

Photron FASTCAM Viewer

for High Speed Digital Imaging

User's Manual

Ver.3 Revision 2.10E

Configuration 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
 Important	This symbol indicates content that should always be read.
 Caution	This symbol indicates instructions that should always be followed when using the software, or things to be careful of when using the software.
 Supplement	This symbol indicates supplementary items to be aware of when using the software.
 Reference	This symbol indicates the location of a reference.
 MEMO	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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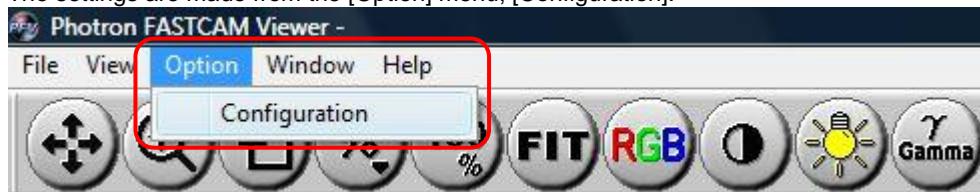
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Chapter. 1 PFV Configuration

This is where configuration settings, such as those loaded when PFV starts, the file format to use when saving files, and the display mode after shooting, can be set.

The settings are made from the [Option] menu, [Configuration].

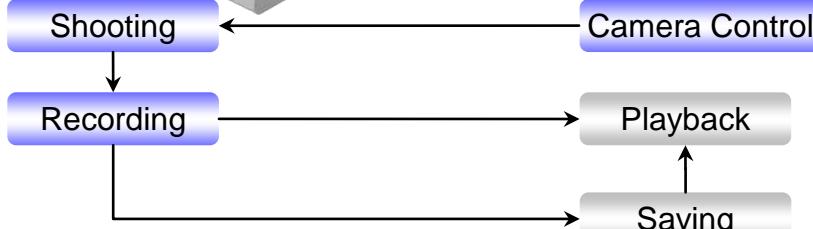
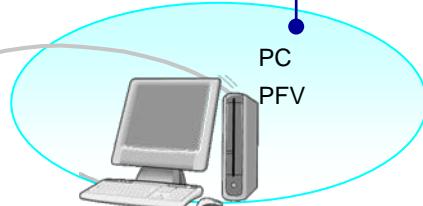
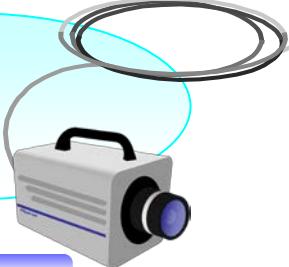


<Chapter.1 Contents>

PFV Configuration Settings

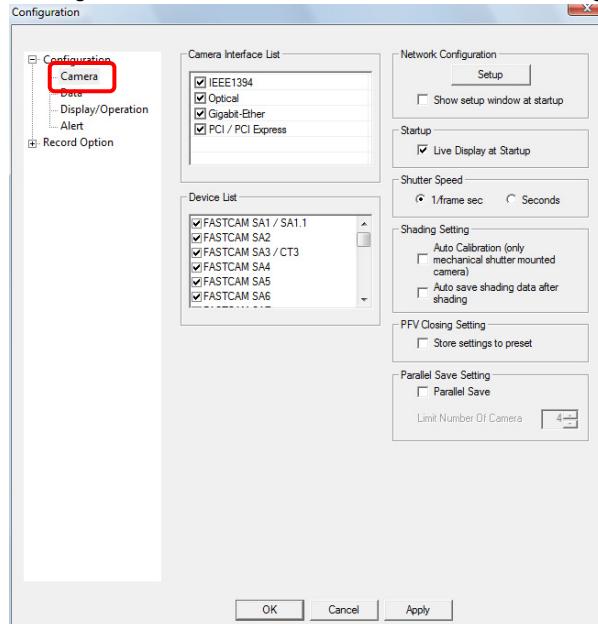
Settings that can be set in advance and how to set them

FASTCAM Series
High-speed Camera



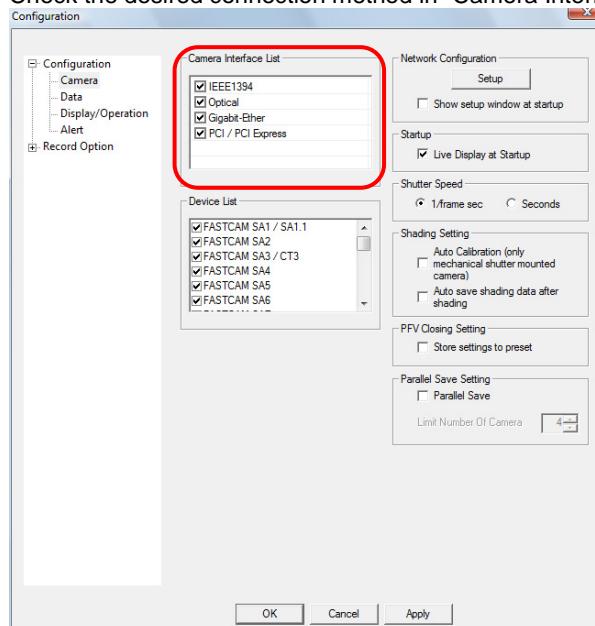
1.1. Settings Related To the Camera

Settings, such as how to connect the cameras and the models to recognize, are made here. For the settings related to the camera, display the "Configuration" dialog box with the menu bar [Option] – [Configuration]. Then, from the tree on the left side, click the "Camera" option under "Configuration" and the screen on which to make settings will be displayed.



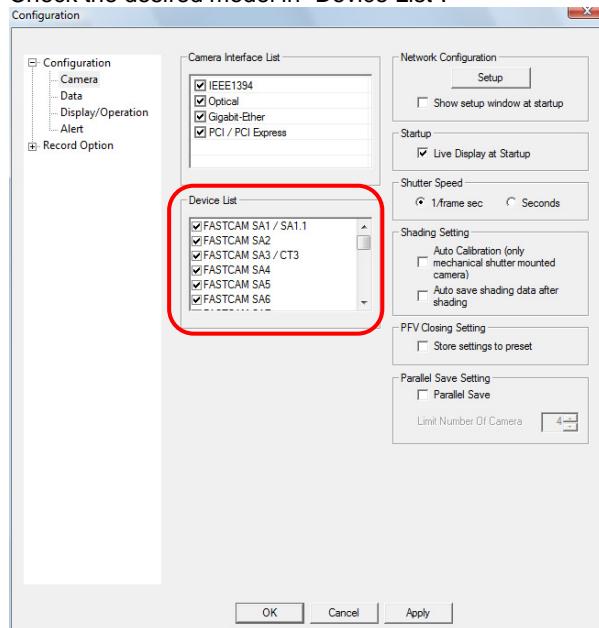
1.1.1. Connection Method Setting

Check the desired connection method in "Camera Interface List".



1.1.2. Recognized Camera Model Setting

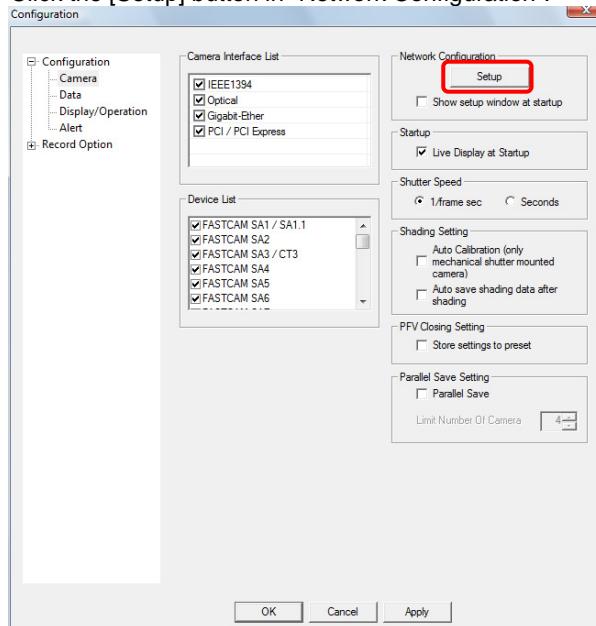
Check the desired model in “Device List”.



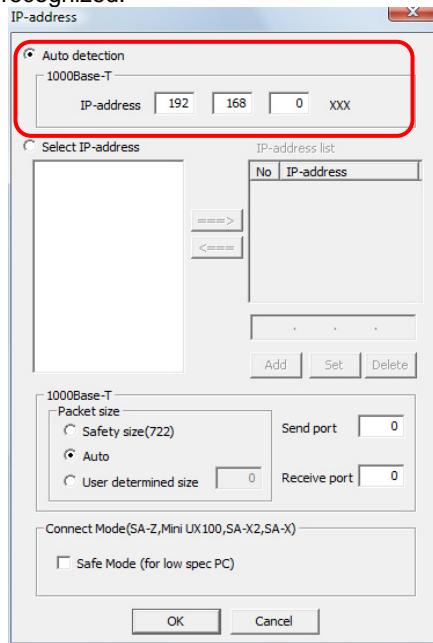
1.1.3. Set/Verify the Camera’s IP address

■ How to verify the setting

1. Click the [Setup] button in “Network Configuration”.



2. When “Auto detection” is selected, set the upper classes of the IP address and PFV will automatically search for IP addresses on the network.
When “Select IP-address” is selected, only cameras with a registered IP address are recognized.



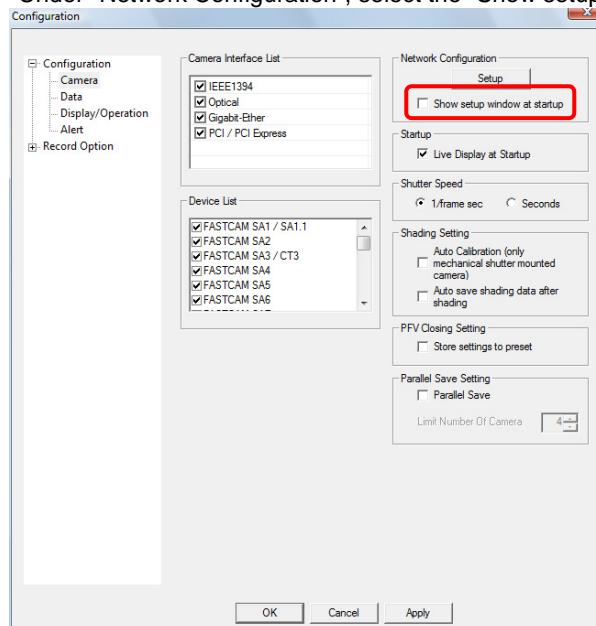
 **Supplement**

- The default setting for the camera's IP address is “192.168.0.10”.

■ Selecting the IP address at PFV3 startup

If you configure this setting, you can select the IP address to start with by displaying the IP address configuration window when PFV3 starts. PFV3 can also start without searching for cameras.

Under "Network Configuration", select the "Show setup window at startup" check box.

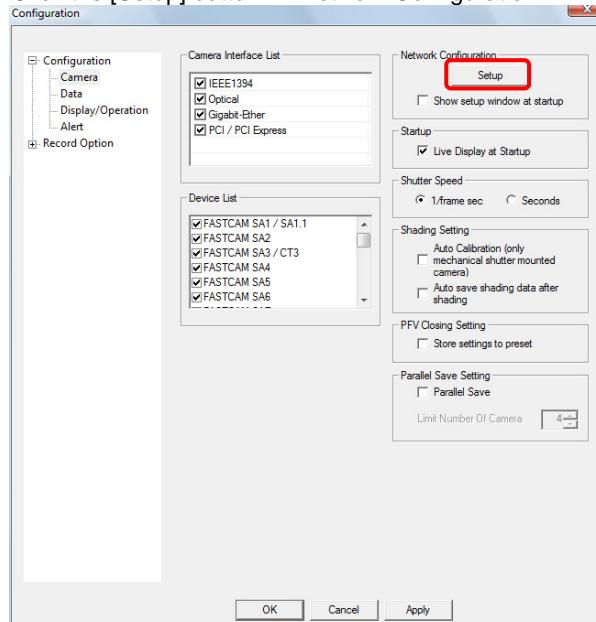


Reference

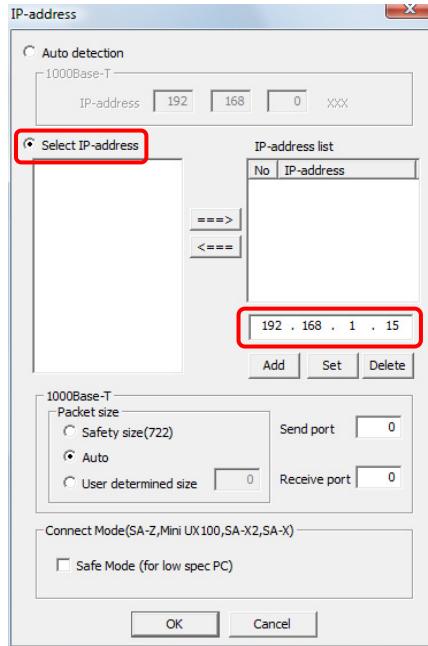
- For how to select the IP address, see "■ How to make a new registration" described later.

■ How to make a new registration

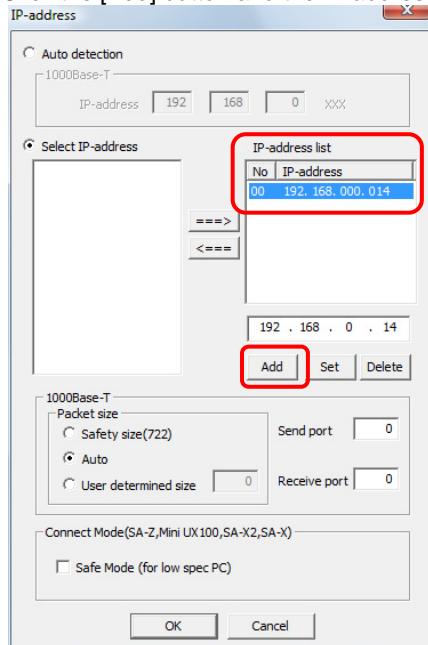
1. Click the [Setup] button in "Network Configuration".



2. Select the “Select IP-address” option and enter the desired IP address directly in the text box under the “IP-address list”.



3. Click the [Add] button and the IP address is added to the “IP-address list”.

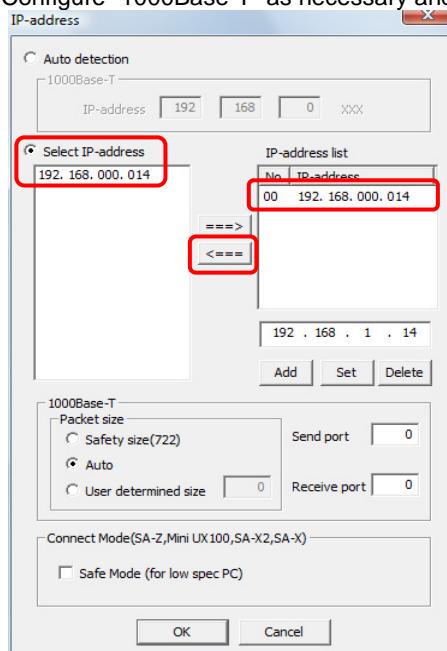


Supplement

- After clicking the desired IP address on the “IP-address list”, clicking the [Set] button will overwrite the value, clicking the [Delete] button will delete the value.

4. Click the IP address on the "IP-address list" to register in "Select IP-address", then click the [<==>] button to register.

Configure "1000Base-T" as necessary and click the [OK] button.



Item	Description
Packet size	The default setting is auto. To specify a value, select "User determined size" and enter a number in the box to the right. When the connection is unstable, specify "Safety size(722)".
Send port	The default setting is 0 for send port and 0 for receiving port. When "0", a free port is automatically used. To specify a value, enter the number in the box to the right.
Receive port	
Connect Mode(SA-Z, Mini UX100, SA-X2, SA-X)	Communications between the PC and the camera may be unstable depending on the specifications of the PC. In this situation, select the "Safe Mode (for low spec PC)" check box and the problem may be resolved.

Supplement

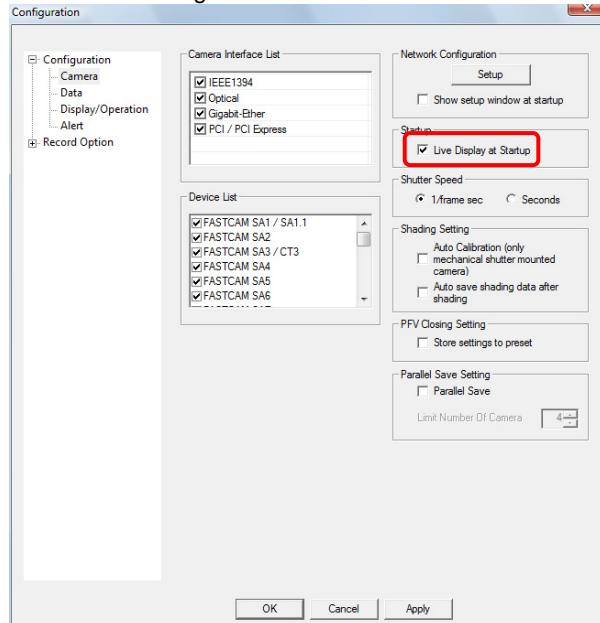
- To delete an address from "Select IP-address", click on the address and click the [==>] button.

1.1.4. Set the Display Mode When PFV Starts To Live Mode

If a camera is connected when PFV starts, the display mode will automatically be live mode. If this option is unchecked, the next time PFV starts the display mode will be live stop mode.

Check the “Live Display at Startup” option in “Startup”.

The default setting is “On”.

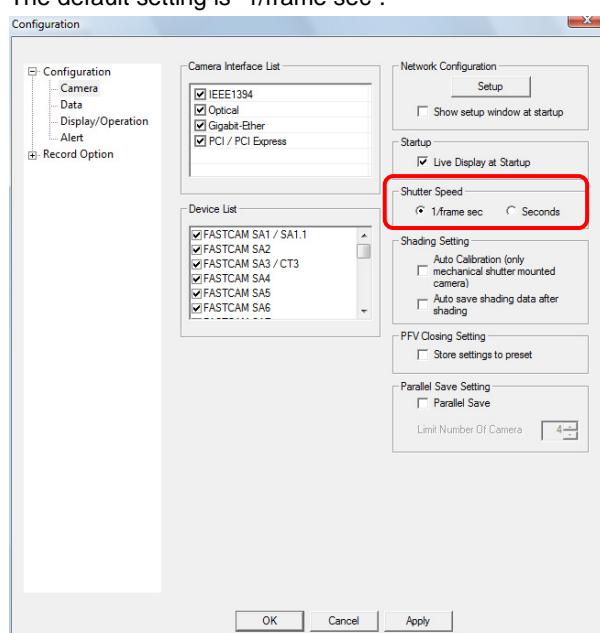


1.1.5. Shutter Speed Notation Setting

Set the shutter speed notation to “1/frame sec” or “Seconds”.

Select the desired notational units for “Shutter Speed”.

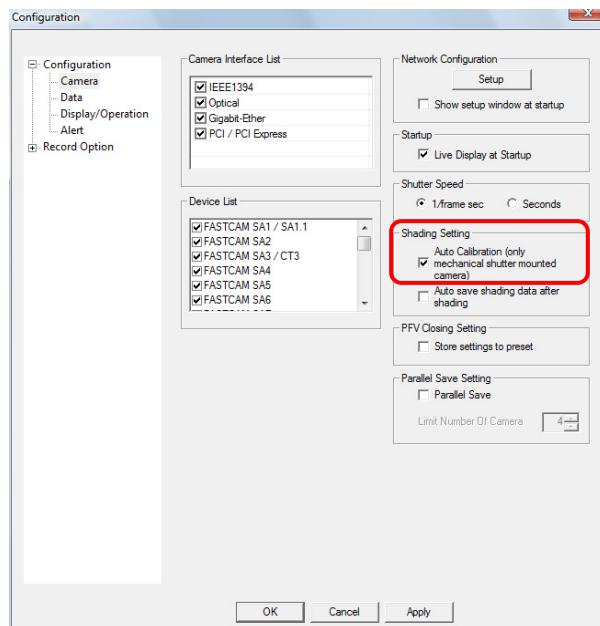
The default setting is “1/frame sec”.



1.1.6. Auto Calibration (only mechanical shutter mounted camera)

When using the cameras with mechanical shutters, if the frame rate, shutter speed, or resolution is changed or when variable setting or external synchronization setting is made, shading is automatically executed.

Check “Auto Calibration (only mechanical shutter mounted camera)” under “Shading Setting”.
The default value is OFF.

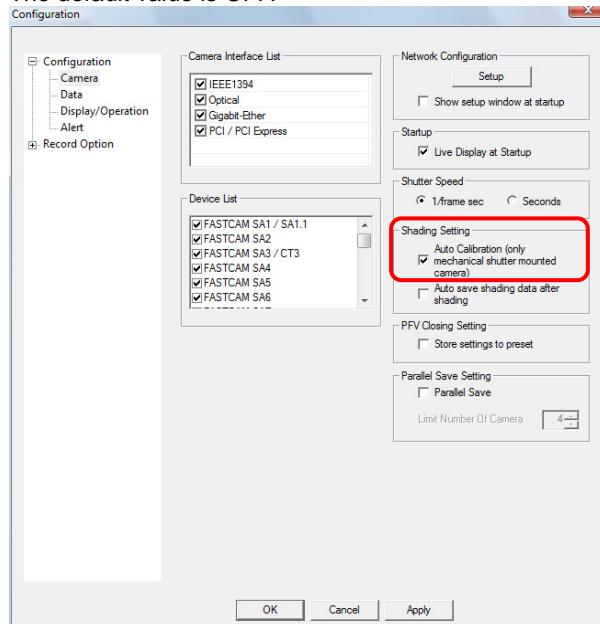


1.1.7. Auto save shading data after shading

After executing shading, PFV can be set to automatically save shading data to the camera.

Check “Auto save shading data after shading” under “Shading Setting”.

The default value is OFF.

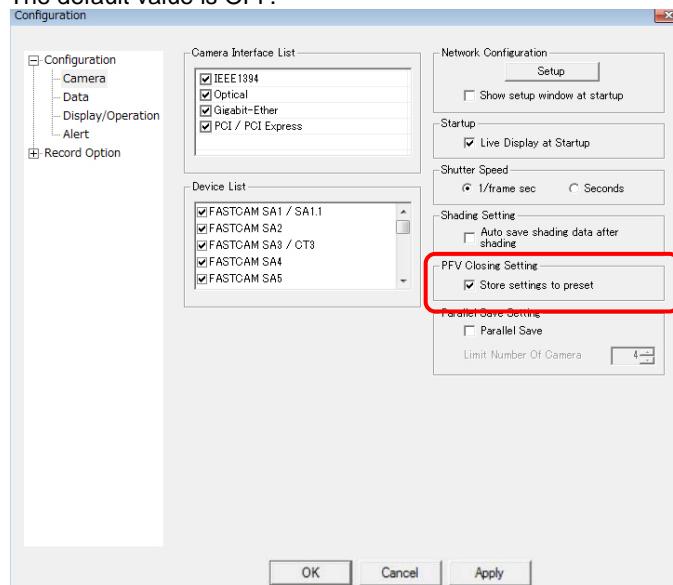


1.1.8. PFV Exit Setting

When PFV exits, save the current recording conditions (frame rate, resolution, etc.) to the camera.

Check “Store Closing Setting” under “PFV Closing Setting”.

The default value is OFF.



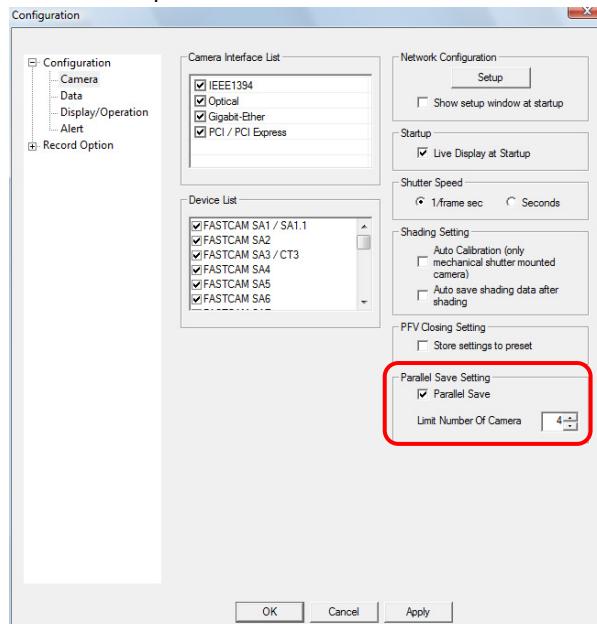
1.1.9. Parallel Save Setting

When multiple cameras are connected to a PC, this function saves images from all of those cameras simultaneously.

When this function is off, each camera saves its image into the PC one after another.

When it is on, all cameras simultaneously save their images into the PC in parallel.

Check the “Parallel Save” checkbox under “Parallel Save Setting”, and enter the number of cameras to be used in parallel. The default value is OFF.

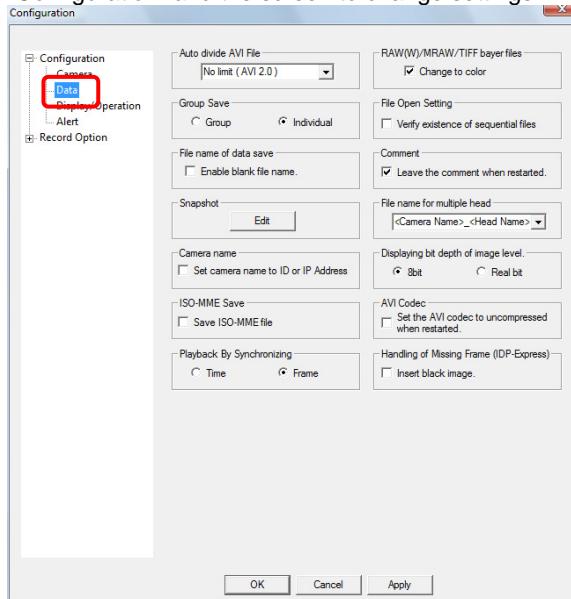


- When using the parallel save setting, prepare a LAN port for each camera on the control PC.

1.2. Settings Related To Saving Data

Settings, such as the file format when saving images to the PC, are made here.

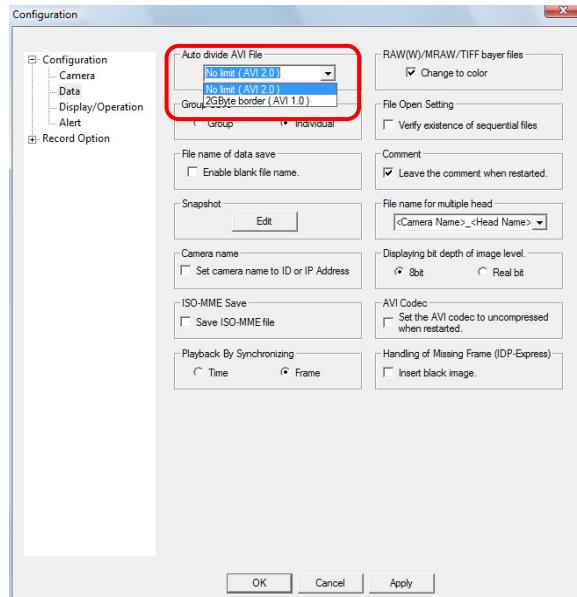
For the settings related to saving data, display the “Configuration” dialog box with the menu bar [Option] – [Configuration]. Then, from the tree on the left side, click the “Data” option under “Configuration” and the screen to change settings will be displayed.



1.2.1. Auto-Split AVI File Setting

When saving files in the AVI format, set the AVI version and maximum size. When saving data that is larger than the size set here, the file is automatically split and saved among one or more files. AVI files auto-split and saved can be continuously played by opening the CIH file simultaneously saved with the AVI files.

Set with "Auto divide AVI File".



Item	Description
No limit (AVI 2.0) (default)	Save as an AVI 2.0 format file. Up to 8,100,000 frames are saved as a single file. When saving data over 8,100,000 frames, it is automatically split and saved. The recommended file system is NTFS. When the file system is not NTFS, the save operation stops when the file reaches 4 GB maximum file limit. The file may not be readable with software that is not compatible with DirectShow.
2GByte border (AVI 1.0)	Save as an AVI 1.0 format file. Up to a maximum of 2 GB is saved as one file. When saving data over 2 GB, the file is automatically split and saved.

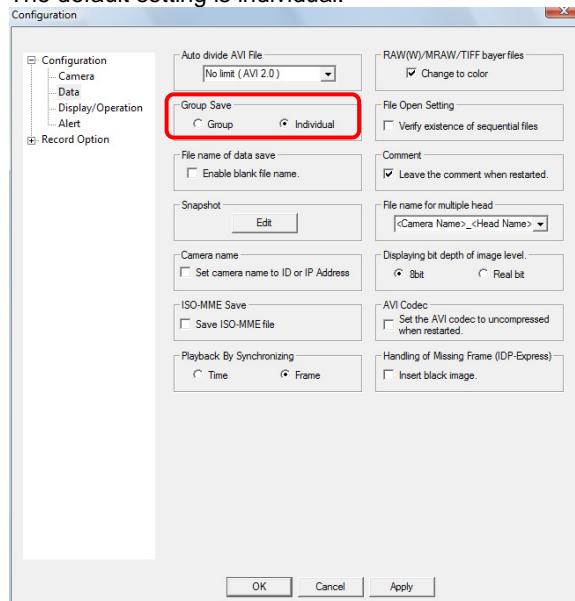
Reference

- For how to use sequential playback, refer to "6.1.4. Sequential Playback of Files Saved Split" in Operation section.

1.2.2. Specify and Save Partitions

You can group save the data of multiple partitions.

Select “Group” under “Group Save” and after clicking the [OK] button, save the data.
The default setting is individual.

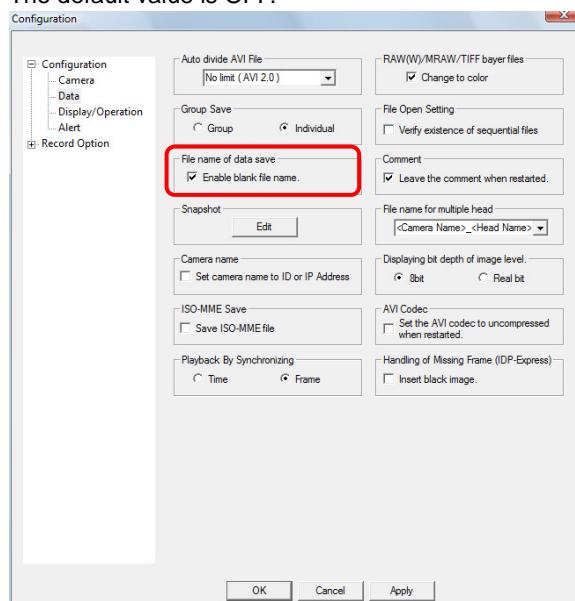


1.2.3. Setting Related to File Names when Saving Data

If file name is blank when data is saved, the file is automatically saved with the camera name, but when set to allow file name to be blank, files can be saved with file name blank.

Check “Allow blank file name” under “Save file name”.

The default value is OFF.





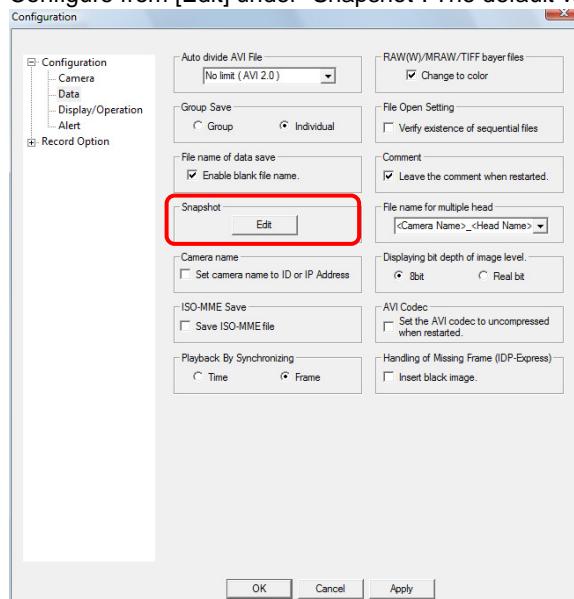
Reference

- For file naming conventions, refer to “5.1.1. About The Save Location/File Naming Conventions” in Operation section.

1.2.4. Snapshot Setting

Sets the operation when the [Snapshot] button is clicked on the control panel.

Configure from [Edit] under “Snapshot”. The default value is file output.



Reference

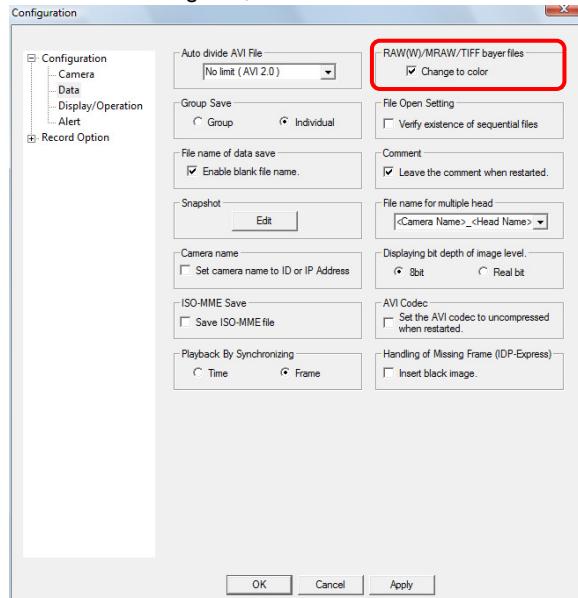
- For the settings, refer to “5.9. Saving a Snapshot Image” in Operation section.

1.2.5. Load a Bayer Pattern File as Color

Files that have been saved in the RAW/RAWW/MRAW/TIFF format can be read as color images.

Check the “Change to color” option in “RAW(W)/MRAW/TIFF bayer files”. After clicking the [OK] button, load the saved data. The default setting is “ON”.

Check this setting first, and then when the saved data is loaded, it is displayed in color.

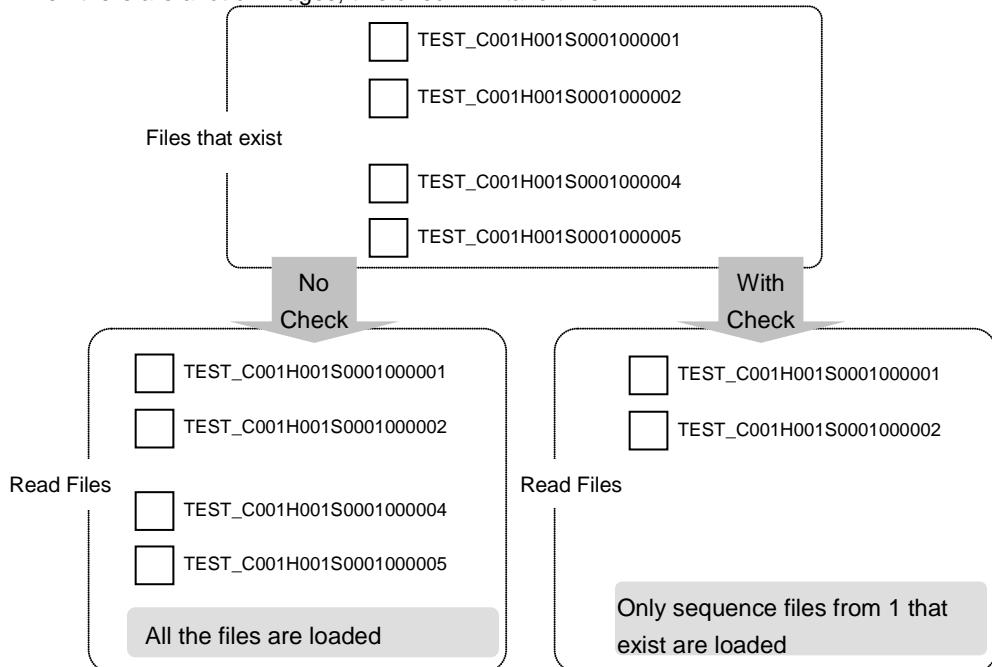


Caution

- This option is valid for files saved with PFV Ver. 2.2 or later.

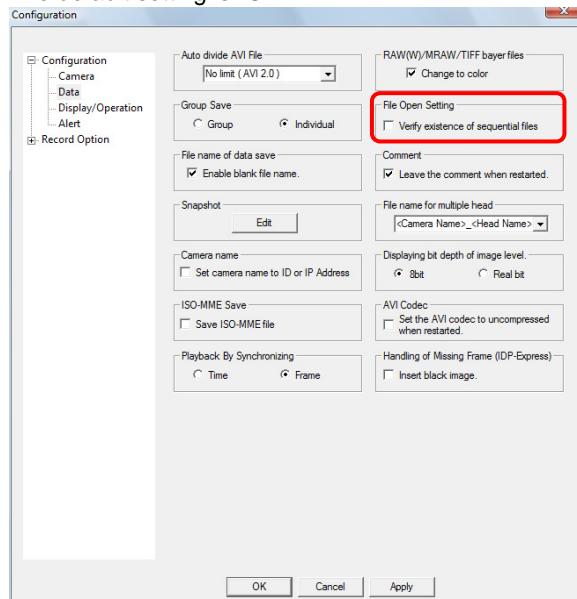
1.2.6. Check Files When Loading A CIH File

When opening a file in the CIH format, each frame of the related image files is checked to ensure there are no missing numbers in the image files, and only the sequential image files are loaded. When there are a lot of images, this check will take time.



Check the "Verify existence of sequential files" option in "File Open Setting".

The default setting is "Off".

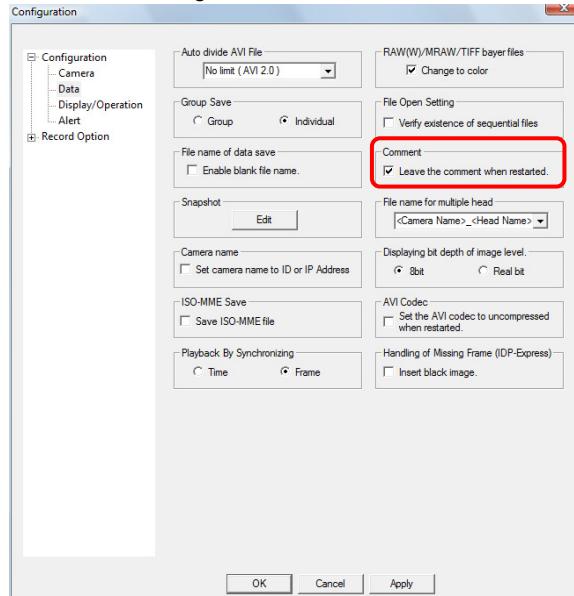


1.2.7. Comment Setting

The previously entered comment can remain in PFV when it's restarted.

Check "Leave the comment when restarted" under "Comment".

The default setting is checked.



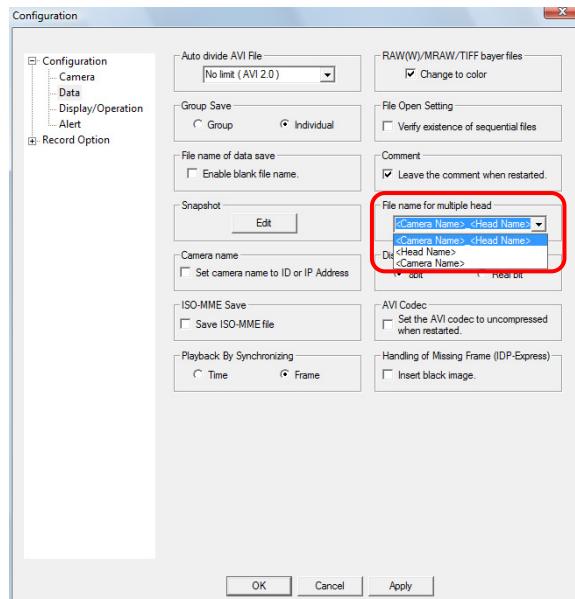
Caution

- If the connected camera configuration changes, the comment is reset.

1.2.8. Filename Setting When Saving Multi Head Camera Data

You can set the filename when saving the data recorded on a multi head camera. The setting is reflected as the filename (camera name) when “Same as camera name” is checked on the “Save Options Setting” dialog box.

Set with “File name for multi head”.

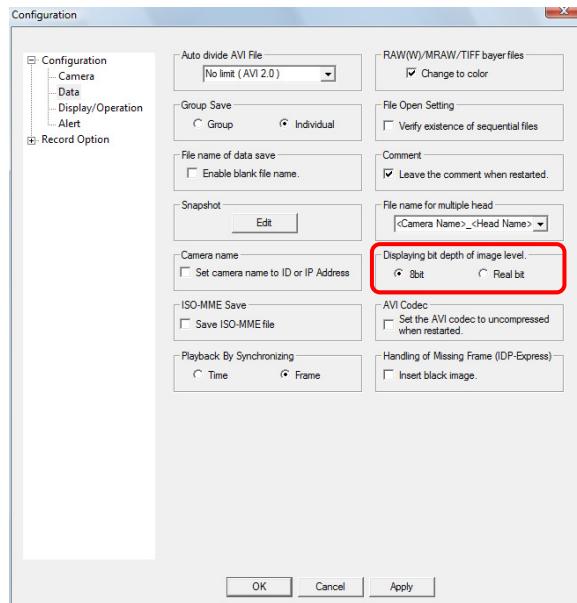


1.2.9. Display Depth Setting for the Image Level Display

Displays the level when using the cross cursor as the actual data depth.

Set with “Displaying bit depth of image level”.

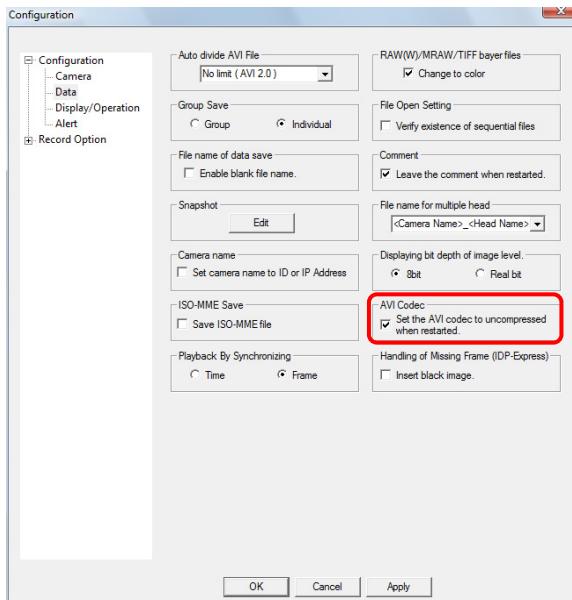
The default value is “8bit”.



1.2.10. AVI Codec Setting

When saving files in AVI format, you can specify the type of codec with the "Format" on the "Save Options Setting" or "Save as" dialog box. Normally, when a codec is set once, that same setting is enabled the next time PFV starts. However, this option can set PFV to specify "uncompressed" each time it starts, regardless of the previous setting.

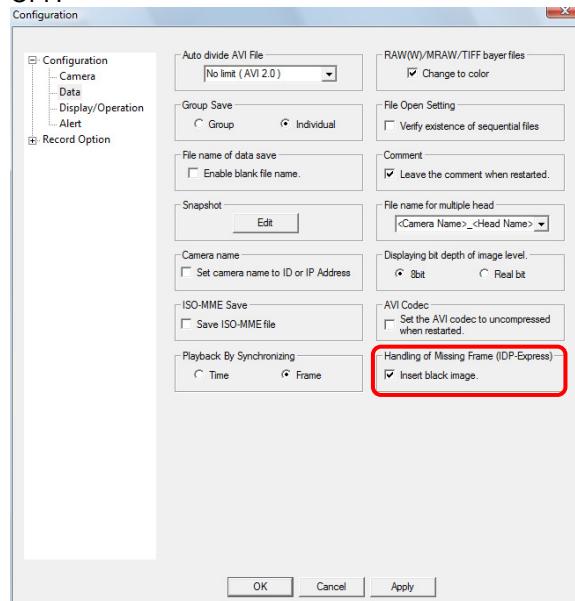
Check "Set the AVI codec to uncompressed when restarted." under "AVI Codec". The default value is unchecked.



1.2.11. Handling Missing Frames (IDP-Express)

When a missing frame occurs, a black image is inserted for the missing frame.

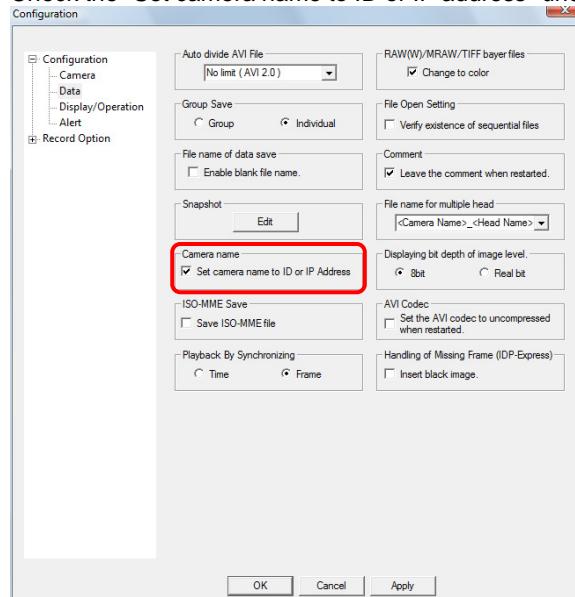
Check "Insert black image" under "Handling of Missing Frame (IDP-Express)". The default value is OFF.



1.2.12. Set Camera Name to ID or IP address

The camera name can be set to the ID or IP address.

Check the "Set camera name to ID or IP address" under "Camera name". The default value is OFF.



1.2.13. Synchronization Method Setting During Synchronized Playback

Set the synchronization method during synchronized playback to synchronize by time or to synchronize by frame number.

When performing synchronized playback of images with different frame rates, synchronized playback is possible on the time axis by setting the synchronization method to time. However, when displaying frames with times on only one half of the images, the other images do not have time frames, so the previous frame is displayed.

■ Time synchronization

Display frame		Frame 1	Frame 2	Frame 3	Frame 4	Frame 5	Frame 6	Frame 7	Frame 8	Frame 9	Frame 10
2000 fps (Priority)	Time	0 ms	5 ms	10 ms	15 ms	20 ms	25 ms	30 ms	35 ms	40 ms	45 ms
	Frame number	0	1	2	3	4	5	6	7	8	9
1000 fps	Time	0 ms		10 ms		20 ms		30 ms		40 ms	
	Frame number	0	0	1	1	2	2	3	3	4	5

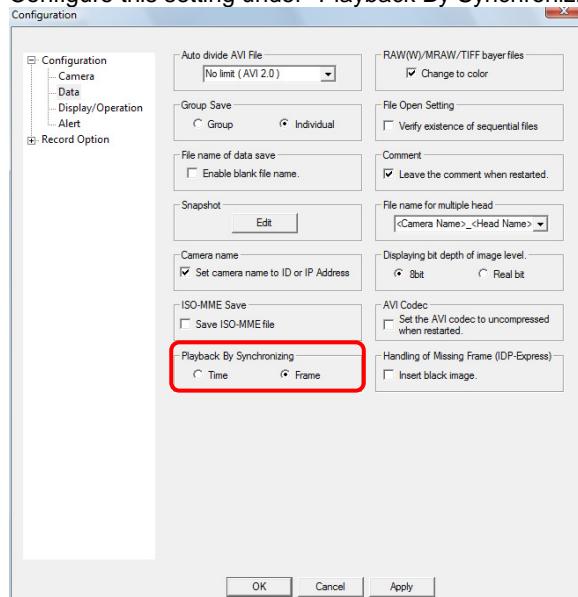
Supplement

- When synchronized by time, the time of the active images are given priority at playback. When images with a slow frame rate are given priority, images with high frame rates are displayed with frames omitted.

■ Frame number synchronization

Display frame		Frame 1	Frame 2	Frame 3	Frame 4	Frame 5	Frame 6	Frame 7	Frame 8	Frame 9	Frame 10
2000 fps	Time	0 ms	5 ms	10 ms	15 ms	20 ms	25 ms	30 ms	35 ms	40 ms	45 ms
	Frame number	0	1	2	3	4	5	6	7	8	9
1000 fps	Time	0 ms	10 ms	20 ms	30 ms	40 ms	50 ms	60 ms	70 ms	80 ms	90 ms
	Frame number	0	1	2	3	4	5	6	7	8	9

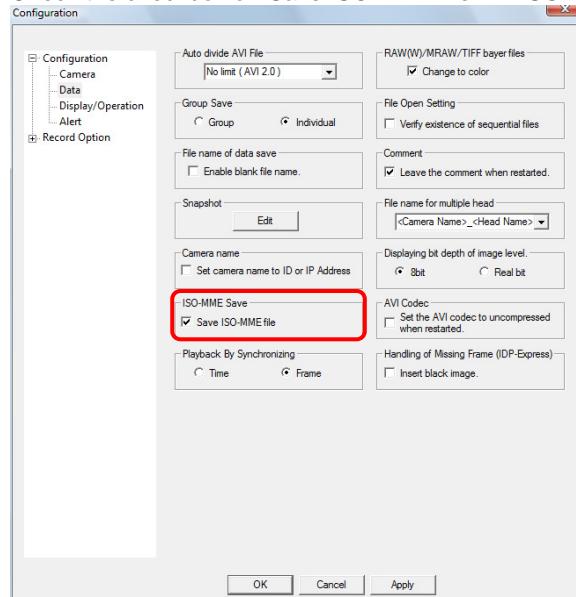
Configure this setting under "Playback By Synchronizing". The default value is "Frame".



1.2.14. ISO-MME File

When saving files, this feature saves ISO-MME files together.

Check the checkbox of “Save ISO-MME file” in “ISO-MME Save”. The default value is OFF.



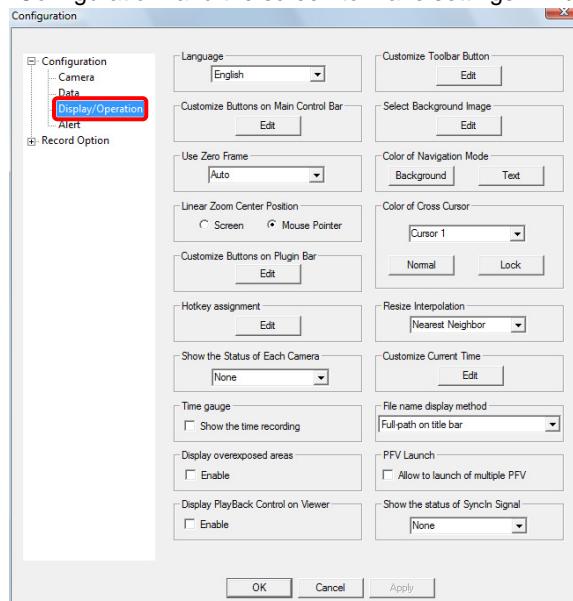
Reference

- For details of the ISO-MME file, refer to “2.11. ISO-MME File”, page 83.

1.3. Display Screen Settings

Settings related to the display screen when PFV starts can be set here.

For the settings related to the display screen, display the “Configuration” dialog box with the menu bar [Option] – [Configuration]. Then, from the tree on the left side, click the “Display” options under “Configuration” and the screen to make settings will be displayed.

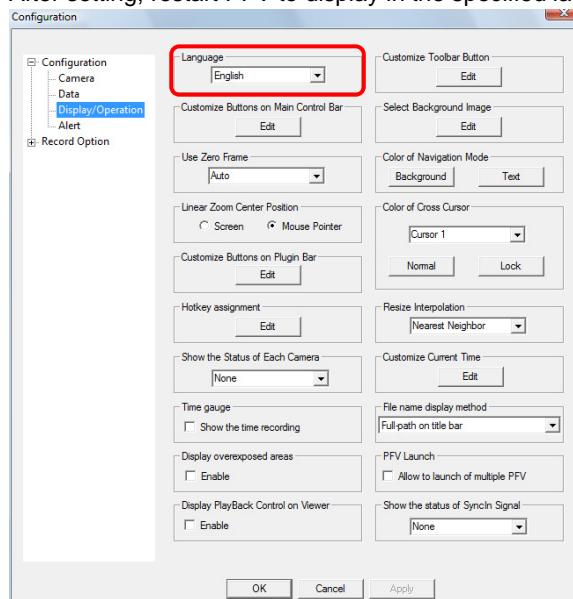


1.3.1. Operating Language Setting

Set the PFV menu display to English, Japanese, French or Chinese.

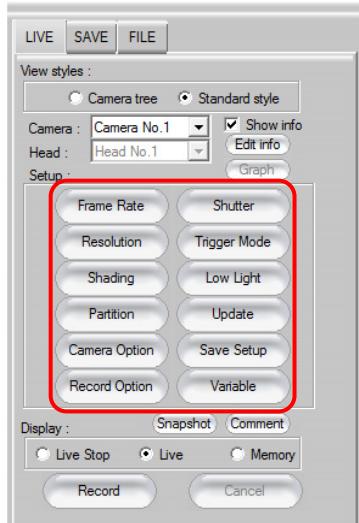
Set with the “Language” option.

After setting, restart PFV to display in the specified language.

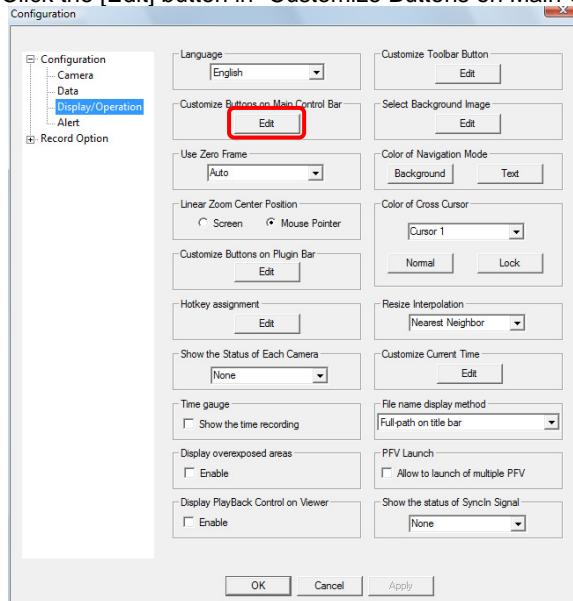


1.3.2. Main Control Button Setting

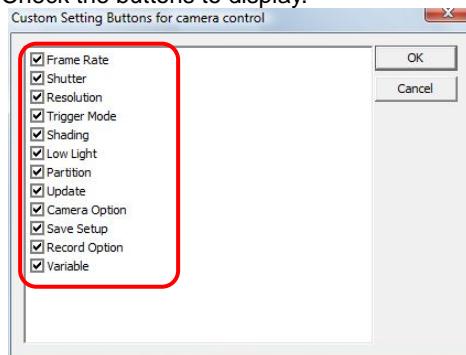
The buttons displayed on the “LIVE” tab on the control panel can be customized.



1. Click the [Edit] button in “Customize Buttons on Main Control Bar”.



2. Check the buttons to display.



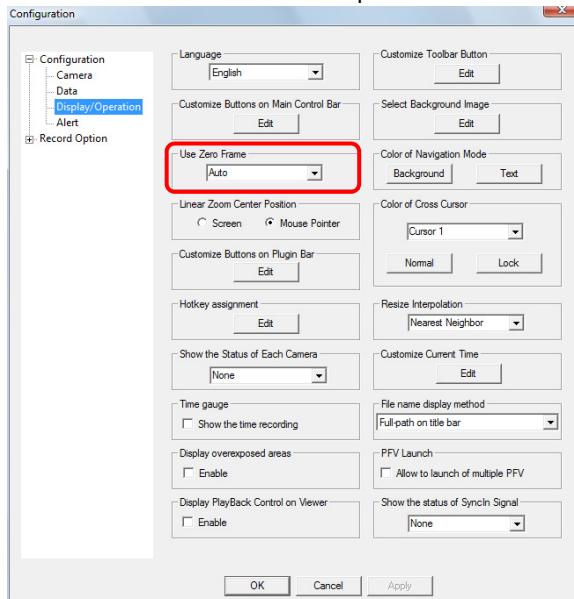
1.3.3. Zero Frame Setting

Set to use “0” as the starting frame number.

When this option is used, the trigger frame number is “0”.

When this option is not used, the trigger frame number is “1”.

Set with the “Use Zero Frame” option.

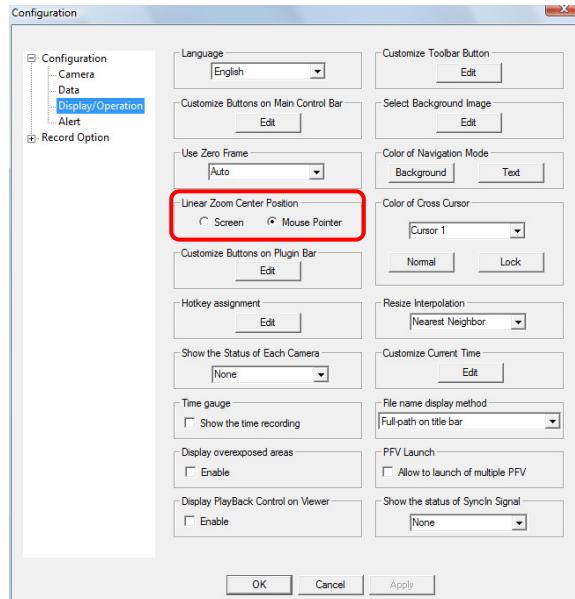


Item	Description
Auto (default)	Automatically set depending on the camera model. Where there are 2 or more types of camera models, the camera model with the lower IP address is given priority. For the FASTCAM-APX RS, FASTCAM-APX, FASTCAM-Ultima512, FASTCAM-1024PCI, and FASTCAM-512PCI, the setting is to not use “0”. For the FASTCAM-APX RS, set to ‘Do not use the zero frame’ setting. For other models, set to ‘Use zero frame’ setting.
Use zero frame	Use “0” for the frame number.
Do not use zero frame	Do not use “0” for the frame number.

1.3.4. Center Point When Zooming Setting

Set the point to zoom in on the display from when using the zoom function.

Set with the "Linear Zoom Center Position" option.
The default value is "Mouse Pointer".



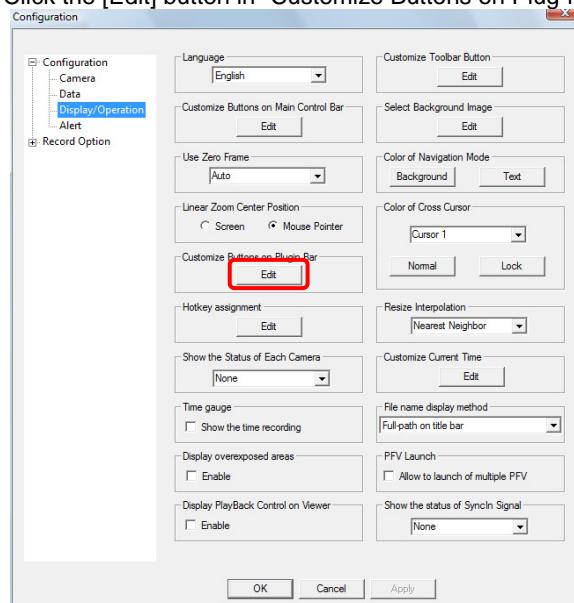
Item	Description
Screen	Zoom the display with the center of the screen as the center point.
Mouse Pointer (default)	Zoom the display centered on the position the mouse was clicked.

1.3.5. Setting Plug-in Bar

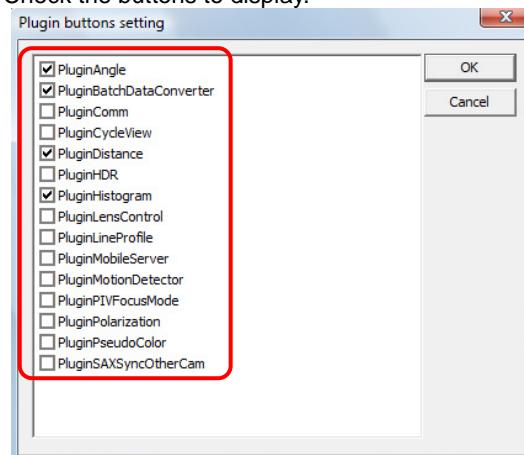
The plug-in bar buttons displayed when the PFV is started up can be customized.



- Click the [Edit] button in "Customize Buttons on Plug-in Bar".



- Check the buttons to display.

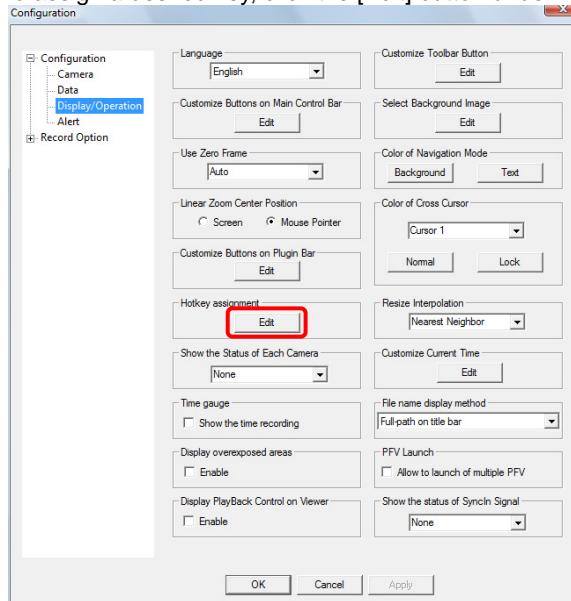


- If all check boxes are unchecked, the plug-in bar itself is hidden.

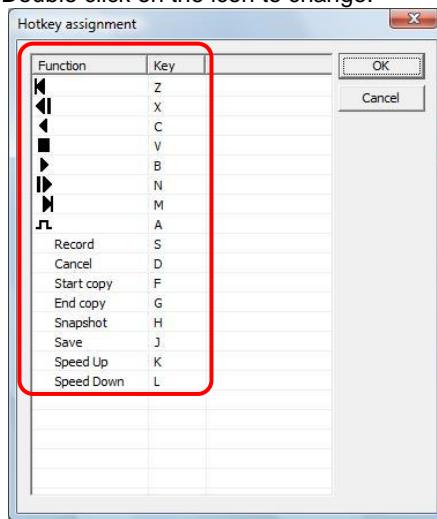
1.3.6. Hotkey Assignment Setting

This setting assigns playback control functions to the keyboard.

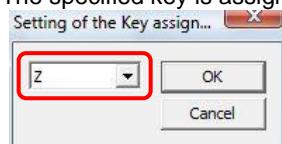
1. To assign a desired key, click the [Edit] button under "Hotkey assignment".



2. The currently assigned keys are displayed.
Double click on the icon to change.

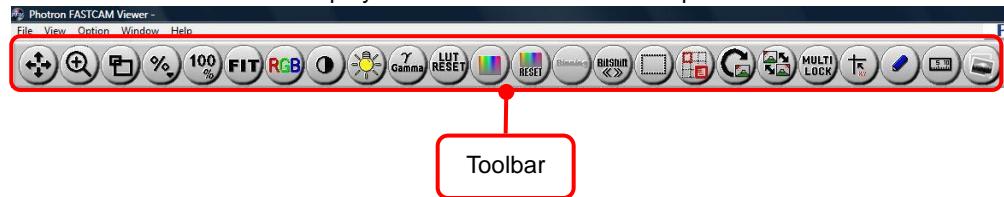


3. Click the [▼] button and select the desired key from the list.
The specified key is assigned when the [OK] button is clicked.

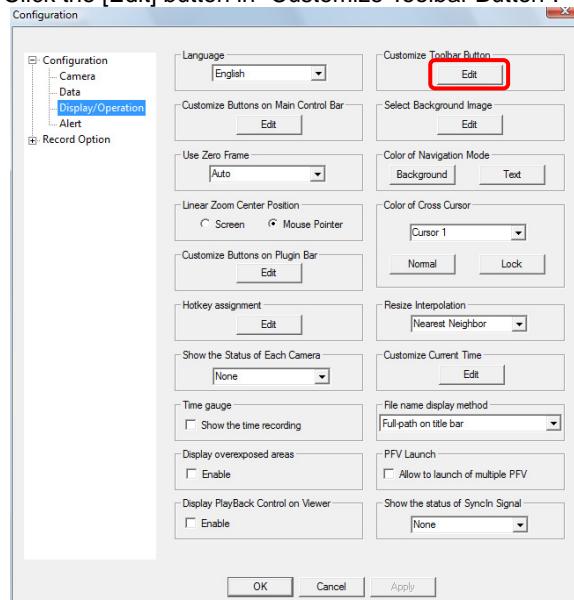


1.3.7. Setting Standard Toolbar

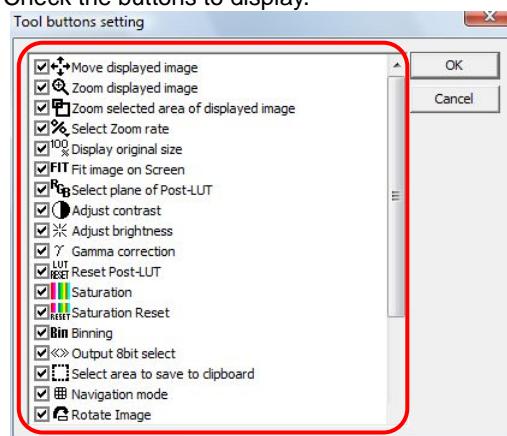
The standard toolbar to be displayed when the PFV is started up can be customized.



- Click the [Edit] button in "Customize Toolbar Button".

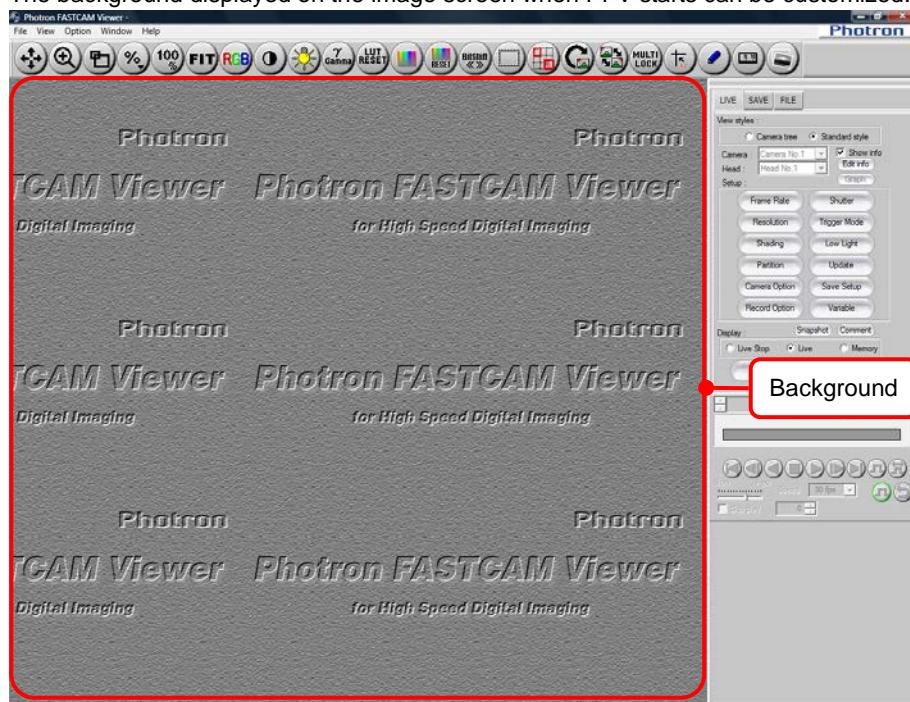


- Check the buttons to display.

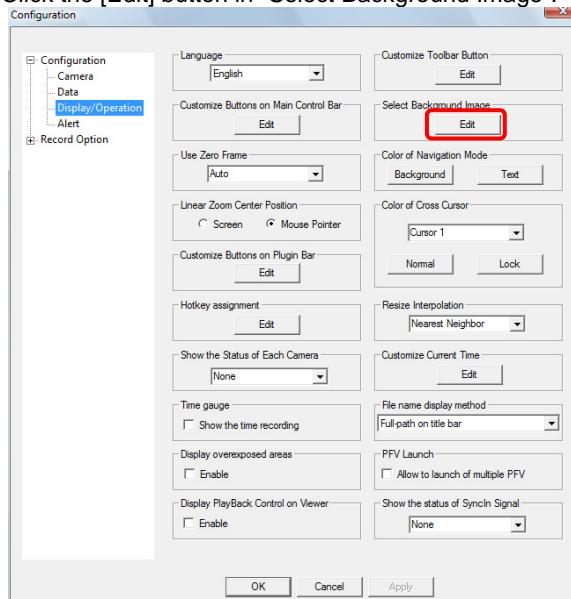


1.3.8. Image Display Screen Background Setting

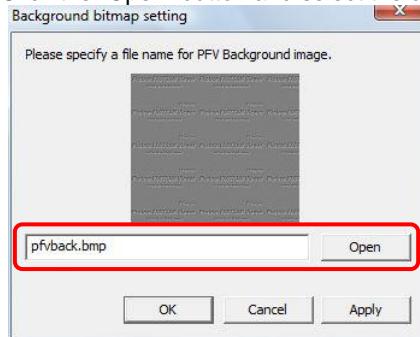
The background displayed on the image screen when PFV starts can be customized.



1. Click the [Edit] button in “Select Background Image”.



2. Click the “Open” button and select the desired image file to use as the background.



Caution

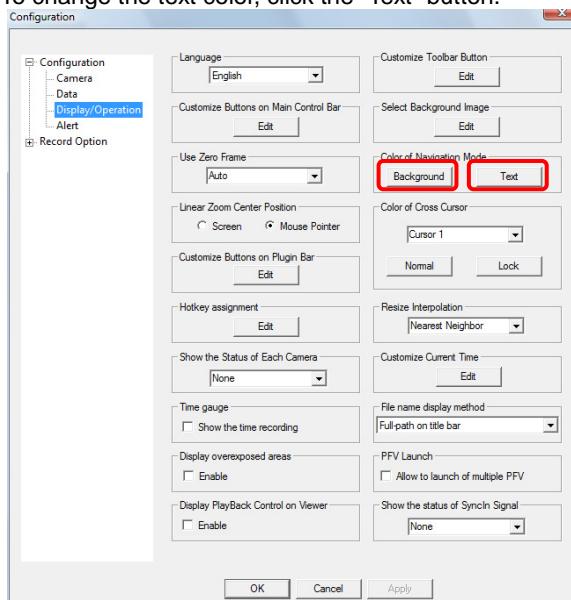
- Files that can be used for the background are 8-bit monochrome or 24-bit color BMP files.

1.3.9. Navigation Mode Display Setting

The navigation mode background (the slider display, etc.) and text color can be customized.



1. To change the background color, click the [Background] button in “Color of Navigation Mode”.
To change the text color, click the “Text” button.



2. Click on the desired color and then click the [OK] button.

The background color or text color is set.



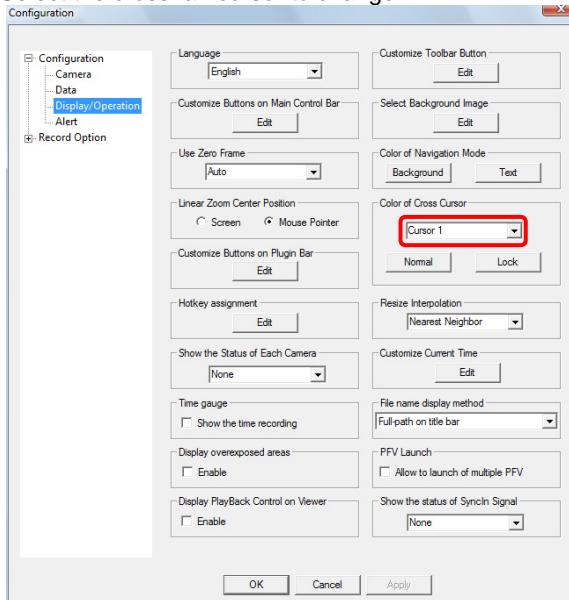
Supplement

- To set a color other than the “Basic colors”, the color can be set using the [Define Custom Colors] button.

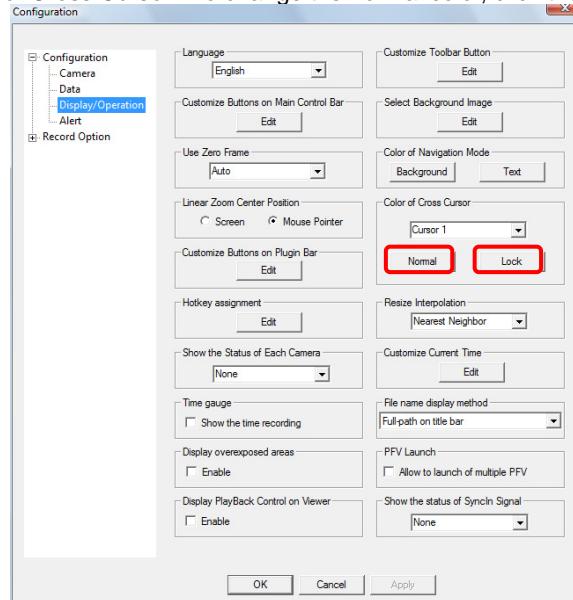
1.3.10. Setting Crosshair Cursor

The color of the crosshair cursor (cursor1, cursor2) can be customized.

1. Select the crosshair cursor to change.



2. To change the color of the crosshair cursor for its fixed status, click the [Lock] button in “Color of Cross Cursor”. To change the normal color, click the [Normal] button.



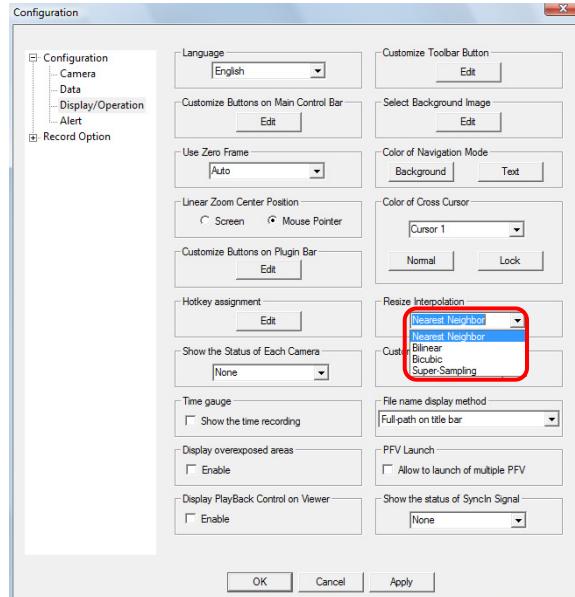
3. Click the on any color in the color pallet that you wish to assign to the crosshair cursor and click the [OK] button. The normal or fixed color is set.



1.3.11. Resize Interpolation Method Setting

This option sets the image display interpolation method when resizing the display with the view window.

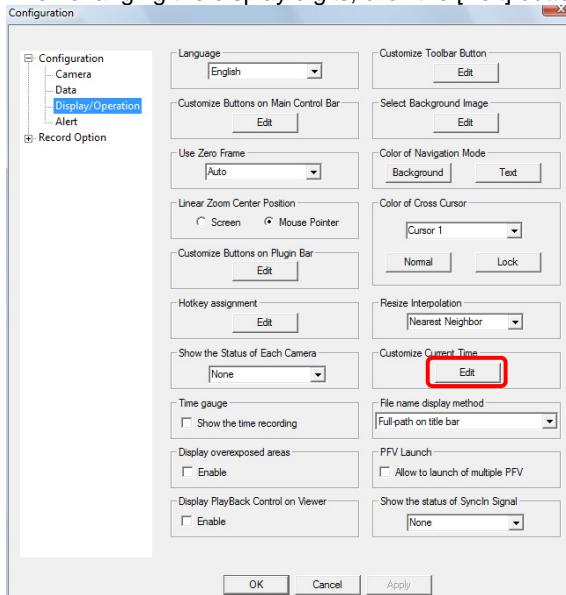
Set with “Resize Interpolation”.



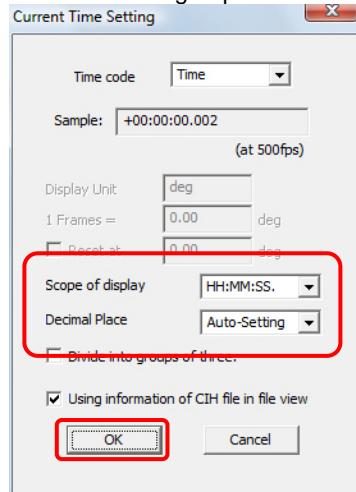
1.3.12. Time Code Setting

You can customize the time code's display digits shown in the information display in the view window during playback.

1. When changing the display digits, click the [Edit] button under [Customize Current Time].



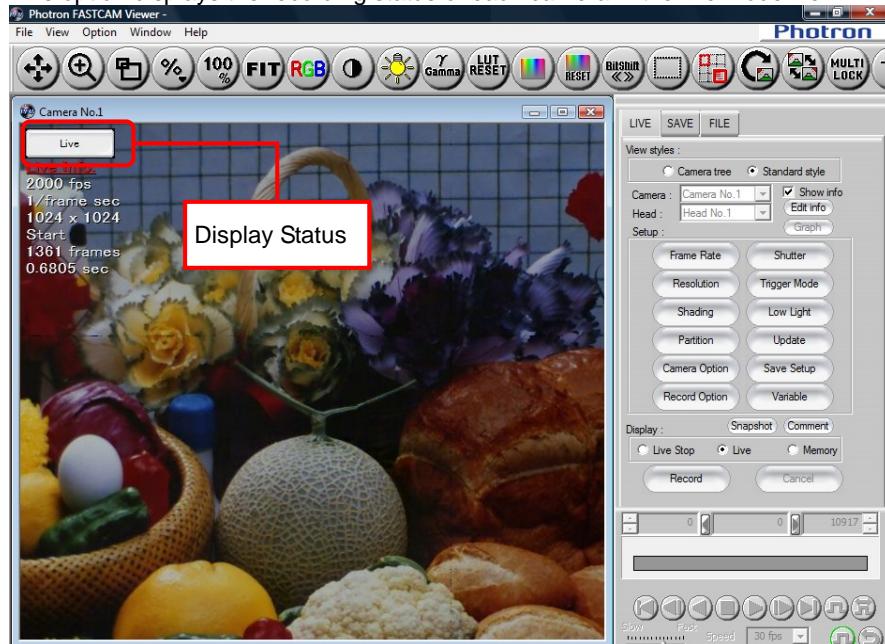
2. Specify the desired way of displaying the time code with “Scope of display” “Decimal Place” and “Divide into groups of three” and click the [OK] button.



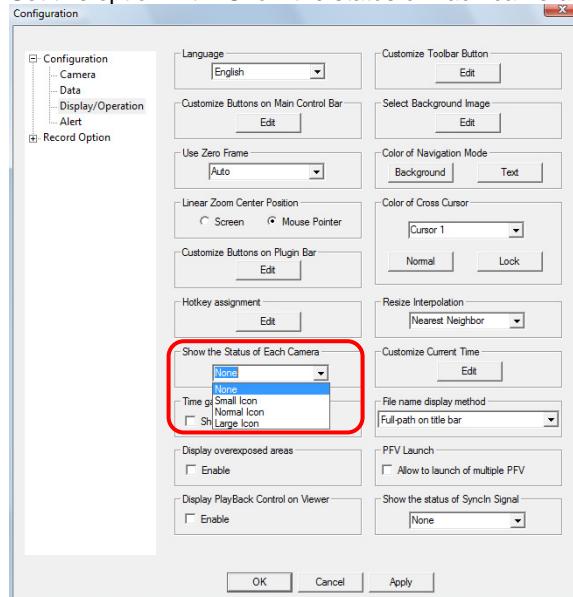
Item	Description
Time code	The default value is “Time”. When time code is set as an optional item, select “Custom”.
Display Unit	Enter the unit of the time code. Select “Custom” for “Time code” and you can set the unit.
1 frame =	Enter a separation of 1-frame length between frames by the unit for display. This can be set if “Custom” is selected for “Time code”.
Reset at	This is set when the time code must be reset to 0 from any current value. Check the checkbox and enter a value in the box to the right at which time the time code is reset. This can be set if “Custom” is selected for “Time code”.
Scope of display	Selects the display format for time. This can be set if “Time” is selected for “Time code”.
Decimal Place	Specifies the number of digits to be displayed for fractions. The default value is “Auto-setting”..
Divide into groups of three	Displays fractions divided at every 3 digits with a space. The default value is OFF.
Using information of CIH file in file view	When CIH file is loaded, the time code information is displayed as it is set according to the CIH file description. The default value is ON.

1.3.13. Show the Status of Each Camera Setting

This option displays the recording status of each camera in the live mode view window.

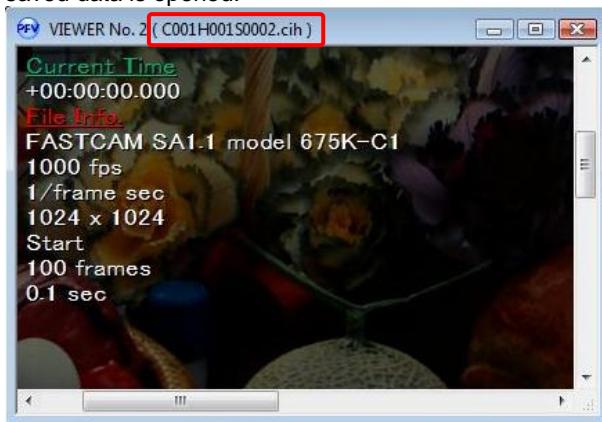


Set this option with "Show the status of Each camera ". The default value is "None".

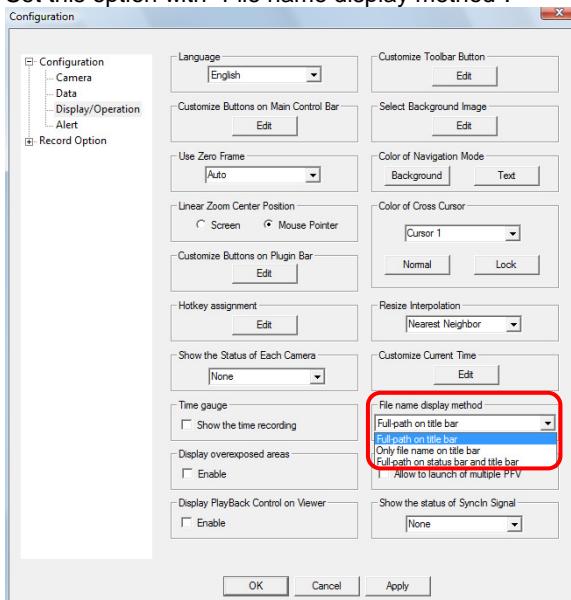


1.3.14. File name display method Setting

This option sets the file name display format that is displayed in the view window's title bar when saved data is opened.

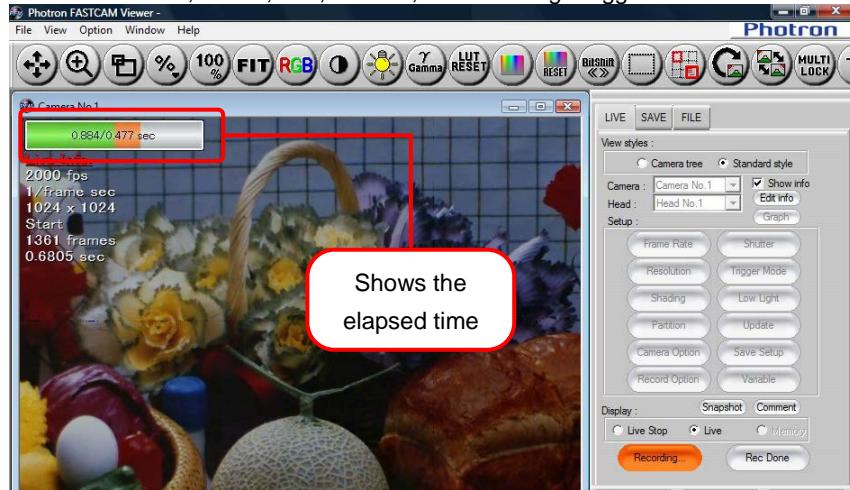


Set this option with "File name display method".



1.3.15. Elapsed Recording Time during Filming Display Setting

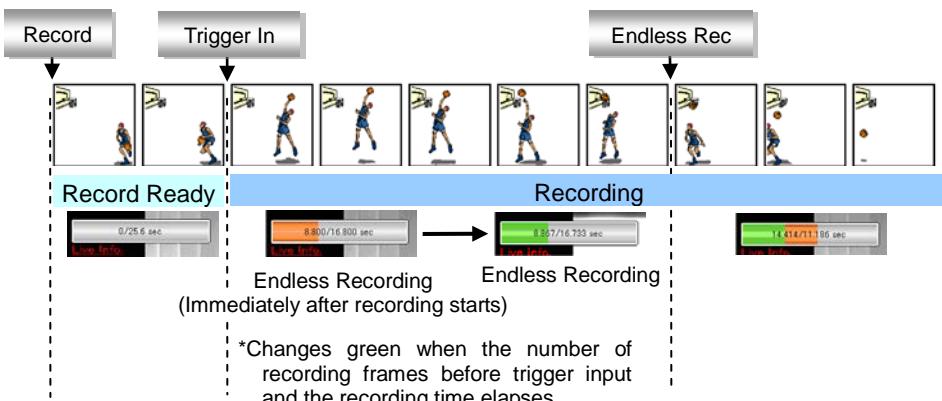
This option displays the elapsed recording time for each camera in the live mode view window. It can be used with start, center, end, manual, and two-stage triggers.



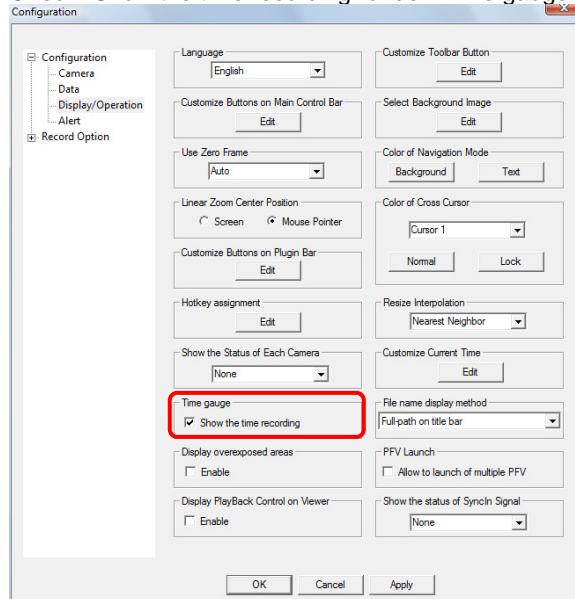
<For the start trigger (two-stage trigger is the same)>



<For the center trigger (end, manual triggers are the same)>



Check "Show the time recording" under "Time gauge". The default value is OFF.



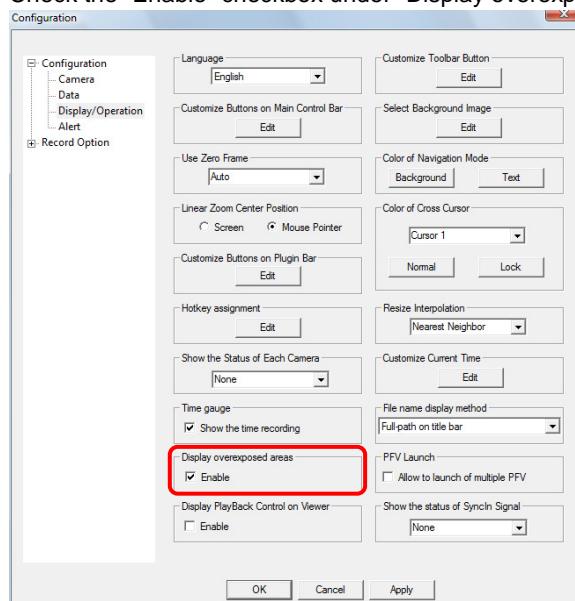
Caution

- The time displayed for the two-stage trigger is calculated based on the frame rate during low speed. Therefore, the actual time may vary according to the trigger input state.

1.3.16. Overexposure warning setting

Portions within a live image which are totally white (255 for 256 grayscale) are displayed in red color.

Check the "Enable" checkbox under "Display overexposed areas". The default value is OFF.

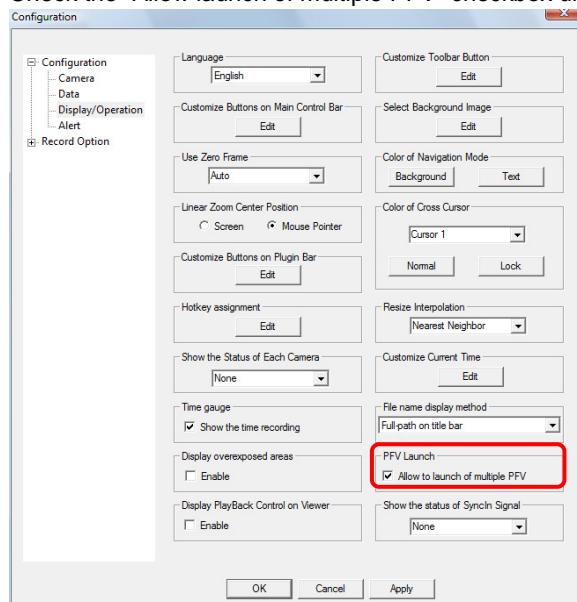


1.3.17. Multiple PFV launching permission setting

Multiple PFV's can be launched simultaneously.

When multiple cameras are involved, multiple PFV's (same number as the cameras) are allowed to start up.

Check the "Allow launch of multiple PFV" checkbox under PFV Launch. The default value is OFF.

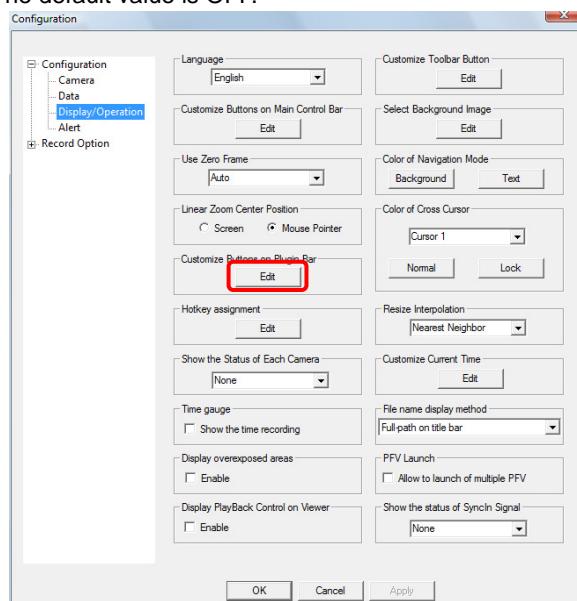


1.3.18. Playback control display setting

When a mouse comes over the displayed image, playback control is displayed.

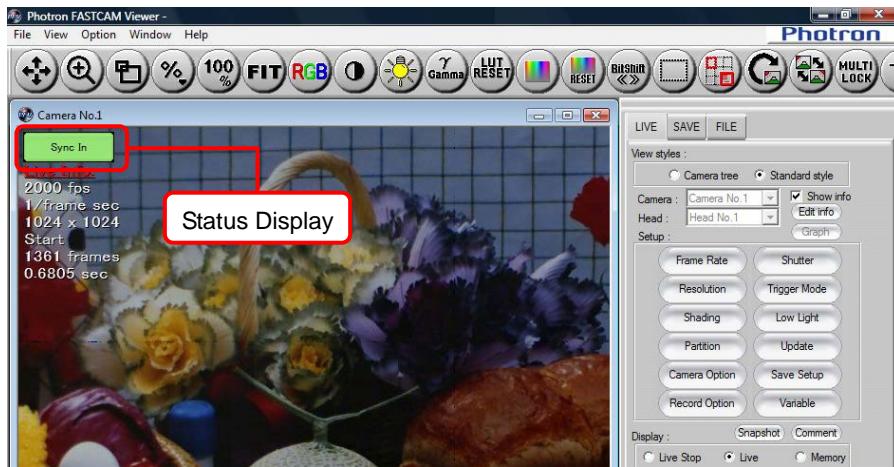
Check the "Enable" checkbox under "Display Playback Control on Viewer".

The default value is OFF.

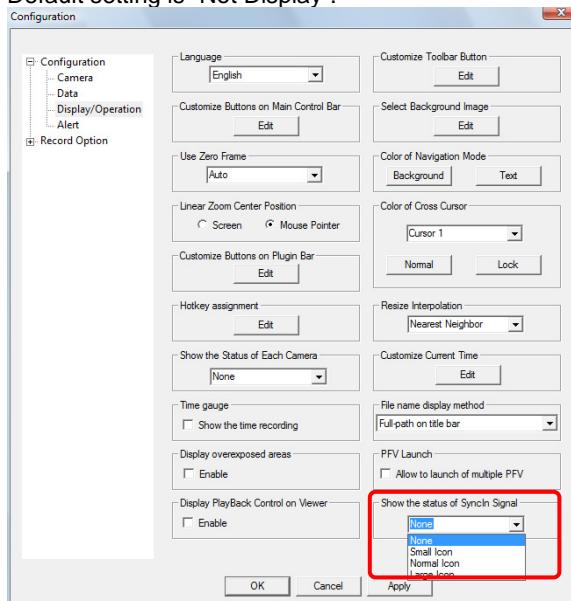


1.3.19. Synchronization Signal Input Status Display Setting

This option displays the synchronization signal input status of each camera in the live mode view window.



The setting is made under “Display the Synchronization Signal Input Status of Each Camera.” Default setting is “Not Display”.



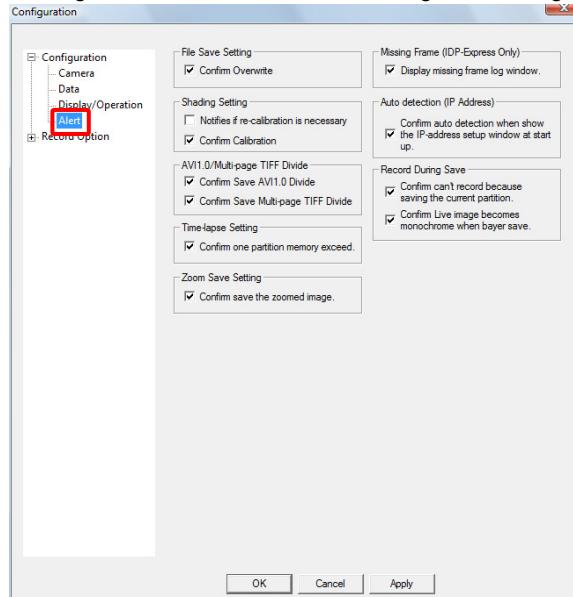
Synchronization signal input status is shown as follows;

Icon	Description
	Synchronization signals are being input.
	No synchronization signal is being input.
	The receiving frequency of input synchronization signals is in excess of the set value.
	The camera does not support the synchronization signal input status display.

1.4. Settings Warning Message

The PFV start-up warning message can be changed in the following manner.

For the settings related to the display screen, select the “Configuration” dialog box with the menu bar [Option] – [Configuration]. Then, from the tree on the left side, click the “Alert” options under “Configuration” and the screen to change the settings will be displayed.

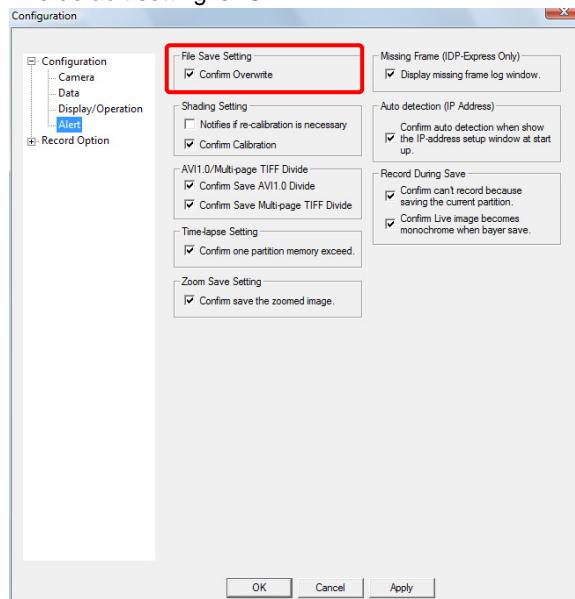


1.4.1. Display Warning When Overwriting

Choose whether to display the overwrite warning message when saving a file with a name that already exists.

Check the “Confirm Overwrite” option in “File Save Setting”.

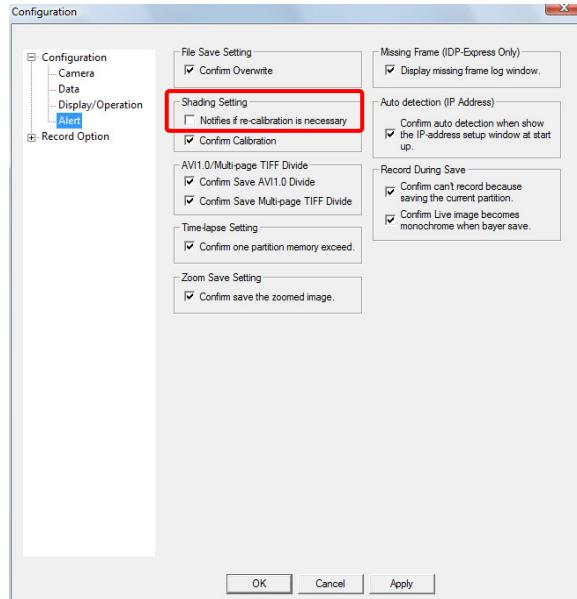
The default setting is “On”.



1.4.2. Display Notification when Shading Required

This option sets the control panel's "Shading" button to be displayed illuminated in red when shading is required because of a change in frame rate or shutter speed.

Check the "Notifies if re-calibration is necessary" option in "Shading Setting". The default value is unchecked.

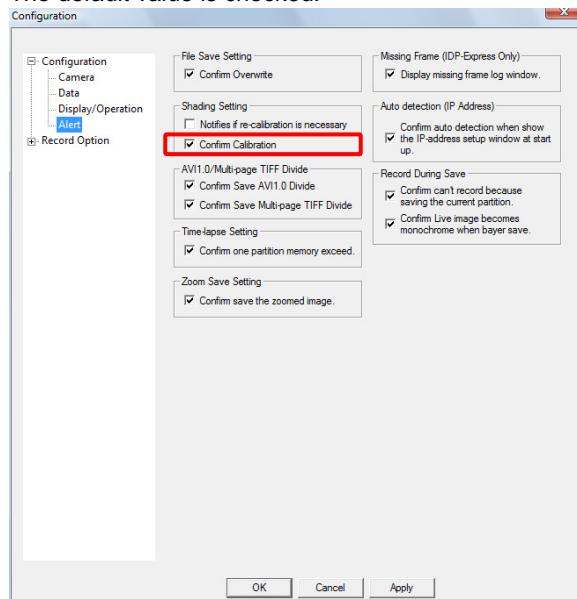


1.4.3. Display of Shading Correction Warning Message

Setting for shading correction warning message can be made in the following manner.

Check the "Confirm Calibration" option in "Shading Setting".

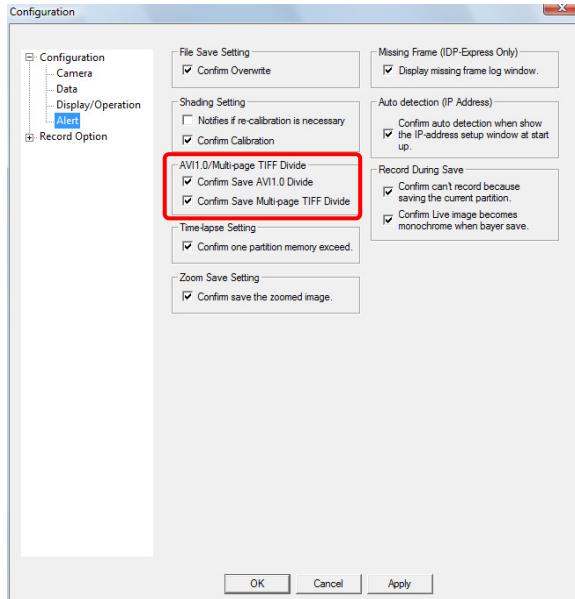
The default value is checked.



1.4.4. Display Warning When Saving Split AVI Files

Sets whether or not to have a warning message displayed when saving a split file in the AVI 1.0 or the Multi-page TIFF format.

Check “Confirm Save AVI1.0/Multi-page TIFF Divide” under “AVI1.0 Divide/Multi-page TIFF”.
The default value is checked.



Caution

- The file size is predicted from the size calculated from the image size when uncompressed, so when compression is set, the warning may be displayed even when the file is not split.

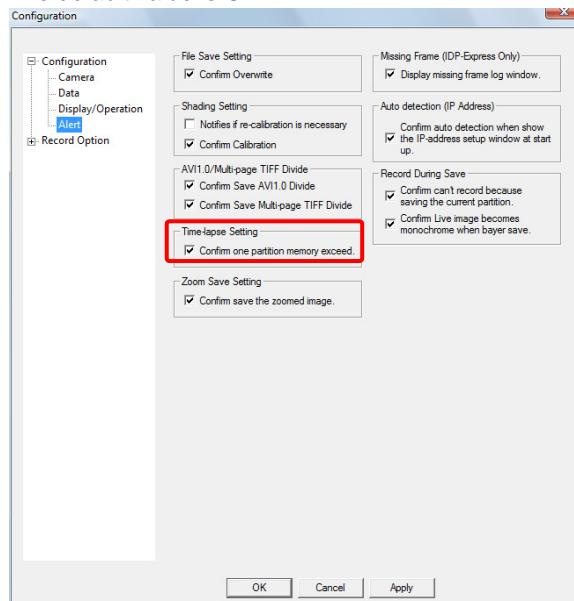
Reference

- For saving compressed AVI format files, refer to “5.1.4. Setting the Save Format” in Operation section.

1.4.5. Display Warning During Time-lapse Recording

When performing time-lapse recording, set to display a warning message that recording will stop prematurely because the repeat count exceeds a single partition's worth of memory.

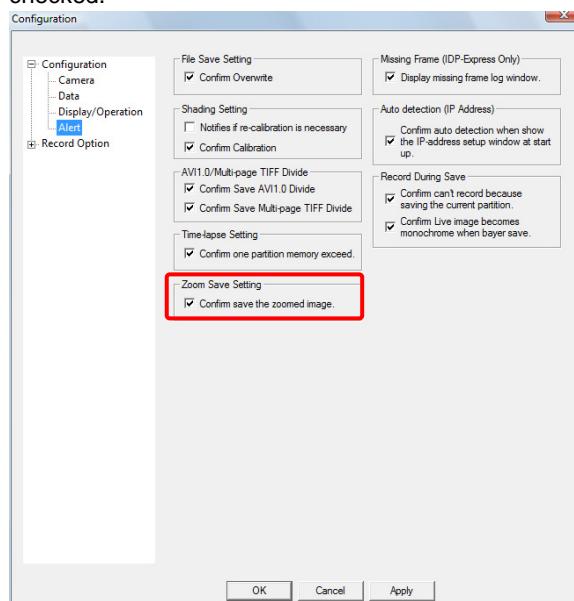
Check "Confirm one partition memory exceed" under "Time-lapse Setting".
The default value is ON.



1.4.6. Display Warning When Saving Zoomed Images

This option sets whether or not to display a warning message when saving a zoomed image.

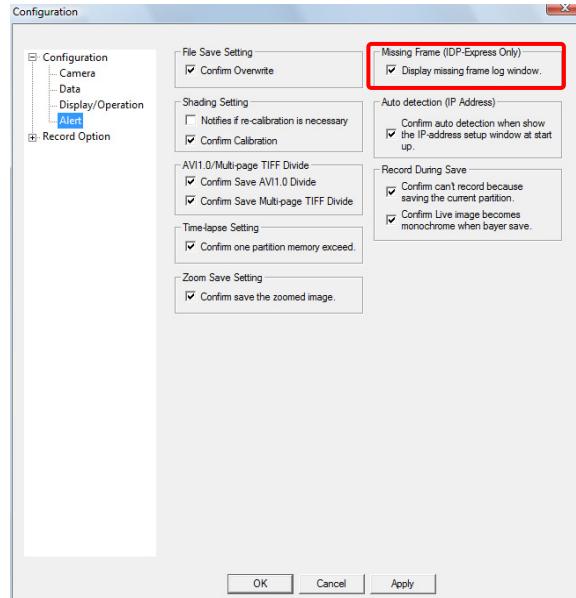
Check "Confirm save the zoomed image" under "Zoom Save Setting". The default value is checked.



1.4.7. Display Warning When Frame Missing (IDP-Express Only)

With IDP-Express, this setting configures showing the log window that determines whether or not frames are missing.

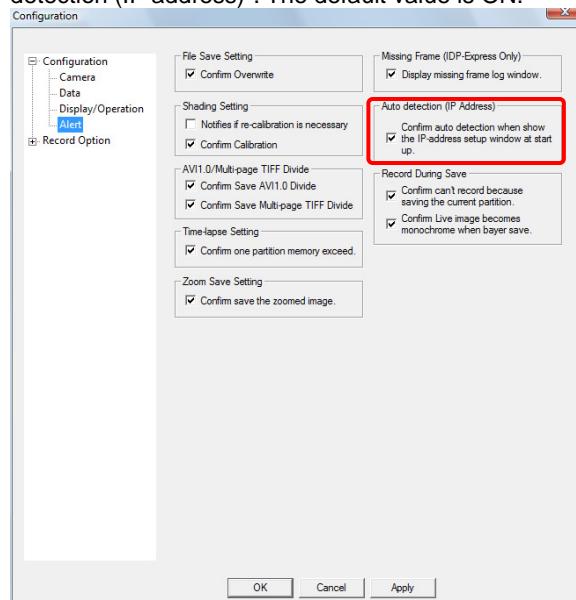
Check the "Display missing frame log window" under "Missing Frame (IDP-Express Only)". The default value is ON.



1.4.8. Display Warning During Camera Auto Search

This setting configures whether or not to display a warning message when displaying the IP address configuration screen and automatically searching for cameras (IP addresses) at PFV startup.

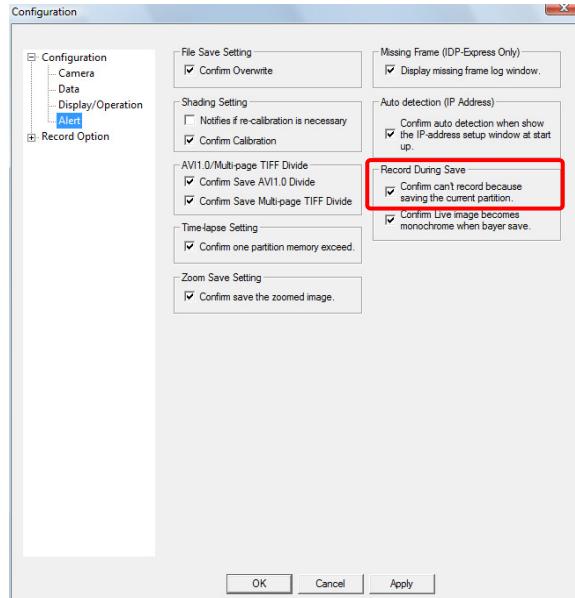
Check the "Confirm auto detection when show the IP-address setup window at start up" under "Auto detection (IP address)". The default value is ON.



1.4.9. Display Warning During Record During Save

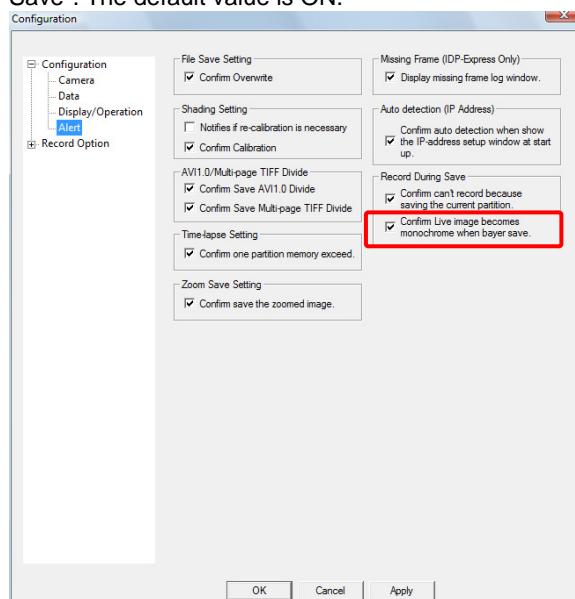
- ◆ This setting configures whether or not to display a warning message when the current partition is automatically saving its data and recording cannot start when record during save is running.

Check the "Confirm can't record because saving the current partition" under "Record During Save". The default value is ON.



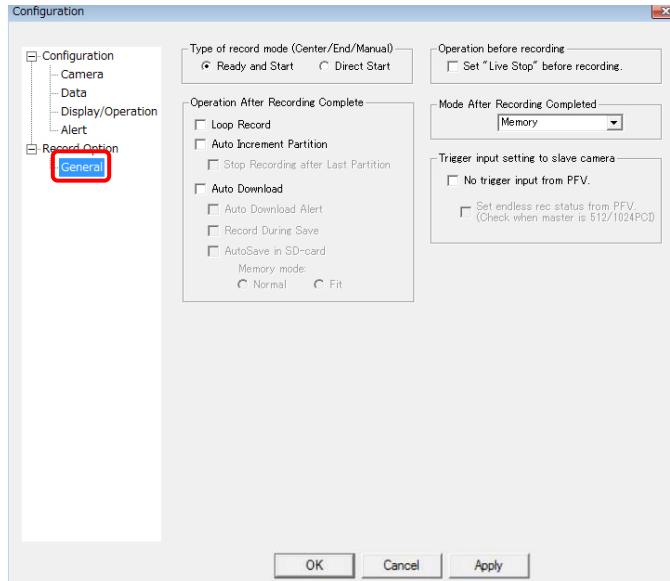
- ◆ This setting configures whether or not to display a warning message when the live image becomes monochrome (Bayer image), even for color cameras, when performing a Bayer save during record during save.

Check the "Confirm Live image becomes monochrome when bayer save" under "Record During Save". The default value is ON.



1.5. Settings When Recording

Make settings such as how to start a recording and the display mode setting after recording. For the settings related to recording, display the “Configuration” dialog box with the menu bar [Option] – [Configuration]. Then, from the tree on the left side, click the “General” option under “Record Option” and the screen to make settings will be displayed.

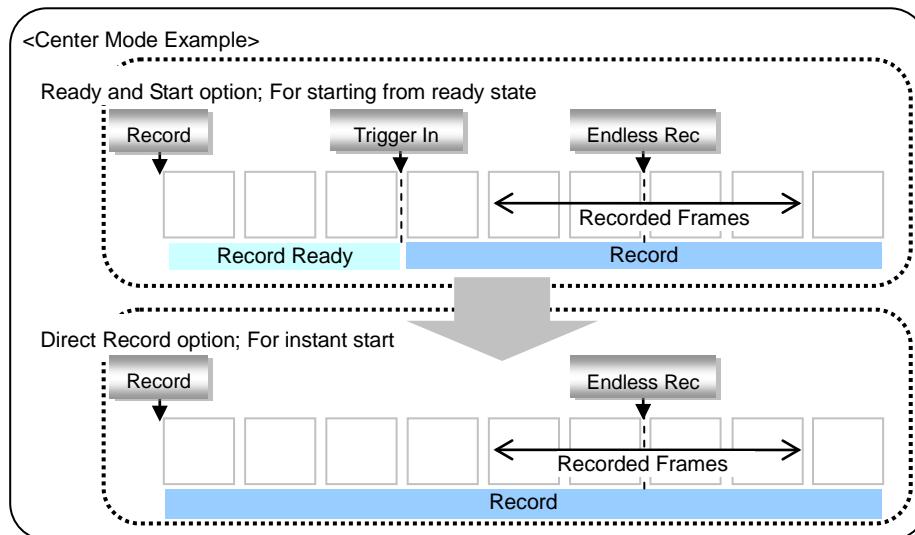


1.5.1. Direct Record Setting

Specify the method with which to start a recording.

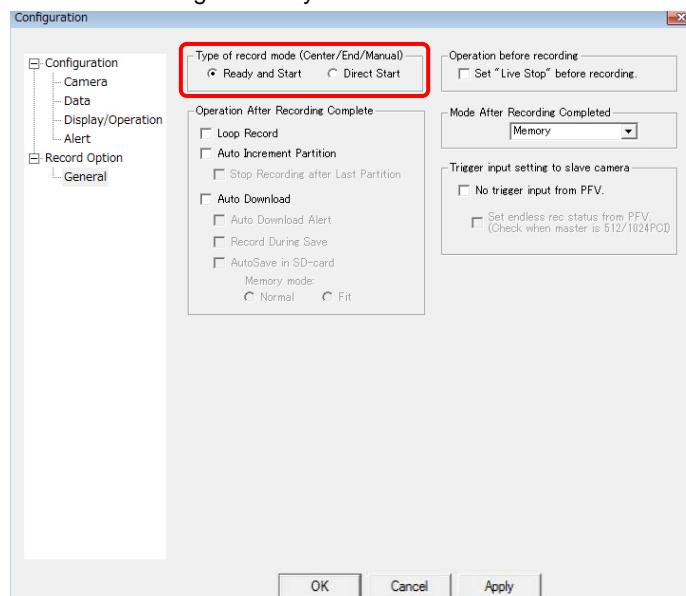
When shooting with center mode, end mode, or manual mode triggers the system enters the record ready state by clicking the [Record] button, recording begins by clicking the [Trigger In] button, and the trigger is input by clicking the [Endless Rec] button.

With the direct record option, PFV can be set to start recording by clicking the [Record] button and to input the trigger by clicking in the [Endless Rec] button. In direct record, the [Trigger In] button is not used so one less mouse click is required.



Set the “Type of record mode (Center/End/Manual)” option.

The default setting is “Ready and Start”.

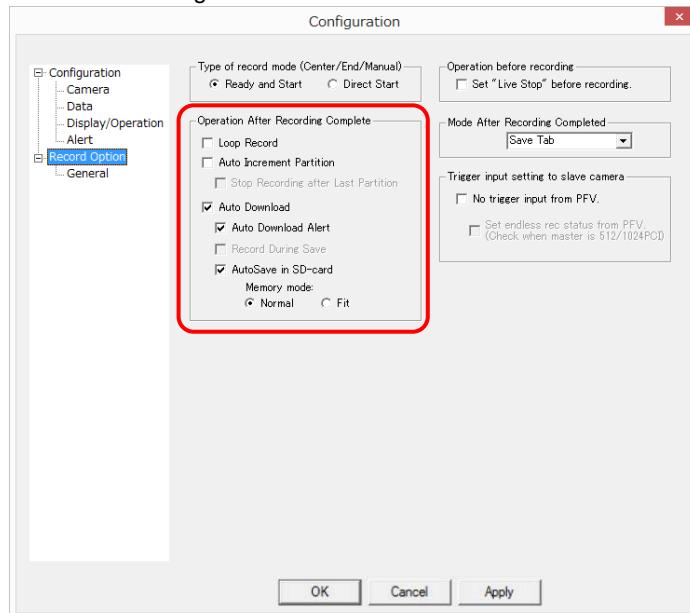


1.5.2. Shot Record Settings

Settings can be made to determine how the shot (record) data will be recorded to the camera memory and if the data will be automatically saved as files to the PC after recording is completed.

Set with the “Operation After Recording Complete” option.

The default setting is all “Off”.



Item	Description
Loop Record	After recording finishes, automatically start recording again. (Automatically go into a state where the [Record] button has been pushed.) The recording will continue by overwriting the data, so use caution when the “Auto Download Setting” and “Auto Increment Partition Setting” are not used.
Auto Increment Partition	When the memory is divide into partitions, after recording the first partition has finished, continue recording by moving to the next partition, without overwriting the data. If “Stop Recording after Last Partition” is checked, recording stops after writing all the partitions. If it is not checked, the camera returns to the first partition, and continues recording by overwriting the original data.
Auto Download	After shooting finishes, automatically save files to the PC. If “Auto Download Alert” is checked, a message is displayed when the file save executes.
AutoSave in SD-card	Automatically save the file to the SD card after the shooting is finished. Use Memory Mode to set whether to match the camera’s shooting time with the storage capacity of the SD card. Normal: Shooting is allowed to the full capacity of the camera memory. Fit: Shooting duration is limited within the SD card’s capacity.

1.5.3. Operation Before Recording

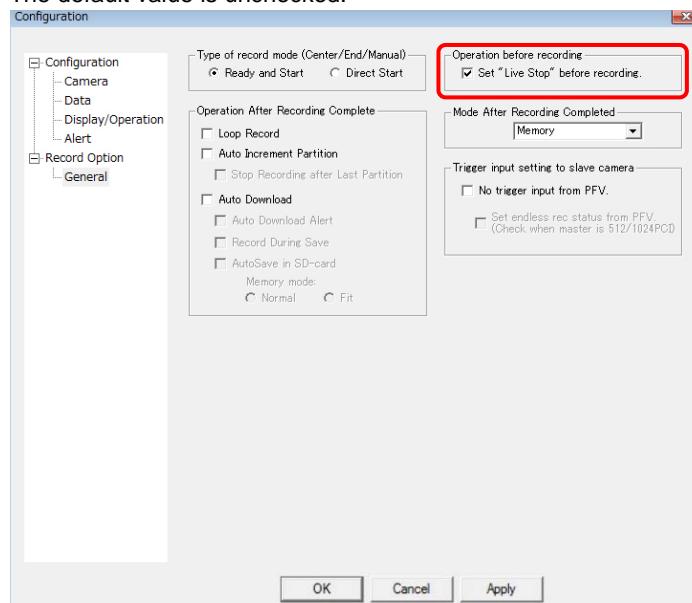
This setting sets the display before recording starts to [Live Stop].

Configure this setting when many cameras are connected and recording does not start smoothly, it takes time until recording starts, or it takes time to reflect the status during recording.

When configured, the live image is not updated during recording, which enables you to make smooth recordings.

Check the "Set 'Live Stop' before recording." under "Operation before recording".

The default value is unchecked.



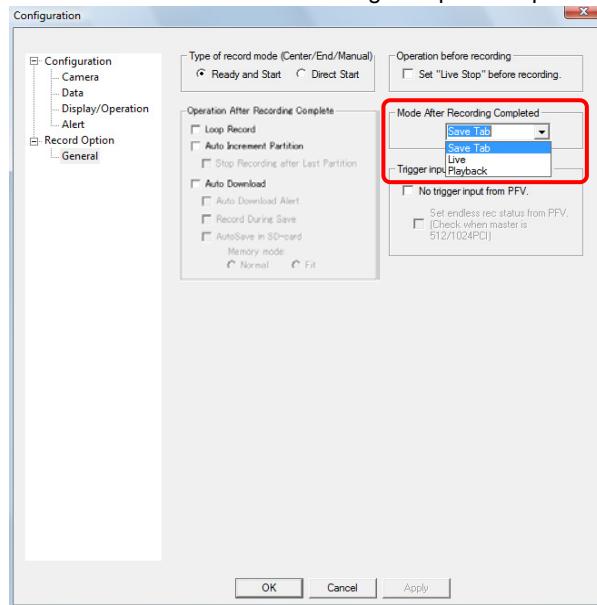
Supplement

- When "Live Stop" is configured, the image during recording is not displayed.

1.5.4. Display Mode after Recording Setting

Set the PFV display mode after shooting finishes.

Set with the “Mode After Recording Completed” option.

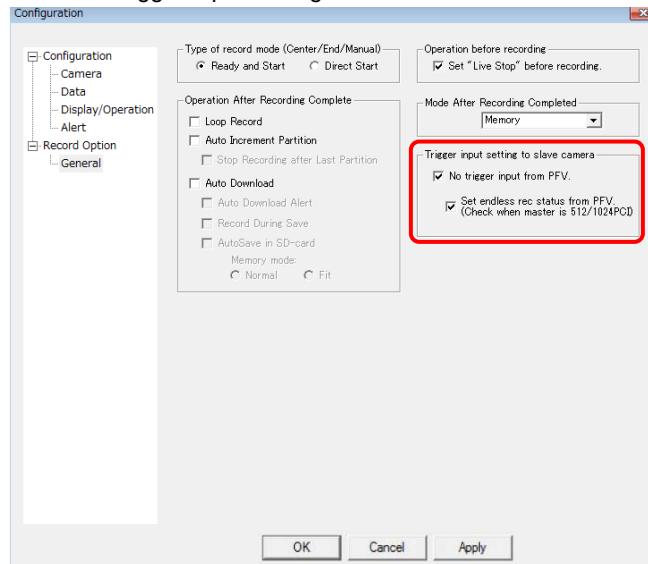


Item	Description
Save Tab (default)	When finishing shooting, the “SAVE” tab is automatically displayed on the control panel.
Live	Sit inactive in live mode.
Playback (Memory)	Automatically playback the recorded image after shooting.

1.5.5. Trigger Input to Slave Cameras Setting

This option sets whether or not to input a trigger from PFV to a slave camera (camera receiving a synchronization signal) when performing synchronized recording with multiple cameras.

Set with "Trigger Input setting to Slave Camera". The default value is unchecked.



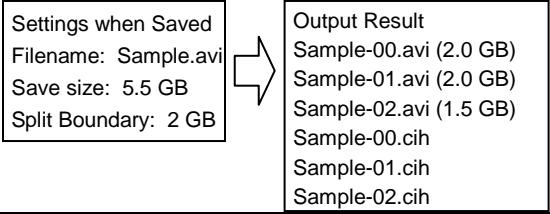
Item	Explanation
No trigger input from PFV	Do not issue a trigger for the slave camera from PFV.
Set endless rec status from PFV	Set to the endless recording state from PFV. A trigger is not issued.

Chapter. 2 Appendix

2.1. File Format List

File (extension)	Description	Comments
CIH (cih)	<p>Camera information file = CIH (Camera Information Header) file. A text file that contains information such as the recording conditions, the camera device setting values at the time of the shot, and information related to the moving image data that was shot on a Photron high-speed camera.</p> <p>When saving images to the PC as files, this file is automatically created in the folder the image files are saved to.</p>	When loading files with PFV, the saved image files can be loaded by specifying a CIH file to load, image files associated with this file are automatically loaded.
BMP (bmp)	The standard format used for bitmap files in the Windows environment. 8-bit grayscale and 24-bit full color images are supported on PFV.	<p>1 frame, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy+zzzzzz.bmp aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name zzzzzz is a six digit sequence number starting from 000001</p>
TIFF (tif)	<p>A bitmap file format. “Tagged Image File Format”</p> <p>PFV supports uncompressed, Packbits compression and Multi-page TIFF. PFV supports 8-bit (24-bit), 16-bit (48-bit), and sensor bit depth (color output capable) output.</p>	<p>1 frame, 1 image file. Multi-page TIFF is 1 sequence, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy+zzzzzz.tif aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name zzzzzz is a six digit sequence number starting from 000001</p>
JPEG (jpg)	<p>A file format designed for still-image compression.</p> <p>PFV only supports 8-bit lossy compression. (Uses the Intel JPEG Library)</p> <p>Compression quality can be set from 0% (high compression) to 100% (high quality).</p>	<p>1 frame, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy+zzzzzz.jpg aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name zzzzzz is a six digit sequence number starting from 000001</p>
PNG (png)	<p>The “Portable Network Graphics” file format designed for still-image compression.</p> <p>It uses a lossless compression algorithm.</p> <p>PFV supports 8-bit (24-bit) and 16-bit (48-bit) output.</p> <p>When compressing, quality priority, standard, and speed priority are selectable.</p>	<p>1 frame, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy+zzzzzz.png aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name zzzzzz is a six digit sequence number starting from 000001</p>

File (extension)	Description	Comments
RAW (raw)	<p>An uncompressed binary data file with no header information.</p> <p>The color image data saved with PFV is interleaved (RGBRGBRGB...) and each color plane, RGB, is saved as 8 bits or 16 bits.</p>	<p>1 frame, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy+zzzzzz.raw aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name zzzzzz is a six digit sequence number starting from 000001</p> <p>* The arrangement of the RAW format differs by software. * A CIH file is necessary for loading a RAW file with PFV.</p>
RAWW (raww)	<p>An uncompressed binary data file with no header information.</p> <p>The color image data saved with PFV is interleaved (RGBRGBRGB...) and each color plane, RGB, is saved as 16 bits.</p>	<p>1 frame, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy+zzzzzz.raww aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name zzzzzz is a six digit sequence number starting from 000001</p> <p>RAWW is Photron's proprietary format. With software that supports 16-bit RAW, the file may be loaded by changing the extension to "raw".</p> <p>A CIH file is necessary for loading a RAWW file with PFV.</p>
MRAW (mraw)	<p>An uncompressed binary data file with no header information.</p> <p>The color image data saved with PFV is interleaved (RGBRGBRGB...) and output is supported for each color plane, RGB, at 8-bits, 16-bits, or the sensor's bit depth (color output capable).</p>	<p>1 sequence, 1 image file.</p> <p>Filename: Caption String+CaaaHxxxSyyyy.mraw aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name</p> <p>* A CIH file is necessary for loading a MRAW file with PFV.</p>

File (extension)	Description	Comments
AVI (avi)	<p>The standard format used for video files in the Windows environment.</p> <p>A number of compression formats can be used by installing the appropriate codec in Windows.</p>	<p>1 sequence, 1 image file. Filename: Caption String+CaaaHxxxSyyyy.avi aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name</p> <p>AVI files are limited to a maximum of 2 GB by the AVI 1.0 specification. AVI files that exceed 2 GB are in the Open DML (AVI 2.0) format. The number of frames is a maximum of 8,100,000 frames, even when using the Open DML format.</p> <p>AVI 2.0 files cannot be read by software that does not support the Open DML format. Also, when the save location's file system is FAT32, a file that exceeds 4 GB cannot be created, even using the Open DML format.</p> <p>With the AVI file auto split function on PFV, when the capacity of the saved data reaches the split boundary, the file is automatically split and saved. The size of the split file can be selected from "2 GB (AVI 1.0)" and "No Size Limit (AVI 2.0)". When "No Size Limit" is selected and the file system is FAT32, output is limited to 4 GB, so NTFS is recommended.</p> <p>Split File Sample:</p> 
WMV (wmv)	<p>The "Windows Media Video" file format developed by Microsoft Corporation.</p> <p>PFV supports WMV9 output.</p> <p>PFV outputs 8-bit grayscale files and 24-bit color files.</p>	<p>1 sequence, 1 image file. Filename: Caption String+CaaaHxxxSyyyy.wmv aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name</p>
MOV (mov)	<p>"QuickTime", the multimedia technology file format developed by Apple Inc.</p> <p>File output in 8-bit grayscale and 24-bit full color is supported with PFV.</p>	<p>1 sequence, 1 image file. Filename: Caption String+CaaaHxxxSyyyy.mov aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name</p>
FTIF (ftif)	<p>A variant of the TIFF file format.</p> <p>Photron's proprietary format,</p> <p>"FASTCAM Tagged Image File Format".</p> <p>Version 1 only supports 8-bit saving.</p> <p>The format is uncompressed, but since it is the data from the camera sensor saved as-is (Bayer pattern), if the data is the output from a color camera, the size of the file will be 1/3 that of the other uncompressed file formats. FITF files can be read with PFV as color images.</p>	<p>1 frame, 1 image file. The file is saved with a filename that is an automatically generated sequence number.</p> <p>Filename: Caption String+CaaaHxxxSyyyy.ftif aaa is a three digit camera ID xxx is a three digit head number yyyy is a four digit identification number for data with the same name</p>

File (extension)	Description	Comments
IRG (irg)	When IRIG or GPS input is used on PFV, an IRIG time record is output during the file save operation. The file is binary data constructed of 20 bytes for each frame.	-
MCD (mcd)	A binary-format file to store the recorded waveform data together with the CIH file of image data when MCDL is operated from the PFV.	-
WVD (wvd)	A binary-format file to save the recorded waveform along together with the CIH file when the waveform input board (optional) is used in PFV.	-
CSV (csv)	Comma Separated Value format, a type of text file in which data is separated with commas and serially aligned.	PFV can input and output waveform input data as Type A, Type B, and Type S CSV files. However, Type S files can only be input.
PCS (pcs)	Camera Setup File A binary file that saves the various conditions set on PFV.	
PCIH (pcih)	"Project file". When opened, all CIH files listed in the project file are opened.	Cannot save just a single CIH file. The file name is given when saved.
ISO-MME (mmi)	Multimedia data exchange format for impact test of road vehicles as defined by ISO/TS 13499	Not all of the items defined by ISO/TS 13499 are shown (not fully compliant with ISO/TS 13499). Values of all items that are retained by the camera are output. All other items than the above are shown as NO or NO VALUE.

Supplement

- The number of digits in file names can be changed.

2.2. CIH File

2.2.1. CIH File Contents

CIH files can be opened with Windows' Notepad or a text editor.
The content output will differ depending on the camera and recording mode.

<Sample>

```
#Camera Information Header
Date : 2010/2/10 : Data creation data
Time : 11:16 : Data creation time
Camera Type : FASTCAM SA5 model 1300K-C1 : Camera name, type
Camera ID : 0 : Camera ID
User Defined Camera Name : Camera1 : User defined camera name
Record Rate(fps) : 7000 : Frame rate
Shutter Speed(s) : 1/7000 : Shutter speed
Trigger Mode : Start : Trigger mode
Color Temperature : 5100K : Color temperature setting
Color Balance R : 1104 : White balance, red
Color Balance G : 1024 : White balance, green
Color Balance B : 1281 : White balance, blue
Color Balance Base : 1024 : White balance reference value
Color Balance Max : 4095 : White balance maximum value
Original Total Frame : 5457 : Original total saved frame count
Total Frame : 2500 : Total saved frame count
Start Frame : 1 : Saved start frame
Correct Trigger Frame : 1 : Trigger frame during recording
Save Step : 1 : Saved frame interval
Image Width : 1024 : Image size, width
Image Height : 1024 : Image size, height
Color Type : Color : Color/monochrome
Color Bit : 24 : Color bits
File Format : Bmp : File format
Effective Bit Depth : 12 : Effective bits
Effective Bit Side : Higher : Effective bit location
Comment Text : : Comment
IRIG Mode : File : IRIG data save mode
IRIG File : C001H001S0001.irg : IRIG file name
MCDL Mode : File : MCDL data save mode
MCDL File : C001H001S0001.mcd : MCDL file name

Scale Method : 0 : Basic scale method
Scale Grid Space : 10 : Grid width
Scale Pixel Size : 10.00 : 1 pixel's size
Scale Unit : 1 : Basic distance unit
Scale Magnification : 1.00 : Magnification
Scale Ruler : 100 : Ruler length in window's bottom right
Scale Distance : 100.00 : Distance corresponding between 2-point wide pixel
Scale 2Points Distance: 121 : 2-point wide pixel specified by clicking
```

<Continues on next page>

```

#Photron Fastcam Viewer Version Information:
Saved Date2010/2/10 : File save date
Saved Time : 11:16 : File save time
PFV.exe : 3, 2, 4, 0 : PFV version
D1024PCI.dll : 1, 0, 2, 9 : DLL version
DMH4.dll : 1, 0, 3, 2 : DLL version
DSA5.dll : 1, 0, 1, 9 : DLL version
IGETHER.dll : 1, 0, 1, 0 : DLL version
PDCLIB.dll : 1, 0, 6, 6 : DLL version
PICLIB.dll : 1, 0, 3, 2 : DLL version

#System Information:
OS : Windows Vista Business Edition (version 6.0 Build 6000) : Operating system
Memory : 3326MB RAM : Memory
Processor : Intel(R) Core(TM)2 Quad CPU Q6700 @ 2.66GHz : Processor
DirectX : DirectX 10 : DirectX version

#Device Information:
Number of devices : 1 : Number of connected devices

#Device 1 :
Device Name : FASTCAM SA5 model 1300K-C : Device information
Device ID : 010 : Device name
Interface : Gigabit Ethernet : Device ID
IP Address : 192.168.0.10 : Connection method
Subnet Mask : 255.255.255.0 : IP address (when Ethernet connection)
connection) : Subnet mask (when Ethernet
Gateway Address : 0.0.0.0 : Gateway address
(when Ethernet connection)
Firmware : 3.05 : Device firmware

```

2.2.2. PCIH File (Project File) Contents

PCIH files can be opened with Windows Notepad or other text editors.

You can directly edit this file when the location of a CIH file has changed because it was moved.

```

<Sample>

[PCIH]
CIH1=D:\Camera 1\CO001H001S0001.CIH      : Project member CIH File 1
CIH2=D:\Camera 2\CO002H001S0002.CIH      : Project member CIH File 2
CIH3=D:\Camera 3\CO002H001S0003.CIH      : Project member CIH File 3

```

2.3. About The IFD (Image File Directory) Tag

The IFD (Image File Directory) is a TIFF tag that indicates how to interpret the TIFF file data. It shows the position and amount of pixel data and the position and amount of frame data.

The IFD normally begins at an even-numbered address and the first two bytes express the number of entries including the IFD tag.

FTIF files also use the same tags.

Tag List

Tag256	Image Width
Tag257	Image Length
Tag258	Bits Per Sample
Tag259	Compression
Tag262	Photometric Interpretation
Tag273	Strip Offsets
Tag274	Orientation
Tag277	Samples Per Pixel
Tag278	Rows Per Strip
Tag279	Strip Byte Count
Tag284	Planar Configuration
Tag320	Color map
Tag34071	FTIF Video Border Data (This tag is only in the FTIF file)

2.4. FTIF Video Border Data

The video border data is entered into the position pointed to by the “offset” value described in the direct entry in “tag=34701” inside the file.

However, for FTIF, the content of the file differs from what is specified with TIFF, it contains a unique data sequence. For this reason, to load an FTIF file, it is necessary to discern the “FTF” string in FTIF info and to check the FTIF version. This data is a fixed-length of 128 bytes and composed of the structure below.

Offset	Type	Value			Data Format	Bytes
+0	FTIF Info	“FTF” (constant)			ASCII char	3
+3	FTIF Version	1			char	1
+4	Application Info	“PL” Name of the application that output the file			ASCII char	2
+6	Application Version	Version of the application that output the file When PFV (PL), the SDK Ver.			char	2
+8	Flag 1	Bit0~Bit3	Chroma Mode		char	1
		Bit4	Trigger Frame	0=No 1=Yes		
		Bit5	IRIG	0=Off 1=On		
		Bit6	MCDL	0=Off 1=On		
		Bit7	Color Mode	0=Grayscale 1=Color		
+9	Camera Type	0x00=Grayscale 0x01=Reserved 0x10=Reserved 0x11=Reserved 0x12=Reserved 0x13=Reserved 0x14=Reserved 0x15=MAX/APX 0x16=NEO/ultima512 0x17=Reserved 0x18=512PCI 0x19=APX RS 0x20=1024PCI			char	1
+10	Geometry	0=Normal			char	1
+11	Camera ID				char	1
+12	Session Number				char	1
+13	Record Rate				long	4
+17	Shutter Speed				long	4
+21	Frame Number				long	4
+25	Trigger Mode				char	1
+26	IRIG					
+26	IRIG Data				short	2
+28	IRIG Year				short	2
+30	IRIG Days				char	1
+31	IRIG Hours				char	1
+32	IRIG Minutes				char	1
+33	IRIG Microseconds				long	4
+37	MCDL					

Offset	Type	Value	Data Format	Bytes
+37	MCDL	Digital(0)	char	1
		Analog A(0)	short	2
		Analog B(0)	short	2
		Analog C(0)	short	2
		Analog D(0)	short	2
		Digital(1)	char	1
		Analog A(1)	short	2
		Analog B(1)	short	2
		Analog C(1)	short	2
		Analog D(1)	short	2
		Digital(2)	char	1
		Analog A(2)	short	2
		Analog B(2)	short	2
		Analog C(2)	short	2
		Analog D(2)	short	2
		Digital(3)	char	1
		Analog A(3)	short	2
		Analog B(3)	short	2
		Analog C(3)	short	2
		Analog D(3)	short	2
		Digital(4)	char	1
		Analog A(4)	short	2
		Analog B(4)	short	2
		Analog C(4)	short	2
		Analog D(4)	short	2
		Digital(5)	char	1
		Analog A(5)	short	2
		Analog B(5)	short	2
		Analog C(5)	short	2
		Analog D(5)	short	2
		Digital(6)	char	1
		Analog A(6)	short	2
		Analog B(6)	short	2
		Analog C(6)	short	2
		Analog D(6)	short	2
		Digital(7)	char	1
		Analog A(7)	short	2
		Analog B(7)	short	2
		Analog C(7)	short	2
		Analog D(7)	short	2
		Digital(8)	char	1
		Analog A(8)	short	2
		Analog B(8)	short	2
		Analog C(8)	short	2
		Analog D(8)	short	2
		Digital(9)	char	1
		Analog A(9)	short	2
		Analog B(9)	short	2
		Analog C(9)	short	2
		Analog D(9)	short	2

2.5. Video Border Data

As a reference, the structure of the TIFF file's video border data is listed here.

Offset	Type	Value	Data Format	Bytes
+0	Header Info		ASCII char	10
+10	Video Type	1=color 2=mono	char	1
+11	Session ID		char	1
+12	Camera ID		char	1
+13	Record Rate	0=External 1=60fps 2=125fps 3=250fps 4=500fps 5=1000fps 6=2000fps 7=4000fps 8=8000fps 9=16000fps	char	1
+14	Exposure	0= External 1=1/60sec 2=1/125sec 3=1/250sec 4=1/500sec 5=1/1000sec 6=1/2000sec 7=1/4000sec 8=1/8000sec 9=1/16000sec 10=1/32000sec 11=1/64000sec 12=1/128000sec	char	1
+15	Record Mode	0=Record 1=Record stop 2=Record Trigger	char	1
+16	White Balance	0=5100K 1=3100K 2=user	char	1
+17	ROC	0=ROC Off 1=ROC On 1frame 2=ROC On 20frames 3=ROC On 50frames	char	1
+18	MCDL	0=MCDL Off 1=MCDL On	char	1
+19	IRIG	0=IRIG Off 1=IRIG On	char	1
+20	White Balance Coefficients	RGB	3floatingpoint#1	12
+32	Frame Number		short	2
+34	Trigger Frame	0=Not Trigger Frame 1=Trigger Frame	char	1
+35	Real Time			
+35	Seconds		BCD	1
+36	Minutes		BCD	1
+37	Hours		BCD	1
+38	Day		BCD	1

Offset	Type	Value	Data Format	Bytes
+39	Month		BCD	1
+40	Year		BCD	1
+41	IRIG			
+41	IRIG Days	Hundredth Value	char	1
		Tenth Value	char	1
		Unit Value	char	1
+44	IRIG Hours	Tenth Value	char	1
		Unit Value	char	1
+46	IRIG Minutes	Tenth Value	char	1
		Unit Value	char	1
+48	IRIG Seconds	Tenth Value	char	1
		Unit Value	char	1
		Microseconds	long	4
+54	Elaps Time	Minutes	short	2
		Seconds	long	4
+60	MCDL	Digital(0)	char	2
		Analog A(0)	char	2
		Analog B(0)	char	2
		Digital(1)	char	2
		Analog A(1)	char	2
		Analog B(1)	char	2
		Digital(2)	char	2
		Analog A(2)	char	2
		Analog B(2)	char	2
		Digital(3)	char	2
		Analog A(3)	char	2
		Analog B(3)	char	2
		Digital(4)	char	2
		Analog A(4)	char	2
		Analog B(4)	char	2
		Digital(5)	char	2
		Analog A(5)	char	2
		Analog B(5)	char	2
		Digital(6)	char	2
		Analog A(6)	char	2
		Analog B(6)	char	2
		Digital(7)	char	2
		Analog A(7)	char	2
		Analog B(7)	char	2
		Digital(8)	char	2
		Analog A(8)	char	2
		Analog B(8)	char	2
		Digital(9)	char	2
		Analog A(9)	char	2
		Analog B(9)	char	2
+120	White Clip	0-255	char	1
+121	Exposure		short	2
+123	Motion Corder Frame Number.		long	4

2.6. IRG File Structure

The structure of the IRG file is shown below.

Offset	Type	Value	Data Format	Bytes
+0	Frame number 1	Year	long	4
		Month	char	1
		Day	char	1
		External Signal	char	1
		Not used		1
		Day Of Year	long	4
		Hours	char	1
		Minutes	char	1
		Second	char	1
		Not used		1
		Micro seconds	long	4
+20	Frame number 2	Year	long	4
.				
.				
Continues until the last frame				

Year/Month/Day are reserved, but not normally used. To retrieve the day, use Day of Year.

2.7. MCD File Structure

The MCD file is in the binary data format. One frame is composed of 172 bytes. Footage of 100 frames therefore has 17,200 bytes.

The detailed structure of the MCD format is shown below.

Offset	Type	Value	Data Format	Bytes
+0	Frame number 1	Digital(0)	char	1
		Digital(1)	char	1
		Digital(2)	char	1
		Digital(3)	char	1
		Digital(4)	char	1
		Digital(5)	char	1
		Digital(6)	char	1
		Digital(7)	char	1
		Digital(8)	char	1
		Digital(9)	char	1
		Not used		2
		Analog A(0)	float	4
		Analog A(1)	float	4
		Analog A(2)	float	4
		Analog A(3)	float	4
		Analog A(4)	float	4
		Analog A(5)	float	4
		Analog A(6)	float	4
		Analog A(7)	float	4
		Analog A(8)	float	4
		Analog A(9)	float	4
		Analog B(0)	float	4
		Analog B(1)	float	4
		Analog B(2)	float	4
		Analog B(3)	float	4
		Analog B(4)	float	4
		Analog B(5)	float	4
		Analog B(6)	float	4
		Analog B(7)	float	4
		Analog B(8)	float	4
		Analog B(9)	float	4
		Analog C(0)	float	4
		Analog C(1)	float	4
		Analog C(2)	float	4
		Analog C(3)	float	4
		Analog C(4)	float	4
		Analog C(5)	float	4
		Analog C(6)	float	4
		Analog C(7)	float	4
		Analog C(8)	float	4
		Analog C(9)	float	4
		Analog D(0)	float	4
		Analog D(1)	float	4

Offset	Type	Value	Data Format	Bytes
		Analog D(2)	float	4
		Analog D(3)	float	4
		Analog D(4)	float	4
		Analog D(5)	float	4
		Analog D(6)	float	4
		Analog D(7)	float	4
		Analog D(8)	float	4
		Analog D(9)	float	4
+172	Frame number 2	Digital(0)	char	1
		Digital(1)	char	1
		Digital(2)	char	1
		Digital(3)	char	1
		Digital(4)	char	1
		Digital(5)	char	1
		Digital(6)	char	1
		Digital(7)	char	1
		Digital(8)	char	1
		Digital(9)	char	1
		Not used		2
		Analog A(0)	float	4
		Analog A(1)	float	4
		Analog A(2)	float	4
		Analog A(3)	float	4
		Analog A(4)	float	4
		Analog A(5)	float	4
		Analog A(6)	float	4
		Analog A(7)	float	4
		Analog A(8)	float	4
		Analog A(9)	float	4
		Analog B(0)	float	4
		Analog B(1)	float	4
		Analog B(2)	float	4
		Analog B(3)	float	4
		Analog B(4)	float	4
		Analog B(5)	float	4
		Analog B(6)	float	4
		Analog B(7)	float	4
		Analog B(8)	float	4
		Analog B(9)	float	4
		Analog C(0)	float	4
		Analog C(1)	float	4
		Analog C(2)	float	4
		Analog C(3)	float	4
		Analog C(4)	float	4
		Analog C(5)	float	4
		Analog C(6)	float	4
		Analog C(7)	float	4
		Analog C(8)	float	4
		Analog C(9)	float	4
		Analog D(0)	float	4

Offset	Type	Value	Data Format	Bytes
		Analog D(1)	float	4
		Analog D(2)	float	4
		Analog D(3)	float	4
		Analog D(4)	float	4
		Analog D(5)	float	4
		Analog D(6)	float	4
		Analog D(7)	float	4
		Analog D(8)	float	4
		Analog D(9)	float	4
+344	Frame number 3	Digital(0)	char	1
		Digital(1)	char	1
		Digital(2)	char	1
		Digital(3)	char	1
		Digital(4)	char	1
		Digital(5)	char	1
		Digital(6)	char	1
		Digital(7)	char	1
		Digital(8)	char	1
		Digital(9)	char	1
		Not used		2
		Analog A(0)	float	4
		Analog A(1)	float	4
		Analog A(2)	float	4
		Analog A(3)	float	4
		Analog A(4)	float	4
		Analog A(5)	float	4
		Analog A(6)	float	4
		Analog A(7)	float	4
		Analog A(8)	float	4
		Analog A(9)	float	4
		Analog B(0)	float	4
		Analog B(1)	float	4
		Analog B(2)	float	4
		Analog B(3)	float	4
		Analog B(4)	float	4
		Analog B(5)	float	4
		Analog B(6)	float	4
		Analog B(7)	float	4
		Analog B(8)	float	4
		Analog B(9)	float	4
		Analog C(0)	float	4
		Analog C(1)	float	4
		Analog C(2)	float	4
		Analog C(3)	float	4
		Analog C(4)	float	4
		Analog C(5)	float	4
		Analog C(6)	float	4
		Analog C(7)	float	4
		Analog C(8)	float	4
		Analog C(9)	float	4

Offset	Type	Value	Data Format	Bytes
		Analog D(0)	float	4
		Analog D(1)	float	4
		Analog D(2)	float	4
		Analog D(3)	float	4
		Analog D(4)	float	4
		Analog D(5)	float	4
		Analog D(6)	float	4
		Analog D(7)	float	4
		Analog D(8)	float	4
		Analog D(9)	float	4

The above repeats to the last frame.

The analog data is of floating decimal type, while the digital data is Low (0) – High (1).

2.8. WVD File Structure

WVD files are binary data. The header size is at the start of the file and following the header is the data.

An example of the composition of the WVD format is listed below. Header size and offset values differ depending on the number of channels.

Offset	Type	Value (Reference example)	Data Format	Bytes
+0	Header size	292	long	4
+4	WVD Version	0x04	long	4
+8	Vendor Name	NIDAQ	ASCII char	64
+72	Device Name	USB-6361 (BNC)	ASCII char	64
+136	Device ID	-1	long	4
+140	Sampling Frequency	10000.0	float	4
+144	Number of Data	510	unsigned long	4
+148	Number of Channel	2	unsigned long	4
+152	Channel Number (1)	0	unsigned long	4
+156	Channel Number (2)	1	unsigned long	4
+160	Channel Name (1)	Dev1/ai0	ASCII char	64
+224	Channel Name (2)	Dev1/ai1	ASCII char	64
+288	Start Frame	0	long	4
+292	Sampling Data	Ch1 (0)	float	4
+296		Ch2 (0)	float	4
		Ch1 (1)	float	4
		Ch2 (1)	float	4
		Ch1 (2)	float	4
		Ch2 (2)	float	4
		Ch1 (3)	float	4
		Ch2 (3)	float	4
		Ch1 (4)	float	4
		Ch2 (4)	float	4
		Ch1 (5)	float	4
		Ch2 (5)	float	4
		Ch1 (6)	float	4
		Ch2 (6)	float	4
		Ch1 (7)	float	4
		Ch2 (7)	float	4
		Ch1 (8)	float	4
		Ch2 (8)	float	4
		Ch1 (9)	float	4
		Ch2 (9)	float	4
		Ch1 (10)	float	4
		Ch2 (10)	float	4
		Ch1 (11)	float	4
		Ch2 (11)	float	4
		Ch1 (12)	float	4
		Ch2 (12)	float	4
		Ch1 (13)	float	4

Offset	Type	Value (Reference example)	Data Format	Bytes
		Ch2 (13)	float	4
		Ch1 (14)	float	4
		Ch2 (14)	float	4
		Ch1 (15)	float	4
		Ch2 (15)	float	4
		Ch1 (16)	float	4
		Ch2 (16)	float	4
		Ch1 (17)	float	4
		Ch2 (17)	float	4
		Ch1 (18)	float	4

Continues below until the end of the data.

Sampling data is floating point.

2.9. CSV File Structure

Waveform data input from an external source can be output as a data file of the CSV format. A CSV file has a waveform input data portion following the header part holding the camera's recording conditions.

The waveform input data portion can be input and output with the Type A and Type B data arrangement formats. Type S can only be input.

2.9.1. TYPE A

With the Type A format, the recorded data is aligned by the sample. The number of samples per one recorded image frame is ten (10). The total number of samples for a recording is therefore [the number of recorded frames] x 10.

```
#PHOTRON MCDL DATA
#SheetType      A
#Date          2010/2/10
#CameraType     FASTCAM SA5 model 1300K-C1
#CameraID       0
#FrameRate(fps) 7000
#ShutterSpeed(s) 1/7000
#ImageWidth     1024
#ImageHeight    1024
#TriggerMode    Center
#NumberOfFrames 10
#FrameRange     -5 to 5
#UseZeroFrame   1
#SamplingRate(fps) 70000
#NumberOfDatas 100
#Slope          1      1
#Interval        0      0
```

DataNo	FrameNo	SampleNo	Digital	AnalogA	AnalogB	IRIG_Day	IRIG_Hour	IRIG_Minute	IRIG_Second
0	-5	0	*	*	*	*	*	*	*
1	-5	1	*	*	*	*	*	*	*
2	-5	2	*	*	*	*	*	*	*
3	-5	3	*	*	*	*	*	*	*
4	-5	4	*	*	*	*	*	*	*

2.9.2. TYPE B

With the Type B format, the recorded data is aligned by the frame.

For one data column, IRIG data is output in a series of 10 samples of analog channel A, 10 samples of analog channel B, 10 samples of analog channel C, 10 samples of analog channel D, and 10 samples of digital channel.

#PHOTRON MCDL DATA											
#SheetType	B										
#Date	2010/2/10										
#CameraType	FASTCAM SA5 model 1300KC1										
#CameraID	0										
#FrameRate(fps)	7000										
#ShutterSpeed(s)	1/7000										
#ImageWidth	1024										
#ImageHeight	1024										
#TriggerMode	Center										
#NumberOfFrames	10										
#FrameRange	-5 to 5										
#UseZeroFrame	1										
#SamplingRate(fps)	70000										
#NumberOfDatas	100										
#Slope		1									
#Interval		0									
DataNo	FrameNo	Digital0	...	Digital9	AnalogA0	...	AnalogA9	AnalogB0	...	AnalogB9	...
0	-5	*		*	*		*	*		*	
1	-4	*		*	*		*	*		*	
2	-3	*		*	*		*	*		*	
3	-2	*		*	*		*	*		*	
4	-1	*		*	*		*	*		*	

2.9.3. TYPE S

The Type S CSV file is exclusively for input. Use this type when inputting data that was output from other devices into PFV.

- The Time position in the file is searched for and the data is acquired based on that position.
- Next to Time, the channel names for the number of channels are listed.
- The time axis unit is listed under Time.
There are four types of units that can be used as the time axis: "Sec", "msec (ms)", "usec", and "nsec".
- Next to the time axis unit (under each channel), the Y axis unit that corresponds to each channel is listed.
However, only one Y axis unit can be displayed in PFV, so the first channel's Y axis unit is displayed on the graph.
- The first time is listed below the time axis unit, and next to that the first item of data is listed per channel.
After that, "Time" and "Data" are listed in order for the required amount of time.
- To specify the frequency, Frequency is listed above Time, and the frequency is listed next to that. (Frequency is set because there are situations where the frequency cannot be correctly calculated from the time axis such as when a frequency is not divisible by a cycle like 3000 fps or the data has a long recording time.)
The frequency can be omitted. In this situation, the frequency is calculated from the first time data and the second time data.

Supplement

- "Time", "Frequency", and the time axis unit are case insensitive.

Frequency	10000		
Time	CH1	CH2	CH3
msec	V	V	V
-5	*	*	*
-4.9	*	*	*
-4.8	*	*	*
-4.7	*	*	*
-4.6	*	*	*
-4.5	*	*	*
-4.4	*	*	*
-4.3	*	*	*
-4.2	*	*	*

2.10. Settings Saved In the PCS File

The settings saved in the PCS file are listed below.

Basic Items

- Number of cameras connected to the system
- Names of cameras connected to the system
- Number of heads connected to the cameras
- Names of heads connected to the camera
- Form of control panel view function
- Information display On/Off; displayed items

Camera Tab

- Frame Rate
- Resolution
- Variable channel being used
- Coordinate of upper left corner within sensor active area
- Shutter Speed
- Auto exposure control On/Off; setting details
- Trigger Mode
- Number of random trigger frames
- Number of triggers to be set for random recording modes
- Number of frames after a trigger for manual recording modes

Items to be set by the camera model

- General
 - Shading On/Off
 - Shading correction warning message On/Off
 - Pixel gain On/Off
 - Edge enhancement correction
 - Sensor gain
 - Sensor gamma (reserved)
 - Dual-slope shutter

I/O

- External I/O ports - settings
- External I/O ports – number of ports
- Camera operation mode
- IRIG function On/Off
- IRIG offset value
- MCDL function On/Off
- Video output

Color Adjust

- Color temperature mode
- Color temperature set value
- Pre-LUT mode
- Pre-LUT gamma setting
- Pre-LUT contrast setting
- Pre-LUT brightness setting
- Pre-LUT positive/negative setting

Partition

- Current partition
- Number of partitioned divisions
- List of partitioned blocks
- Auto increment of partition number by the camera On/Off

- Signal Delay Settings
 - Signal delay settings
- Additional Features
 - Shutter lock mode
- Data save tab
 - Adding caption to save file On/Off
 - Caption name
 - Adding number to file name On/Off
 - Making subfolder with file name On/Off
 - Subfolder name
 - Making subfolder with file name On/Off
 - Adding number to subfolder On/Off
- Details settings for saving files
 - Saved file format
 - Saving path
 - File name
 - Format options (TIFF, JPEG, PNG, RAW, RAWW, MRAW, AVI, WMV, MOV)
 - Bayer format saving On/Off
 - Information saving On/Off, detailed settings
- Environmental setting items
 - Setting for the camera
 - Settings for start-up
 - Shutter speed indication
 - Video playback during download
 - Settings for data save
 - AVI output format
 - Output AVI playback speed
 - Operation for saving files
 - Settings for reading RAW/RAWW/MRAW/TIFF Bayer files
 - Operation for opening files
 - Post-LUT settings
 - Indication settings
 - Main control buttons
 - Setting frame zero
 - Setting center point for linear zoom
 - Toolbar settings
 - Indication settings for navigation mode
 - Settings for recording
 - Direct recording setting
 - Loop recording
 - Auto increment of partition number
 - Stop recording after the last partition
 - Auto download of image file after recording
 - Display of dialog at start of auto download recording
 - Sequence for auto download recording
 - Display mode setting after recording
 - Other system information
 - PCS file version

2.11. ISO-MME File

In the ISO-MME file, shooting information regarding the multiple cameras is written as a set of text data. This file can be opened by Windows memo pad or text editor.

```
<sample>

Number of Movies :2
Comments :by Photron FASTCAM Viewer (3.4.0.0)
ID-number 1 :18
Origin 1 :NOVALUE
Camera type 1 :FASTCAM SA3 model 120K-C2
Description 1 :NOVALUE
Lens focal length 1 :NOVALUE
Number of images 1 :11
Film speed 1 :2000
Shutter time 1 :0.00050
Aperture 1 :NOVALUE
Time zero 1 :0
Time vector filename 1 :NO
Reference system 1 :NOVALUE
Location X 1 :NOVALUE
Location Y 1 :NOVALUE
Location Z 1 :NOVALUE
Theta X 1 :NOVALUE
Theta Y 1 :NOVALUE
Theta Z 1 :NOVALUE
Width of image 1 :1024
Height of image 1 :1024
Aspect ratio of pixels 1 :NOVALUE
Colour 1 :RGB
Name of movie file 1 :test_C002H001S0002.avi
Format of movie file 1 :avi
Keyframes 1 :NOVALUE
Codec used 1 :uncompressed
Compression 1 :NOVALUE
ID-number 2 :10
Origin 2 :NOVALUE
Camera type 2 :FASTCAM SA5 model 1550K-C2
Description 2 :NOVALUE
Lens focal length 2 :NOVALUE
Number of images 2 :11
Film speed 2 :7000
Shutter time 2 :0.00014
Aperture 2 :NOVALUE
Time zero 2 :0
Time vector filename 2 :NO
Reference system 2 :NOVALUE
Location X 2 :NOVALUE
Location Y 2 :NOVALUE
Location Z 2 :NOVALUE
Theta X 2 :NOVALUE
Theta Y 2 :NOVALUE
Theta Z 2 :NOVALUE
Width of image 2 :1024
Height of image 2 :1024
Aspect ratio of pixels 2 :NOVALUE
Colour 2 :RGB
Name of movie file 2 :test_C001H001S0006.avi
Format of movie file 2 :avi
Keyframes 2 :NOVALUE
Codec used 2 :uncompressed
Compression 2 :NOVALUE
```



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Contacting Photron

For inquiries 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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