click the [Endless Rec] button and the trigger is input.

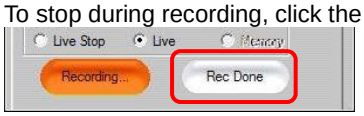


5. The [Recording] button is displayed.
When recording ends, the view window display switches to memory mode, and the trigger frame image is displayed in the view window.



Supplement

- To stop during recording, click the [Rec Done] button.



- The trigger input can also be input externally.
  When using an external trigger input, refer to the camera's hardware manual.
- When using the waveform input board, the recording state of the waveform input board is displayed on the waveform input board bar.

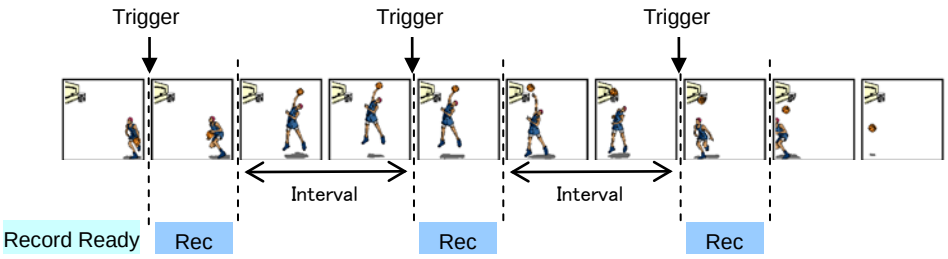
Reference

- PFV can be set to automatically playback the recorded image after recording ends with the configuration settings.
  For more information about the automatic playback setting, refer to "1.5.4. Display Mode after Recording Setting" in Configuration section.

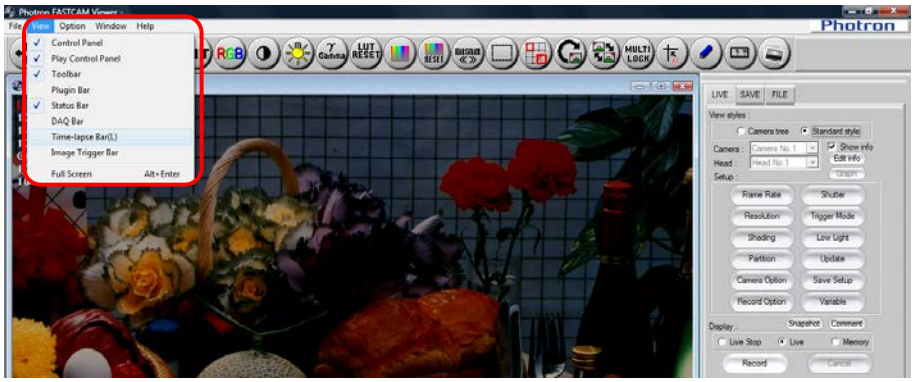
3.11.3. Time-lapse Recording

With time-lapse recording, you can record by automatically inputting a trigger from software at the desired time interval.
To execute time-lapse recording, you can only use random or random reset for the trigger mode.

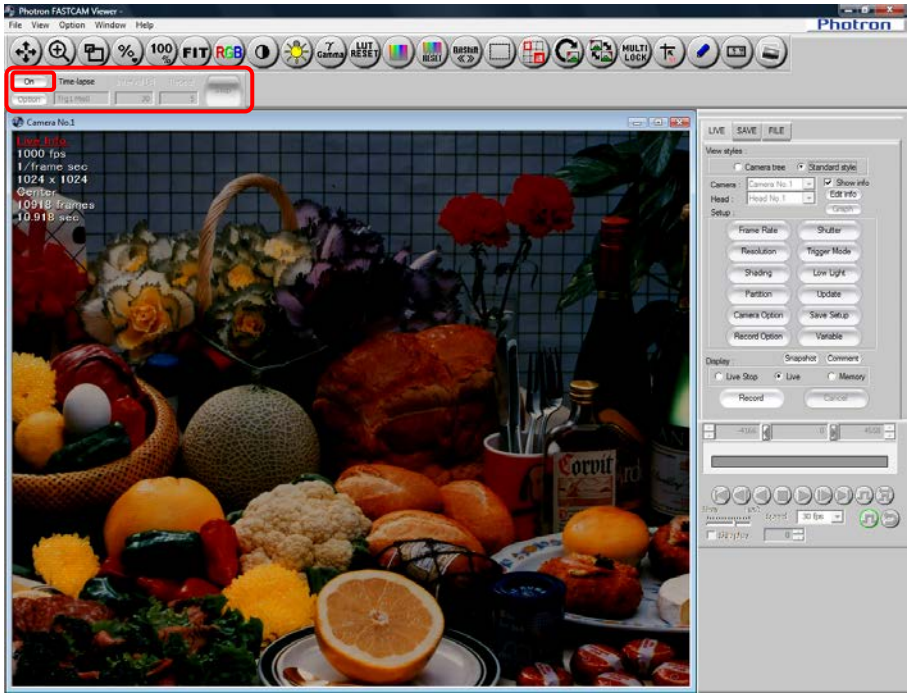
Example: For random mode with the frame count specified as 1000 frames,
interval time is 2 seconds, repeat is 3 times
After recording the specified frame count from the trigger, waits for the specified interval time (seconds), and records by automatically inputting the trigger for the specified repeat count.



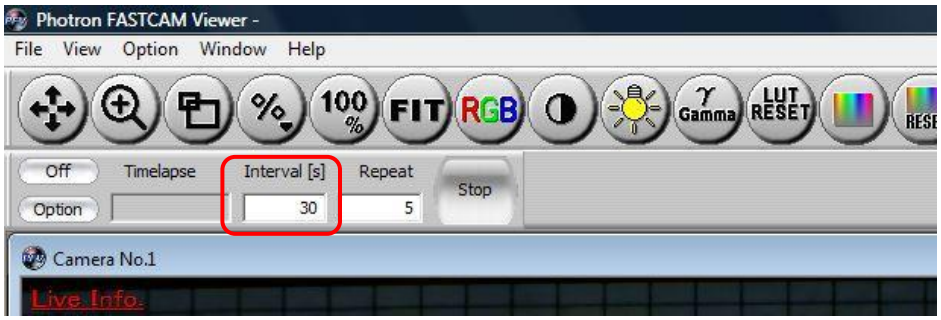
1. Click [View] – [Time-lapse bar] on the menu bar.



2. The time-lapse bar is displayed.
Click the [On] button to enable time-lapse recording.

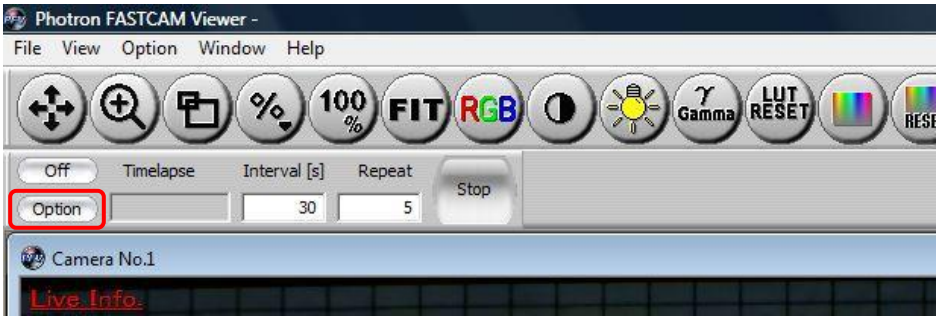


3. Specify the trigger input interval.
Enter the desired value in “Interval”.
The value can be specified from a minimum of 2 seconds to a maximum of 99 hours.

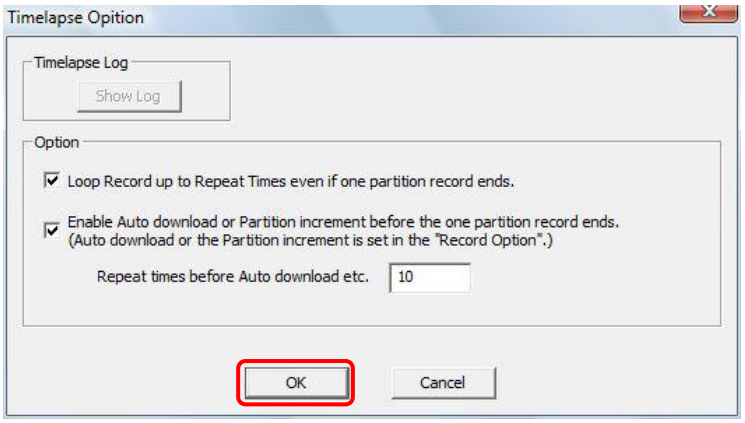


4. Specify the number of times to record.
   Enter the number of times to repeatedly record in “Repeat”.
   The value can be specified from a minimum of 2 times to a maximum of 2,147,483,647 times.

5. To configure options such as how to record to the camera's memory, click the [Option] button.



6. After configuring, click the [OK] button.

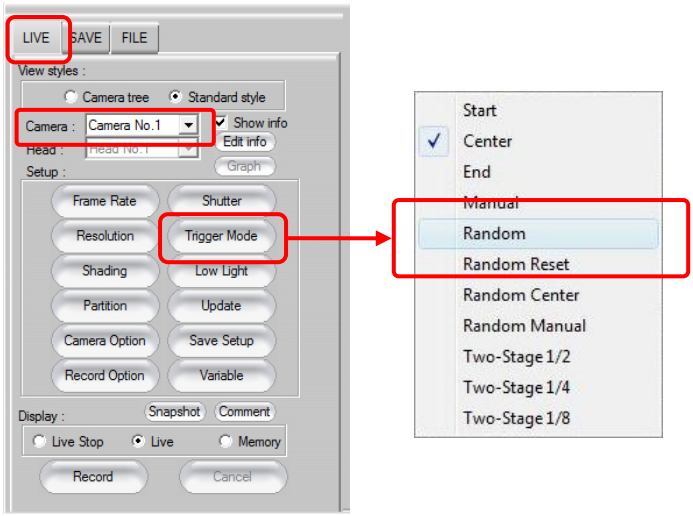


Item	Description
Loop Record up to Repeat Times even if one partition record ends.	If not checked, recording ends when recording for 1 partition ends. If checked, recording repeats up to the repeat count even if 1 partition's worth of recording has ended. “Auto Save after Recording” or “Auto Increment Partition” must be set in the record options under configuration.
Enable Auto download or Partition increment before the one partition record ends.	If checked, “Auto Download” and “Auto Increment Partition” are allowed to interrupt before recording up to the end of 1 partition.
Repeat times before Auto download etc.	Specify the trigger input count until “Auto Download” or “Auto Increment Partition” interrupts.

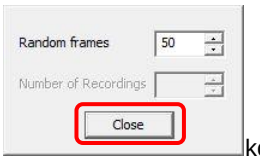
Reference

- For recording options, refer to “1.5.2. Shot Record Settings” in Configuration section.

7. After displaying the “LIVE” tab on the control panel and selecting the camera to use under “Camera”, click the [Trigger Mode] button and select “Random” or “Random Reset”.

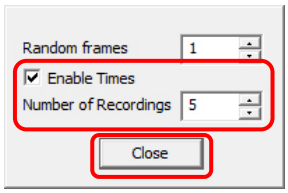


8. Specify the frame count to record per trigger input. Enter the desired value in “Random frames” and click the [Close] button.

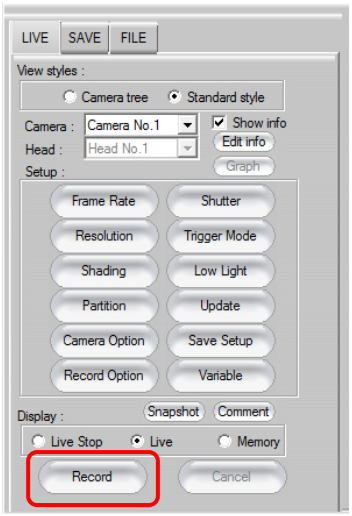


kokomade

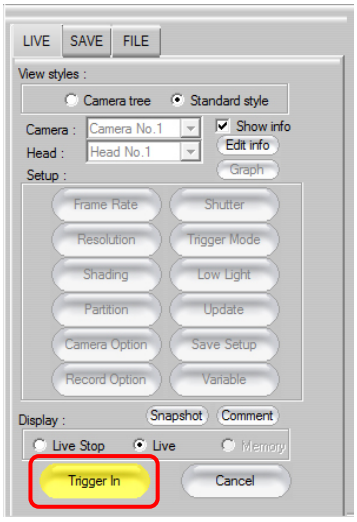
9. Click the [Record] button.



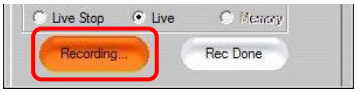
10. Click the [Record] button.



11. The system enters the recording ready state and the [Trigger In] button is displayed. When the [Trigger In] button is clicked, shooting begins and the image is recorded on the camera.

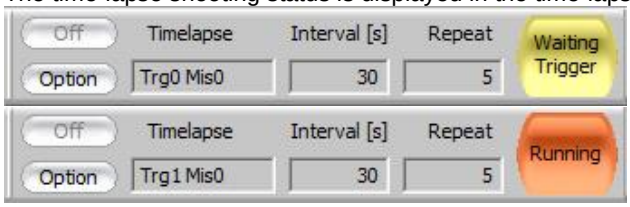


12. The [Recording] button is displayed.
When recording ends, the view window display switches to memory mode and the trigger frame image is displayed in the view window.



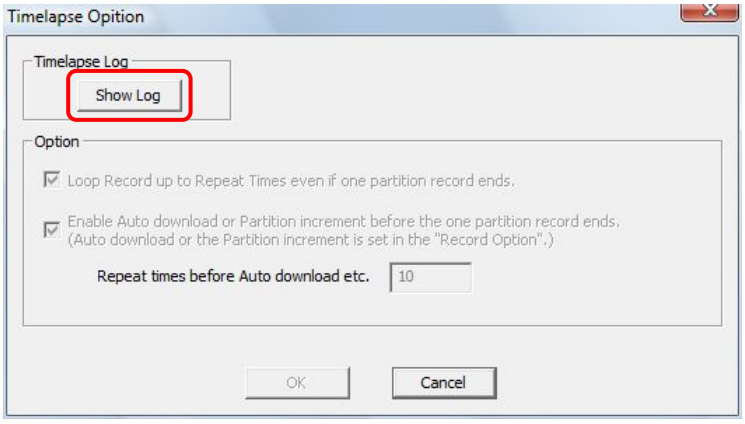
Supplement

- The time-lapse shooting status is displayed in the time-lapse bar.

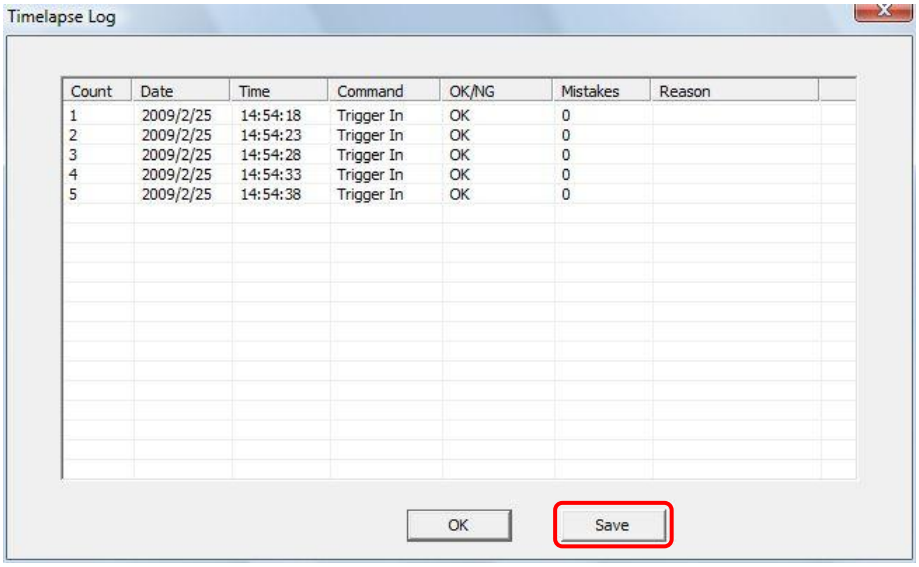


13. To check the time-lapse log, click [Option] on the time-lapse bar.

14. Click the [Show Log] button.



15. The log is displayed. To save the log, click the [Save] button.



Caution

- The time accuracy of time-lapse recording is dependent on the PC environment and operating status.

Supplement

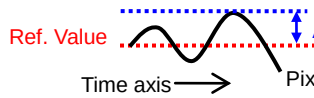
- The time-lapse log is automatically saved together with the recording data when saved.

3.11.4. Recording by the Image Trigger

PFV can record by detecting the change in an image from the live image being displayed and applying a trigger.
Specify the change detection method and when the desired threshold value is exceeded the trigger is applied and recording starts.
The two types of detection method are described below.

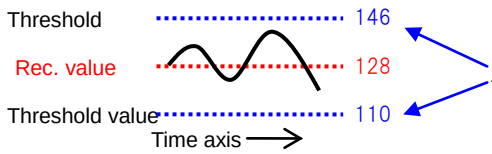
- Level trigger
  When the brightness value in a specified area surpasses or falls below a brightness value specified as the threshold value, or when it deviates from between two points, a trigger is applied.
  This is effective for applying a trigger at a change in the image such as when the brightness in a specific area gets brighter or darker than a specific brightness or when the brightness deviates from a specific brightness range.
  For color images the function uses an RGB average value.
- Background subtraction
  The background image is made up of the per pixel average of brightness values from the first 100 images and, as the threshold value, the amount of change in the image's brightness is calculated.
  When the change in the image is detected, the live image and background image are compared by each pixel, and a trigger is applied if that amount of change exceeds the amount of change first calculated as the threshold value.
  This method is effective for applying a trigger in a specific area when there is some kind of change in the image where normally there is no change.

Background subtraction concept
First 100 live images are imported. The reference value and the amount of change are calculated per pixel.
Reference value: Average value
Amount of change: Maximum deviation from average value
} These are the background image values



Amount of change : Set this amount of change's % as the threshold value.

Example: A pixels average value is 128, its brightest value is 140
Reference value: 128
Amount of change: 12 (140-128)
If the threshold value is set to 150%, the amount of change is 18
The image is detected if the value is less than 110 (128-18) or larger than 146 (128＋18).



Detected if the image value exceeds the threshold value line

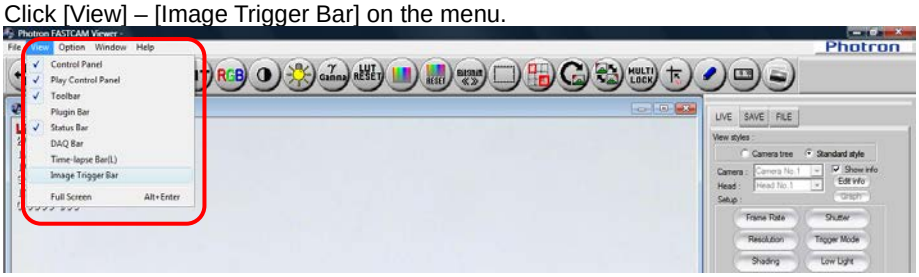
Caution

- The image trigger is not guaranteed to capture 100% of image changes. Depending on the circumstances, this function may overlook image changes, or the trigger may be applied when you feel no change in the image has happened. Fully understand the characteristics of this function and do not use it in situations where a trigger failure is unacceptable.
- Since PFV is handling the processing, a change in the image for all frames cannot be monitored.
- Use this function after fully testing it. The chance of being able to capture the change in an image increases by an even higher percentage by the way the image changes and the settings.
- A delay occurs from when the image changes until the trigger is applied.
- Image changes cannot be detected in the live stop mode state.
- When connecting multiple cameras or multi-head cameras, the image trigger is enabled on the live image of only a single camera (a single head for multi-head cameras).
- After the image trigger is detected, a trigger can be issued for other connected cameras (slave cameras).

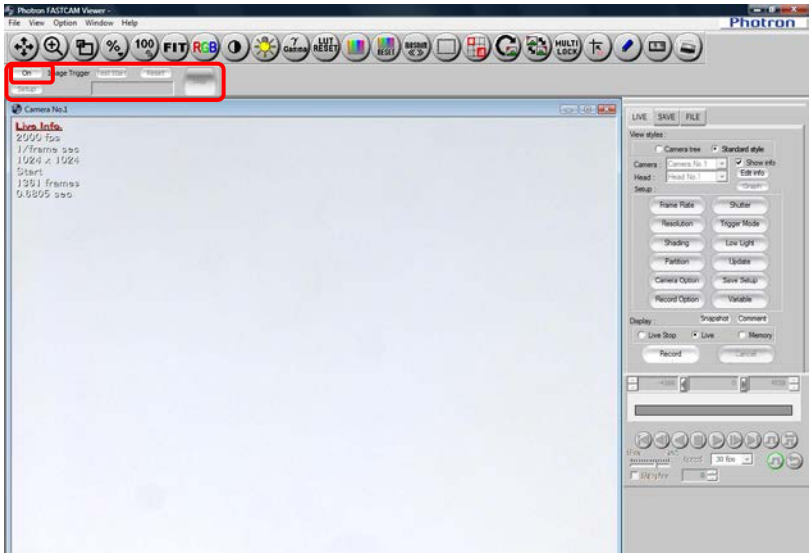
Reference

- To issue triggers to slave cameras, refer to "1.5.5. Trigger Input to Slave Cameras Setting" in Configuration section.

1. Click [View] – [Image Trigger Bar] on the menu.

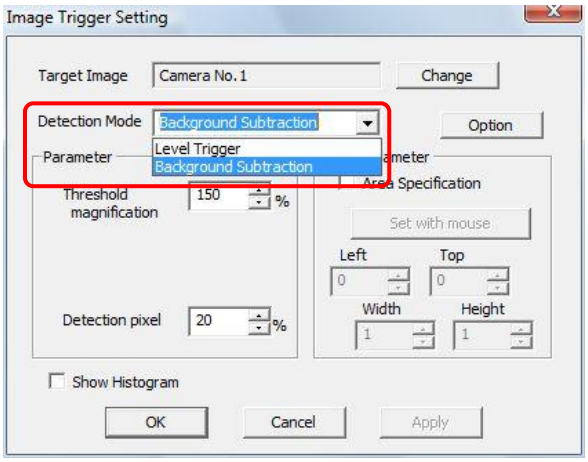


2. The image trigger bar is displayed.
Click the [On] button to enable the image trigger.

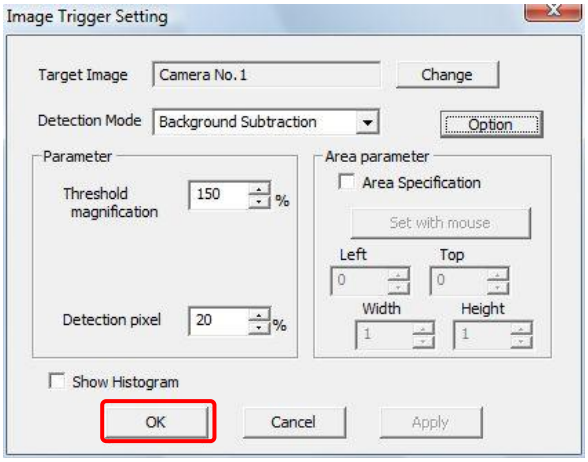


3. Click the [Setup] button.

4. Specify the camera to use with "Target Image" and under "Detection mode" select either "Background subtraction" or "Level trigger".
Further settings are different depending on "Detection mode".

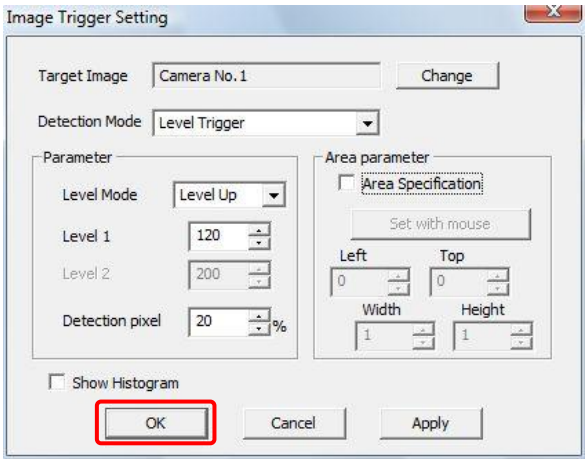


5. Set the image trigger and click the [OK] button.
<When "Background subtraction" is selected under "Detection mode">



Item	Explanation
Threshold magnification	Adjust the acceptable amount of change in the image from the background image. 100% is the unchanged value of the amount of change calculated from the first 100 images. For example, setting this value to 150% makes the acceptable amount of change in the image 1.5x the calculated value.
Detection pixel	Of the pixels in the detection area, specifies how many pixels to meet the condition before the trigger is applied. Specify as a percentage of the pixels in the area.
Options	“Store the background image when Image trigger close.” Check this option to save the acquired background image when the image trigger ends. The next time you use the image trigger, you can select the previous background image that was saved. “Use background image of live mode was stored, when playback mode” Check this option and you can use the background image during image trigger playback that was used during image trigger recording. When using this function, you must check the "Store the background image when Image trigger close." option during image trigger recording.
Area parameter	Check "Area Specification” and you can specify the area to be the detection target by dragging your mouse on the desired area or by specifying the values. Uncheck " Area Specification " to make the entire area the detection target.
Histogram view	Check this option to display the histogram.

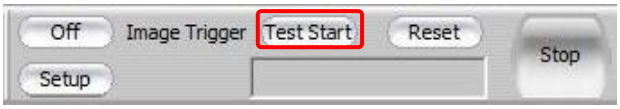
<When "Level trigger" is selected under "Detection method">



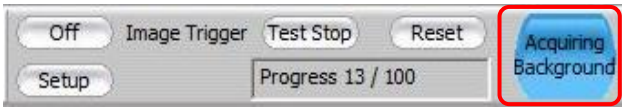
Item	Explanation
Level mode	Specify the direction of change in the brightness value. The trigger is applied in the situations below. Level Up: When the brightness value surpasses the brightness value specified in Level 1 Level Down: When the brightness value falls below the brightness value specified in Level 1 Out of Range: When the brightness value deviates from between the brightness values specified in Level 1 and Level 2
Level 1/Level 2	Specify the brightness values to be the threshold values.
Detection pixel	Of the pixels in the detection area, specifies how many pixels to meet the condition before the trigger is applied. Specify as a percentage of the pixels in the area.

Item	Explanation
Area parameter	Check "Area Specification" and you can specify the area to be the detection target by dragging your mouse on the desired area or by specifying the values. Uncheck "Area Specification" to make the entire area the detection target.
Histogram view	Check this option to display the histogram. For color images, a histogram of RGB averaged values is displayed.

6. Click the [Test Start] button on the image trigger bar as necessary to test the trigger. If not testing the trigger, proceed to step 9.



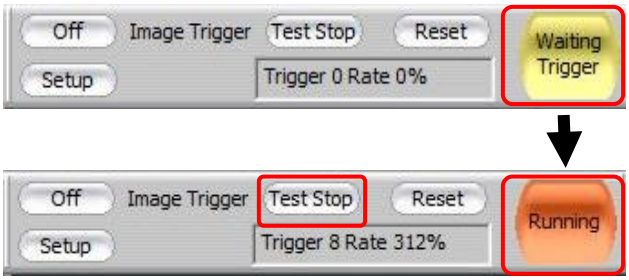
7. If "Background subtraction" is selected under "Detection mode", the background image acquisition starts and "Acquiring background" is displayed on the image trigger bar.



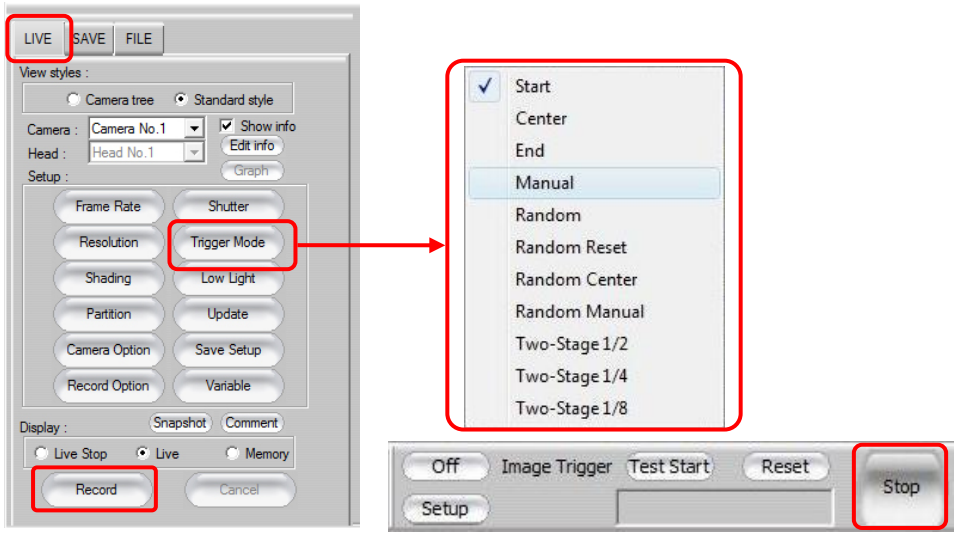
Caution

- If at all possible, do not allow changes to the image while acquiring the background image.

8. When "Waiting trigger" is displayed on the image trigger bar, image change monitoring starts. Allow a change in the image, verify that the display changes to "Running", then click the [Test Stop] button.



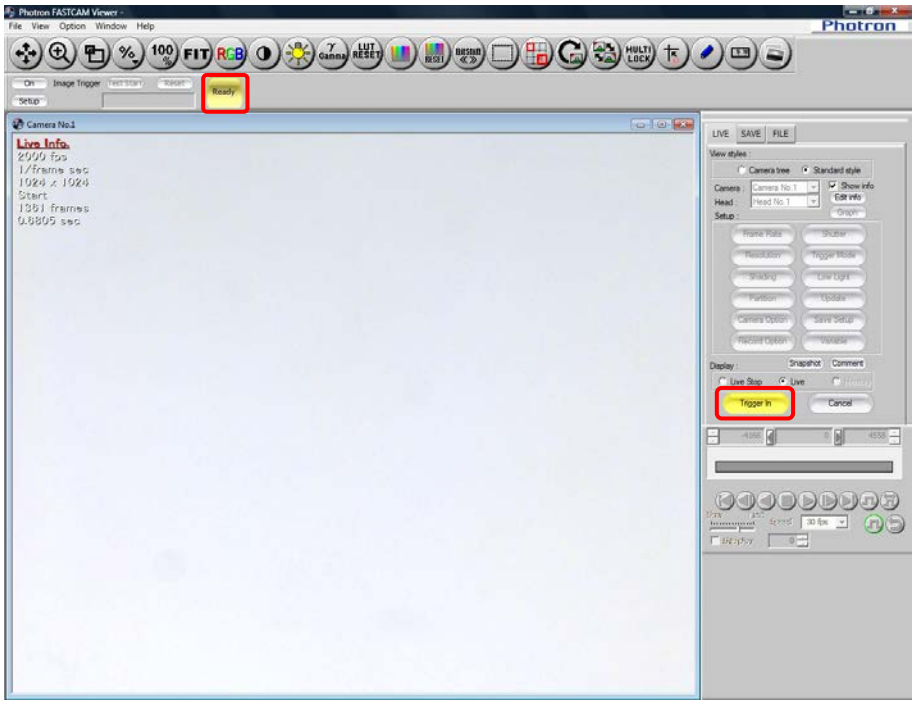
9. After the test, start recording.
Select the desired trigger mode from the [Trigger Mode] button on the control panel's "LIVE" tab, then click the [Record] button.
"Stop" is displayed on the image trigger bar at this time.



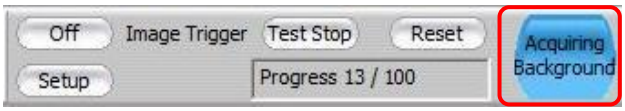
Supplement

- Since a delay occurs with the image trigger from when the image changes until the trigger is applied, using the center, manual, or end trigger is recommended.

10. Click the [Trigger In] button on the control panel.
"Ready" is displayed on the image trigger bar at this time.



11. If "Detection mode" is "Background subtraction", background image acquisition starts.

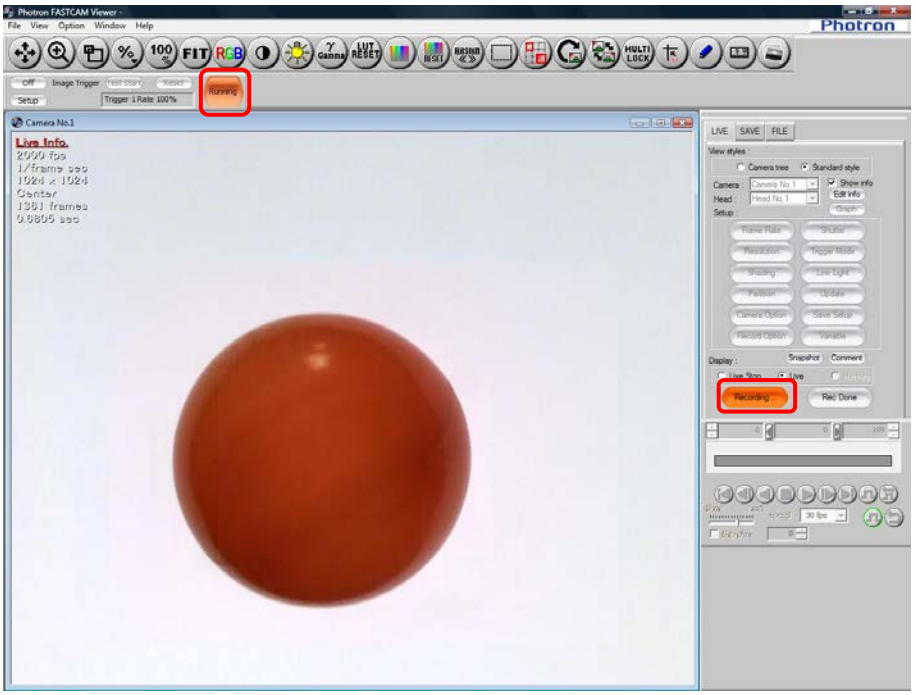


Caution

- If at all possible, do not allow changes to the image while acquiring the background image.

12. "Waiting trigger" is displayed on the image trigger bar.

13. When an image change occurs that meets the detection conditions, the trigger is applied and recording starts.



Supplement

- The state of processing and other information is displayed in the status display box on the image trigger bar.

Display	Explanation
Progress	Displays the progress status of the background image acquisition work.
Trigger	Displays the number of times an image change was recognized as a trigger. The number always increases when a change in the image keeps occurring.
Rate	Displays as a percentage the pixels that meet the trigger conditions in the current image. The trigger is applied when this is 100%.

- The delay that occurs from when the image changes until the trigger is applied is dependent on the live update speed, image trigger settings, and the detection area. The live update speed is dependent on such factors as the computer's performance, camera model, the connection method to the PC, whether the camera is color or monochrome, and the resolution. The amount of delay is also not constant.
  <Reference>
  The amount of delay in the following environment
  OS: Windows XP SP3, CPU: Intel Core 2 Duo E6600, Memory: 2 GB
  Image trigger settings Detected pixels: 100%, Detected area: entire area
  There is not much difference between detection methods.

Connection Method	Color Type	Resolution	Frame Rate	Delay Time (Approximate)
PCI	Monochrome	1024x1024	1000fps	30 to 130 ms
		256x256	10000fps	5 to 60 ms
	Color	1024x1024	1000fps	80 to 200 ms
		256x256	1000fps	5 to 60 ms
Gigabit Ethernet (1000Base-T)	Monochrome	2048x2048	1080fps	350 to 550 ms
		1024x1024	2000fps	100 to 290 ms
		256x256	15000fps	30 to 120 ms
	Color	2048x2048	1080fps	700 to 1200 ms
		1024x1024	2000fps	180 to 360 ms
		256x256	15000fps	30 to 120 ms

3.11.5. Hardware image trigger

A change in image is detected by the hardware and a resultant trigger is automatically input to the camera to start shooting.
An area within an image is specified, and if the average luminance within the area goes out of the predetermined threshold range, a trigger is generated and input to the camera.
With color images, the luminance value of the G channel is used as the criterion.

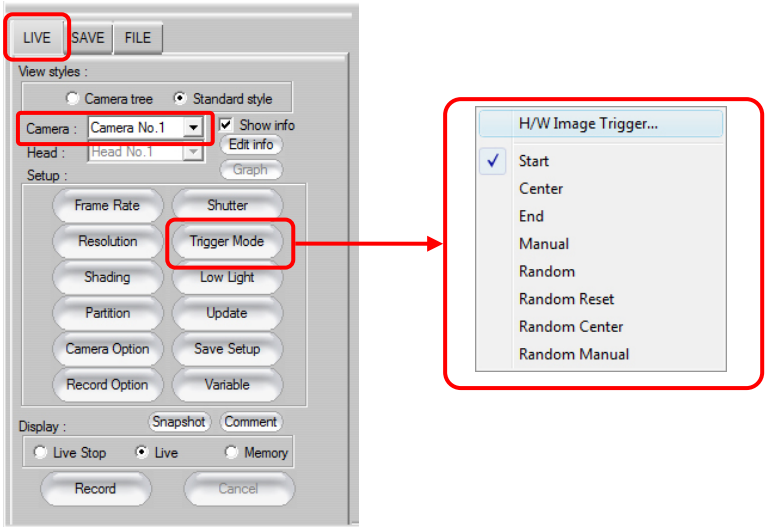
Caution

- The image trigger function does not guarantee that it can capture 100% of image changes. Depending on the circumstances, this function may overlook image changes, or the trigger may be applied when you feel no change in the image has happened. Fully understand the characteristics of this function and do not use it in situations where a trigger failure is unacceptable.
- Use this function after fully testing it. The chance of being able to capture the change in an image increases by an even higher percentage by the way how the image changes and how the settings are made.

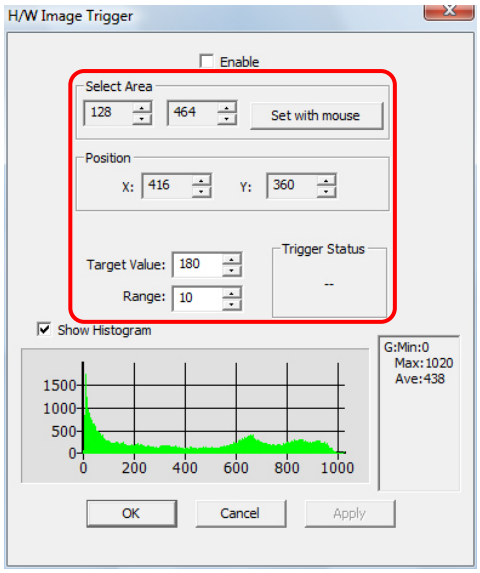
Supplement

- The image trigger described in “3.11.4. Recording by the Image Trigger” is generated based on difference in image detected by the software. The hardware image trigger, on the other hand, is processed in the camera, and so its reaction is much faster than that of the software image trigger.

1. Display the “LIVE” tab on the control panel and select a camera to be used. Then click the [Trigger mode] button and select the “H/W Image Trigger”.



2. “H/W Imgage Trigger” dialog box appears.
Set an area and specify relevant values.

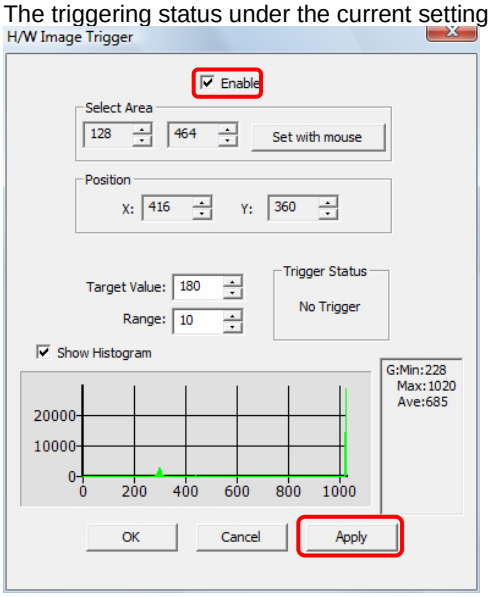


Item	Description
Select Area	Sets an area for reference. Position of the set area may be changed using [▲][▼] buttons as necessary. If you click the [Set by mouse drag] button, you can set an area for reference by dragging the view window with the mouse. The set area is displayed as a frame of dotted lines on the live image view window.
Position	Enter “X (horizontal” and “Y (vertical)” coordinate values to indicate the starting point of an area. If you specify an area by mouse drag, it is set automatically.
Target Value	Enter an image level for reference. Value should be 10 bits (0 to 1024).
Range	Enter an allowable range for the image level. With the image level set by the “Value” as the center value, any excess beyond this range, plus or minus, will cause a trigger. The range is 10 bits (0 to 1024).
Show Histogram	If “Show Histogram” is checked, a histogram is displayed.

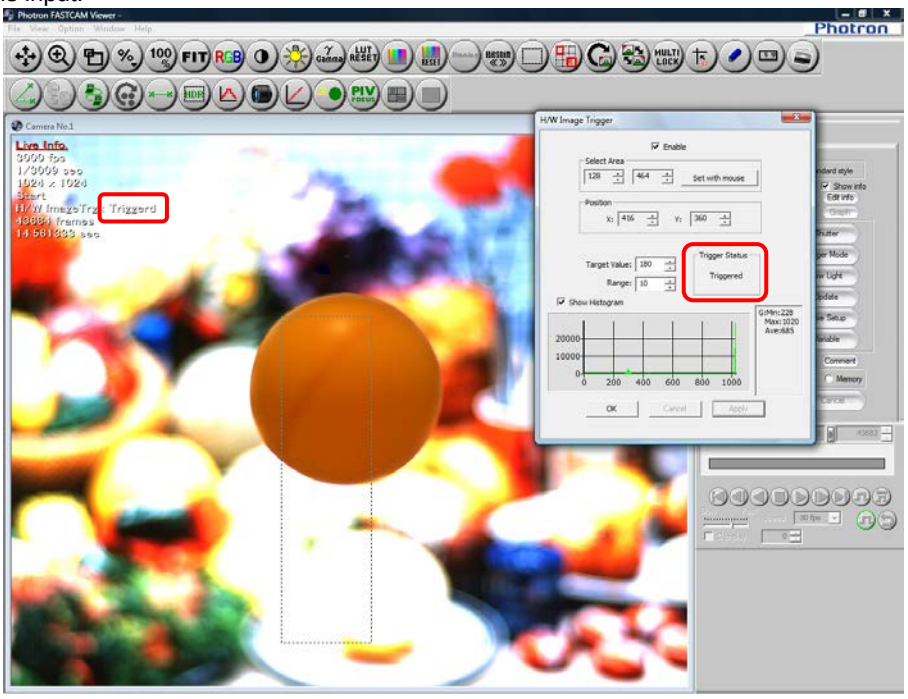
Reference

- For details of setting a range, refer to “3.4.2. Setting Automatic Exposure Control”, page 114.

3. Check the “Enable” checkbox and click the “Apply” button.
The triggering status under the current setting is displayed.



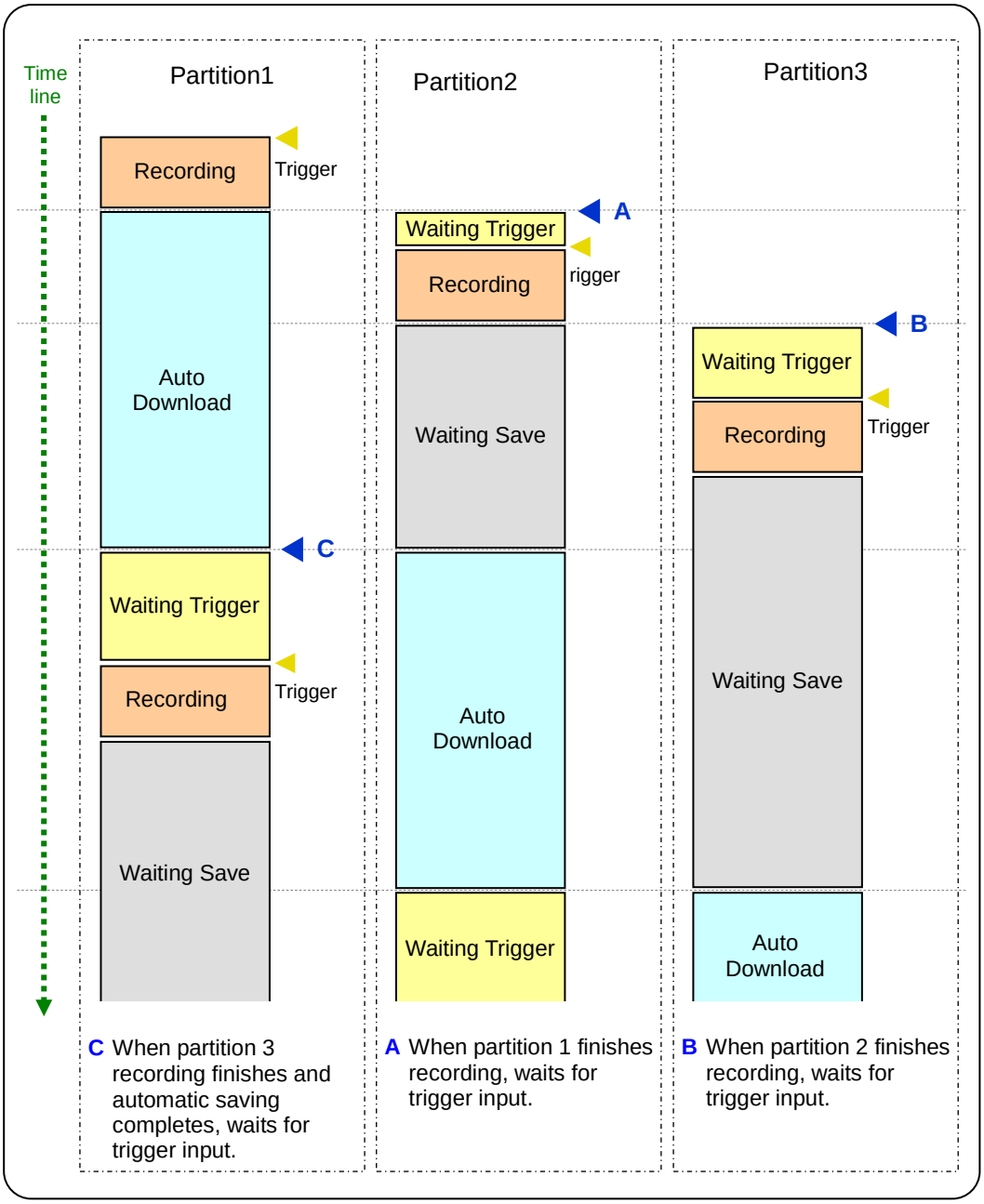
4. Click the [OK] button and then click the [Record] button.
The system gets in ready status, and as soon as a change in the image is detected, a trigger is input.



3.11.6. Record during save

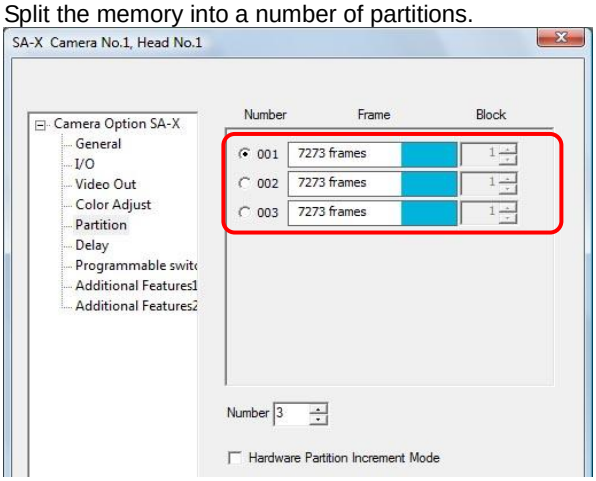
While data is being automatically saved to the PC, PFV can record to a partition separate from the partition that is saving data.

- Record during save operation (3 partitions)



To record during saving, follow the steps below.

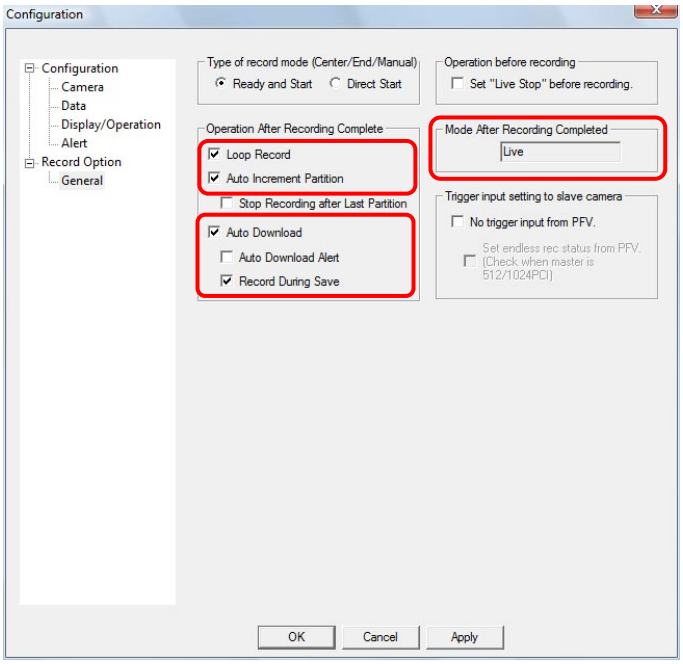
1. Split the memory into a number of partitions.



Reference

- For splitting the memory into partitions, refer to "3.8.2. Dividing Partition", page 152.

2. Under "Record Option", set "Mode After Recording Completed" to "Live", and then select the "Loop Record", "Auto Increment Partition", "Auto Download", and "Record During Save" check boxes to configure auto saving.



Caution

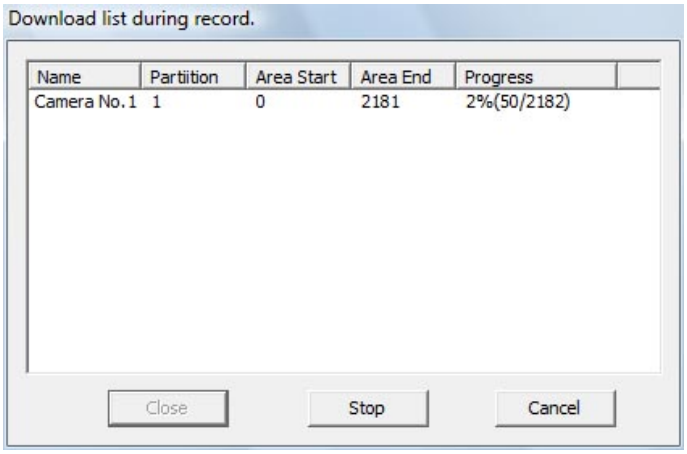
- If you do not select the "Loop Record" check box, the next partition will not automatically wait for the trigger, even when the previous partition has finished recording.

Reference

- For the "Record Option" and "Auto Download" settings, refer to "5.7. Automatic save Setting", page 258.

3. The camera records to the first partition.

4. When the first partition is finished recording, the "Download list during record" dialog is displayed and saving begins.



5. The second partition enters the recording ready state and the [Trigger In] button is displayed. Click the [Trigger In] button to start recording.

Caution

- When the next recording finishes during auto saving, the recorded images start saving after the previous save completes.
- If the partition to record to next is saving, the next recording cannot begin until that save completes.
- While recording during save is running, the update speed of the live image slows down.
- For a Bayer save, the live image is a monochrome image, even on color cameras.
- Recording during save cannot save the cursor.
- If you change the save range while the camera is waiting to save, the recorded images in the partition that is waiting to save are saved with the modified save range.
- While recording during save is running, the recording conditions such as the frame rate cannot be modified.

MEMO

Chapter. 4 **Image Playback**

Prepare PFV for use ▶▶ Basic PC control operation ▶▶ Shot conditions/Shooting

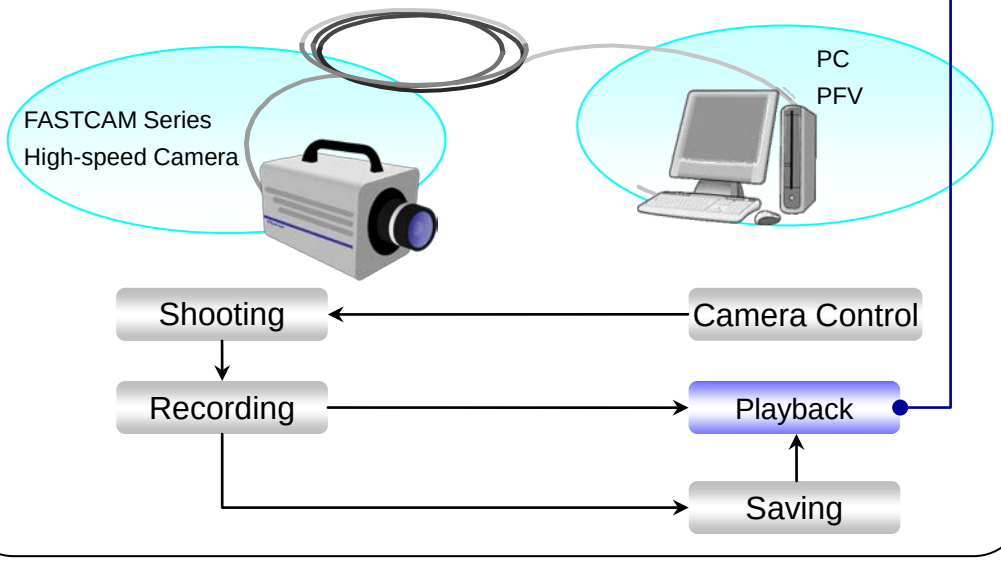
▶▶ **Image playback** ▶▶ Saving images ▶▶ Saved data playback

The following describes how to playback recorded images.

<Chapter.4 Contents>

Recorded Image Playback

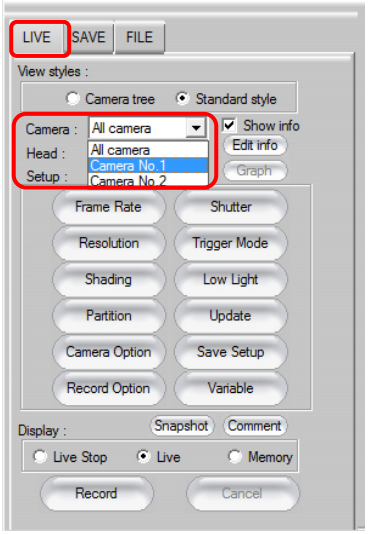
How to playback images recorded on the camera.
How to play at the desired speed, select an area, etc.



4.1. Playing Images Recorded On the Camera

Playback recorded images.

1. Display the “LIVE” tab on the control panel and select the camera which contains the recorded images to play from the “Camera” option.



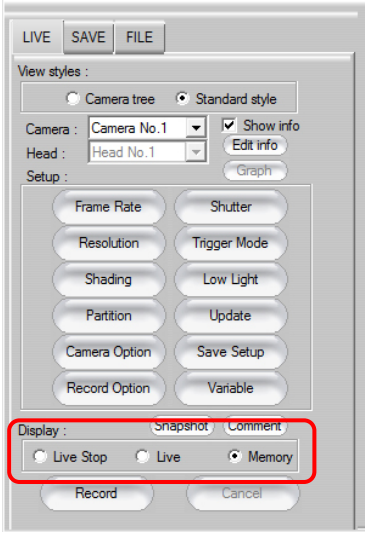
Supplement

- When multiple cameras are connected and “All Cameras” is selected, the images for all cameras can be synchronized playback.

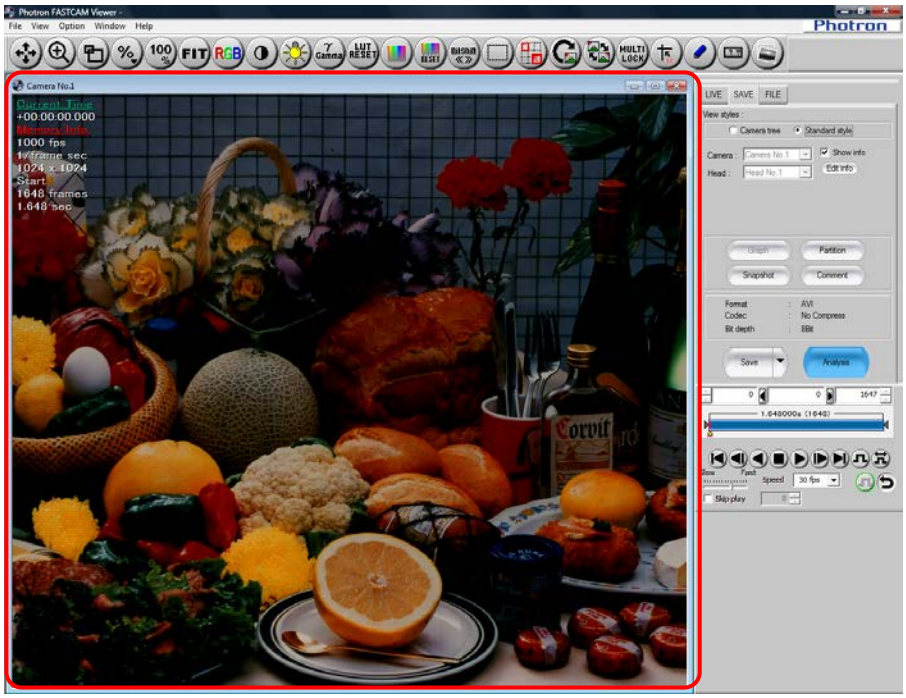
Reference

- For details on synchronized playback, refer to "1.2.18. Synchronization Method Setting During Synchronized Playback” in Configuration section.

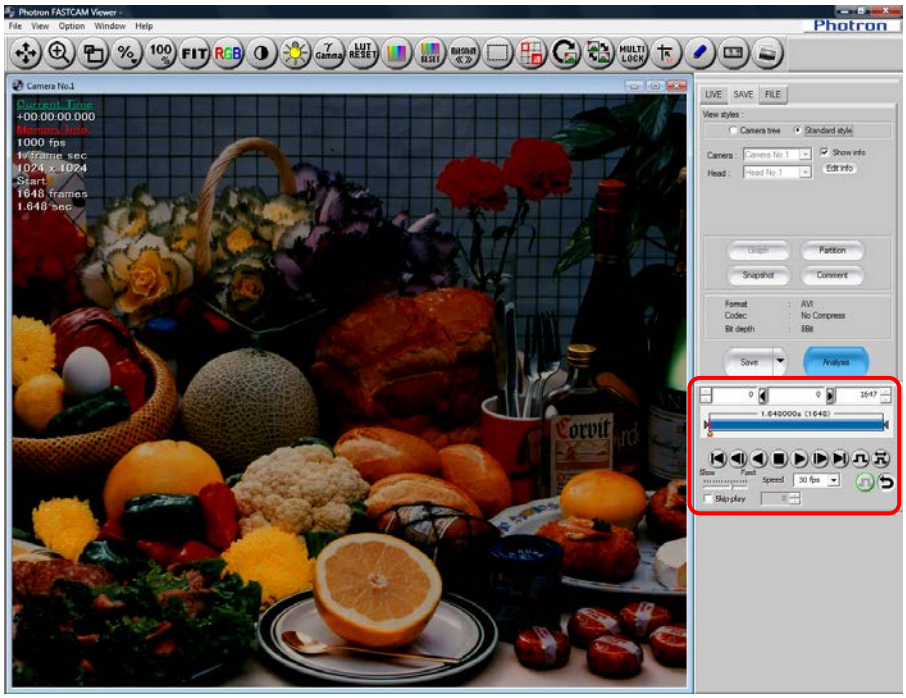
2. Select “Memory” from the “Display” option.



3. The recorded image is displayed in the view window.



4. The desired playback can be performed using the playback control panel.



Supplement

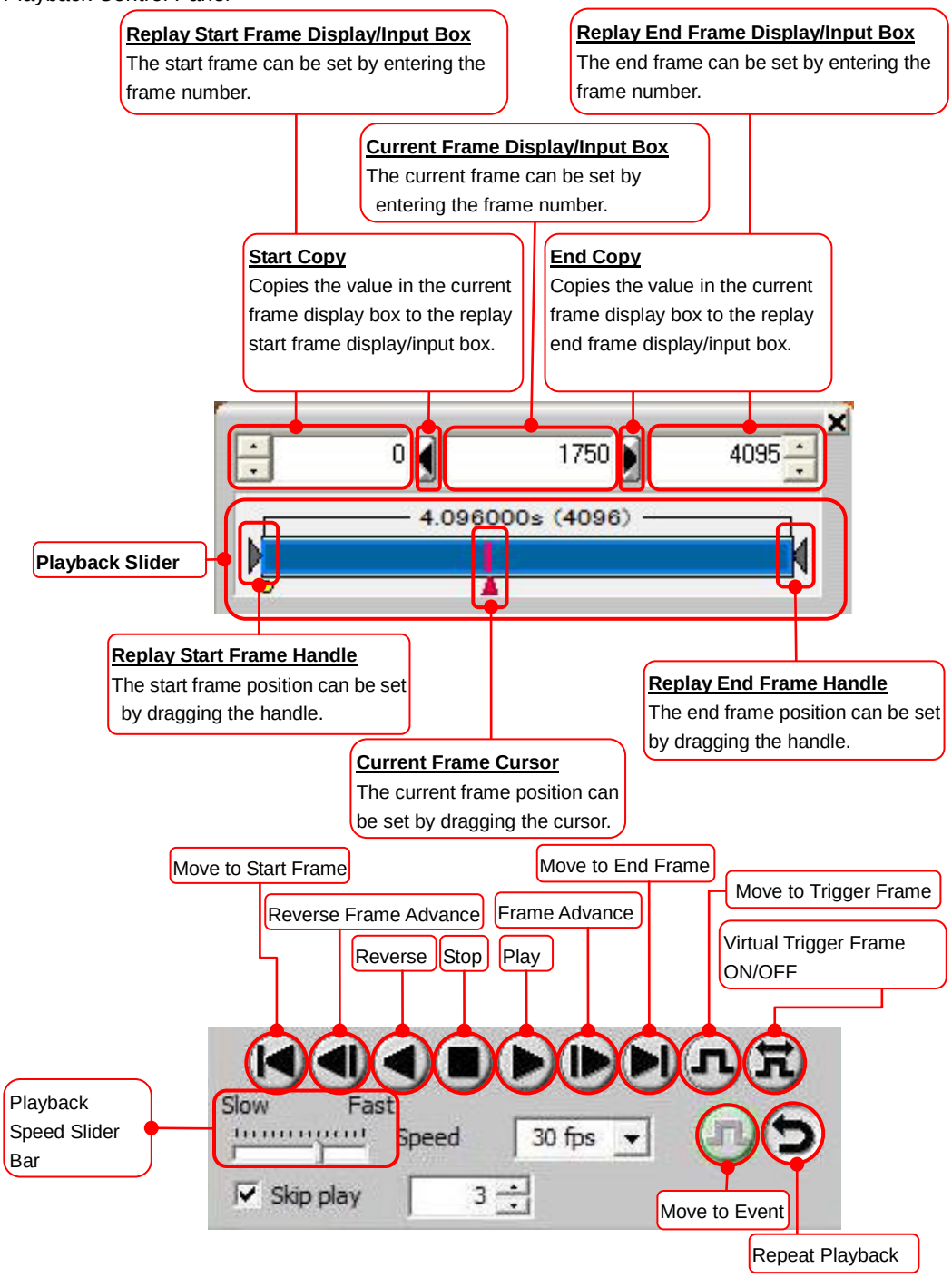
- In the view window information display, you can display just the time code during playback. You can change the time code's display digits with the configuration setting.

- Place the mouse on the displayed image and the playback control panel is displayed. Playback of images can be done using the playback control displayed on the view window. The playback control may be relocated by dragging it.

Reference

- For how to change the time code's display digits, refer to “1.3.12. Time Code Setting” in Configuration section.
- For details of display setting for the playback control, refer to “1.3.18. Playback control display setting” in Configuration section.

◆ Playback Control Panel



Supplement

- Playback button functions can be assigned to the keyboard.

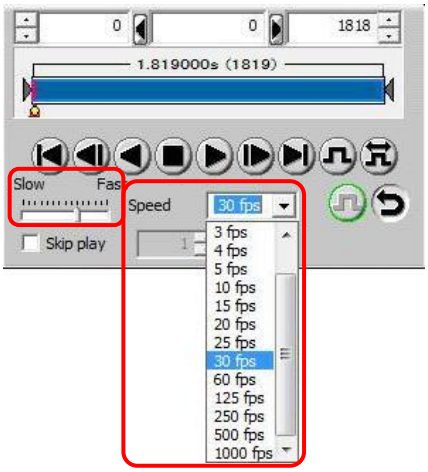
Reference

- For keyboard assignments, refer to “1.3.6. Hotkey Assignment Setting” in Configuration section.

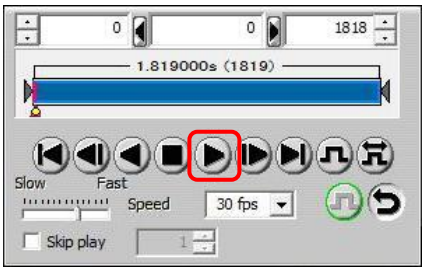
4.2. Playback at the Selected Speed

The playback speed can be changed as the images are played.

1. Select the desired speed (frames per second) from the playback control panel.
   The playback speed can also be specified by dragging the “Playback Speed Slider Bar” slider.

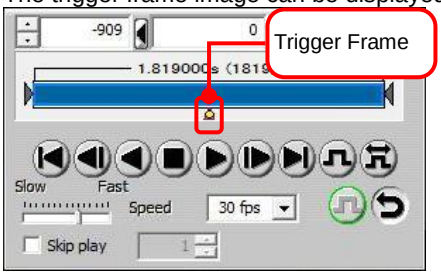


2. Click the [Play] button to playback.
   Playback occurs at the specified speed.

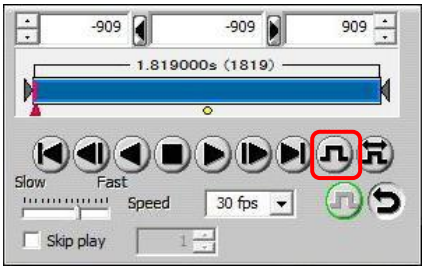


4.3. Move to Trigger Frame

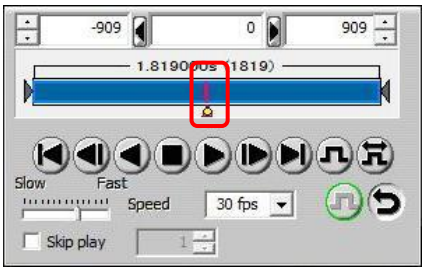
The yellow dot displayed on the playback slider bar indicates the trigger frame.
The trigger frame image can be displayed by moving the current frame to the trigger frame.



1. Click the [Move to Trigger Frame] button on the playback control panel.



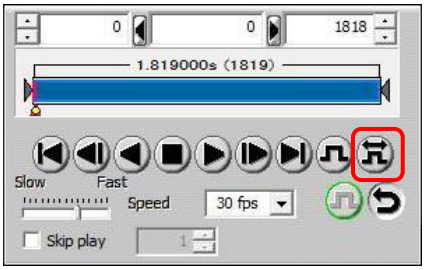
2. The current frame cursor moves to the trigger frame's position and the trigger frame image is displayed in the view window.



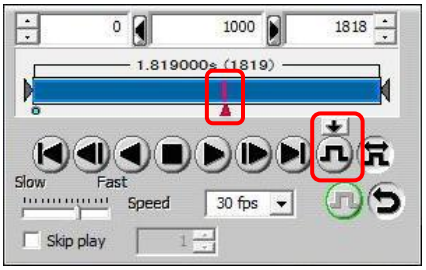
4.4. Moving To an Optionally Set Trigger Frame

An optionally selected frame, separate from the trigger frame recorded in the images, can be set as the virtual trigger frame.
The virtual trigger frame image can be displayed by moving the current frame cursor to the virtual trigger that was set.

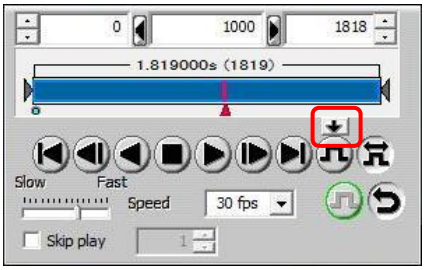
1. Click the [Virtual Trigger Frame ON/OFF] button to turn it ON.



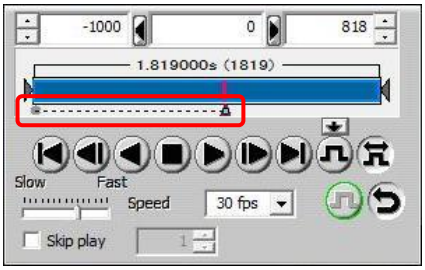
2. The [↓] button will appear above the [Move to Trigger Frame] button.
Drag the current frame cursor on the playback slider bar to move it to the desired position for the virtual trigger frame. The desired position can also be clicked on the playback slider bar.



3. Click the [↓] button above the [Move to Trigger Frame] button.

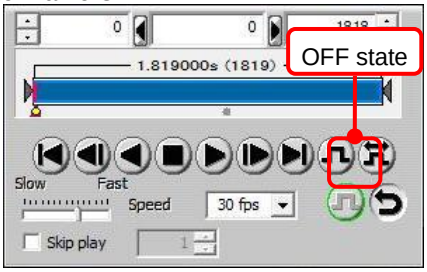


4. Dots connecting the virtual trigger frame and the original trigger frame are displayed. The current frame cursor moves to the virtual trigger frame (displayed with the green dot) and virtual trigger frame image is displayed in the view window.

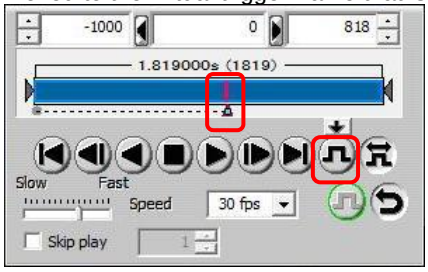


Caution

- When the virtual trigger frame is ON, the original trigger frame cannot be moved to with the [Move to Trigger Frame] button.
  To use the original trigger frame, turn the virtual trigger frame OFF.

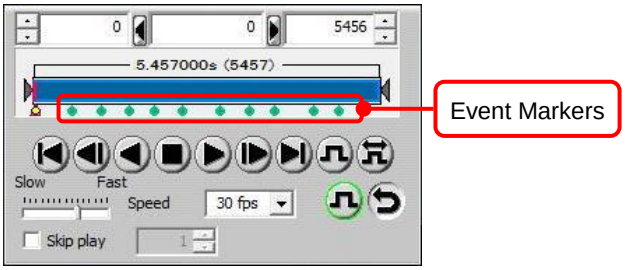


- By clicking the [Move to Trigger Frame] button when virtual trigger frame is ON, the current cursor is moved to the virtual trigger frame that is set.

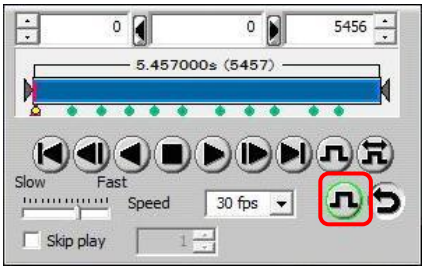


4.5. Move to an Event Marker

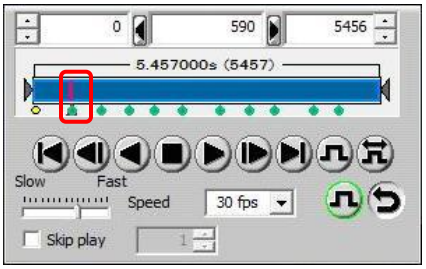
The green dots displayed on the playback slider bar indicate the event markers.
The current frame cursor can be moved to the event marker and the frame image for the event marker can be displayed.
For how to input the event marker, refer to the camera's hardware manual.



1. Click the [Jump to Event] button on the playback control panel.



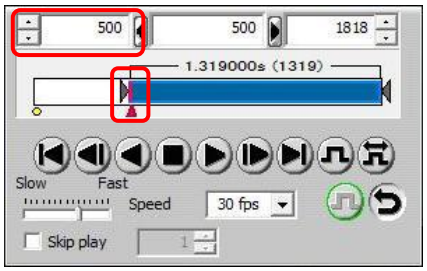
2. The current frame cursor moves to the next event marker and the frame image for the event marker is displayed in the view window.



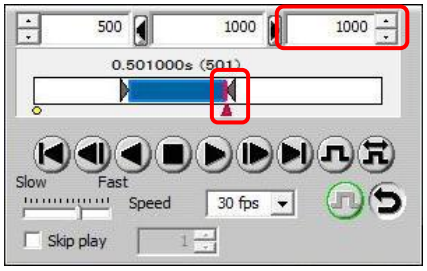
4.6. Specify and Play Only Part of the Sequence

Just the desired sequence (segment) of a recorded image can be played.

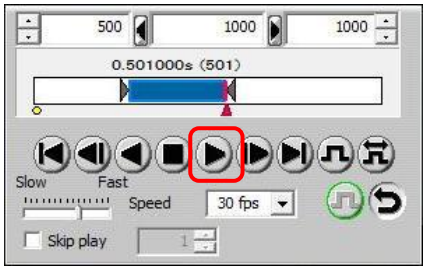
1. Specify the start frame of the sequence to playback.
Enter the start frame number in the [Replay Start Frame Input/Display] box. The start frame number can also be set by dragging [Replay Start Frame Handle] on the playback slider bar.



2. Specify the end frame of the sequence to playback.
Enter the end frame number in the [Replay End Frame Input/Display] box. The end frame number can also be set by dragging the [Replay End Frame Handle] on the playback slider bar.



3. Click the [Play] button.
Only the specified sequence is played.



Important

- The specified sequence is maintained even when the control panel tabs are switched.
  After specifying the new sequence, when the images are saved to the PC as files, only the specified sequence is saved.

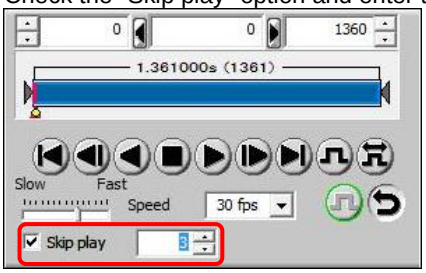
Reference

- For saving to files, refer to “5.1.2. Saving Files”, page 214.

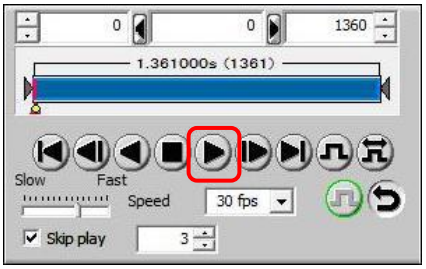
4.7. Skip Play

Skip play can play images by skipping the specified number of frames.

1. Check the "Skip play" option and enter the number of frames to skip.



2. Click the [Play] button.
Skip playback is performed based on the area start frame.



4.8. Stop Playback by Image Trigger

Using the image trigger function, you can set a trigger to detect a change in the playback images being displayed and stop playback. You can use this function to detect the scene where the images change out of a massive amount of recorded frames.

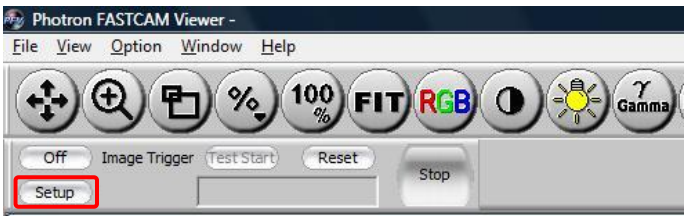
Reference

- For image trigger recording, refer to "3.11.4. Recording by the Image Trigger", page 176.

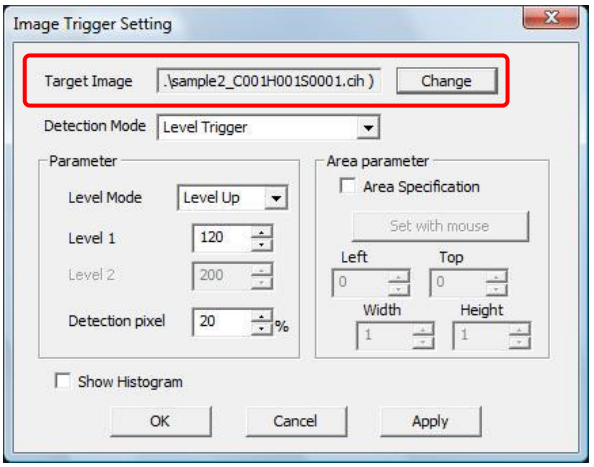
1. Click [View] – [Image Trigger Bar] on the menu.

2. The image trigger bar is displayed.
Click the [On] button to enable the image trigger.

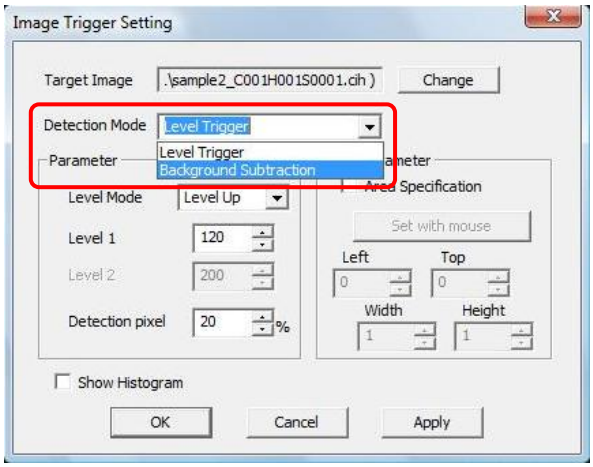
3. Click the [Setup] button.



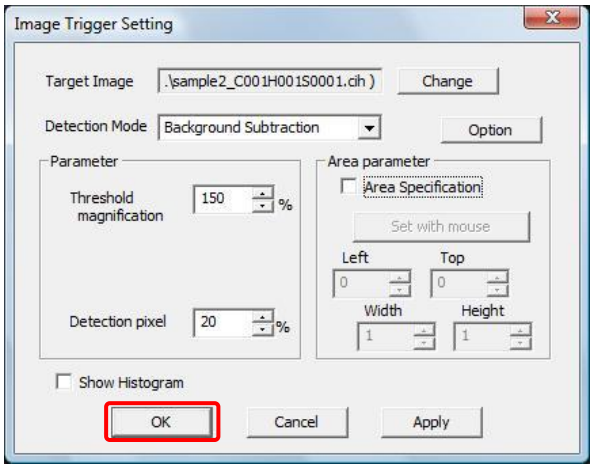
4. Specify the image file to use in "Target Image". You can specify the desired image file with the [Change] button.



5. Specify the image file to use with "Target Image" and under "Detection mode" select either "Background subtraction" or "Level trigger".
Further settings are different depending on "Detection mode".



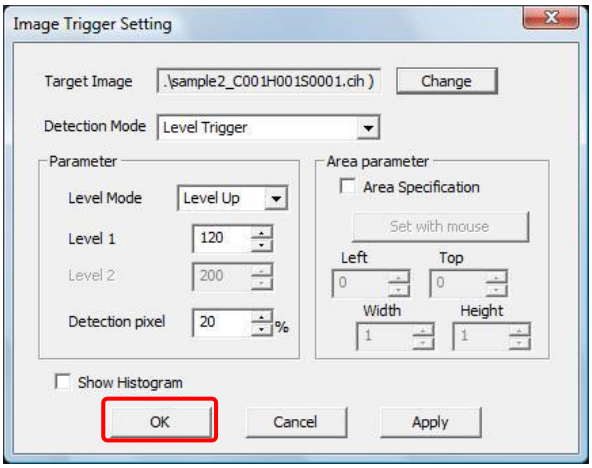
6. Set the image trigger and click the [OK] button.
<When "Background subtraction" is selected under "Detection mode">



Item	Explanation
Threshold magnification	Adjust the acceptable amount of change in the image from the background image. 100% is the unchanged value of the amount of change calculated from the first 100 images. For example, setting this value to 150% makes the acceptable amount of change in the image 1.5x the calculated value.
Detection pixel	Of the pixels in the detection area, specifies how many pixels to meet the condition before the trigger is applied. Specify as a percentage of the pixels in the area.
Options	“Store the background image when Image trigger close.” Check this option to save the acquired background image when the image trigger ends. The next time you use the image trigger, you can select the previous background image that was saved. “Use background image of live mode was stored, when playback mode” Check this option and you can use the background image during image trigger playback that was used during image trigger recording. When using this function, you must check the "Store the background image when Image trigger close." option during image trigger recording.

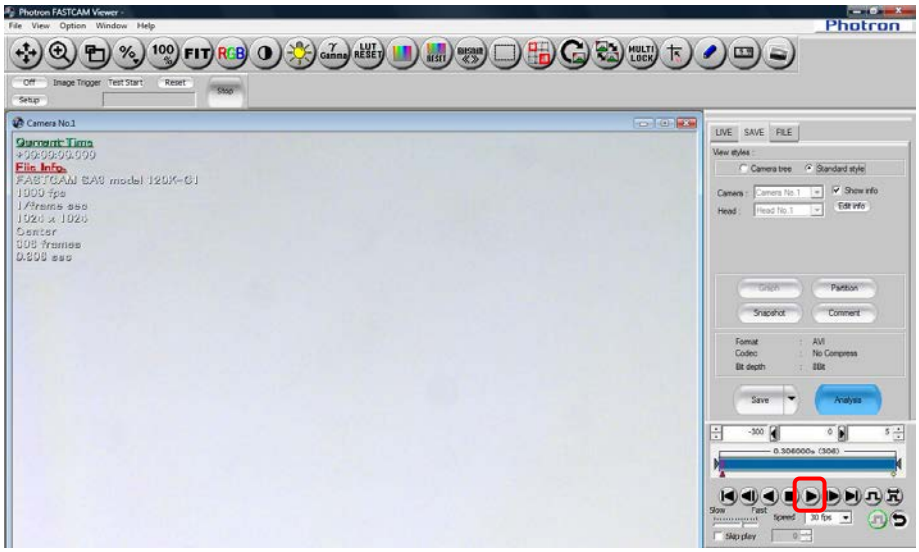
Item	Explanation
Area parameter	Check "Area Specification" and you can specify the area to be the detection target by dragging your mouse on the desired area or by specifying the values. Uncheck " Area Specification " to make the entire area the detection target.
Histogram view	Check this option to display the histogram.

<When "Level trigger" is selected under "Detection method">



Item	Explanation
Level mode	Specify the direction of change in the brightness value. The trigger is applied in the situations below. Level Up: When the brightness value surpasses the brightness value specified in Level 1 Level Down: When the brightness value falls below the brightness value specified in Level 1 Out of Range: When the brightness value deviates from between the brightness values specified in Level 1 and Level 2
Level 1/Level 2	Specify the brightness values to be the threshold values.
Detection pixel	Of the pixels in the detection area, specifies how many pixels to meet the condition before the trigger is applied. Specify as a percentage of the pixels in the area.
Area parameter	Check "Area Specification" and you can specify the area to be the detection target by dragging your mouse on the desired area or by specifying the values. Uncheck "Area Specification" to make the entire area the detection target.
Histogram view	Check this option to display the histogram. For color images, a histogram of RGB averaged values is displayed.

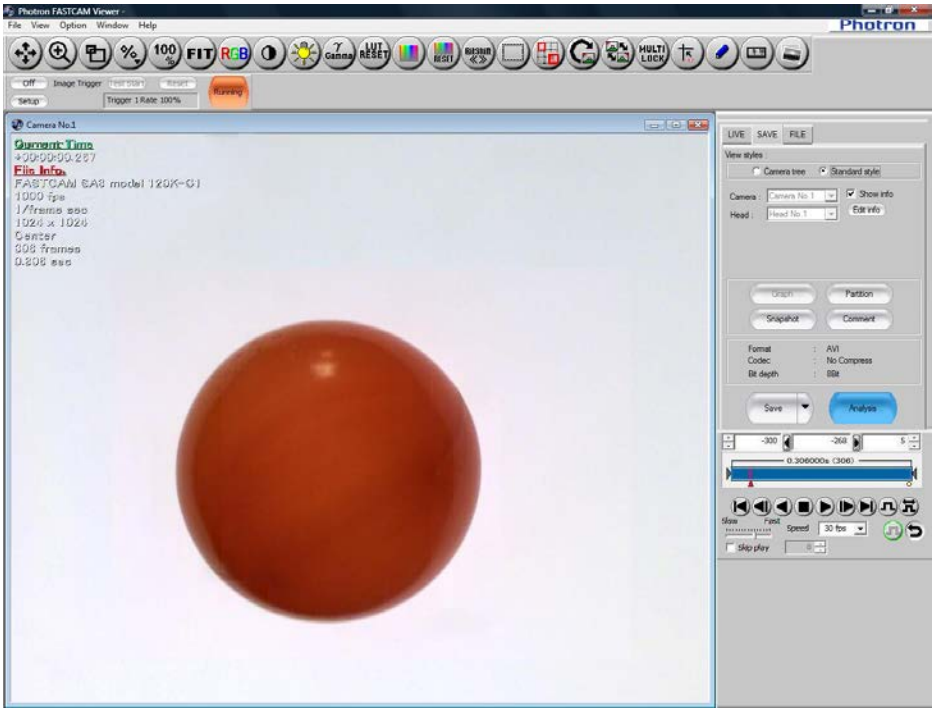
7. Click the [Play] button on the playback control panel.



8. When not using a background image during recording when "Detection Mode" is "Background Subtraction", background image acquisition begins using the first 100 playback frames. "Acquiring Background" is displayed on the image trigger bar.

9. "Waiting trigger" is displayed on the image trigger bar.

10. The trigger is activated when the change in the image satisfies the detection conditions and playback stops.



Caution

- The images may not play at the set playback speed because all frames are played regardless of the playback speed.
- This function uses 100 images from the start to create the background image. More than 100 frames of image data are necessary to stop playback by image trigger with the background subtraction method. If there is an image change within 100 frames from the start frame, the image change is not detected.

MEMO

Chapter. 5 **Saving Images to the PC**

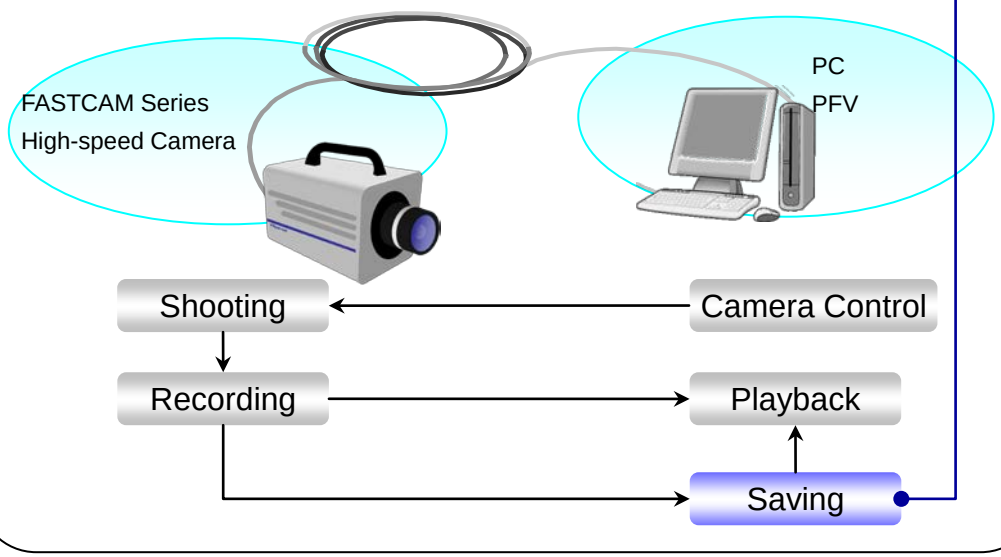
Prepare PFV for use ▶▶ Basic PC control operation ▶▶ Shot conditions/Shooting ▶▶ Image playback ▶▶ **Saving images** ▶▶ Saved data playback

Unless the camera has battery backup capability images that are recorded on the camera are lost when the camera's power is turned off. To keep the recorded images, they must be saved from the camera to the PC.
The following describes how to save image data files in the PC.

<Chapter.5 Contents>

Save to the PC

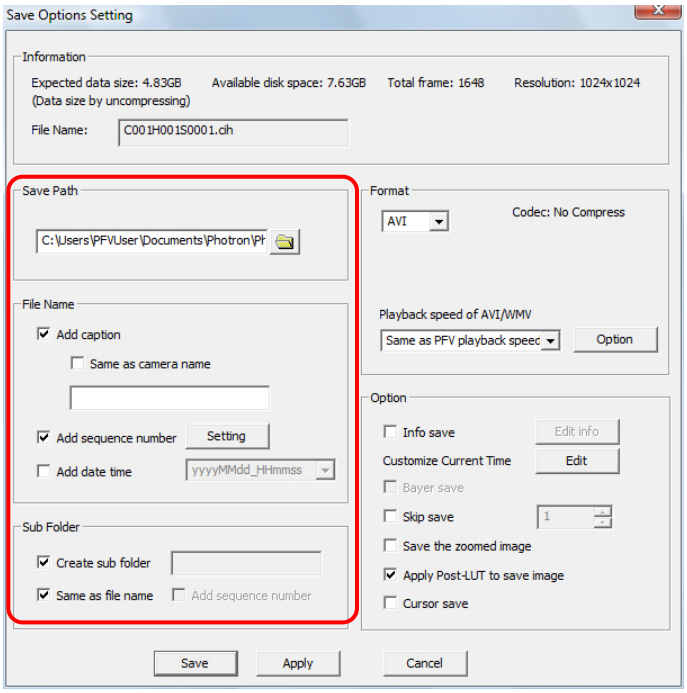
- Explanation of how to save image files to the PC and the naming conventions for filenames
- Explanation of the save formats
- How to save specific frames
- How to set the auto save setting
- Types of data that can be added and how to save them



5.1. Saving Images Recorded On the Camera to the PC

5.1.1. About The Save Location/File Naming Conventions

The destination and filename for the data can be set with the “Camera Setting Save” dialog box displayed by clicking the [Save] button under the “SAVE” tab on the control panel.

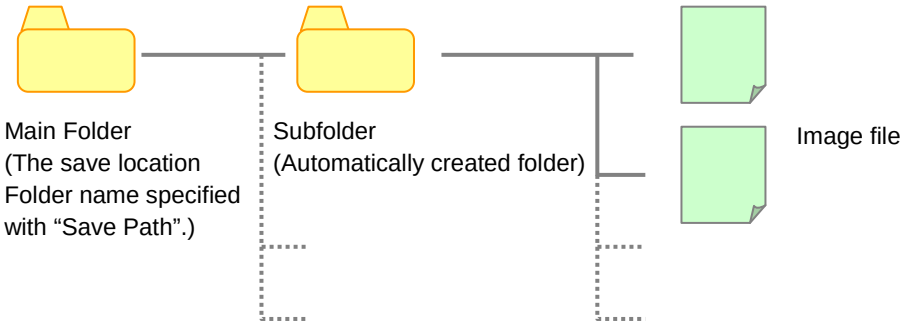


- Save Location

  Specify the location of the folder to save in with the “Save Path” option.

  The default value is “C:\Users\<user name>\Documents\Photron\Photron FASTCAM Viewer 3”. (This value can be changed to a user-defined value)

  The specified save location is used as the main folder and the image files are saved in automatically created subfolders under the main folder.



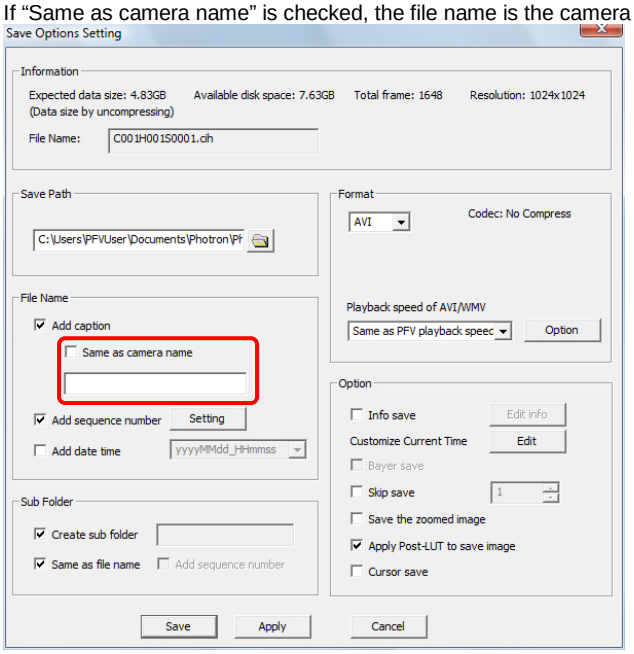
- Subfolder Name

  As the default value, subfolders are created using the naming convention below.

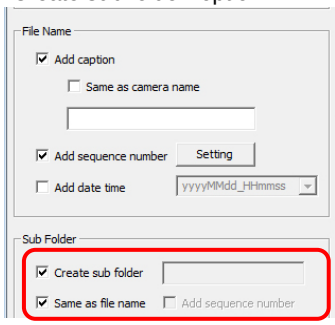
  “Filename” + “Camera ID” + “Head Number” + “Session Number”

Filename _C001 H001 S0001

Filename Camera ID Head No. Session No.

Name	Description
Filename	The value entered in “File name” on the “Camera Setting Save” dialog box. If file name is blank, the file name is made from the camera ID. To attach a blank file name, configure the data settings under configuration. If “Same as camera name” is checked, the file name is the camera name. 
Camera ID	The ID displayed on “Camera”. (The ID displayed on the title bar of the view window.)
Head Number	The number displayed on “Head”.
Session Number	An index number which is automatically generated.

When making the name of the subfolder different than the filename, uncheck “Same as filename” and enter the desired subfolder name, “Sample” in the example below, in the textbox to the right of the “Create sub folder” option.



Reference

- For saving a blank file name, refer to “1.2.5. Setting Related to File Namges when Saving Data” in Configuration section.

- Filename

  As the default value, filenames are created using the name below.

  “Filename” + “Camera ID” + “Head Number” + “Session Number” + “Image File Number”

  Filename_C001H001S0001000001.extension

  Filename Camera ID Head No. Session No. Image File No.

Name	Description
Image File Number	For 1 frame, 1 image saved. An index number which is automatically generated.

  Example: For “TEST” entered in “Filename”, saved in the bmp format with the default settings as-is
  Under “C:\Users\<user name>\Documents\Photron\Photron FASTCAM Viewer 3”
  The “TEST_C001H001S0001” folder is created, and in that folder the files are saved with sequential numbers starting from “TEST_C0001_H001S0001000001.bmp”.

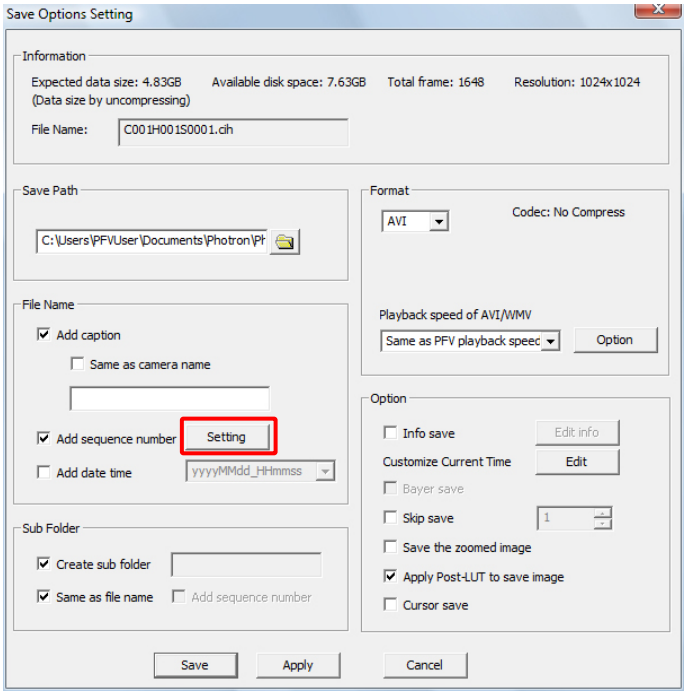
Caution

- The filename is limited to 255 characters that include the full path.

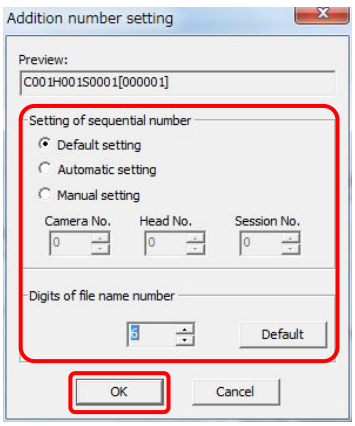
■ Setting the number of digits for the additional numbers of filenames

The number of digits for the additional numbers (camera number, head number, session number or image file number) of filenames can be set individually up to 8 digits.

1. Click the [Setting] button under [Filename] on the [Camera Setting Save] dialog box.



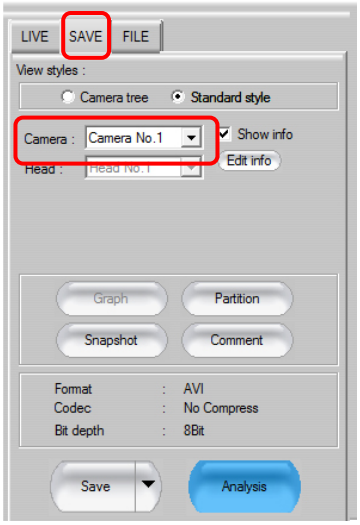
2. Set the numbers and click [OK].



5.1.2. Saving Files

Save the images from the camera to the PC as files. When saving images, an image file and a CIH file are created. Recording information is contained in the CIH file.

1. Display the “SAVE” tab on the control panel and select the camera where the images recorded are currently located.
   Select the desired camera with the “Camera” option.



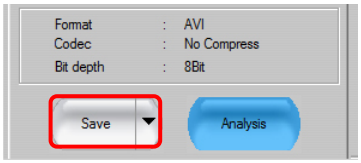
Supplement

- When “All Cameras” is selected, all of the camera’s images can be saved to files at once.
  Only the images recorded to the partition currently being used are saved to files. When selecting the desired partitions and group saving files, grouped files are saved.
- For multi-head cameras, select the camera head where the images are recorded to save files by “Head”.

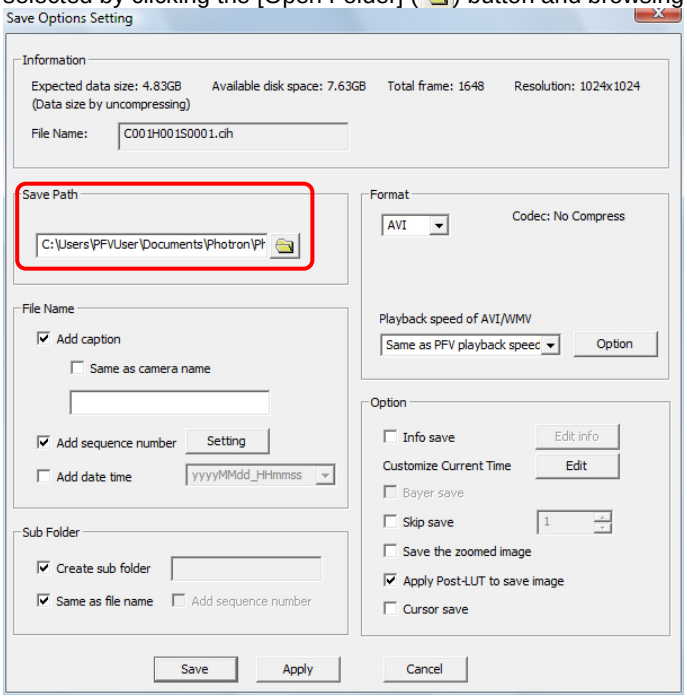
Reference

- When group saving files for specified partitions, refer to “5.5. Group Saving Files for Specified Partitions”, page 251.

2. Click the [Save] button.



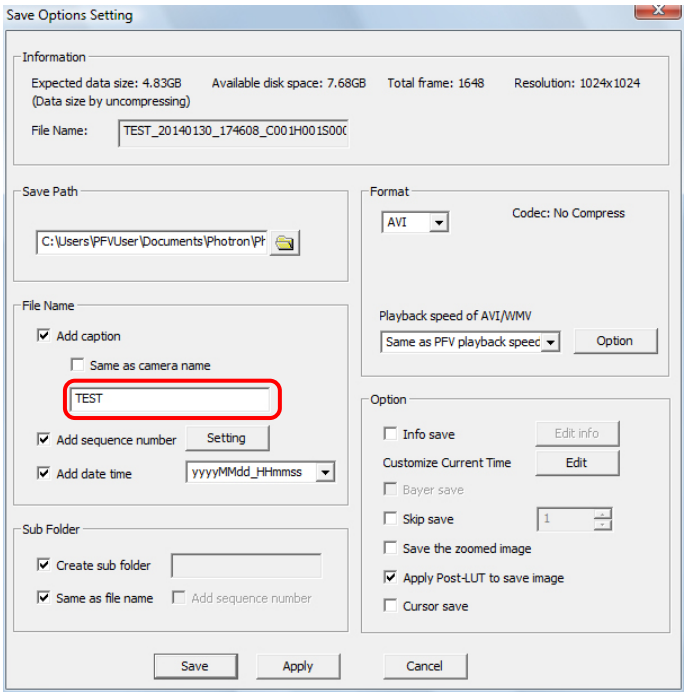
3. Specify the save location folder or “Save path”.
When specifying a path, enter the desired save location in “Save path”. The folder can be selected by clicking the [Open Folder] ( ) button and browsing to it.



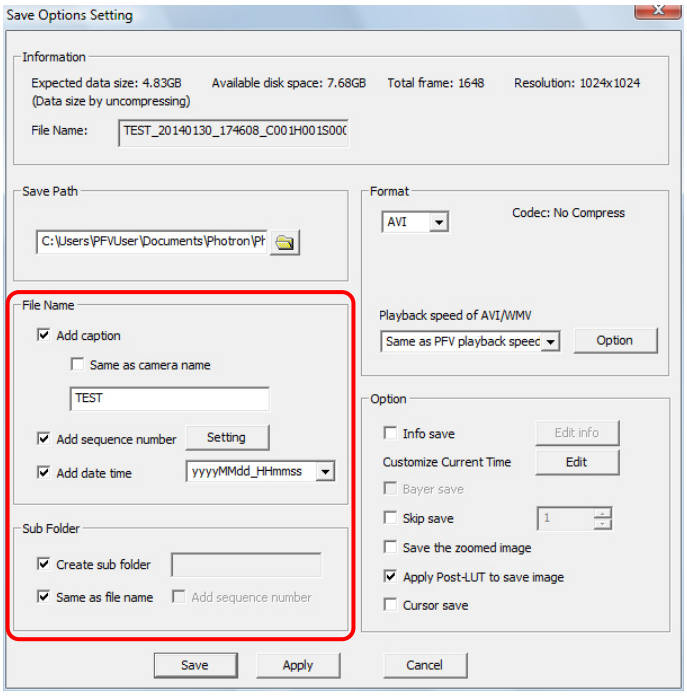
Caution

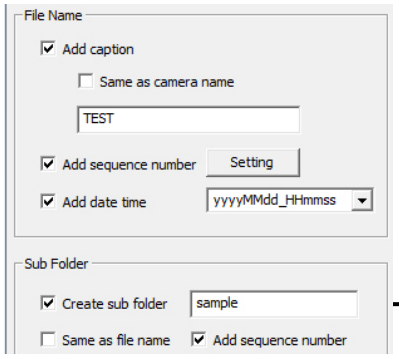
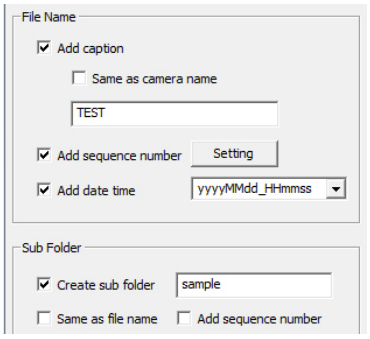
- The saved data can be extremely large, be sure to specify a save location with plenty of free space.

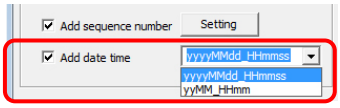
4. Enter a filename in “File name”.



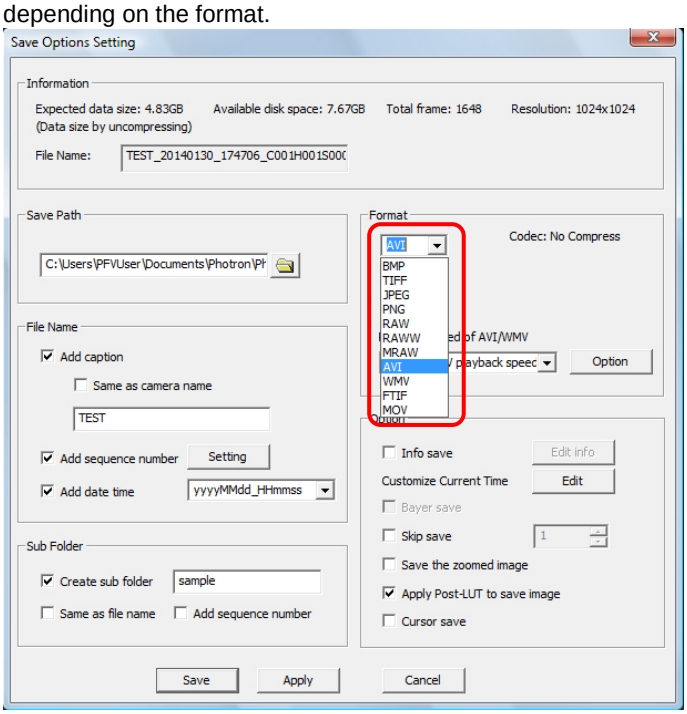
5. Set the options below as necessary.



Item Name	Description
Add caption	Uncheck when not using the contents of “File name” for the filename. When unchecked, the filename is saved starting from the camera ID.
Add sequence number (To the right of “Add Caption”)	Uncheck to save without adding the camera ID, head number, and session number to the image filename. When unchecked, the filename is saved as “Filename” + “Image File Index”. When checked, the number of digits for camera number, head number, session number and image file number can be set individually by clicking the [Setting] button on the right.
Create sub folder	Uncheck to save all image files in the main folder specified with “Save path”.
Same as filename	Creates the subfolder with the name entered in “File name”. To add a desired name, uncheck the checkbox and enter the name in the textbox to the right of “Create sub folder”. Example: Settings  Created subfolder name “Sample” + camera ID + head number + session number
Add sequence number (To the right of “Same as filename”)	When specifying a desired subfolder name (when “Same as filename” is unchecked), this item is displayed. Uncheck to save the subfolder name without adding the camera ID, head number, and session number. When unchecked, the subfolder name is the text entered in the textbox to the right of “Create sub folder”. Example: Settings  Create subfolder name “Sample”

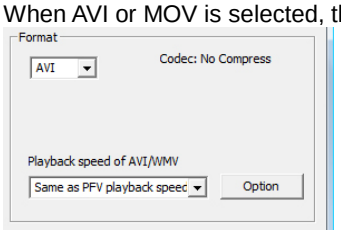
Item Name	Description
Add date time	If you wish to add the date or data/time to save, check the box. If checked, date or date/time is added in the back of the file name. The date format can be set by environment setting. The date format can be set by the pulldown menu on the right of “Add date time”.  Refer to “1.2.20 Adding date and time setting” in Configuration section.

6. Select the file format to save with.
Click the [▼] button under “Format” and select the desired format. Detailed settings can be made when saving, such as the compression rate, from the [Option] button, depending on the format.



Supplement

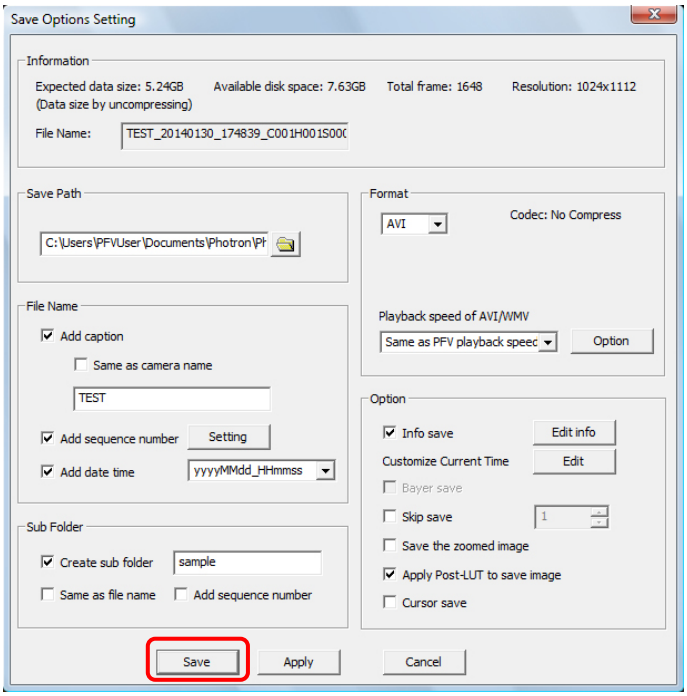
- When AVI or MOV is selected, the codec name is displayed under “Format”.



Reference

- For more information on save formats, refer to “5.1.3. Setting the Save Format”, page 220.

7. Set the Option parameters as required and click the [Save] button.



Reference

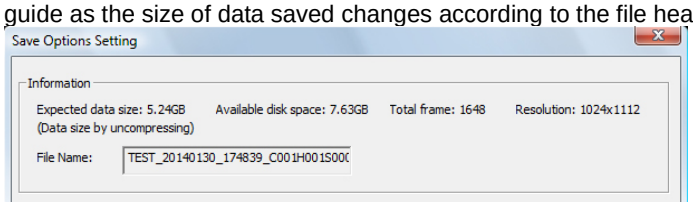
- As for setting the Option parameters, refer to “5.2 Setting Save Options” on page 216.

8. The files are saved.

High-speed camera images use a large amount of data, so saving them as files will take time.

Supplement

- Just the desired number of frames can be saved as files.
  After specifying the number to save with the playback control panel, save as files.
- You can also skip save to save skipping the desired number of frames.
- The expected data size is displayed under “Information” on the [Camera Setting Save] dialog box. The size displayed is the size when uncompressed calculated from the image size. Consider it as a guide as the size of data saved changes according to the file header size and compression.

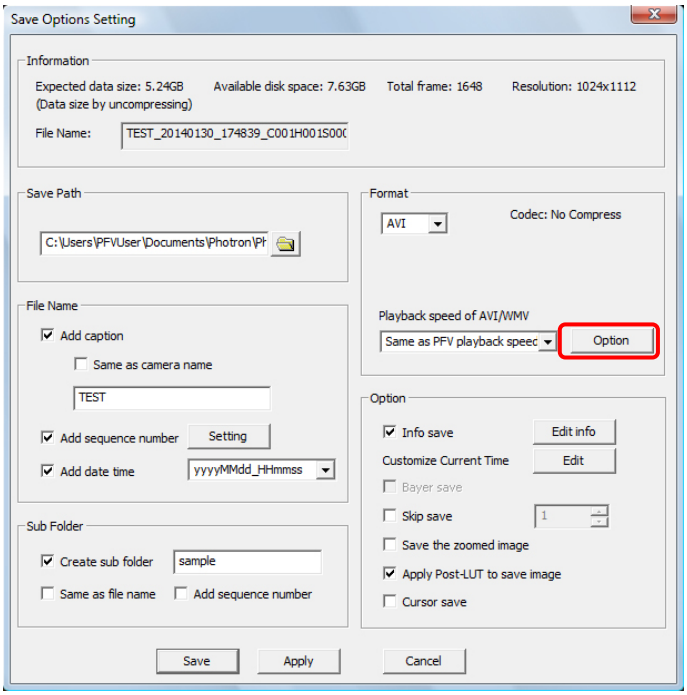


Reference

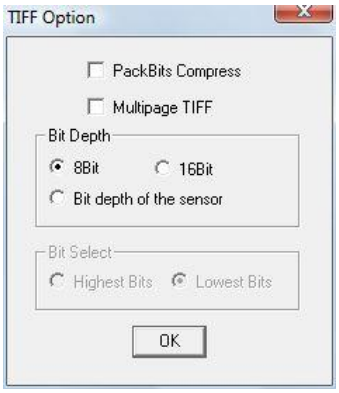
- For more information about setting a desired number of frames, refer to “4.6. Specify and Play Only Part of the Sequence”, page 201.
- For skip save, refer to “5.2.3. Skip Save”, page 240.

5.1.3. Setting the Save Format

On the [Camera Setting Save] dialog box, after selecting the format from the list, click the [Options] button next to it on the right and the detailed settings below can be set.

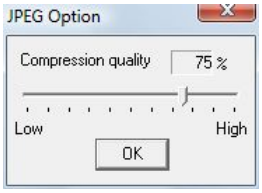


◆ For TIFF



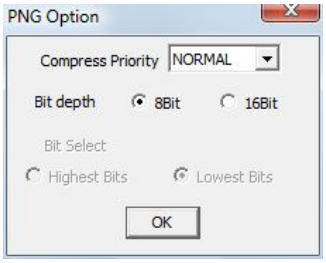
Item	Description
PackBits Compress	Check to use Packbits compression.
Multi-page TIFF	Save multiple files as a single TIFF file.
Bit depth	Specify to save the image as 8-bit, 16-bit, or the sensor's bit depth.
Bit Select	Select where to insert the data bits when 16-bit (Highest Bits or Lowest Bits is filled). “Highest Bits” is recommended when viewing as images.

◆ For JPEG



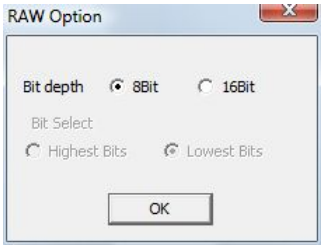
Item	Description
Compression Quality	The higher the value, the higher the image quality and the lower the compression ratio. Drag the handle to set.

◆ For PNG



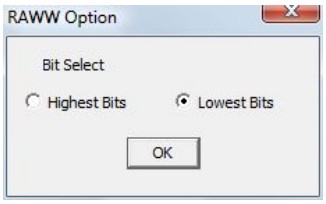
Item	Description
Compress Priority	Set the priority of the compression processing.
Bit depth	Select to save the image in 8-bit or 16-bit color depth.
Bit Select	Select where to insert the data bits when 16-bit (Highest Bits or Lowest Bits is filled). “Highest Bits” is recommended when viewing as images.

◆ For RAW



Item	Description
Bit depth	Select to save the image in 8-bit or 16-bit color depth.
Bit Select	Select where to insert the data bits when 16-bit (Highest Bits or Lowest Bits is filled). “Highest Bits” is recommended when viewing as images.

◆ For RAWW

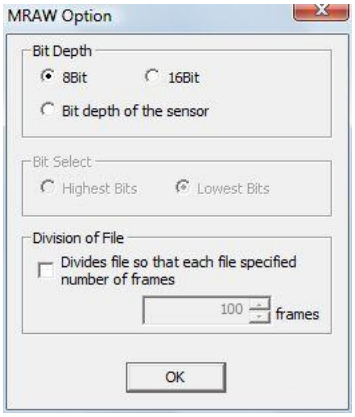


Item	Description
Bit Select	Select where to insert the data bits when 16-bit (Highest Bits or Lowest Bits is filled). “Highest Bits” is recommended when viewing as images.

Supplement

- A 16-bit RAW file and its corresponding RAWW file are essentially the same except for the extension.

◆ For MRAW



Item	Description
Bit depth	Specify to save the image as 8-bit, 16-bit, or at the sensor's bit depth.
Bit Select	Select where to insert the data bits when 16-bit (Highest Bits or Lowest Bits is filled). “Highest Bits” is recommended when viewing as images.
Split file setting	This option can split and save the file at the specified number of frames.

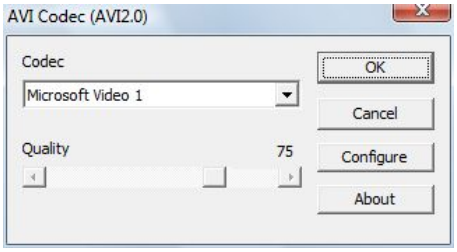
Caution

- When saved in the RAW, RAWW, MRAW formats, a CIH file is simultaneously created. To open a file saved in the RAW, RAWW formats with PFV, and the CIH file must be present, so do not delete it.

◆ For AVI

Depending on the value of “Auto divide AVI File” set in the configuration settings, the screen displayed will differ.

The screen below is displayed when set to “AVI 2.0”.



Item	Description
Codec	Select the codec to use during AVI output.
Quality	Select the compression quality for the selected codec. The file size gets larger as quality increases.
Configure	Use when detailed settings are available for the selected codec.
About	Displays the version information of the selected codec.

Caution

- Depending on the type of codec, there may be an error when saving. If there is an error, select a different codec and save again.
- There is no performance guarantee when using a codec other than a non-compressed codec with PFV.

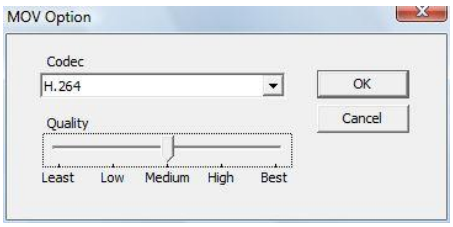
Supplement

- When AVI is selected under “Format”, the playback rate can be set.

Reference

- As for setting the playback rate, refer to “5.1.4. Setting Playback Rates of AVI/WMV Files” on page 224.

◆ For MOV



Item	Description
Codec	Specify the codec when outputting a MOV file.
Quality	Specify the compression quality of the selected codec. File size gets larger as quality increases.

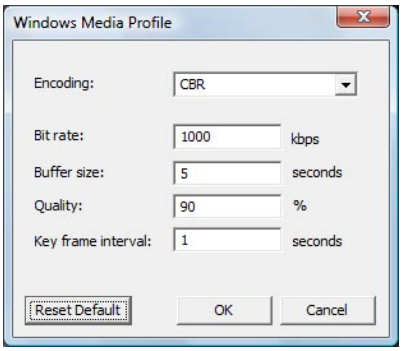
Caution

- Depending on the type of codec, there may be an error when saving. If there is an error, select a different codec and save again.
- To output MOV files, QuickTime Player 7.5.5 or higher must be additionally installed on the PC where PFV is installed.

Reference

- For more information about file formats, refer to “Chapter.2 Appendix” in Configuration section.

◆ For WMV



Item	Description
Encoding	Select the encoding method. CBR: Converts at the specified bit rate. The bit rate varies so that the specified buffer size is not exceeded. Bit rate VBR (Peak): Converts at the average bit rate. The bit rate varies within the maximum bit rate. Quality VBR: Converts at a bit rate that maintains the specified quality. Bit rate VBR: Converts at the average bit rate. The bit rate varies, but the bit rate for the movie overall is the average bit rate.
Bit rate	Specify the bit rate.
Buffer size	Specify the buffer size.
Quality	Specify the compression quality.
Key Frame interval	Specify the key frame interval.
Peak bit rate	Specify the maximum bit rate.
Peak buffer size	Specify the maximum buffer size.
Average bit rate	Specify the average bit rate.

Supplement

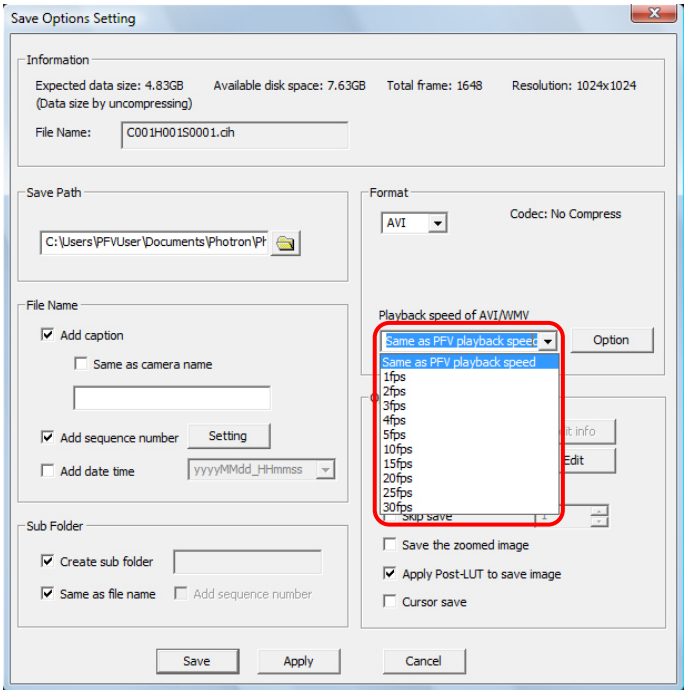
- When WMV selected under “Format”, the playback rate can be set.

Reference

- As for setting the playback rate, refer to “5.1.4. Setting Playback Rates of AVI/WMV Files” on page 224.

5.1.4. Setting Playback Rates of AVI/WMV Files

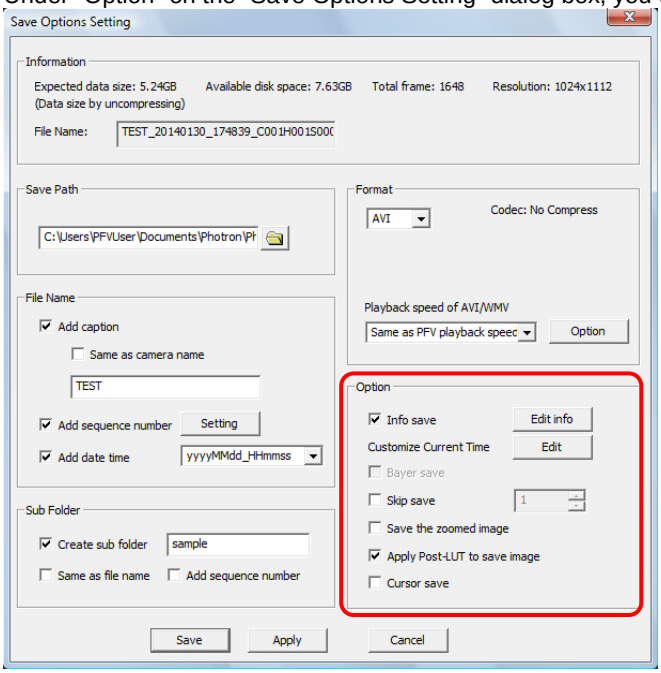
Since AVI/WMV files retain their playback rates, you can set the rates for playing back them. To set the playback rate, select a desired rate from the “Playback Rate of Output AVI/WMV” dropdown list on the “Save Options Setting” dialog box and save the file.



Item	Description
PFV defined rate (default)	The file is played back at the playback rate defined for output (the set rate on the playback control panel). The rate is capped at 30 fps. Higher settings than it are ignored and the file is played back at 30 fps.
Selected rate (any of the listed rates)	When you want to play back the file at other rate than the set rate on the playback control panel, select the rate. Option rates are displayed on the dropdown list.

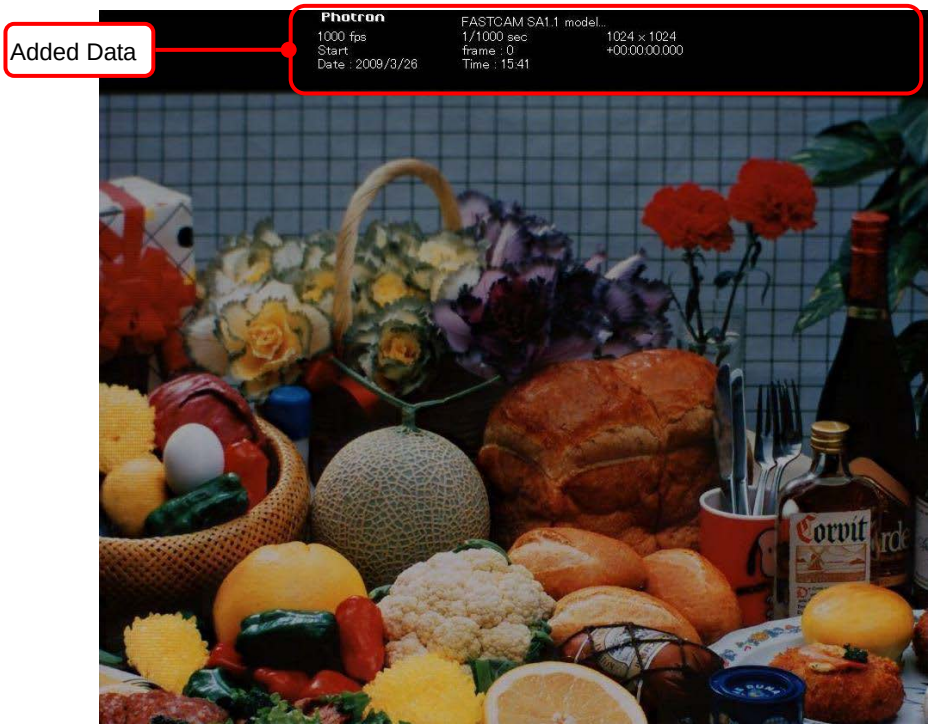
5.2. Setting Save Options

Under “Option” on the “Save Options Setting” dialog box, you can set other saving options.

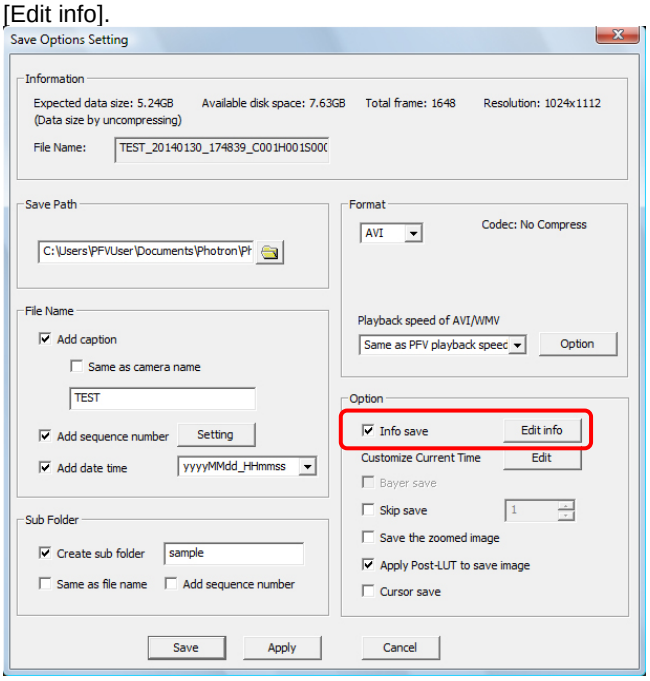


5.2.1. Adding Data to the Image And Saving

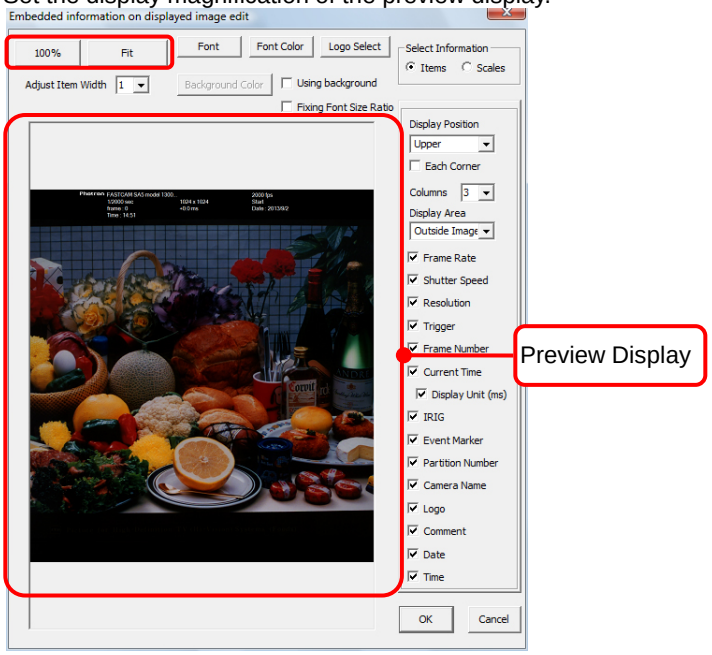
With PFV, shot information such as the frame rate can be added to the image and saved as files. However, the image cannot have information added and saved when it is saved as a Bayer pattern.



1. On the “Save Options Setting” dialog box, check “Info save” under “Option” and click [Edit info].

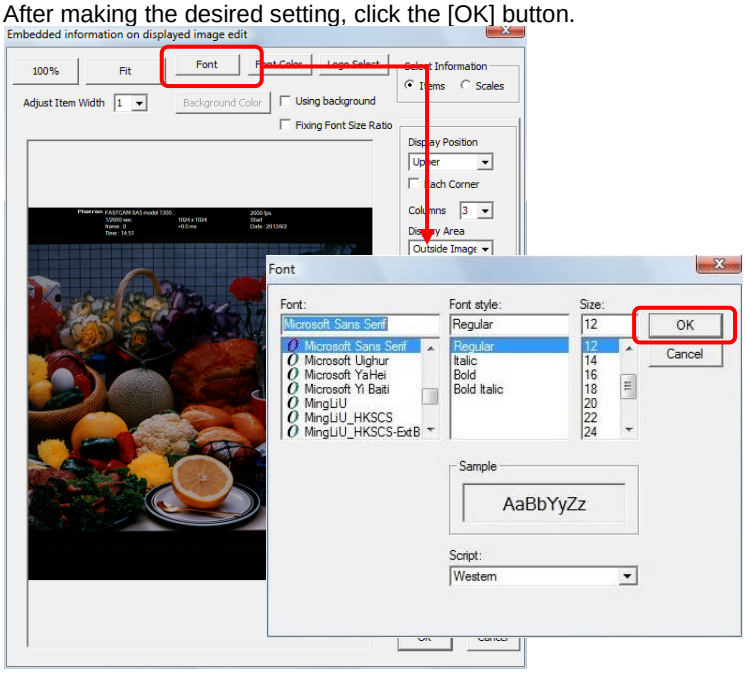


2. The save data dialog box is displayed.
Set the display magnification of the preview display.



Button	Description
100%	Displays the image pixels at full size.
Fit	Fit the image to match the display screen size.

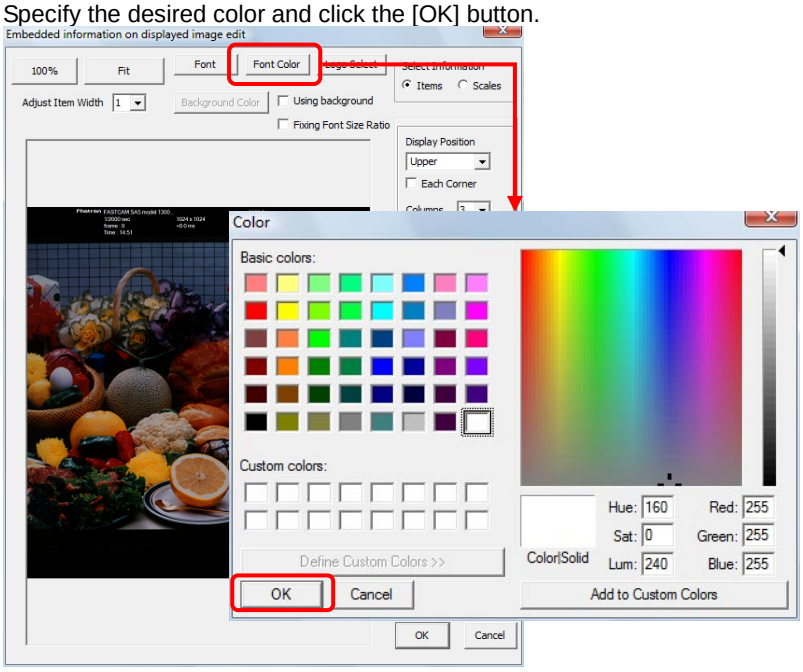
3. Click the [Font] button to set the display font setting.
After making the desired setting, click the [OK] button.



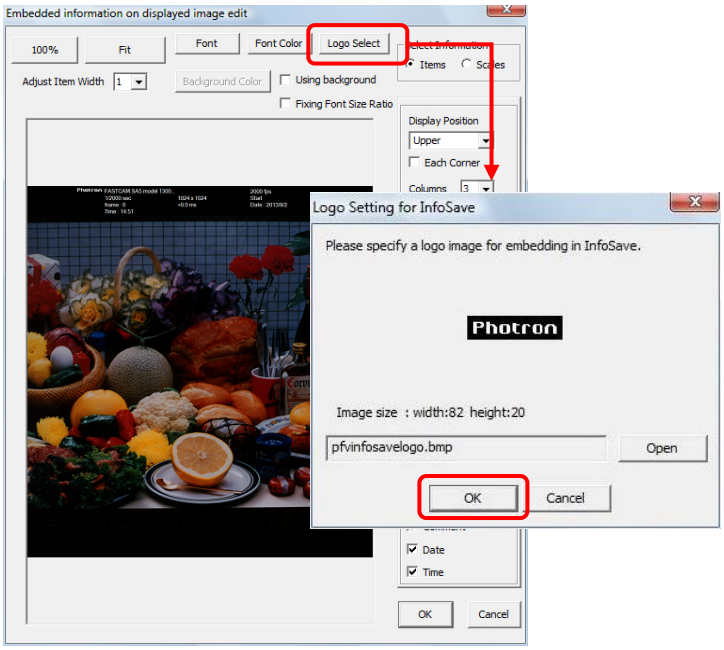
Supplement

- If you select the "Fixing Font Size Ratio" check box, the image resolution and font size ratio are fixed.
  Example: For a 1024x1024 resolution image, set to font size 18, with a fixed font size ratio,
  the font size is set to 9 for a 512x512 resolution image.

4. To change the font color, click the [Font Color] button.
Specify the desired color and click the [OK] button.



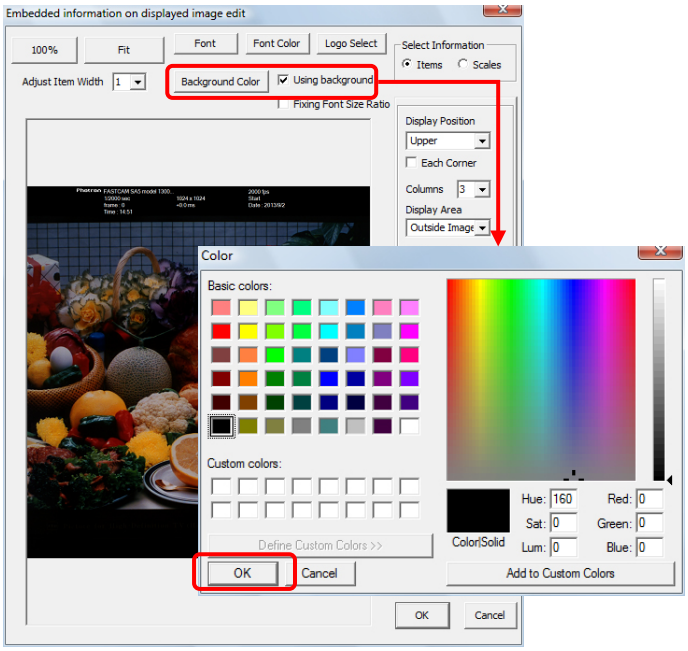
5. Click the [Logo Select] button to change the logo.
Locate and select the desired file and click the [OK] button.



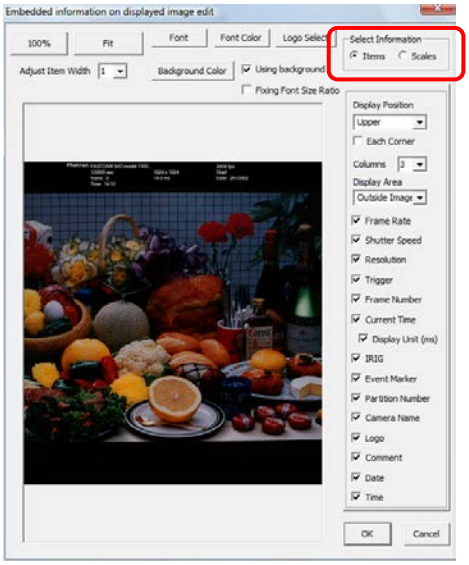
Caution

- Files that can be used for the logo are limited to 8-bit monochrome BMP files. The size of the image that can be attached differs by the font size used. The default value is 82x20 pixels.
  Also use caution as the image colors after inserting the image change color according to the brightness: 0-10 are transparent, 11-20 are black, 21-255 are unchanged.

6. To use a color for background of information display, check the “Using background” checkbox and click the [Background Color] button.
Specify a color of your choice and click the [OK] button.



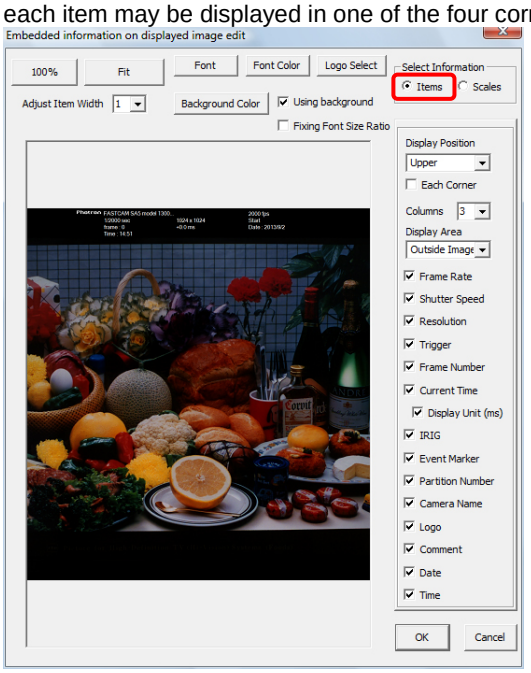
7. Specify shot information
Select “Items” in the “Select Information” section.



Supplement

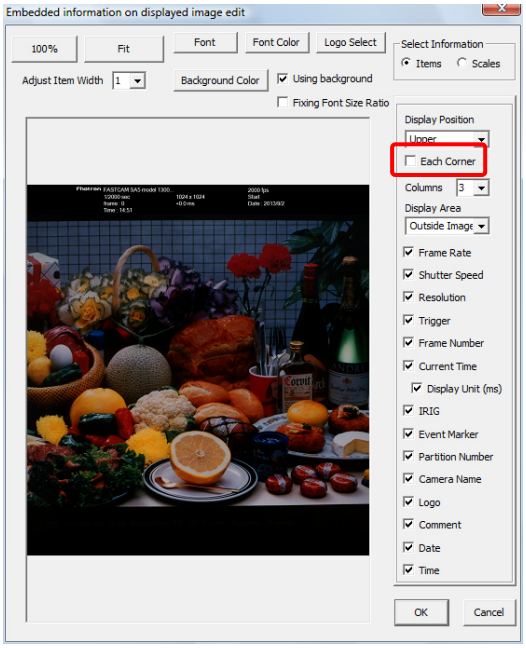
- For information selection, either “Items” or “Scale” may be selected first.
  Also, a selection of “Items” or “Scale” only is possible.

8. For “Items”, all relevant shot information may be displayed as a group in any place, or one each item may be displayed in one of the four corners.

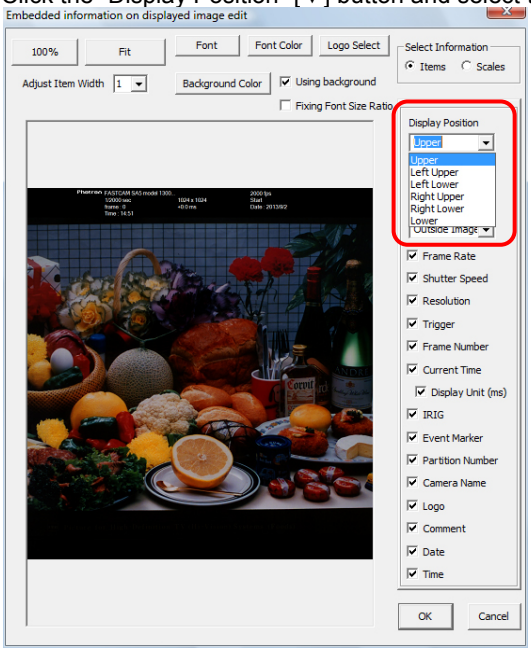


- All pieces of relevant shot information displayed as a group in one place

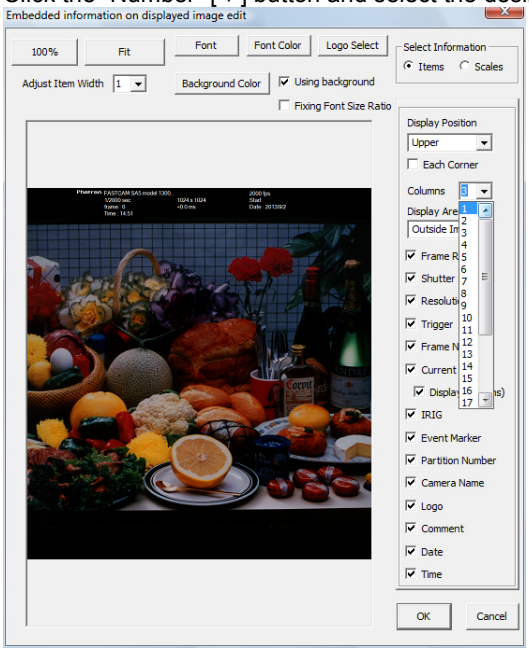
  i. Be sure to see that the “Each Corner” checkbox is NOT checked.



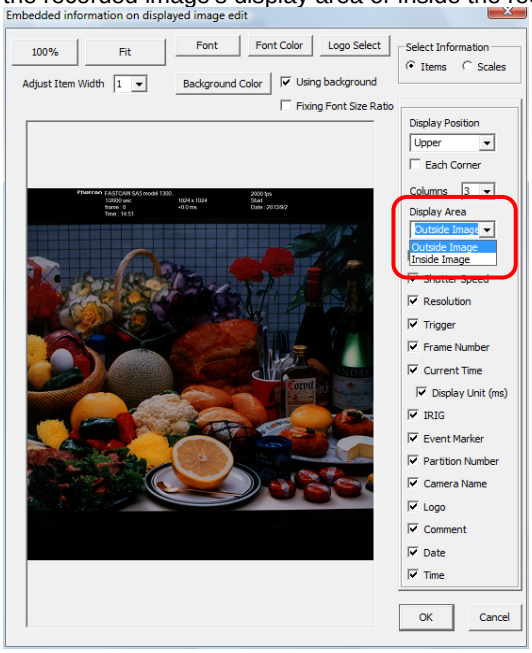
ii. Set the preferred position for the shot information to be displayed.
Click the “Display Position” [▼] button and select the desired position from the list.



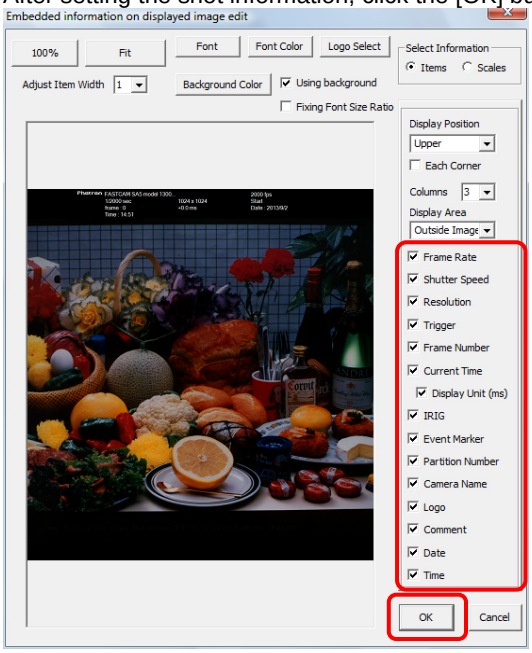
iii. Set the number of columns for shot data to be displayed. This determines how many rows your information will require to be displayed., The example below shows three columns of data.
Click the “Number” [▼] button and select the desired number of columns.



iv. Set the display area.
Click the “Display Area” [▼] button and select to display the shot information outside of the recorded image’s display area or inside the recorded image’s display area.



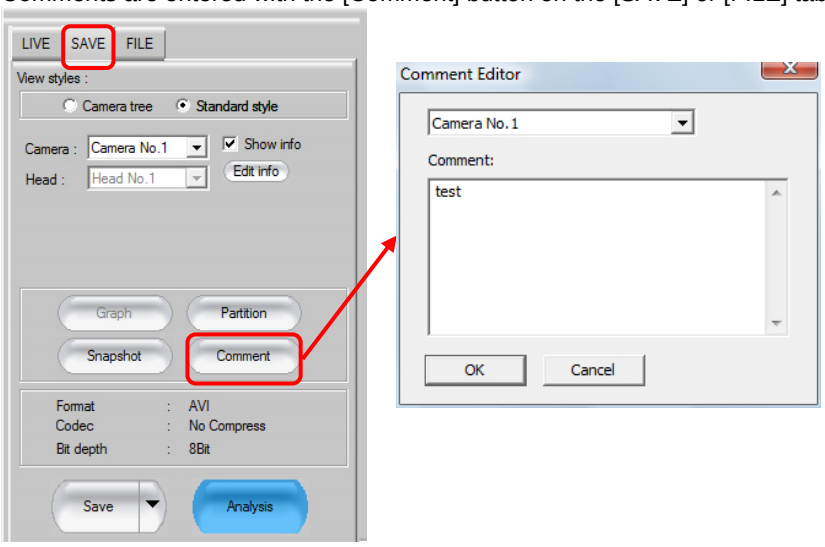
v. Select the items to display as shot information. Check the items to display.
After setting the shot information, click the [OK] button.



Item	Description
Frame Rate	Display the frame rate as fps (frames/sec) used for the recording
Shutter Speed	Display the shutter speed used for the recording
Resolution	Display the resolution used for the recording
Trigger	Display the trigger mode used for the recording
Frame Number	Display the frame number (When PFV has been set in the configuration settings to display the start frame as “0”, the number is displayed as 0, when not set, the number is displayed as 1)
Current Time	Display the number of seconds in the recording (The count is set from the trigger frame)
Display Unit (ms)	Display the time code in millisecond units
IRIG	Display the IRIG time for each frame when the image has been recorded with an IRIG time signal input
Event Marker	Display Event N (N=1-10) when event markers were used
Partition Number	Display the partition number
Camera Name	Display the model name of the camera used to make the recording
Logo	Display the Photron company logo
Comment	Display the comment entered with the [Comment] button on the [Data SAVE] or [FILE] tabs
Date	Display the date the file was saved
Time	Display the time the file was saved

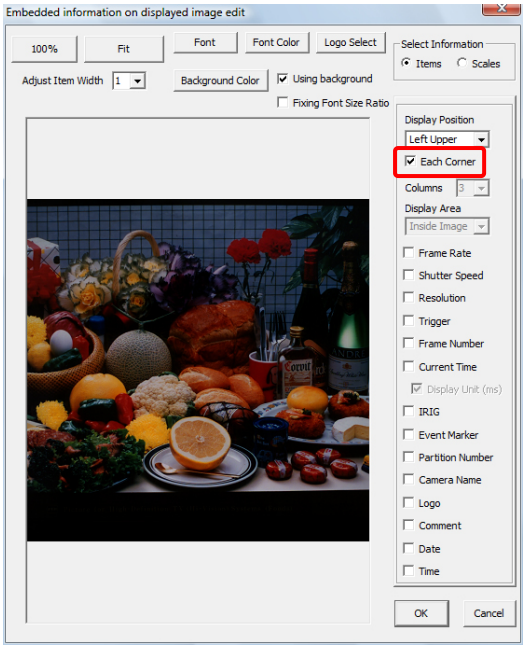
Supplement

- Comments are entered with the [Comment] button on the [SAVE] or [FILE] tabs.

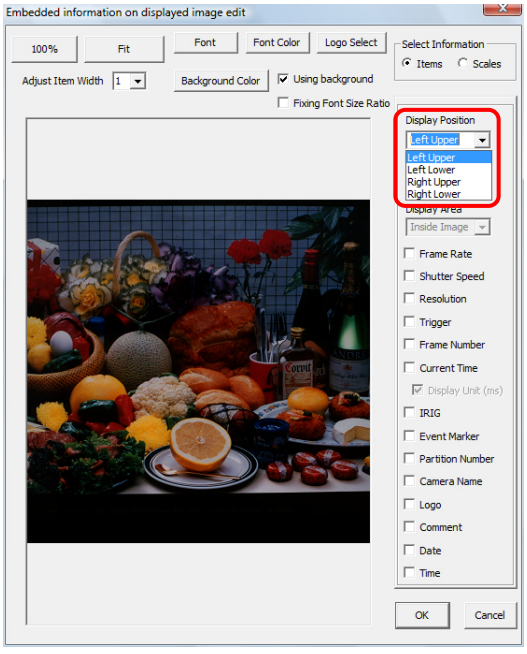


- To display one each piece of shot information in one of the four corners.

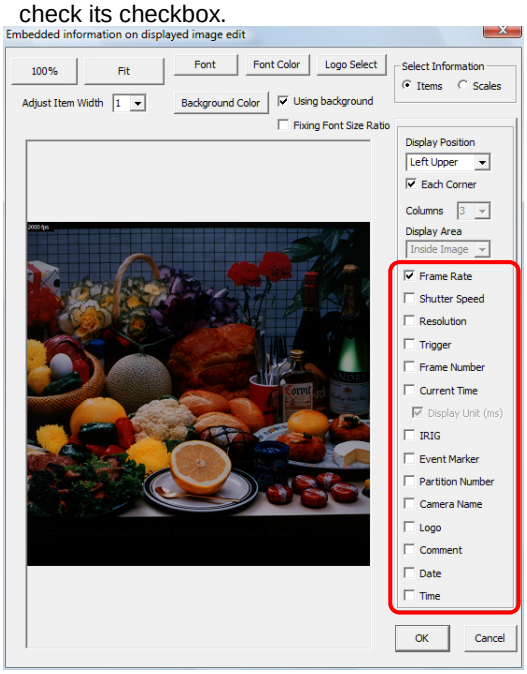
i. Check the “Each Corner” checkbox.



ii. Click the “Display Position” [▼] button and select the desired display position from the list.

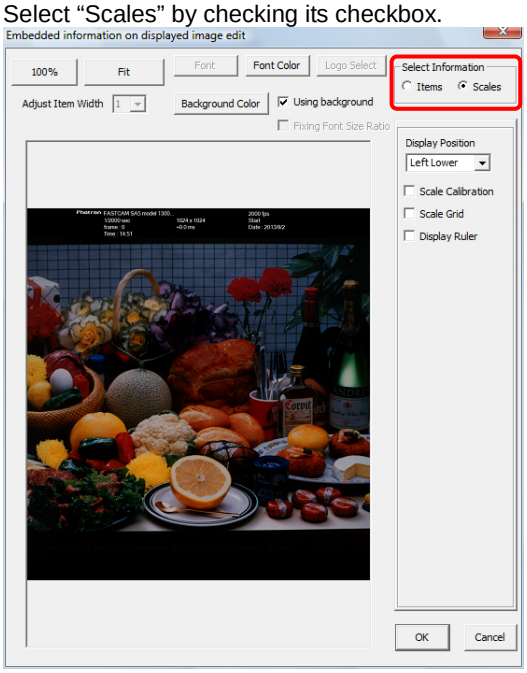


iii. Specify the item to be displayed as shot information. Select one item to display and check its checkbox.

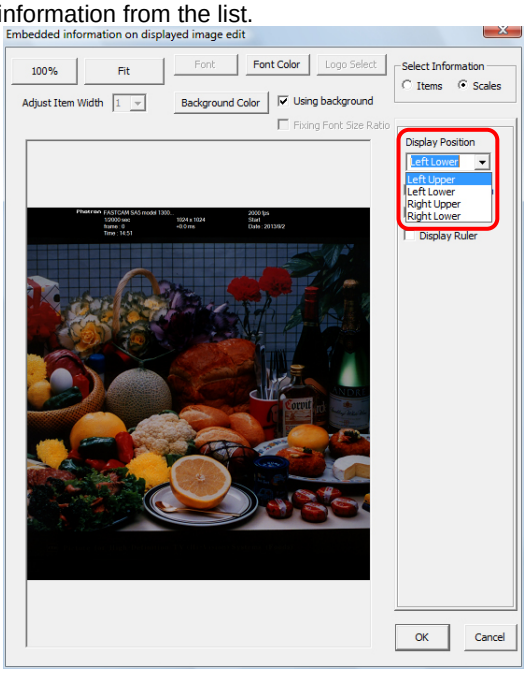


iv. Repeat steps 2 and 3 to set all the shot information, piece by piece, in the four corners.

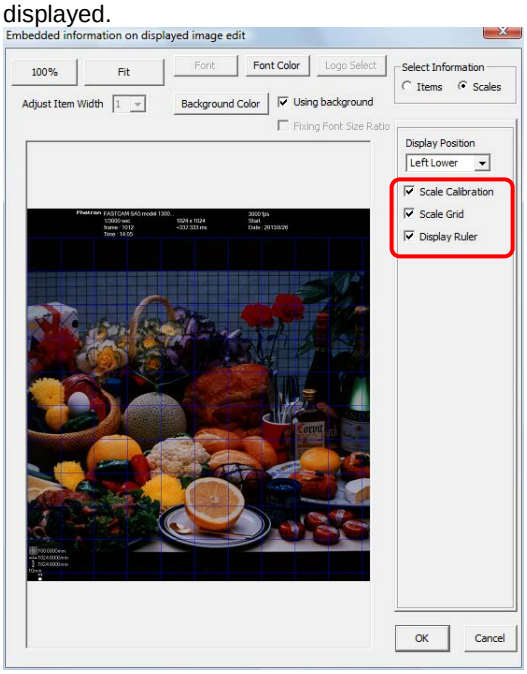
9. Specify the scale information.
Select “Scales” by checking its checkbox.



10. Click the “Display Position” [▼] button and select the desired position to display the scale information from the list.

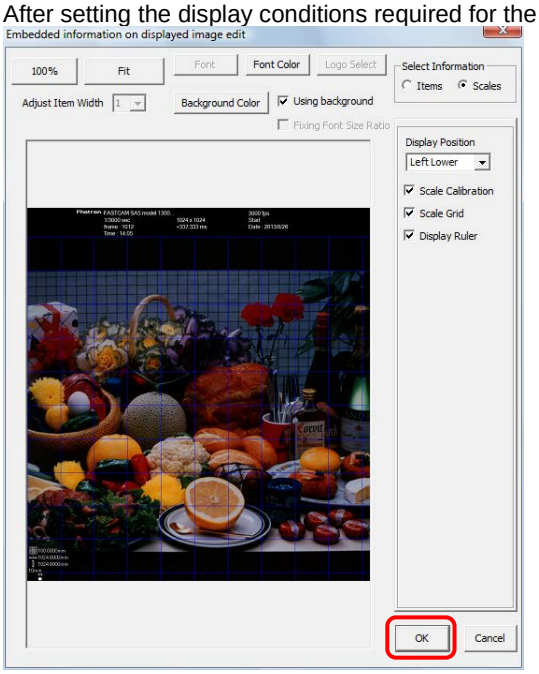


11. Specify the items to be displayed as shot information. Check all items that should be displayed.

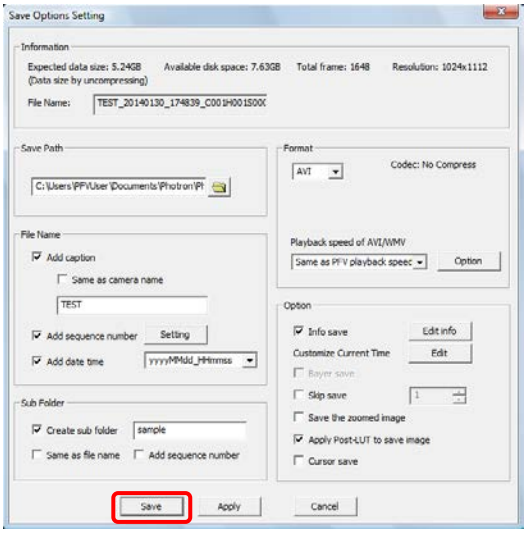


Item	Description
Scale Calibration	Displays scale information (Information is displayed in the place specified in “Display Position”)
Scale Grid	Displays a scale grid in the image.
Display Ruler	Displays a ruler in the image.

12. After setting the display conditions required for the information, click the [OK] button.



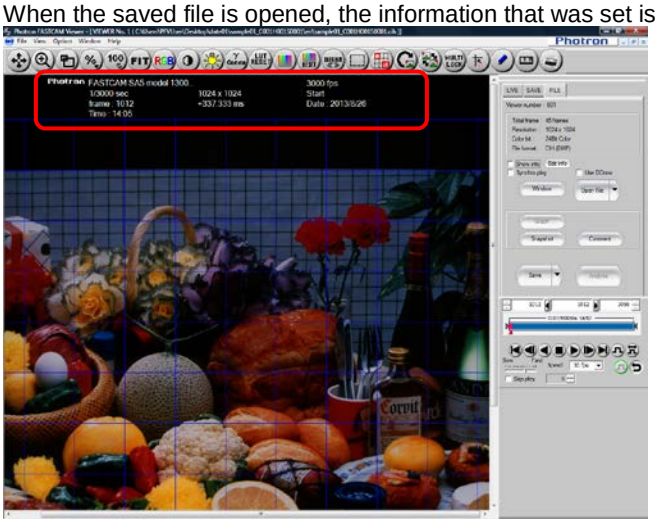
13. After setting the save location and file format, click the [Save] button.



Reference

- For how to save, refer to “5.1.2.Saving Files”, page 214.

14. When the saved file is opened, the information that was set is displayed.



Caution

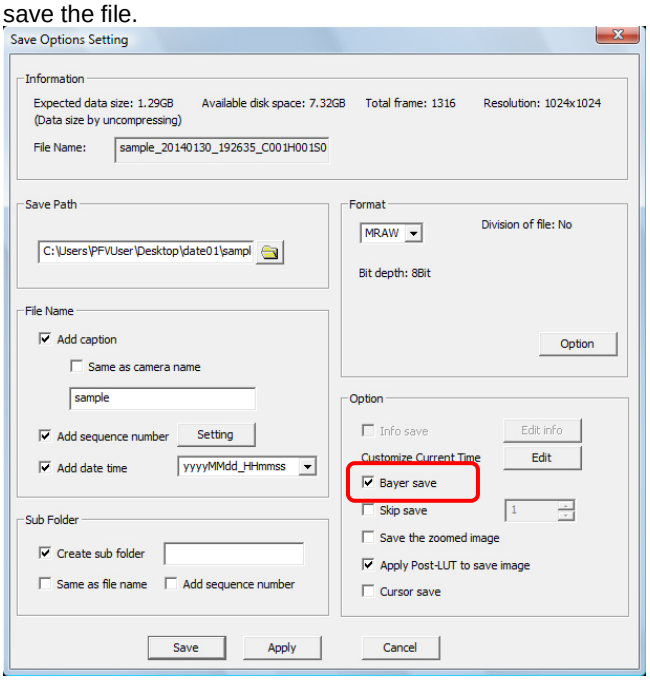
- Saved added data is embedded in the image and therefore cannot be deleted.

Reference

- For how to display saved files, refer to “6.1. Playback Image Data Saved to the PC”, page 270.

5.2.2. Save As Bayer Pattern

On a single-chip color camera RGB color filters are arranged on top of the pixels in a checkerboard pattern in order to obtain a color image. The color image is ultimately created by an algorithmic process. This method of representation is the Bayer method.
With PFV, the monochrome image shot by a single-chip camera sensor, the image before being created as a color image, can be saved as-is (Bayer save) to reduce download time and file size.
To perform a Bayer pattern save, check “Bayer save” on the “Save Options Setting” dialog box and save the file.



When the file format is “FTIF”, the image is always saved as a Bayer pattern.
The images saved as a Bayer pattern are displayed as monochrome. The size of the output file is one-third the size of a color image.
However, it can only be read as a color image and the color temperature adjusted when the file format is set to “RAW”, “RAWW”, “MRAW” or “TIFF”. Set the color read setting with [Option] – [Configuration] on the menu bar.

Important

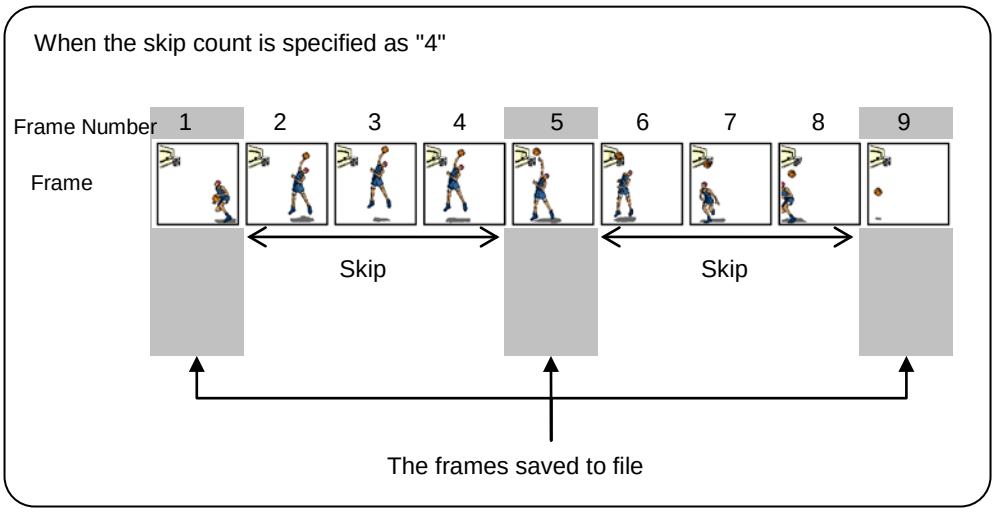
- Reading with as a color image is only valid for files saved with PFV 2.2 or higher.

Reference

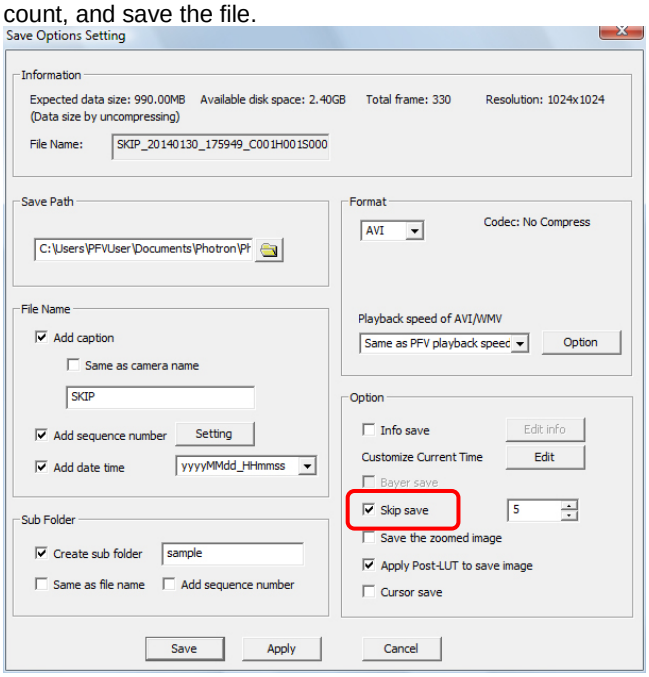
- For how to read with as a color image, refer to “1.2.7. Load Bayer Pattern File as Color” in Configuration section.
  For color temperature adjustment, refer to “6.1.3. Saved Data Color Temperature Adjustment”, page 276.

5.2.3. Skip Save

You can save while skipping the desired number of specified frames.

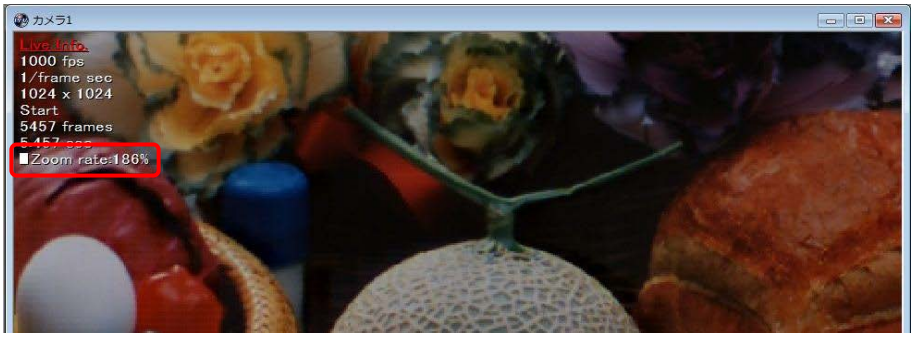


To perform a skip save, check “Skip save” on the “Save Options Setting” dialog box, enter a skip count, and save the file.

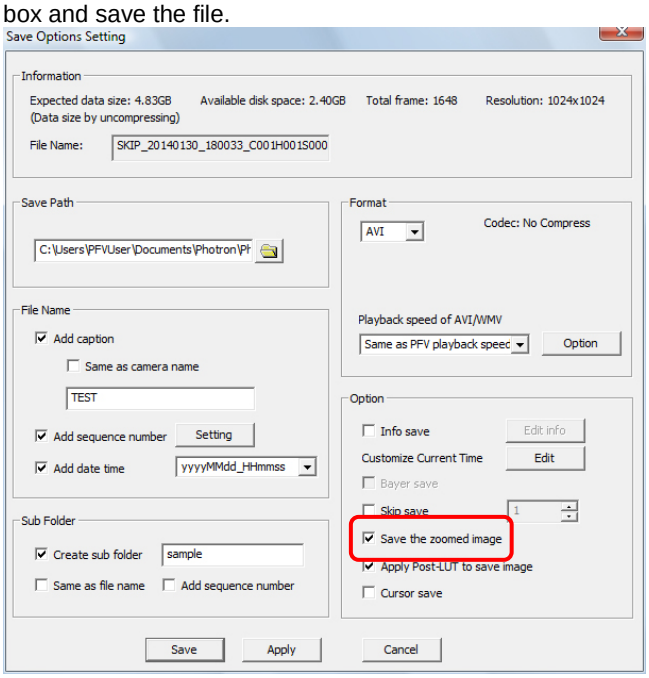


5.2.4. Resize Image and Save

An image displayed resized in the view window can be saved with that zoom rate.
Display the image to save resized in the view window.
The zoom rate can be checked with the view window information. When saving resized images is enabled, "■" is displayed before "Zoom rate".



To save the resized image, check "Save the zoomed image" on the "Save Options Setting" dialog box and save the file.



Caution

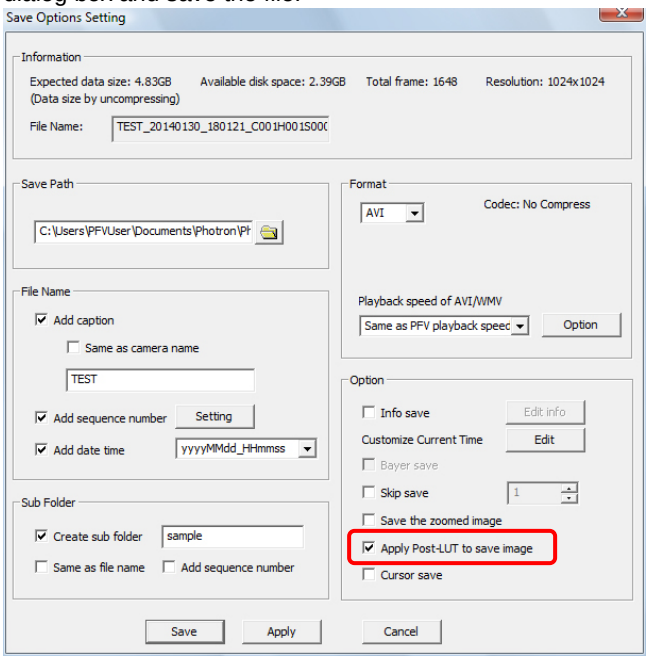
- File formats which can be saved resized as listed below.
  BMP, TIFF, JPEG, PNG, RAW (excluding Bayer format), RAWW (excluding Bayer format), MRAW (excluding Bayer format), AVI, MOV

5.2.5. Apply Post-LUT to Saved Images

"Apply Post-LUT to save image" is used to save the LUT settings (brightness, gamma and contrast) of PFV with the file.

The file reflecting the settings is saved.

To save the LUT settings, check "Apply Post-LUT to save image" on the "Save Options Setting" dialog box and save the file.



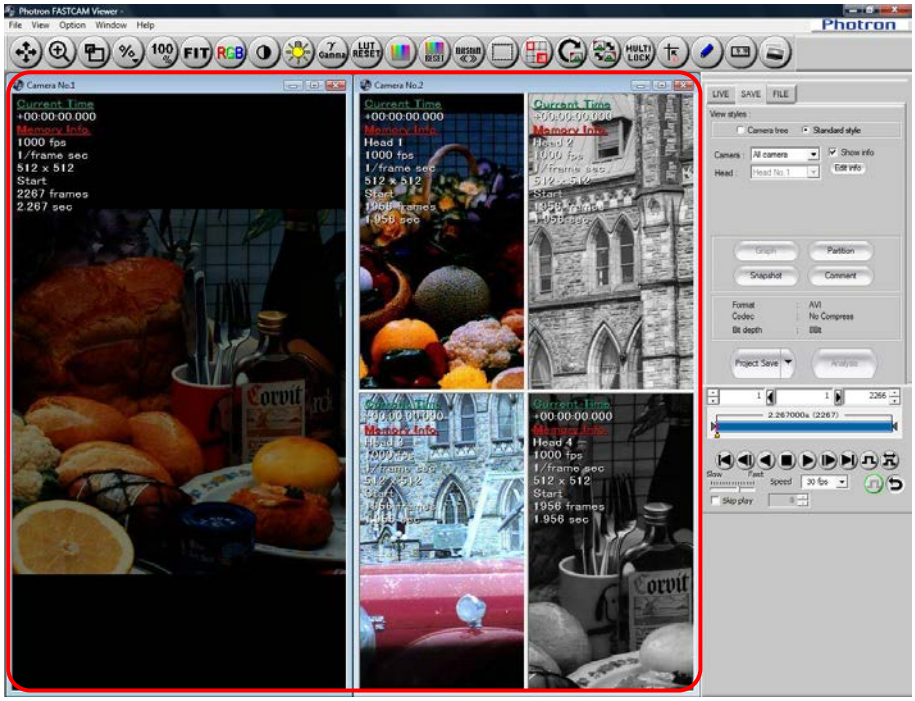
Supplement

- When unchecking "Apply Post-LUT to save image", the file is saved with Pre-LUT settings.
  Post-LUT: LUT set on the view window
  Pre-LUT: LUT set by the [Camera Option] button

5.3. Saving Project Files

PFV can save multiple image data as a single file (project file).
If a project file is saved, when the project file is opened next multiple saved files can be opened at once.

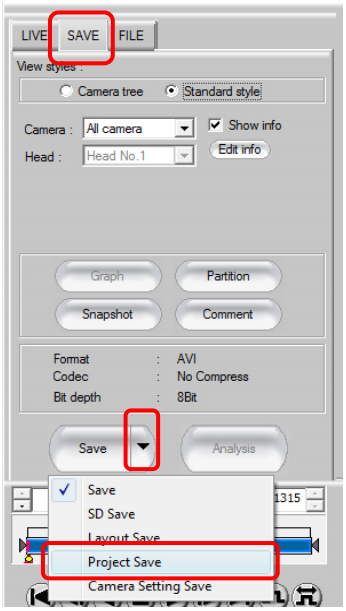
1. Display the recorded data to save.
Display all the data to save together.



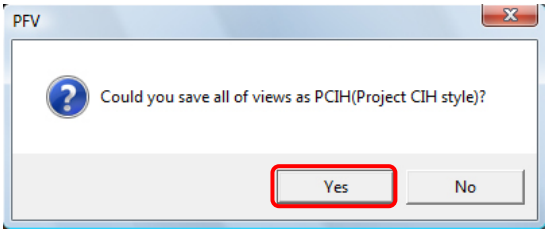
Reference

- For how to display images, refer to "4.1. Playing Images Recorded On the Camera", page 192.

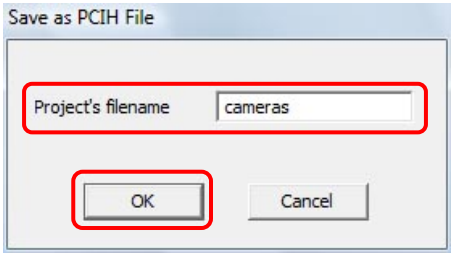
2. Click [▼] on the right of the [Save] button on the control panel and select “ Project Save”.



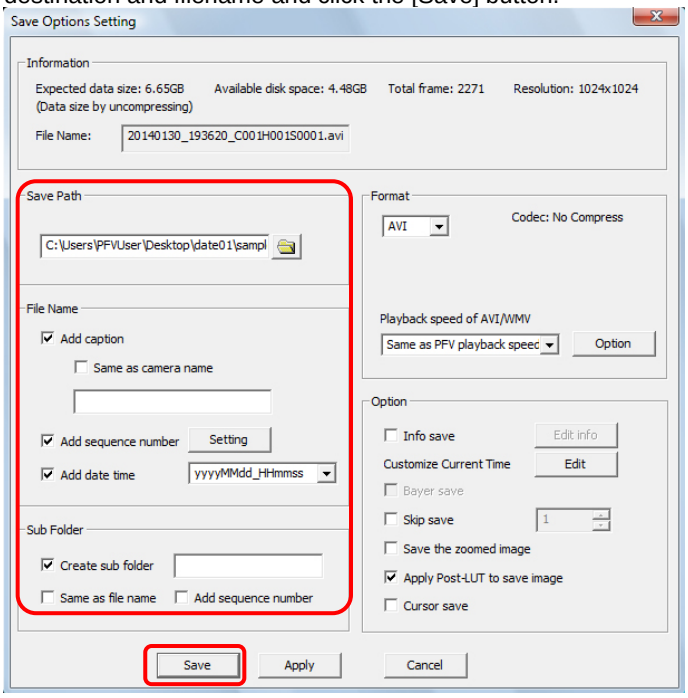
3. To save a project file, click the [Yes] button.



4. Enter the project file name in [Project’s filename], then click the [OK] button.



5. On the “Save Options Setting” dialog box, set the usual setting parameters including destination and filename and click the [Save] button.



Supplement

- The project file is saved in the location specified by "Save Path".

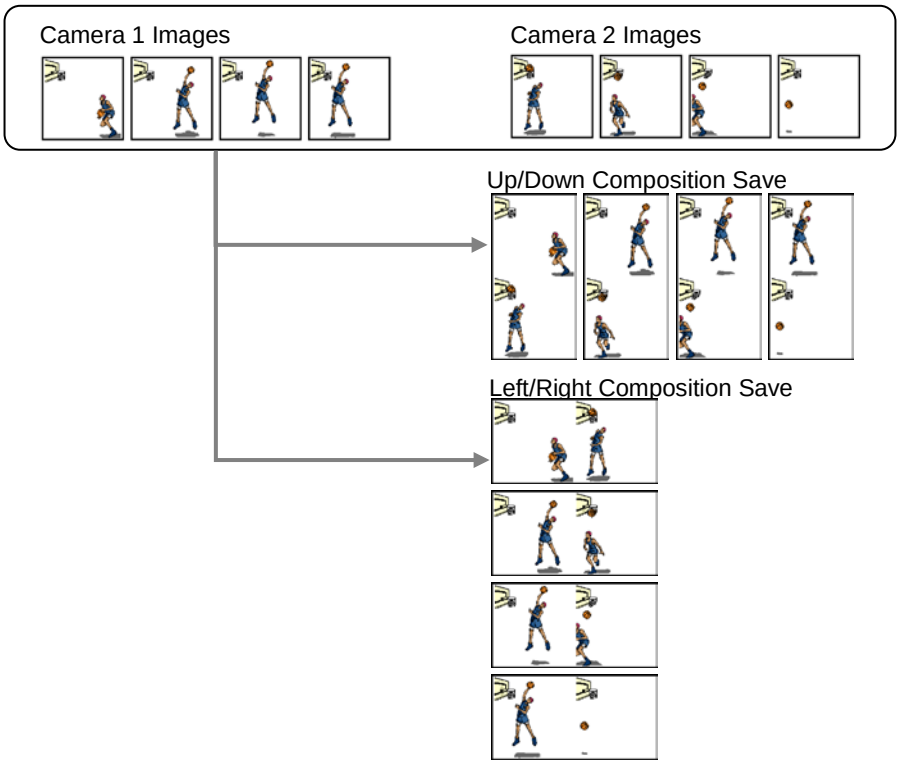
6. The paths of CIH formatted files included with the saved recorded data are listed in the project file and saved in the PCIH format.
To open the file, open the PCIH formatted file with the same procedure as other saved data.

Reference

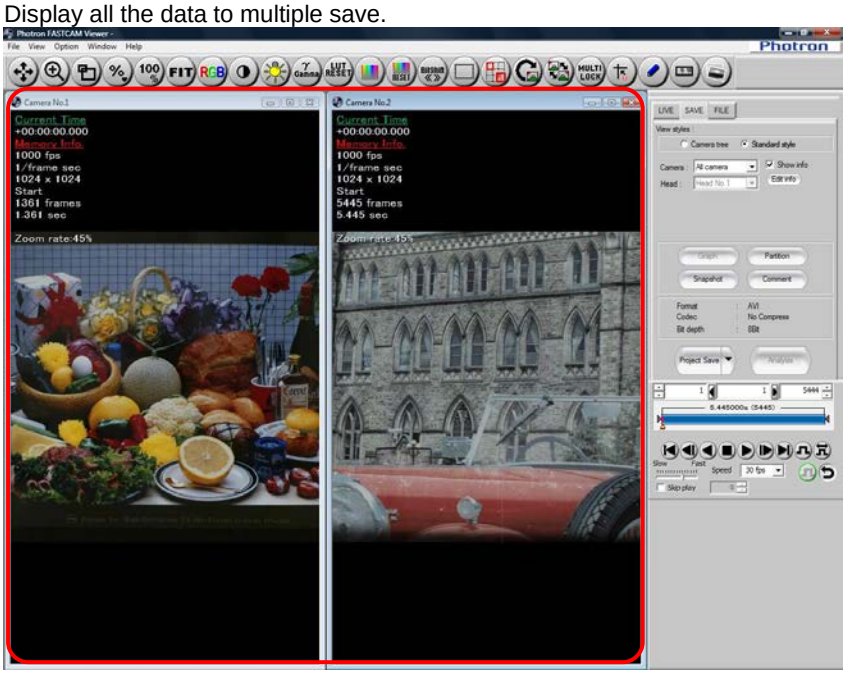
- For how to save files normally, refer to "5.1.2. Saving Files", page 214.
- For how to open saved data, refer to "6.1.1. Open Saved Data", page 270.

5.4. Layout Save

You can compose the images recorded with multiple cameras and heads into a single file and save. You can also save them together with the waveform data.



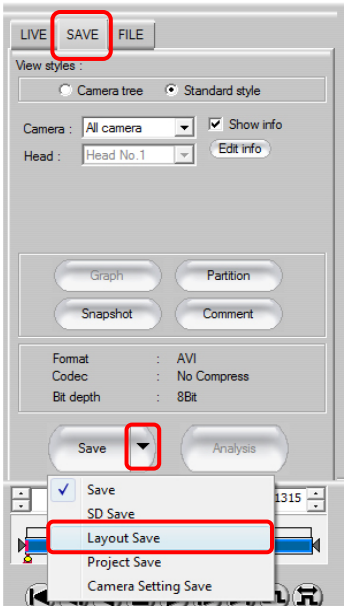
1. Display the recorded data to save.
Display all the data to multiple save.



Reference

- For how to display, refer to “4.1. Playing Images Recorded On the Camera”, page 192.
- For how to display waveform input data, refer to “Waveform Recording Manual”.

2. Click [▼] on the right of the [Save] button on the control panel and select “Layout Save”.



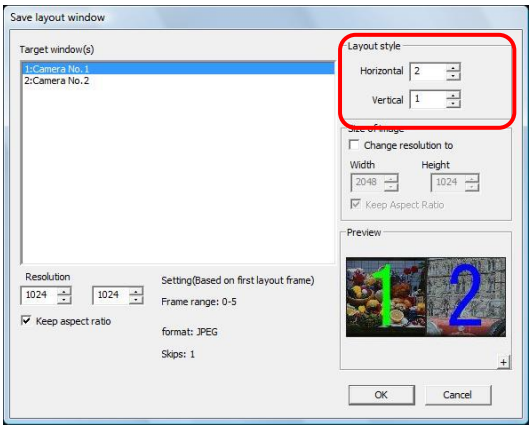
Caution

- You cannot save in a 16-bit format.
- When performing a layout save, a CIH file is not created.

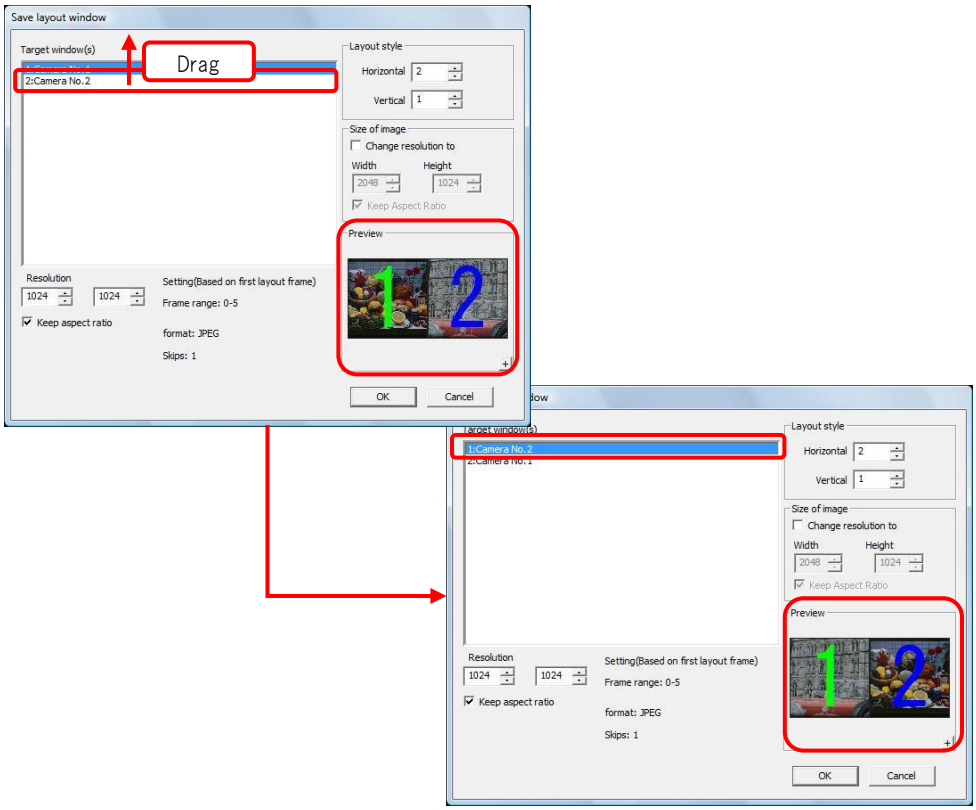
Reference

- For how to save normally, refer to “5.1.2. Saving Files”, page 214.

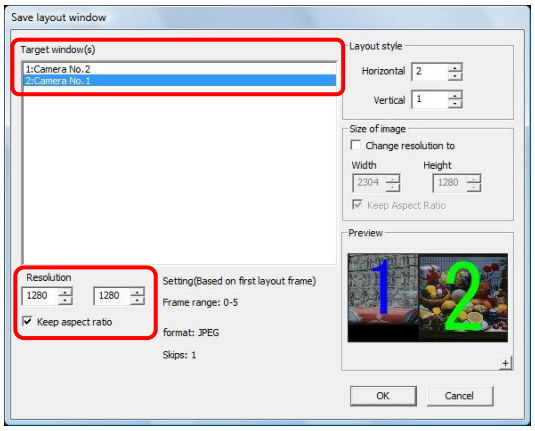
3. Specify the number of horizontal and vertical images in "Layout style".



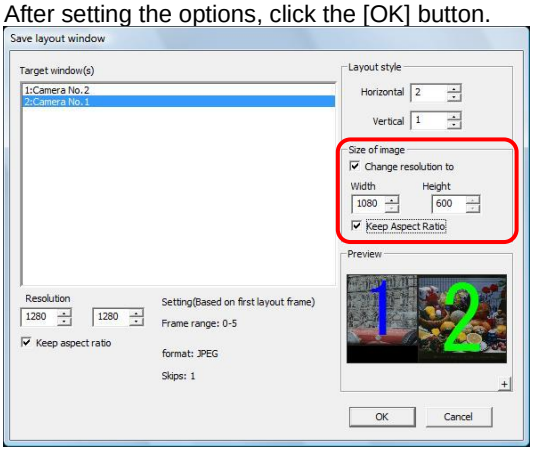
4. Arrange the windows to layout save.
The starting number for the windows to layout save is displayed in the list and the layout is displayed in "Preview". The layout displayed in "Preview" will be combined and saved as one image. To change the layout, drag and drop the desired windows in "Target window(s)" to change their numbers.



5. You can change the resolution for each image with "Resolution". Select the desired window in "Target window(s)" and specify the desired value in "Resolution".



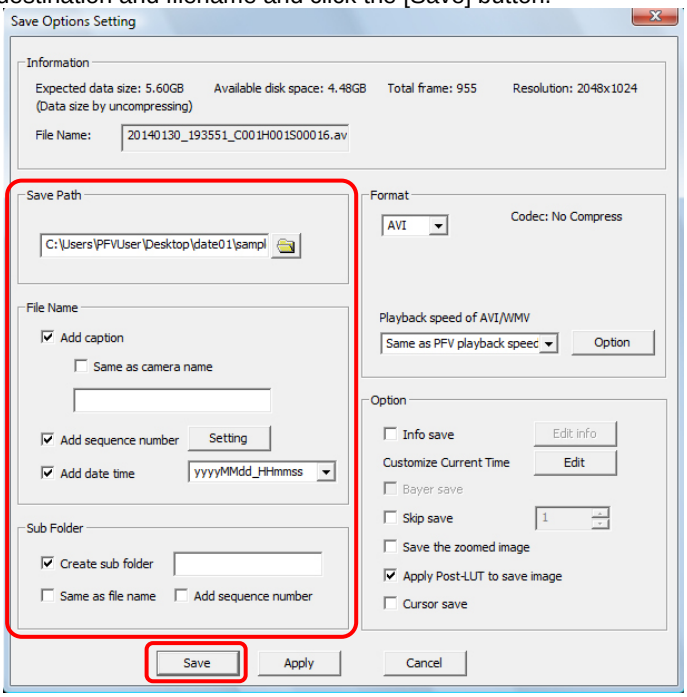
6. You can change the overall image size after the windows are laid out with "Size of image". Check "Change resolution to" and specify the size of the overall image with "Width" and "Height".
After setting the options, click the [OK] button.



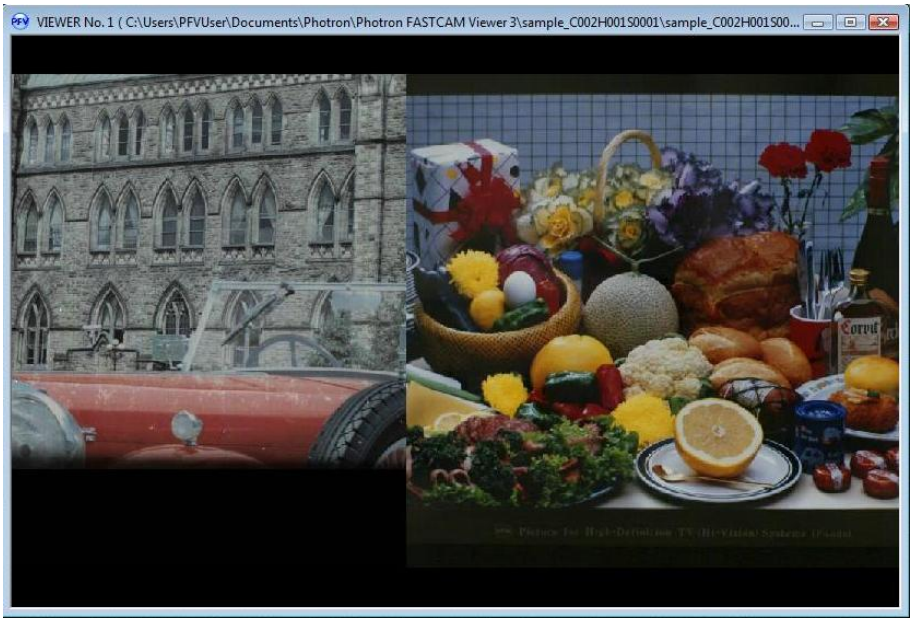
Supplement

- You can preview the layout at the image size it will save by clicking the [+] button in "Preview".

7. On the “Save Options Setting” dialog box, set the usual setting parameters including destination and filename and click the [Save] button.



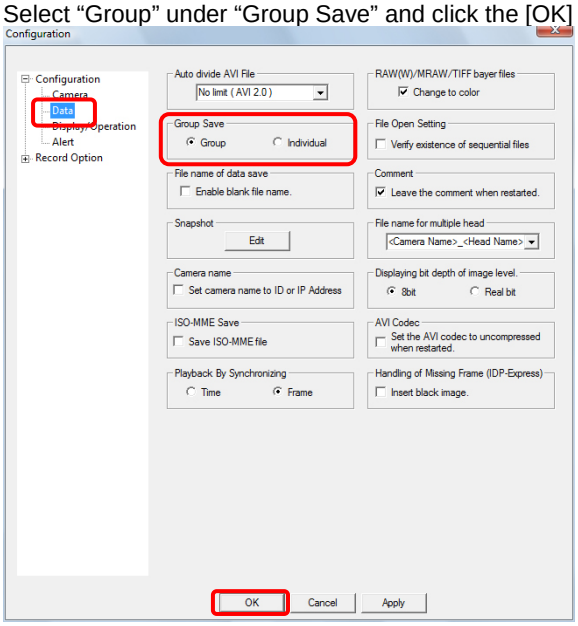
8. The layout is saved.
The file that was saved is composited and displayed.



5.5. Group Saving Files for Specified Partitions

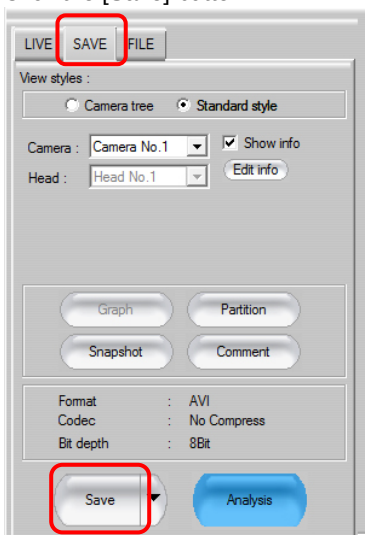
For cameras with memory divided into partitions, you can group save the images from multiple partitions to the PC.
You can group save files from multiple cameras and multiple partitions.

1. Display the “Configuration” dialog box from the [Option] menu – [Configuration] and display “Configuration” – “Data” on the left-side tree display.
Select “Group” under “Group Save” and click the [OK] button.



2. Display the “SAVE” tab on the control panel and select the camera that recorded the images to save to file.
Select the desired camera with “Camera”. When saving the images of all cameras, select “All Cameras”.

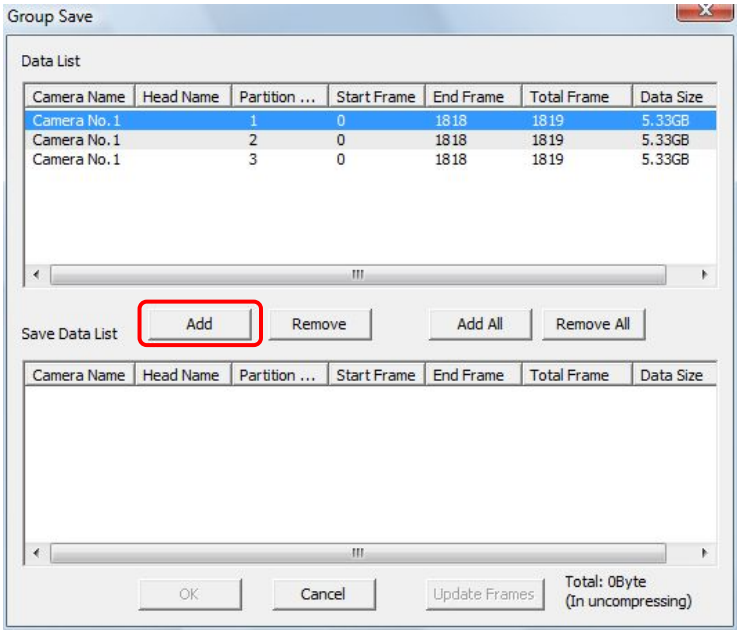
3. Click the [Save] button.



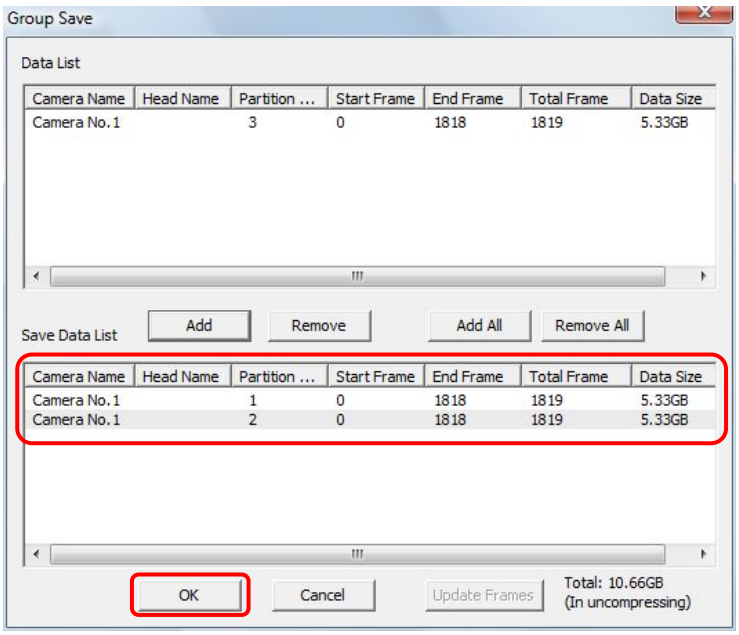
Reference

- For how to save normally, refer to “5.1.2. Saving Files”, page 214.

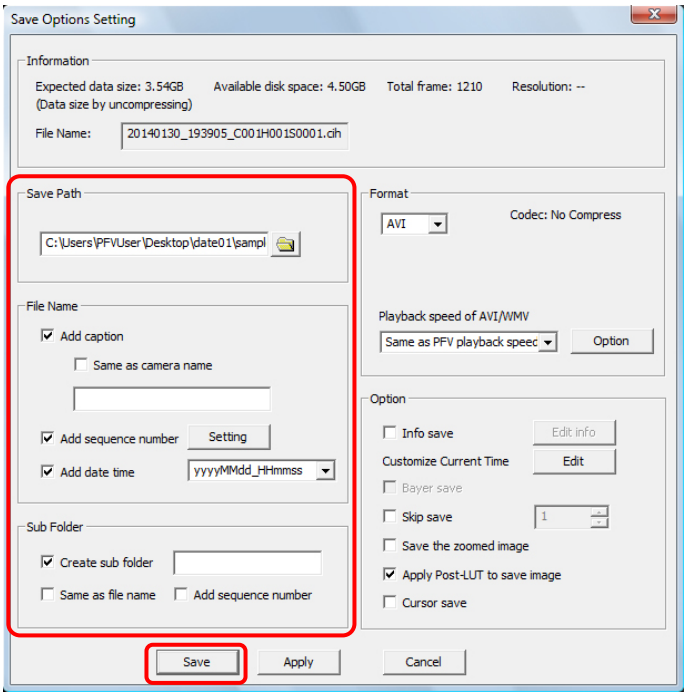
4. A list of cameras and partitions that can have files saved is displayed in the “Group Save” dialog box.
Select partitions to group save and add them with the [Add] button.



5. Verify the partitions to save displayed in the “Save Data List” and click the [OK] button.



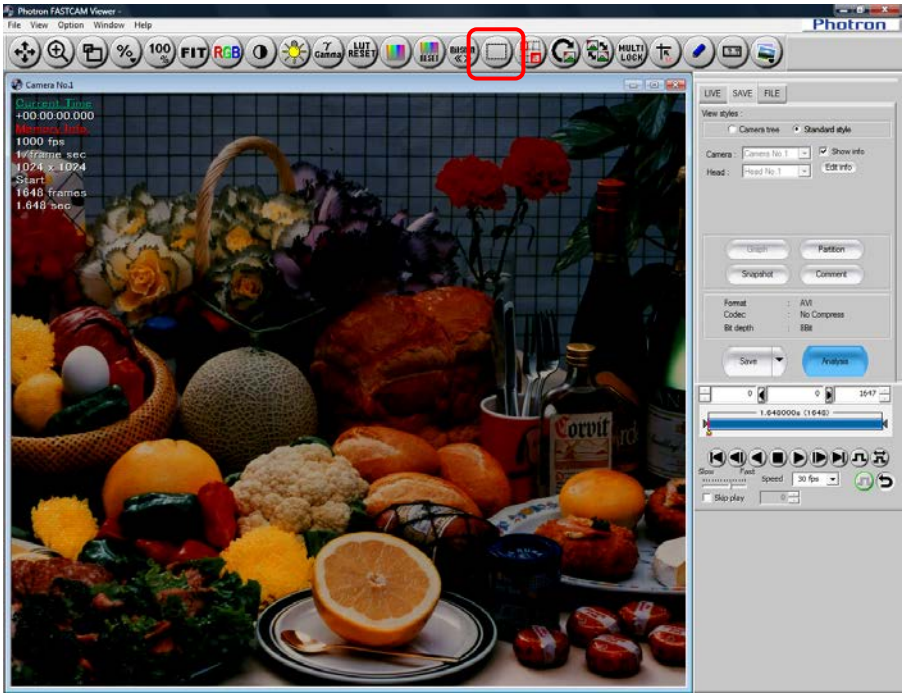
6. On the “Save Options Setting” dialog box, set the usual setting parameters including destination and filename and click the [Save] button.



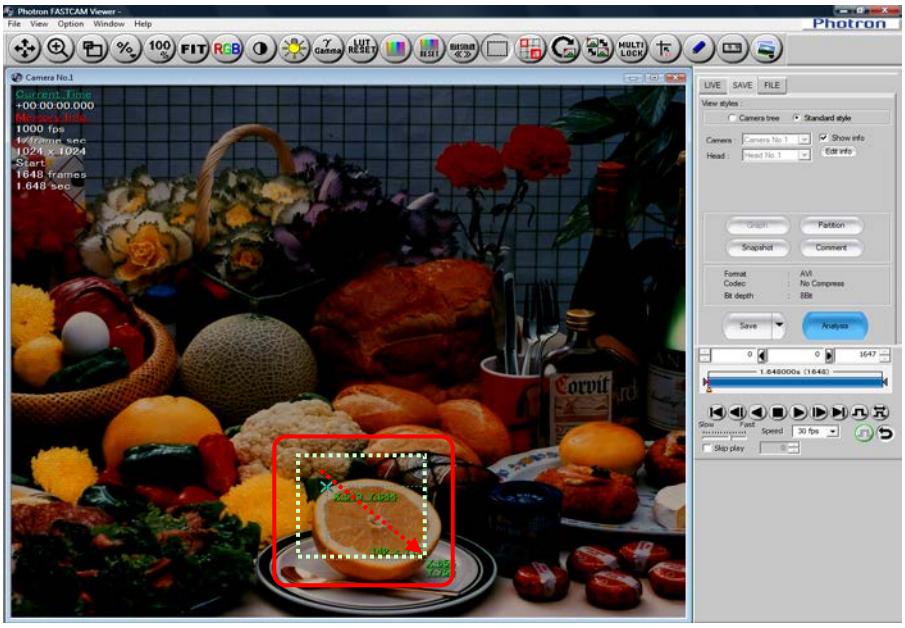
5.6. Saving a Portion of an Image

Just a portion of the image can be saved.

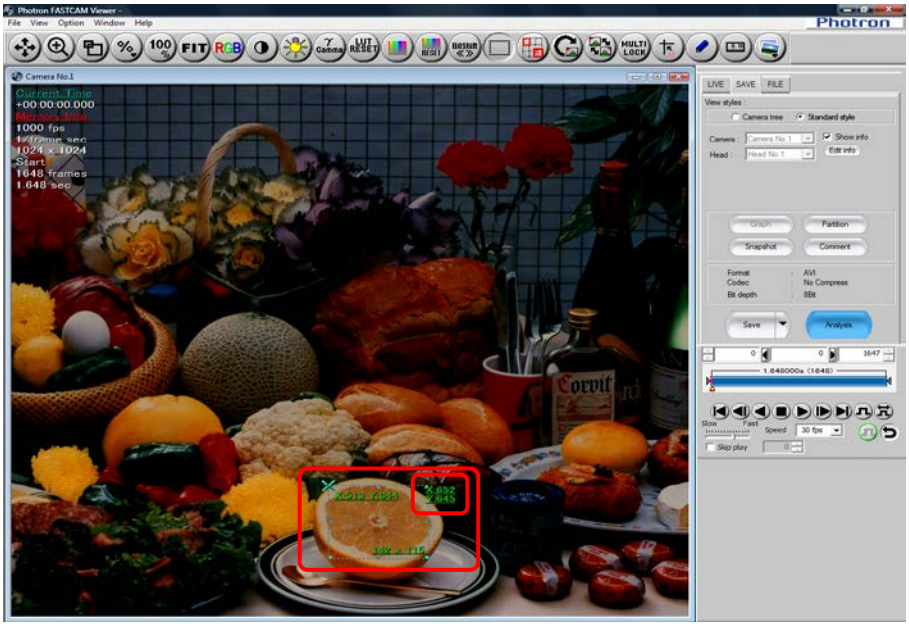
1. Display the image data and click [Area Save] button on the toolbar.



2. Select the area of the image to save. Drag the cursor to draw a rectangle.
The coordinates for the point are displayed in the mouse pointer. Select a range and the start point coordinates are displayed at the start point, the resolution is displayed at the end point.

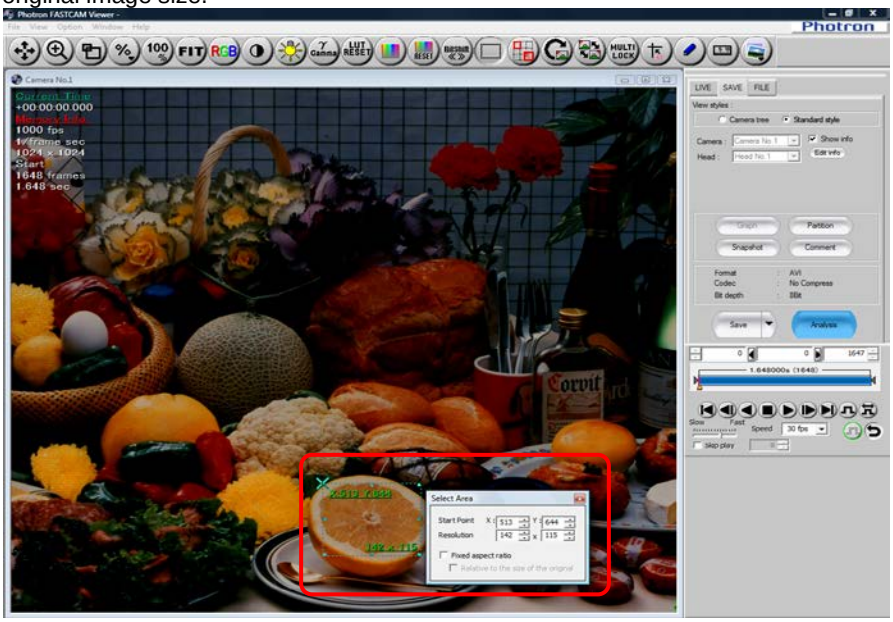


3. If you point at the specified range frame and drag when the pointer becomes a bidirectional arrow, you can change the start coordinates and the resolution.

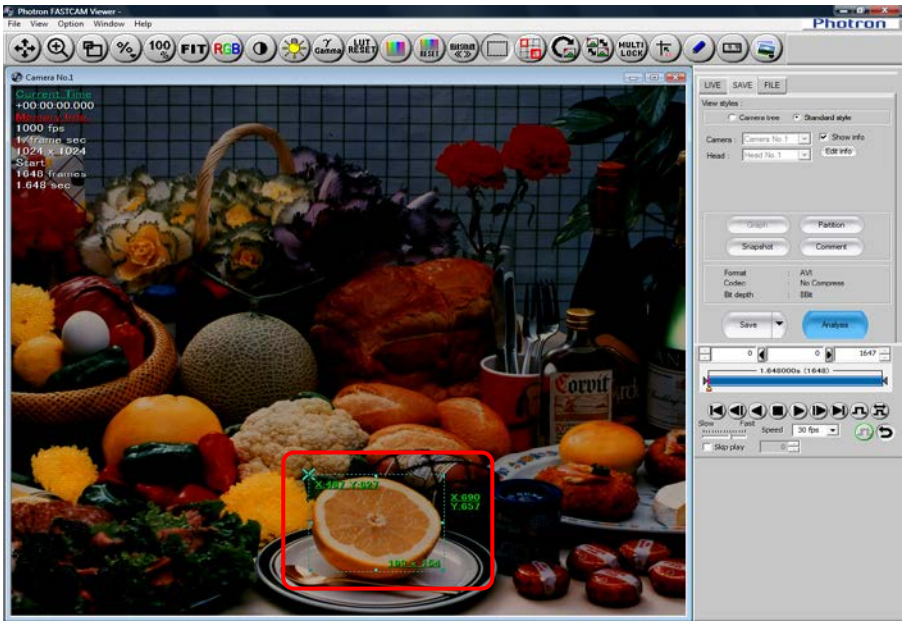


Supplement

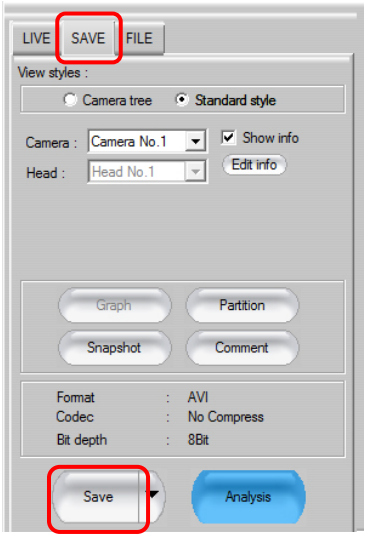
- Right click inside the specified range to display the “Select Area” dialog box. You can also change the start coordinates and resolution by specifying the values on the “Select Area” dialog box.
- If you select the "Fixed aspect ratio" check box, the aspect ratio when the check box was selected is maintained and the resolution changes. This setting is applied when the value is specified and when the value is changed by dragging with the mouse.
  If you select the "Relative to the size of the original" check box, the aspect ratio is fixed to that of the original image size.



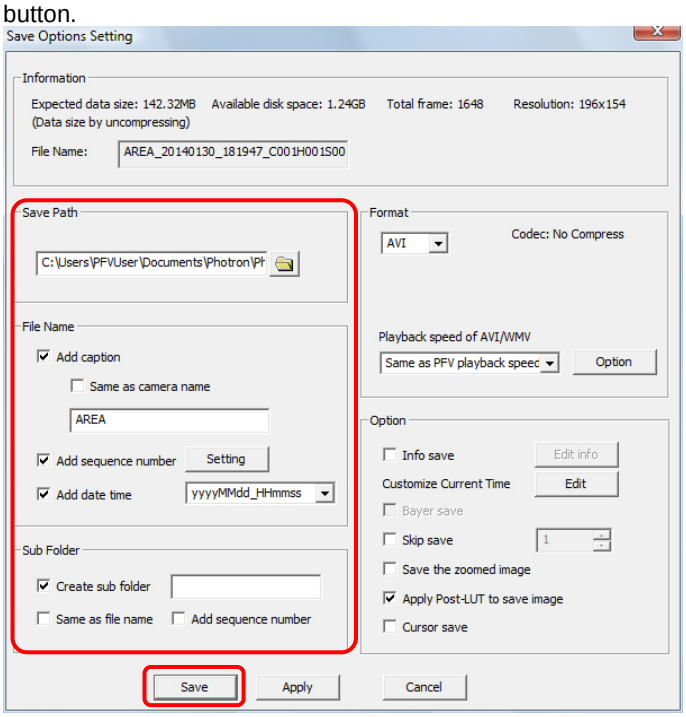
4. You can move the range by dragging inside the specified range.



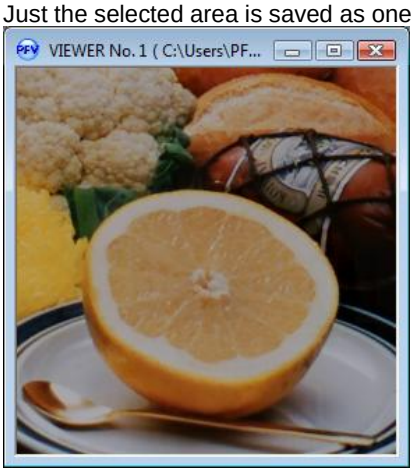
5. Display the “SAVE” tab on the control panel and click the [Save] button.



6. On the “Save Options Setting” dialog box, set the saving parameters and click the [Save] button.



7. Just the selected area is saved as one image (frame).



Caution

- When saved as an AVI, an error may occur depending on the selected resolution and codec.

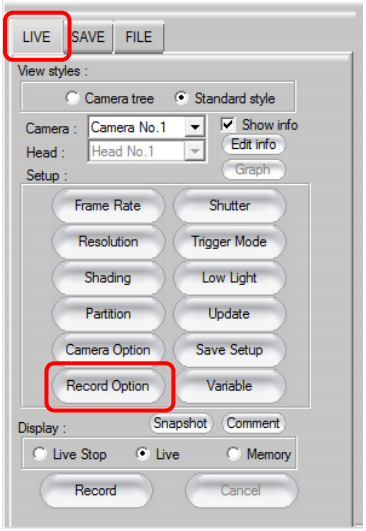
Supplement

- After selecting the area, the image can be copied to the clipboard by pressing the “Ctrl” key plus the “C” key on the keyboard.

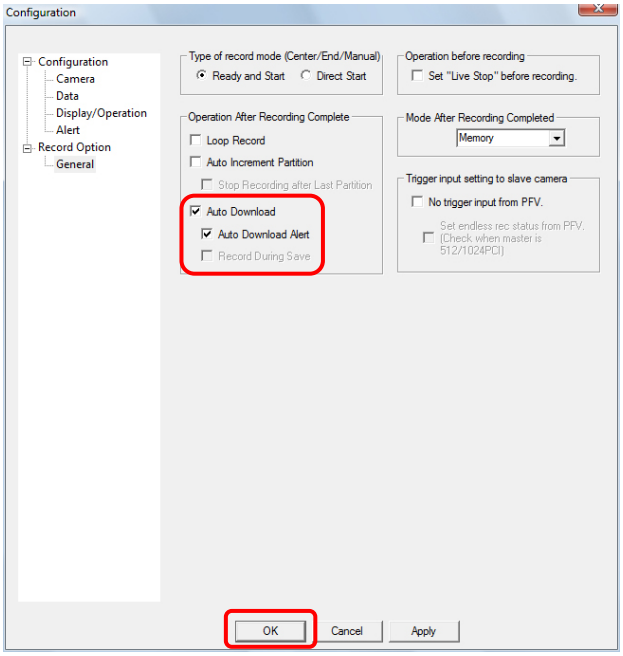
5.7. Automatic save Setting

PFV can be set to automatically save data to the PC as files immediately after making a recording.

1. Display the “LIVE” tab on the control panel and click the [Record Option] button.

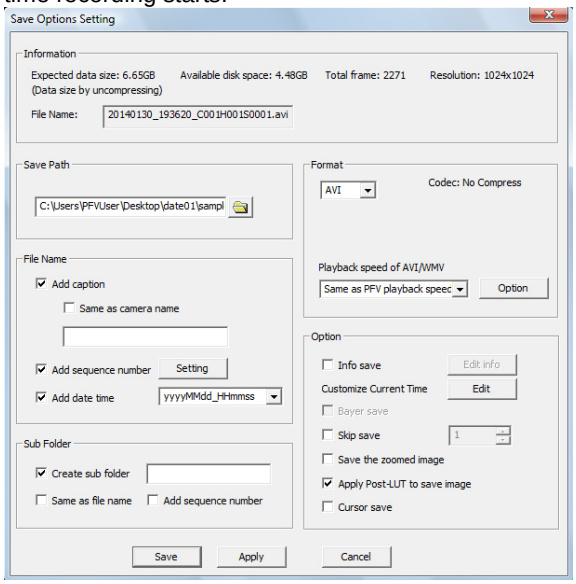


2. Check “Auto Download” and click the [OK] button.
After setting this option, when recording has finished, the data is automatically saved as files.



Supplement

- If “Auto Download Alert” is checked, the “Save Options Setting” dialog box is displayed when recording starts (when the [Record] button is clicked), and the location, etc., can be specified each time recording starts.

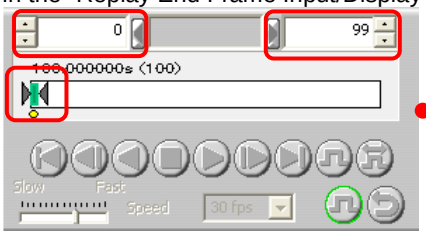


When “Auto Download” is checked and “Auto Download Alert” is not checked, the files are saved during shooting with the options (save path, filename, file format, etc.) set in PFV.

- To save only the desired frames, specify the frames with the playback control panel before saving as files.

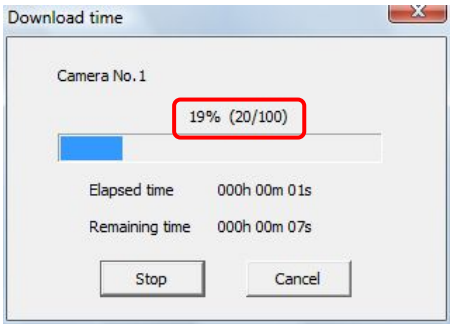
When auto save has been set, specify the frame count before recording.

4. Specify the frame count to save as files using the playback control panel before recording. Drag the playback slider bar’s “Replay End Frame Handle” or enter the end frame number in the “Replay End Frame Input/Display” box, then start recording.



In this case, frame 0-99 are automatically saved

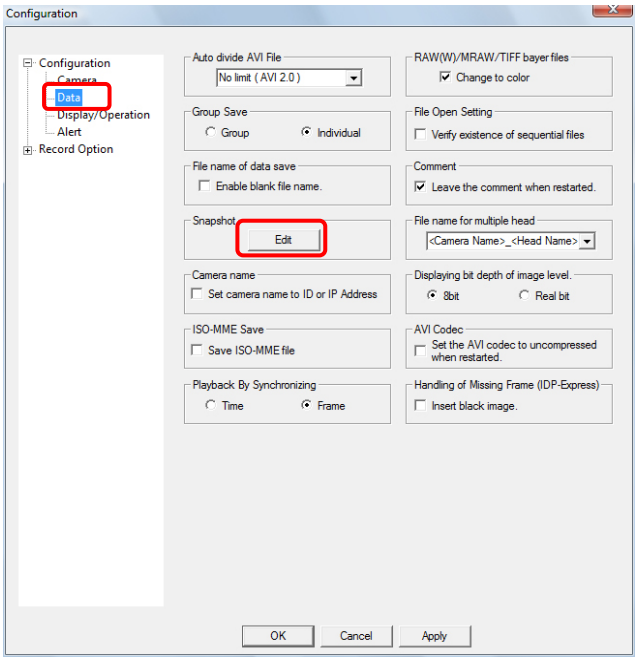
5. After shooting (recording) tme maximum number of frames, up to the camera’s memory capacity, the images are automatically saved as files, and only the specified frame count is saved.



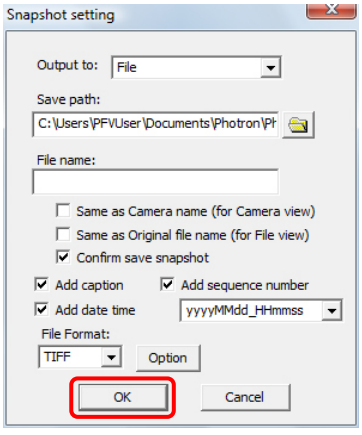
5.8. Saving a Snapshot Image

The image displayed in the view window can be copied to the clipboard or saved as a file as a single snapshot.

1. Display the “Configuration” dialog box from the [Option] menu - [Configuration], and then from the tree view on the left side, display “Data” under “Configuration”.
Click [Setup] under “Snapshot”.



2. Set the output destination.
After configuring, click the [OK] button.



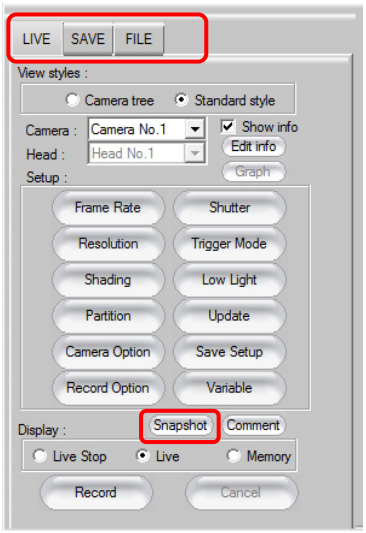
Item	Description
Output to	When the [Snap] button is pressed, specify whether to output the image to a file, copy the image to the clipboard, or to output the file and copy to the clipboard.
Save path	Specify the save destination when file output is specified with “Output destination”. The default value is “C:\Users\<user name>\Documents\Photron\Photron FASTCAM Viewer3\Snapshot”.
File name	Enter the file name when file output is specified with “Output destination”.
Same as Camera name	Check to make the camera name the file name. Valid when the “Snap” button is clicked on the “LIVE” or “SAVE” tabs on the control panel.
Same as Original file name	Check to output the file with the same name as the original file name. Valid when the "Snap" button is clicked on the "FILE" tab on the control panel.
Confirm save snapshot	Check to display a confirmation message after saving is complete.
Add caption	Uncheck when not using the content entered in “File name” for the file name. When unchecked, the file name is saved starting from the camera ID.
Add sequence number	Uncheck to save without adding the camera ID, head number, and session number to the file name. When unchecked, the file is saved with “File name”.
Add date time	Check the checkbox if you wish to add date or date/time to the image file name before saving. If checked, “Date” or “Date/Time” is added to the back of the file name. The date format can be set by the pulldown menu on the right of “Add date time”. The Format of the date is set in Environment Setting. Refer to “1.2.20. Setting date and time” in Configuration section.
File Format	Select the file format to save with. Click the [▼] button and select the desired format. Depending on the format, detailed settings, such as the compression ratio, can be configured when saving from the [Option] button.

Reference

- For file formats, refer to “5.1.3. Setting the Save Format”, page 220.

3. Click the [OK] button on the [Configuration] dialog box to close it.

4. After displaying the image to copy or save in the view window, click the [Snapshot] button on the control panel.



Supplement

- The [Snapshot] button is on all the control panel tabs (“LIVE” tab, “SAVE” tab, “FILE” tab).

5. The image is processed (file output, copying to the clipboard, etc.) with the method specified with “Output destination” in the configuration.

Caution

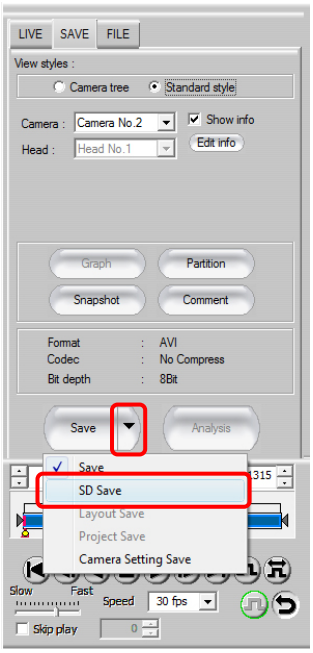
- When live images from multiple cameras are displayed, they cannot be synchronized images even if they are saved using the snapshot function.
  After the [Snapshot] button is clicked, each of the live images is saved one after another.

5.9. Saving Image to SD card

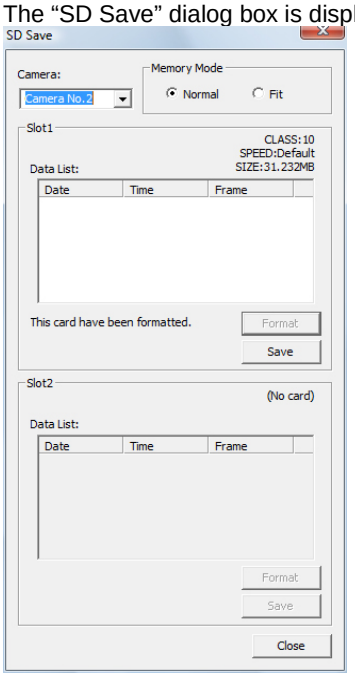
Some cameras can save the images directly to the SD card inserted to its slot. And, among those SD card compatible cameras, a certain cameras can save the images under the control of PFV without remote keypad.

1. Insert a SD card into the camera slot.

2. Display the “SAVE” tab on the control panel and click [▼] on the right of the [Save] button to select “SD Save”.

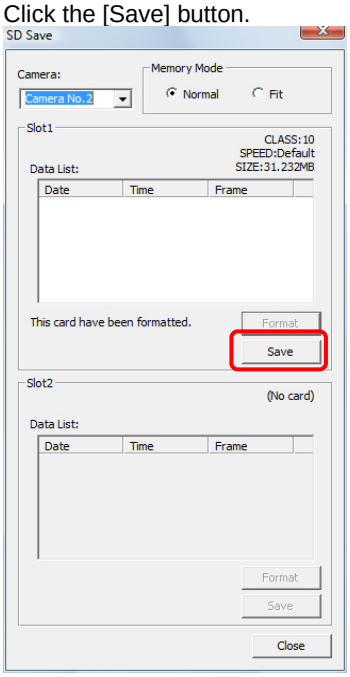


3. The “SD Save” dialog box is displayed.



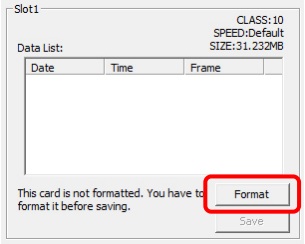
Item	Description
Camera	Open the pulldown menu and select the camera where data is saved.
Memory Mode	Specify if the shooting duration is limited within the SD card’s capacity. This setting can be made before shooting. Normal: Shooting is allowed to the full capacity of the camera memory. Fit: Shooting duration is limited within the SD card’s capacity.
Slot 1 Slot 2	Each camera has two slots for SD cards. You can do format/save individually for each slot. And the status when connected is also displayed within the frame.
Data List	Shows the list of the stored data.
Format	When storing the camera data to a new SD card, click this button to format it. And the button can also be used to delete the stored data.
Save	Save the camera data on the formatted SD card. Once the data is saved on the SD card, you can open it only from PFV. Converting the data opened from PFV enables downloading to PC.

4. Click the [Save] button.

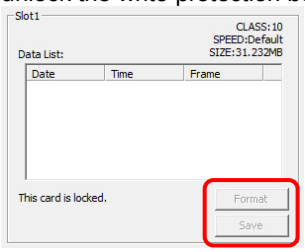


Supplement

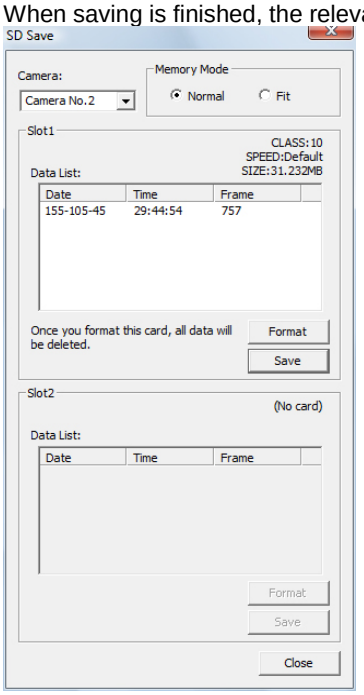
- While the SD card has not been formatted, you cannot click the [Save] button.
  Click [Format] and then [Yes] on the confirmation dialog to start formatting of the SD card.



- When the SD card is write-protected, the [Format] or [Save] button is not alive. Eject the card and unlock the write protection before reinserting it.

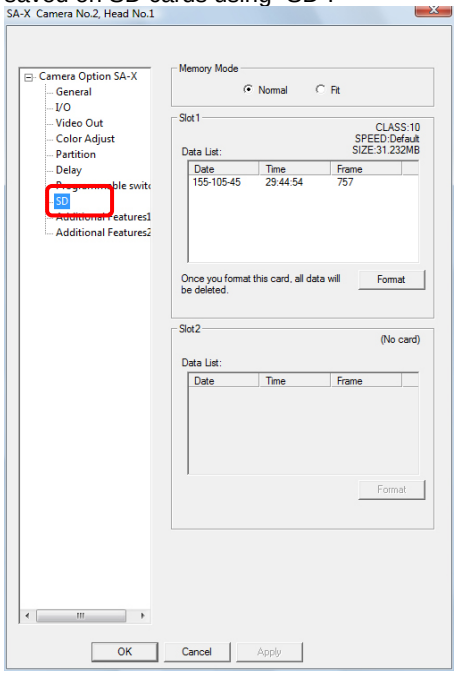


5. When saving is finished, the relevant data is displayed on the “Data List”.



Supplement

- SD cards can be set or formatted using “SD” under “Camera Option”. But the data cannot be saved on SD cards using “SD”.



Reference

- As for playing back data, refer to “6.3. Loading from SD card” on page 281.

Reference

- As for “Camera Option”, refer to “3.8.Other Settings” on page 135.

MEMO

Chapter. 6 Display/Playback Saved Data

Prepare PFV for use ▶▶ Basic PC control operation ▶▶ Shot conditions/shooting ▶▶ Image playback ▶▶ Saving images ▶▶ **Saved data playback**

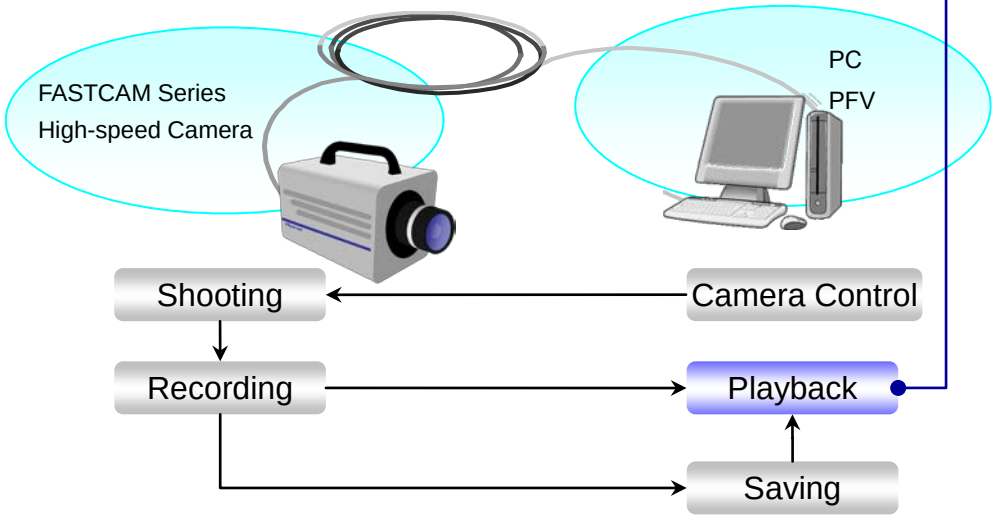
The following describes how to playback image data files saved to the PC.

<Chapter.6 Contents>

Playback saved data

How to playback/load data saved to the PC

How to resave

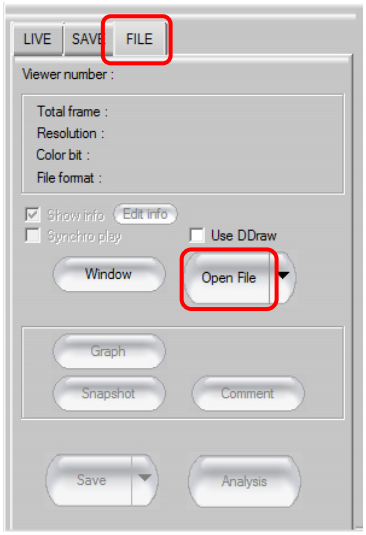


6.1. Playback Image Data Saved to the PC

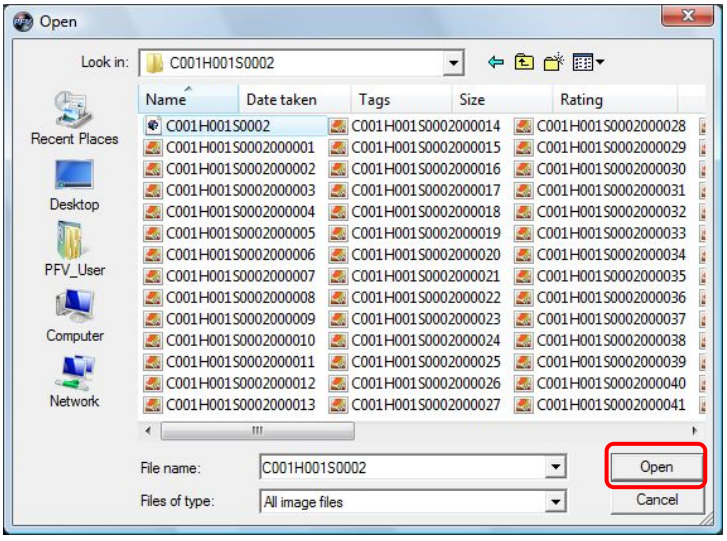
Playback saved image data.
Open and playback CIH files created when data is saved.
Image files can also be opened directly.

6.1.1. Open Saved Data

1. Display the “FILE” tab on the control panel and click the [Open File] button.



2. Select the CIH file to playback and click the [Open] button.



Caution

- When opening a file saved in the RAW, RAWW or MRAW formats with PFV, select and open the CIH file that was saved together with it.

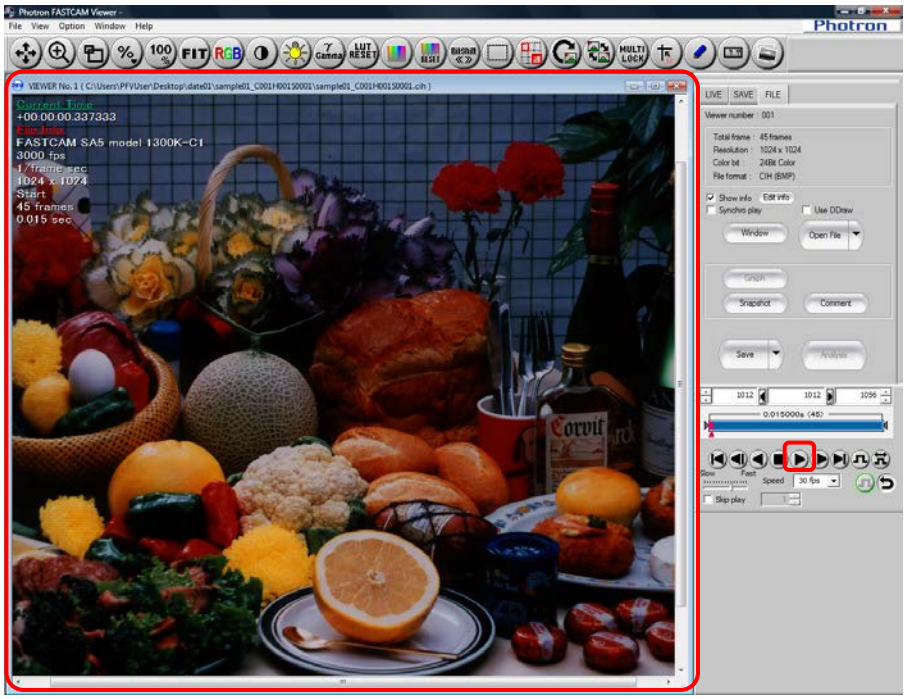
Supplement

- The file formats can be played are shown below.
  CIH, BMP, TIFF, JPEG, PNG, AVI, WMV, CSV , MOV, PCIH
- Project files are saved in the PCIH format.
- You can also open (display the waveform image) CIH, BMP, TIFF, JPEG, PNG, AVI, CSV, PCIH files by dragging the file icon on the PFV window.
- You can also open (play) CIH, PCIH files by double clicking the file icon.

Reference

- For details on the CSV format, refer to "2.9. CSV File Structure" in Configuration section.

3. The data is displayed.
Click the [Play] button and the data can be played.



Supplement

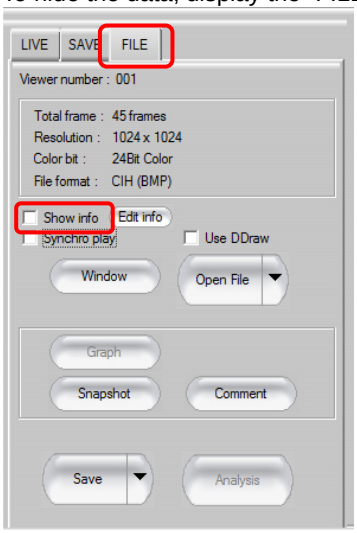
- The view window can be closed with the [X] button in the upper right of the window.
- When opening AVI files, they can be played back even more smoothly by checking "Use DDraw " on the control panel's "FILE" tab.

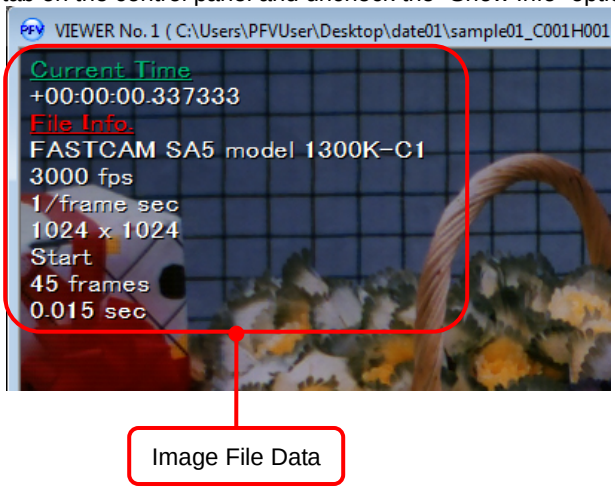
Reference

- The desired playback/display settings can be made using the playback control panel and toolbar. For details, refer to “4.1. Playing Images Recorded On the Camera”, page 192.
- For project files, refer to "5.3. Saving Project Files", page 243.

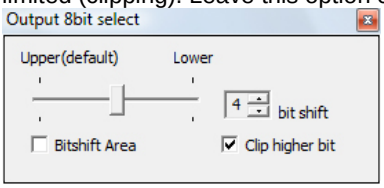
Supplement

- When a CIH file is opened, image file data is displayed.
  To hide the data, display the “FILE” tab on the control panel and uncheck the “Show Info” option.





- About displaying 16-bit data
  RAWW and 16-bit RAW/MRAW/PNG/TIFF formatted files are saved with 16-bit color planes.
  With PFV, because Windows normally cannot display a color plane that exceeds 8 bits, the data is displayed using 8 bits out of the 16 bits.
  When 16-bit data is opened with PFV, the “16-bit Option” is displayed on the control panel.
  Drag the “Bit Offset” slider, or enter the desired value, and which 8 bits out of the 16 bits to display can be specified.
  If the “Clip High Bit” option is checked, the influence of the bits higher than the specified bit can be limited (clipping). Leave this option checked normally.



Caution

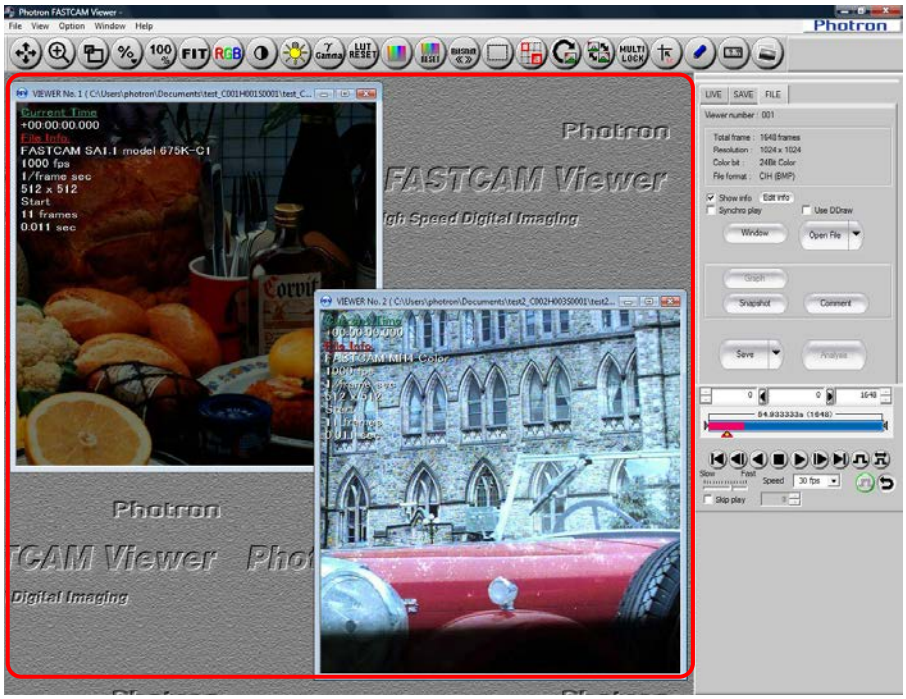
- DDraw video playback can be used on PCs with poor playback capabilities or when frames are easily dropped. However, this function does not guarantee that 100% of frames will not be dropped. The following restrictions apply.
  - Only supports AVI file playback.
  - Since the image size conforms to the window size, existing FIT or zoom functions cannot be used.
  - The playback frame width cannot be changed.
  - The playback speed cannot be changed. Playback speed conforms to the AVI file's rate.
  - Reverse playback cannot be used.
  - Functions on images such as filters, rotation, inversion, LUT, navigation mode, and waveforms cannot be used.
  - The video being played cannot be saved again.
  - The current frame cursor (current frame position) during playback and the actual playback image may not be synchronized.
  - The information display function and the synchronized playback function cannot be used.
  - The file cannot be opened in multiple views.
  - For video with a resolution that cannot be shown on the display, the view window cannot be scrolled. The video is shown reduced while maintaining the aspect ratio.

6.1.2. Open Multiple Saved Data

To playback multiple images, select multiple files on the “Open” screen displayed after clicking the [Open] button.

1. Select the multiple files desired by clicking them while holding down the “Shift” key or “Ctrl” key, then click the [Open File] button.

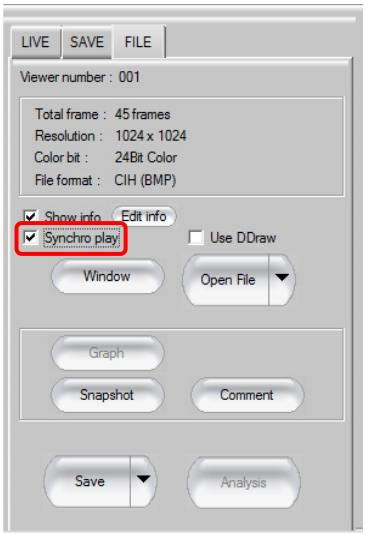
2. The data for the selected files is displayed.



Supplement

- When multiple BMP, TIFF, JPEG, or PNG files are selected and opened, they are displayed in a single view window as continuous frames like a movie.

3. To collectively playback multiple files, check the “Synchro play” option.



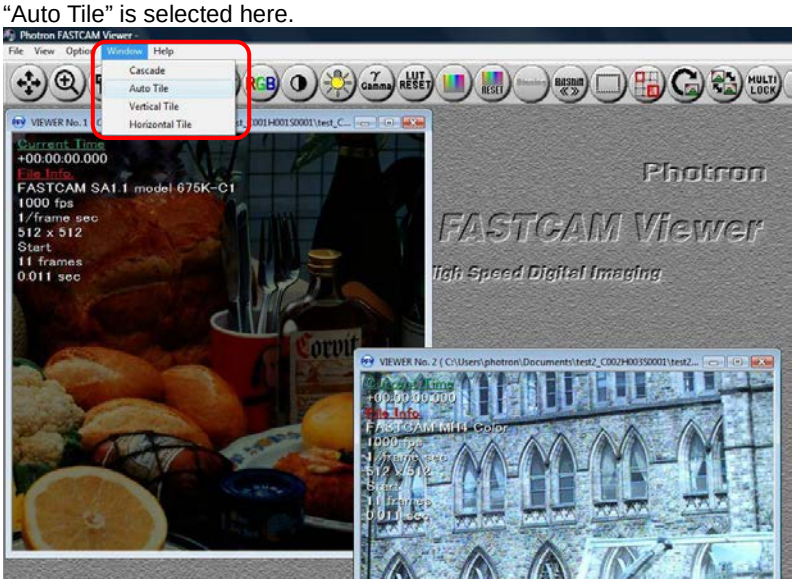
Reference

- For details on synchronized playback, refer to "1.2.18. Synchronization Method Setting During Synchronized Playback” in Configutation section, page 23.

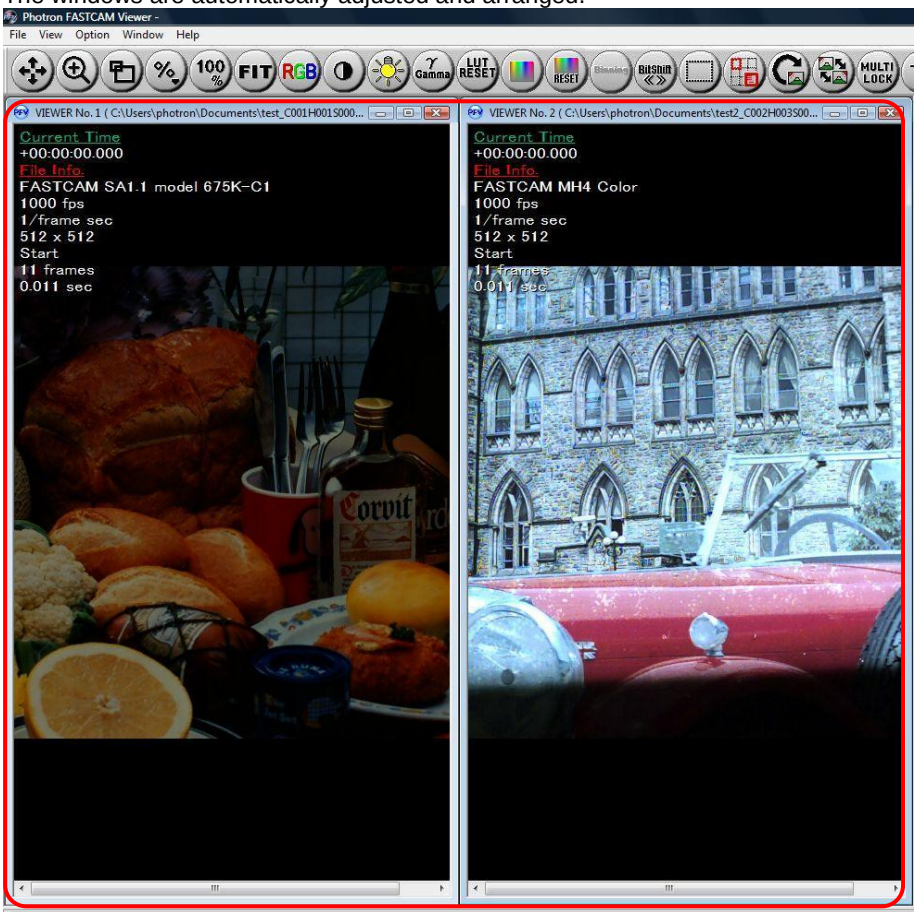
Supplement

- <How to Arrange Multiple Windows>

1. Open [Window] menu or click the [Window] button on the “FILE” tab of the control panel. “Auto Tile” is selected here.



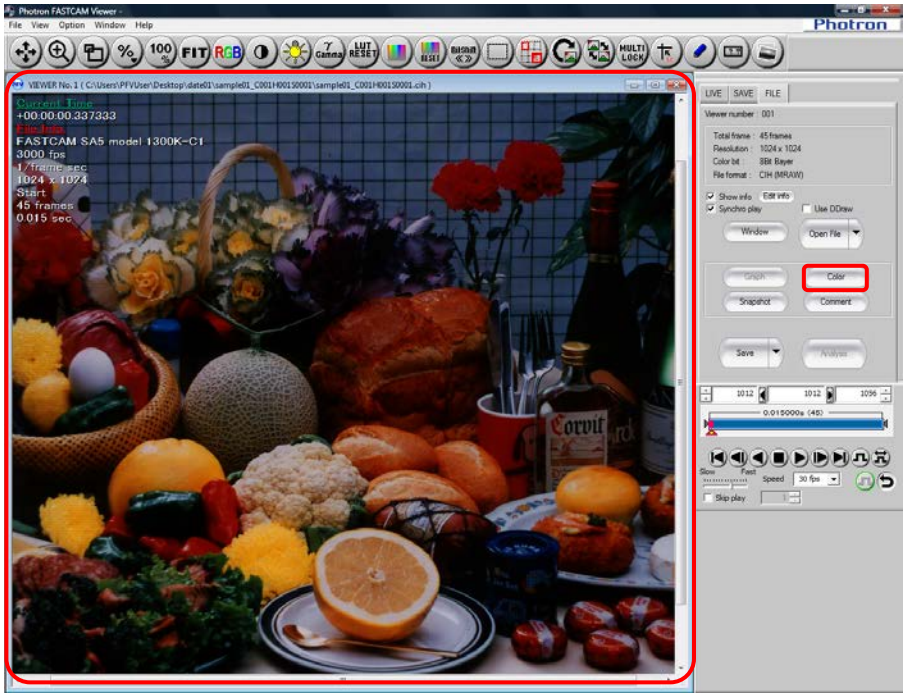
2. The windows are automatically adjusted and arranged.



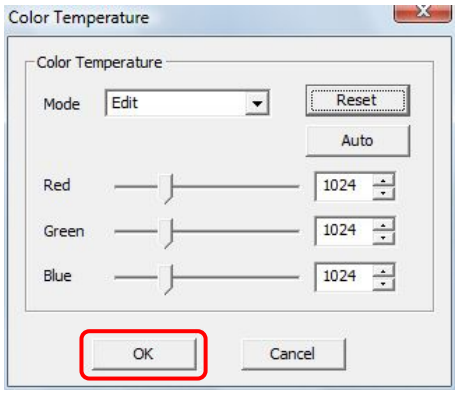
6.1.3. Saved Data Color Temperature Adjustment

The color temperature of image files saved with Bayer save in the RAW, RAWW or MRAW file formats can be adjusted.

1. Open the saved file and click the [Color] button on the “FILE” tab on the control panel.



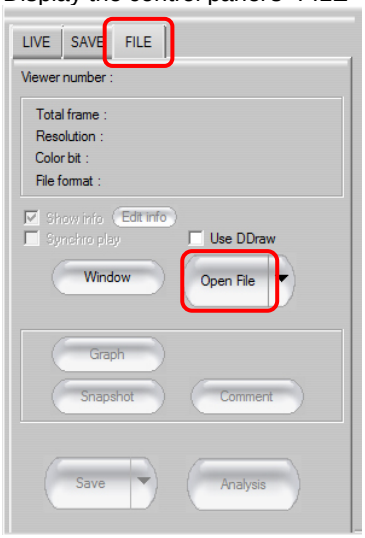
2. Set the color temperature and click the [OK] button.
User defined settings can be adjusted by selecting “Edit” under “Mode” and dragging the slider.
Click the [Reset] button to reset to the default value.
After clicking the [Auto] button, the white balance can be adjusted by dragging the mouse to draw a rectangle to select a white area in the view window that is not washed-out.



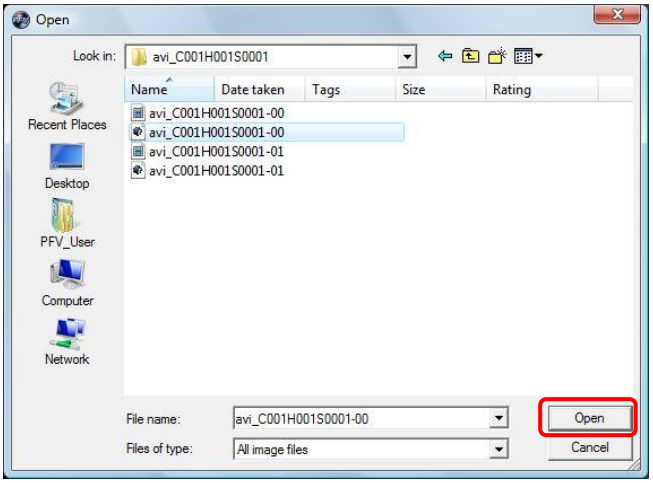
6.1.4. Sequential Playback of Files Saved Split

When saving images in the AVI 1.0 format or in the Multi-page TIFF format, files are split up and saved when they exceed 2GB. When saving images in the AVI 2.0 format, files are split up and saved when the number of frames exceeds 8,100,000 frames. These files can be sequentially played back.

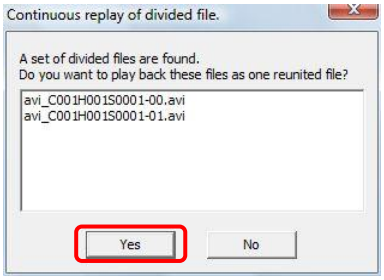
1. Display the control panel's "FILE" tab and click the [Open File] button.



2. Select one of the split files and click the [Open] button.



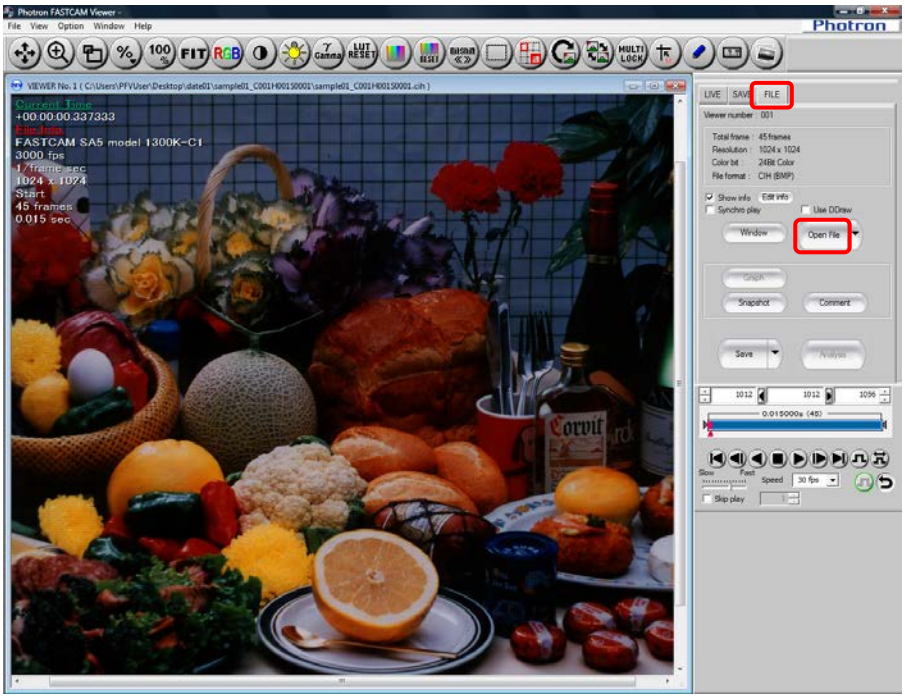
3. A message is displayed. For sequential playback, click the [Yes] button.



6.2. Resaving a Loaded File

Data saved to a file can be loaded and resaved in a different file format.

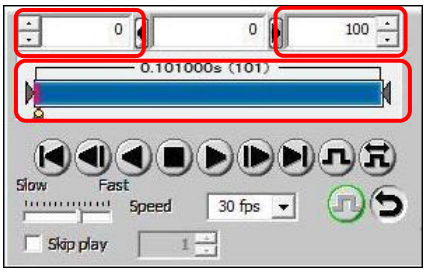
1. Open the file to resave.
Click the [Open File] button from the “FILE” tab on the control panel and open the desired file.



Reference

- For how to open file, refer to “6.1.1. Open Saved Data”, page 270.

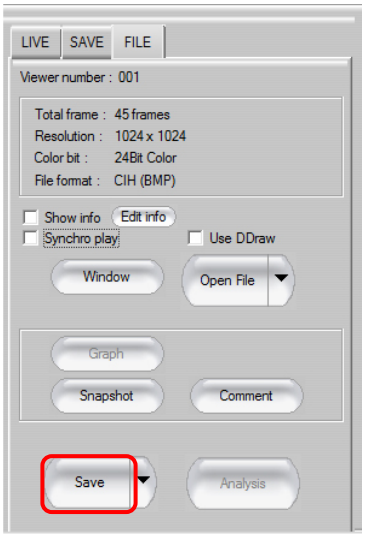
2. When resaving a file, if there is a change in the sequence of the data to save, etc., set those changes with the playback control panel.



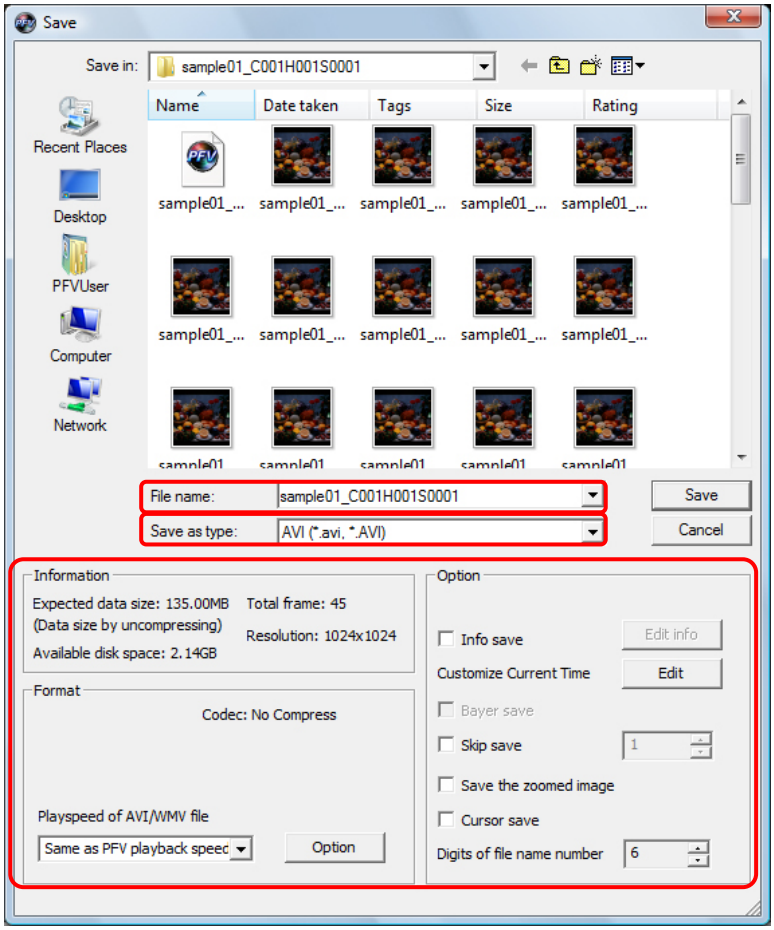
Reference

- For more information on the playback control panel, refer to “4.1. Playing Images Recorded On the Camera”, page 192.

3. Click the [Save] button.

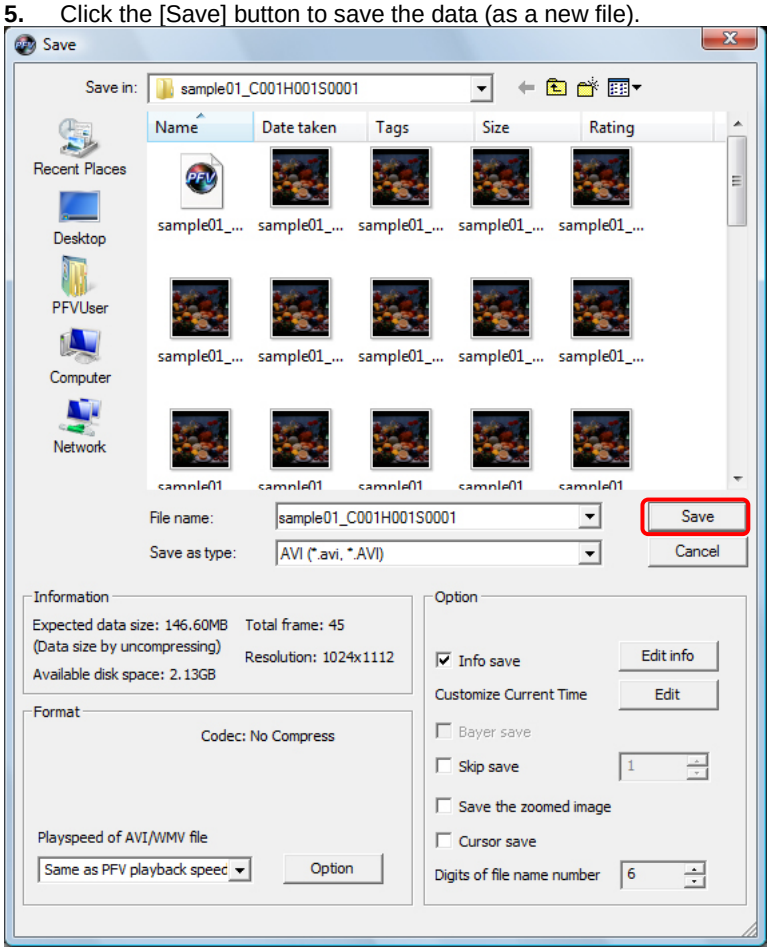


4. The “Save as” dialog box appears. Set the destination and filename and make other settings as required.



Item	Description
Information	The size displayed is the size when uncompressed calculated from the image size. Consider it as a guide as the size of data saved changes according to the file header size and compression.
Format	The files filtered by the “File Type” are displayed. Clicking the [Option] button allows detailed settings.
Option	Saving options can be set.

5. Click the [Save] button to save the data (as a new file).



6.3. Loading from SD card

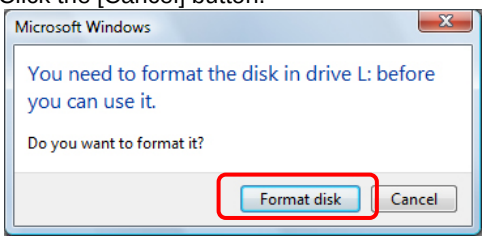
Images saved in SD cards by a camera can be played.

Caution

- Images that can be played back are limited to those saved by SD-card-compatible cameras.
- To play images saved in SD cards, load directly from the SD card into a PC that has PFV installed.

1. Set an SD card in the SD card reader.

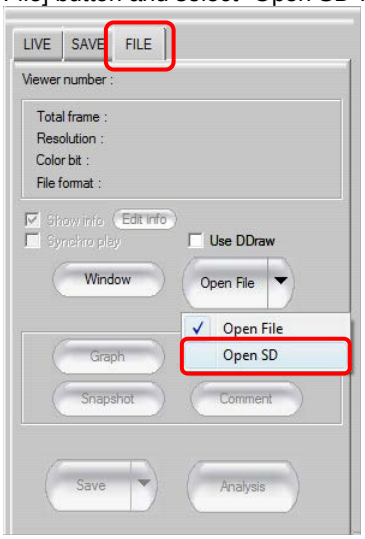
2. Formatting confirmation dialog box is displayed.
Click the [Cancel] button.



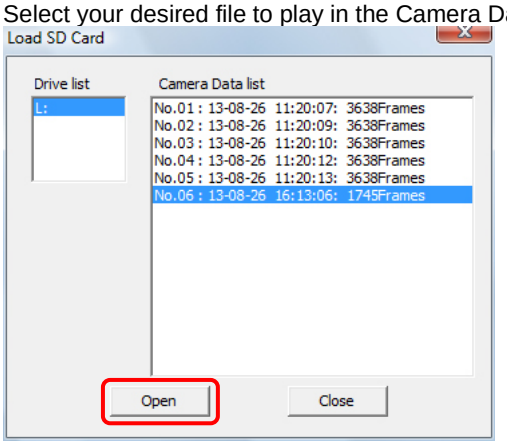
Caution

- Never click the [Format disk] button at this time, or the SD card is formatted and all the images saved in it will be removed.

3. Have the “FILE” tab displayed in the control panel and click [▼] on the right of the [Open File] button and select “Open SD”.



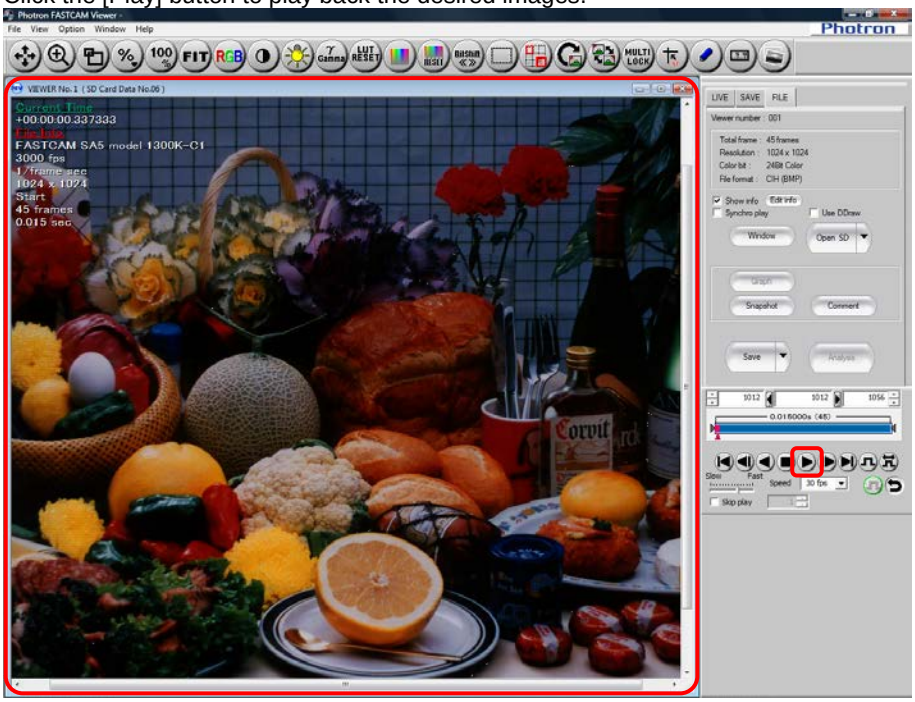
4. “Load SD Card” dialog box appears.
Select your desired file to play in the Camera Data List and click the [Open] button.



Supplement

- When multiple SD cards are being loaded, select the drive for the SD card reader of your choice from the “Drive List” and select the desired file.

5. Data is displayed.
Click the [Play] button to play back the desired images.



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Contacting Photron

For inquires related to PFV, contact Photron at the contact information listed below.
Additionally, the following items will be verified when inquiring, so please prepare them in advance.

Items Verified	Concrete Example
Contact Information	Company, school or organization name, customer contact name, contact phone number, contact e-mail.
Product Name	The Photron FASTCAM Viewer version number and the high-speed camera name. For the version number, check the version information.
Condition of the system and what is known about it.	

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