FASTCAM NI DAQ software option User's Manual

Revision 1.10E



• The copyright of this manual is held by Photron Limited.

- Product specifications and manual contents can change without advanced notification.
- This manual was created taking every possible measure to ensure the accuracy of its contents. However, if you find a section which is unclear, a mistake, or an omission, please contact Photron Limited using the contact information provided at the end of the manual.
- Photron Limited bears no responsibility for the results of using the product or from following the instructions in this manual.
- The official name of Windows is the Microsoft[®] Windows[®] Operating System.
- Microsoft[®], Windows[®], Windows[®], Windows[®] 7 are registered trademarks or trademarks in the United States and other countries of Microsoft Corporation of the United States.
- Pentium® is a registered trademark of Intel Corporation of the United States.
- National Instruments®, NI®, ni.com® are the registered trademark of National Instruments in the United States (US) and in other countries.
- Other company names and product names listed in this manual are trademarks of their respective companies.
- Product specifications and features can change for the purpose of improvement without notification.

Introduction

Thank you for purchasing your FASTCAM NI DAQ software option.

This manual contains the operating instructions and warnings necessary for using the FASTCAM NI DAQ software option.

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.

lcon/Symbol	Description	
Supplement	This symbol indicates supplementary items to be aware o when using the software.	
Reference	This symbol indicates the location of a reference.	
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.	
KEMO	This symbol indicates a space for you to use for making notes.	
ű "	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.	

Table of Contents

Chapter.1. Overview of the FASTCAM NI DAQ software option	
 1.1. Overview of the FASTCAM NI DAQ software option	<u>2</u> 3 1
Chapter.2. Installing the FASTCAM NI DAQ software option	5
 2.1. Installing the FASTCAM NI DAQ software option))
Chapter.3. Using the FASTCAM NI DAQ software option 15	5
 3.1. Recording work flow	5
3.3. Connecting FASTCAM and NI DAQ (Manual Trigger))
3.4. Connecting FASTCAM and NI DAQ (Level Trigger)	l
3.5. Recording Image	2
3.5.1. Setting the Frame Rate	<u>_</u>
3.5.2. Setting the Trigger Mode	, 1
3.5.4. Trigger Mode Types	7
3.6. Setting the Wave input board bar)
3.7. Inputting a Rec Start trigger	3
3.8. Graphic Display of Waveform Input Data	7
3.8.1. Settings for Graphic Display of Waveform Data)
3.8.2. Changing the Channel Name41	l
3.8.3. Setting Style of Displayed Graph	2
3.8.4. Setting Display Unit, Gradient and Segment	3
3.8.5. Setting Range of Graphic Display	ł
3.8.6. Graph View Window) 7
)
Chapter.4. Alert Display 51	1
Chapter.5. Specifications 53	3
Chapter.6. Contacting Photron 55	5

Chapter.1. Overview of the FASTCAM NI DAQ software option

1.1. Overview of the FASTCAM NI DAQ software option

With the FASTCAM NI DAQ software option, it is possible to use "NI USB-6251 BNC" waveform measuring instruments by National Instruments (hereafter referred to as NI DAQ) to simultaneously record analog signals along with images from FASTCAM high speed digital cameras by Photron (hereafter referred to as FASTCAM) and playback graphs and images in synchronization.

The camera may be operated by using a threshold input level to the NI DAQ system, or by START/STOP buttons.

Features of the FASTCAM NI DAQ software option

 Integrated adjustment of both high speed cameras and waveform measuring instruments The FASTCAM NI DAQ software option was designed to be used as a plug-in for Photron FASTCAM Viewer (hereafter referred to as PFV), the camera control software for FASTCAM. From this plug-in software, it is possible to perform integrated adjustment of both FASTCAM and NI DAQ.

The FASTCAM NI DAQ software option imports the image recording settings of FASTCAM, and then automatically sets NI DAQ so that it matches with the image recording time of FASTCAM. Furthermore, by saving FASTCAM image data and NI DAQ waveform data at a discretionary location with the same name, it is possible to view data after recording.

 Includes cables and connectors for simultaneous operation The product is packaged with the cables and connectors necessary for the simultaneous operation of FASTCAM and NI DAQ. This means that even new users can easily perform setup.

Supplement

- For information regarding applications involving FASTCAM NI DAQ software option, please send your request to Photron or to your nearby Photron dealer.
- If you have any questions regarding NI DAQ, please contact National Instruments.

Caution

- FASTCAM NI DAQ software option is plug-in software and cannot be run in isolation. PFV must be acquired separately.
- Though the "NI USB-6251 BNC" features operation of up to 1.25M samples/s, its operation in FASTCAM NI DAQ software option is limited to 1M samples/s.

1.2. Operating environment of the FASTCAM NI DAQ software option

FASTCAM NI DAQ software option can be run with the following OS environments, high speed cameras, and waveform measuring instruments.

- OS
 - Windows Vista (32-bit or 64-bit version)
 - Windows 7 (32-bit or 64-bit version)
 - Windows 8 (32-bit or 64-bit version)
 - Windows 8.1 (32-bit or 64-bit version)
- High speed camera
 - FASTCAM SA Series
 - FASTCAM MH/MC Series
 - FASTCAM Mini Series
 - FASTCAM Multi
- Waveform measuring instrument
 - NI USB-6251 BNC (National Instruments)
- PFV
 - Ver.3.6.0 (32-bit/64-bit version) or later

1.3. Included accessories of the FASTCAM NI DAQ software option

The FASTCAM NI DAQ software option includes the following accessories.

1	EASTCAM NILDAO coffware option installation CD	One
\cup	FASTCAM NI DAQ software option installation CD	One
2	FASTCAM NI DAQ software option User's Manual (this manual)	One
3	Photron FASTCAM Viewer Installation DVD	One
4	BNC cable (1.5m)	Two

Chapter.2. Installing the FASTCAM NI DAQ software option

2.1. Installing the FASTCAM NI DAQ software option

Install the FASTCAM NI DAQ software option using the following procedure.

Caution	
Before installing the FASTCAM NI DAQ software option, it is necessary to install PFV.	

• FASTCAM NI DAQ software option supports PFV Ver.3.6.0 or later.

	Reference
--	-----------

- For the PFV installation procedure, see "1.2 Setup" of the PHOTRON FASTCAM Viewer User Manual.
 - ① Place the FASTCAM NI DAQ software option installation CD in the CD (or DVD) drive, and then open the CD (or DVD) drive from the computer.
 - ② On the CD (or DVD) drive, open the "Setup32" folder, and then double click the file "Setup.exe". The setup program starts, and then the following dialog box appears. Click [Next].

Photron FASTCAM NI DAQ opti	ion software - InstallShield Wizard
	Welcome to the InstallShield Wizard for Photron FASTCAM NI DAQ option software The InstallShield Wizard will install Photron FASTCAM NI DAQ option software on your computer. To continue, click Next.
InstallShield	< Back Cancel

Ķ	Supplement	
	• For 64-bit OS	s, start "Setup.exe" in the "Setup64" folder.

③ The user license agreement appears. Confirm the contents, and then click [Yes].



Specify the installation location. The default setting for the installation location is as follows:
 C: \Program Files\PHOTRON\Photron FASTCAM Viewer 3

Photron FASTCAM NI DAQ optic Choose Destination Location Select folder where setup will in	on software - InstallShield Wizard examples and the software stall files.
	Setup will install Photron FASTCAM NI DAQ option software in the following folder. To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
	Destination Folder C:\Program Files\Photron\Photron FASTCAM Viewer 3 Browse
InstallShield	<back cancel<="" td=""></back>

If necessary, click [Browse] and specify another location. Click [Next].

Caution

• For directory for installation, be sure to specify a folder where Photron FASTCAM Viewer 3 has been installed.

Installation starts.When installation is finished, the following screen appears. Click [Finish].

Photron FASTCAM NI DAQ option software - InstallShield Wizard		
	InstallShield Wizard Complete The InstallShield Wizard has successfully installed Photron FASTCAM NI DAQ option software. Click Finish to exit the wizard.	
InstallShield	< Back Cancel	

2.2. Installing USB driver software for NI DAQ

To use FASTCAM NI DAQ software option to control NI DAQ, USB driver software must be installed in advance.

Install the USB driver software using the following procedure.

① The NI-DAQmx X.X.X DVD comes with NI DAQ. Place the DVD in the DVD drive.



② Setup program starts up and the below dialog appears. Click [Install NI-DAQmx X.X.X]

	ni.com/dataacquisition
NI-DAO Data Acquisition Driver Software	
View Readme View Device Documentation	
Explore the Media Exit	
© 2011 National Instruments, All rights reserved.	



Specify the installation location. The default setting for the installation location is as follows:
 C: \Program Files\National Instruments\

If necessary, click [Browse] and specify another location. Click [Next].

WI-DAQmx 9.3.5	- • •
Destination Directory Select the primary installation directory.	
To change the default folder for installing National Instruments software, clic Browse button and select another folder. You can select individual compone locations in the next dialog.	k the nt
Destination Directory C:\Program Files\National Instruments\	Browse
	biowse
<< <u>B</u> ack N	lext >> Cancel

④ Select an install option.
 Select [Typical] and click [Next].

🖏 NI-DAQmx 9.3.5	
Select Installation Option Select one of the following options.	
If yoical Install NI-DAQmx device driver, support for hardware configurat Select the individual features to install.	tion, and application
	<u>N</u> ext >> <u>C</u> ancel

Confirmation process of product information begins.
 If your PC is connected to an outside network, there may be a case where certain relevant information is displayed.

🐨 NI-DAQmx 9.3.5	- • •
Product Notifications The installer will now check for new notifications for the products you installing.	
Contacting notification server	
	Next >> Cancel

6 License agreement window is displayed. Check the content and select [I accept the above 4 License Agreement(s)] and click [Next].

WI-DAQmx 9.3.5	- • •
License Agreement You must accept the licenses displayed below to proceed.	7 NATIONAL INSTRUMENTS
NI .NET 2.0 MSXML 4 IVI	
NATIONAL INSTRUMENTS SOFTWARE LICENSE AG	
INSTALLATION NOTICE: THIS IS A CONTRACT. BEFORE YOU DOWINLOAD TH AND/OR COMPLETE THE INSTALLATION PROCESS, CAREFULLY READ THIS BY DOWINLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BL COMPLETE THE INSTALLATION PROCESS, YOU CONSENT TO THE TERMS OF AGREEMENT AND YOU AGREE TO BE BOUND BY THIS AGREEMENT. IF YOU TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ALL OF ITS T CONDITIONS, CLICK THE APPROPRIATE BUTTON TO CANCEL THE INSTALL PROCESS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SU WITHIN THIRTY (30) DAYS OF RECEIPT OF THE SOFTWARE (WITH ALL ACCO WRITTEN MATERIALS. ALONG WITH THEIR CONTAINERS) TO THE PI ACE YO	E SOFTWARE AGREEMENT. JTTON TO OF THIS DO NOT WISH ERMS AND ATION OFTWARE MPANYING U ORTAINED
The software to which this National Instruments license applies is NI-DAQmx 9.3.5.	
 I do not accept all these Licent 	se Agreement(s). cense Agreements.
<< Back Next >>	<u>C</u> ancel

License agreement widow is displayed again. Check the content and select [I accept the above 2 Licenses Agreement(s)] and click [next].



8 Trust confirmation window toward the driver software is displayed. Check the content and select [Always trust software from National Instruments Corporation] and click [Next].

WI-DAQmx 9.3.5	- • •
Driver Software Installation Always trust software from National Instruments	
This installer includes driver software signed by National Instruments. Lea for an uninterrupted installation. If you uncheck the box, your installation r more Microsoft Windows security dialogs.	ve the box below checked nay be interrupted by one or
Always trust software from National Instruments Corporation.	
<< Back	Next >> Cancel

(9) A group of software applications being installed are displayed. Click [Next].

WI-DAQmx 9.3.5	
Start Installation Review the following summary before continuing.	
Adding or Changing • NI-DAQmx 9.3.5 NI MAX Configuration Support Application Development Support • NI LabVIEW SignalExpress 2011 • NI Update Service 2.0 • NI Update Service 3.0 • NI Measurement & Automation Explorer 5.0 • NI Network Browser 5.0.0	
Click the Next button to begin installation. Click the Back button to change the ins	stallation settings.
Save File) << <u>B</u> ack	Next >> Cancel

1 Installation of driver software begins. It may take around 30 minutes to install (depending on the PC's performance).

WI-DAQmx 9.3.5	
Overall Progress: 56% Complete	
[<< Back

(1) Below window appears when driver software installation is finished.

WI-DAQmx 9.3.5	
Installation Complete	
The features in this installation have been successfully update dismissing this dialog.	d. You may be prompted to reboot after
	Back Next >> Einish

1 Below window appears prompting reboot of the PC. Click [Restart] to restart the PC.

NI-DAQ	mx 9.3.5
U	You must restart your computer to complete this operation. If you need to install hardware now, shut down the computer. If you choose to restart later, restart your computer before running any of this software.
	Restart Shut Down Restart Later

Caution

• To use FASTCAM NI DAQ software option to control NI DAQ, USB driver software included on the NI-DAQmx X.X.X installation DVD or the latest USB driver software downloaded from the National instruments web site must be used. The latest USB driver software for NI DAQ and installation manuals can be acquired from the following website.

http://www.ni.com/support/

Chapter.3. Using the FASTCAM NI DAQ software option

3.1. Recording work flow

Use the following procedure to use the FASTCAM NI DAQ software option to record and save FASTCAM image data and NI DAQ waveform data or playback graphs and images in synchronization.

- ① Connect PCand NI DAQ using the specified connection method. (See 3.2 Connecting PC and NI DAQ)
- ② Connect FASTCAM and NI DAQ using the specified connection method. (See 3.3 Connecting FASTCAM and NI DAQ (Manual Trigger), or 3.4 Connecting FASTCAM and NI DAQ (Level Trigger))
- Using PFV, set the various image recording settings, including FASTCAM frame rate, shutter speed, and trigger mode.
 (See 3.5 Recording Image)
- Using the Synchronized Navigater Window of the FASTCAM NI DAQ software option, set NI DAQ to match the FASTCAM image recording settings. (See 3.6 Setting the Wave input board bar)
- Recording by FASTCAM and NI DAQ.
 (See 3.7 Inputting a Rec Start trigger)
- After completion of recording by FASTCAM and NI DAQ, the image data recorded by FASTCAM can be played back using PFV (See 3.8 Graphic Display of Waveform Input Data)

3.2. Connecting PC and NI DAQ

Before using the FASTCAM NI DAQ software option, connect PC and NI DAQ using the following method.

- 1 \bigcirc Prepare the NI USB-6251 USB main unit. Connecting terminals are located on the top.

② Connect the power adapter cable to [11-30VDC, 20W] terminal on the main unit. Turn the outer shell clockwise to lock.



③ Plug the male connector (B type) on the attached USB cable into female USB receptacle (B type) on the main unit.



④ Plug the male connector (A type) on the attached USB cable into female USB receptacle (A type) on PC.



6 Connect the AC adapter power cable to NI DAQ unit. Plug the AC cord from the adapter to AC outlet.



6 Turn on power switch of NI DAQ unit. Green LED lights on upper right corner of the main unit.



The NI DAQ should be detected by PC at this point. Installation of the NI DAQ will automatically be completed if the driver software is properly installed by "2.2 Installing USB driver software for NI DAQ"



3.3. Connecting FASTCAM and NI DAQ (Manual Trigger)

This section discusses settings for manual shooting using the REC button on the PFV. Connect between your FASTCAM and NI DAQ as shown below before using the FASTCAM NI DAQ software option.



Caution

- When connecting FASTCAM and PC to the NI DAQ, use either the cables included with FASTCAM and NI DAQ or the BNC and USB cables, included with the FASTCAM NI DAQ software option.
- For the above Gigabit LAN connection, use network terminals compatible with "1000Base-T (Gigabit Ethernet)" and cables compatible with "Enhanced category 5 (CAT5e)" or higher only.
- START, CENTER, END and MANUAL trigger modes can only be used for manual shooting. No other modes are available for use.
- To use a manual trigger, a pre-trigger period of 2 frames or more is needed.

3.4. Connecting FASTCAM and NI DAQ (Level Trigger)

This section discusses settings for shooting that uses the input level difference of waveform data acquired by NI DAQ, higher or lower than a predetermined voltage level, as a trigger. Connect between your FASTCAM and NI DAQ as shown below before using the FASTCAM NI DAQ software option.



Caution

- When connecting FASTCAM and PC to the NI DAQ, use either the cables included with FASTCAM and NI DAQ, or the BNC and USB cables, included with the FASTCAM NI DAQ software option.
- For the above Gigabit LAN connection, use network terminals compatible with "1000Base-T (Gigabit Ethernet)" and cables compatible with "Enhanced category 5 (CAT5e)" or higher only.
- For a Level Trigger shooting, use a signal input to "APF10" or "Dev1/ai0~15" terminal to determine the level difference. However, if a signal to one of "Dev1/ai0~15" terminals is used, no other terminals cannot be used. So, the use of "APF10" terminal is recommended.
- CENTER, END and MANUAL trigger modes can only be used for Level trigger shooting. No other modes are available for use.
- To use input level triggering, a pre-trigger period of 2 frames or more is needed.

3.5. Recording Image

3.5.1. Setting the Frame Rate

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



To set the frame rate or the resolution, display the "Camera" 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.



3.5.2. Setting the Shutter Speed

Display the "Camera" 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.



3.5.3. Setting 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.

Caution

- Trigger modes that FASTCAM NI DAQ software option supports are START, CENTER, END and MANUAL a total of four trigger modes.
- When using a level triggering method, START trigger mode is NOT available for use.
- When using CENTER, END or MANUAL mode, an error is issued if a pre-trigger period is not used completely.



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

Record	Trigger In ↓ Lendless Rec
Record Ready	Recording (Endless Record) Image: A state of the st
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.

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.

An example for a camera that can record four frames
Endless record starts Trigger input
Frames recorded in memory Endless record starts
1 2 3 4
Camera Memory 3 4 5 6
X X X 4 5 6 7
× × × 5 6 7 8
✓ X X X 6 7 8 9 ···
When the memory capacity is surpassed, the old frames are overwritten and the new frames are recorded
is an overwritten frame
After the trigger signal is input, the frames that are ultimately recorded.
In center mode 4 5 6 7
Memory In end mode 2 3 4 5

3.5.4. Trigger Mode Types



Caution

- Trigger modes available and displayed are dependent on the camera model.
- An error will result if a trigger mode that is NOT supported is chosen for shooting.
 - 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 events start point is known in advance.

This mode records until the maximum recordable frame count (camera memory capacity).



Center Mode

In center mode, the content directly before and after when 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.



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

- Camera Data Save File View View styles : C Camera tree 📀 Standard style Camera No.1 👻 🔽 Show info Cam Start Edit info Head : Head No.1 Center Setup Frame Rate End Resolution Trigger Mode Manual Shading Random Partition Random Reset Update Random Center Camera Option Save Setup Record Option Random Manual Variable Two-Stage 1/2 Snapshot Comment Display Live Stop . Live C Memory Two-Stage 1/4 Two-Stage 1/8 Pagard
- 1. <u>Click the [Trigger Mode] button and select "Manual".</u>

 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.

Before trigger	1364	frame	\$5.00	%
After trigger	4093	frame	75.00	- %

3.6. Setting the Wave input board bar

Set up the PFV waveform port bar.

Before starting PFV, make sure that FASTCAM, NI DAQ and control PC are properly connected and powered up.

1 Press [START] button, then [All programs] – [Photron FASTCAM Viewer 3] and [PFV Ver.3].



button on the desktop.

2 PFV starts up.

Input waveform board bar is displayed if FASTCAM NI DAQ software option is installed properly.



J Supplement

- If the waveform input board bar is not displayed, click [View] [Waveform Input Board Bar] on the menu.
 - ③ Click the [Open] button on the waveform input board.

Image: Cose Image: Figure and the second s	File View Option	Window Help		
Open Sampling Frequency Live Stop Setup		5%, ¹⁰⁰ /51		RESET
Close [Hz] Alert (Setup)	Open Sampling Fr	equency	Stop Live	
🚱 Camera No.1	Close	[Hz] (Alert	()	
	Camera No.1			

With "Select Device", select the "NIDAQ".
 Select a board to use from the list displayed in "Device Name" and click the [OK] button.

Select Device
Select Device NIDAQ Device Name
Dev1
rename Dev1
OK Cancel

Supplement

- The name to be displayed in "Device name" should be the same as what is shown in "Measurement & Automation". To change the device name, see the relevant section in NI DAQ manual.
 - (5) "Analog Board Setup" dialog is displayed. Make necessary settings on NI DAQ.

Analog Board Setup			— ×
Sampling	-Channel	al Salact	
Samples / mame 10 Sampling Frequency 10000.00 [Hz] 10000 Hz Clock Type Internal Sync Camera V-Sync Number of Sampling 27270	Channel Channel Dev 1/ai0 Dev 1/ai1 Dev 1/ai2 Dev 1/ai3 Dev 1/ai3 Dev 1/ai4 Dev 1/ai5 Dev 1/ai6	Channel Name Dev1/ai0 Dev1/ai1 Dev1/ai2 Dev1/ai3 Dev1/ai4 Dev1/ai5 Dev1/ai6	
Input Method Differential Alert Implementation	Dev 1/ai7	Dev 1/ai7	Live/Start
Option V Use RecPos Signal Use Analog trigger to trigger the camera External In Terminal	External C	ger Out	ync Out PFI4)
Stop Trigger In : PFI0	Cancel	Apply	

	Analog Board Setup	×
1	Sampling Channel Salect All Delete All	3
0	Sampling Frequency 10000.00 [Hz] 10000 Hz Image: Clock Type Internal Clock Type Internal Image: Clock Type Sync Camera V-Sync Dev1/ai1 Dev1/ai2 Number of Sampling 27270 Input Method Differential Image: Dev1/ai7	
2 4	Input Range -10 to 10V Live/Start	
6	External In Terminal Stop Trigger In : PFI0	2
7	Trigger Condition Mode Level Channel Start Software Image: Software	
	OK Cancel Apply	

6 Settings for the waveform input board are shown below:

1. Sampling

Sets options related to sampling.

Item	Description
Samples / frame	Select from the list how many points of data to acquire in 1 frame. The sampling frequency is set according to this value and the camera's frame rate. When setting a desired sampling frequency, select "Off".
Clock Type	 Select the clock type. Internal : Internal clock, operates with waveform input board's internal clock. External : External clock, operates with the rise or fall of an externally input clock signal. When using an external clock, you must also set the sampling frequency of the signal to input. When setting the external clock's sampling frequency matched to the camera's V-Sync output frequency, check "Sync Camera V-Sync". For normal operation, it is recommended to select "External" and check "Sync with camera V-sync".
Number of Sampling	Sets the number of samplings. If "Auto Setup" is checked, this setting is automatically calculated from the sampling frequency, frame rate, and recording frame count. If an alert is displayed, adjust manually.
Input Method	Indicates the connection method for analog input signal. Choose one from [Referenced Single-Ended], [Non-referenced Single-Ended] and [Differential].

Caution

• If the waveform input board is set to a sampling frequency that is not possible in the specification, it is automatically set to an approximate value.

Supplement

- If "Samples / frame" is set to "Off", sampling frequencies that fulfill the below conditions are displayed in the "Sampling Frequency" list.
 - Integral multiple of the frame rate
 - Input board specification

2. Alert

An alert is issued here when a problematic setting has been made. Use the displayed information for problem soving and/or asking Photron for help.

3. Channel

Selects channels to use.

Beware of the decrease in measurable sampling speed as the number of channels increases.

4. Option

Sets a collaborative method with the camera.

Item	Description
Use RecPos Signal	Check this item to use the camera start signal, issued by camera, to control the measurement sequence of NI DAQ system. This item is mutually exclusive against "Use Analog trigger to trigger the camera".
Auto Setup	Most of other settings are automatically made by checking this item. Basically, it is recommended to keep this item always checked.
Use Analog trigger to trigger the camera	Check this item if you wish to have the camera triggered by sending a start signal issued at detection of a trigger based on input voltage to NI DAQ. This item is mutually exclusive against "Use RecPos Signal".

5. External Output

Use this item when you wish to have various signals output by NI DAQ. If "Trigger camera with analog trigger signal" is chosen at "Option", "Trigger output (PF15)" will be cheked automatically.

6. External Input

Indicates which signal should best be input to which terminal.

7. Trigger Conditions

Settings to have camera work in collaboration with NI DAQ. When both "Auto setup" and "Use RecPos Signal" are checked, no display is made because all items are atutomatically set.

Caution

• To use "Use Analog trigger to trigger the camera", be sure to make a test shooting to confirm proper operation. This is vitally important because the camera fails to start shooting if there is even the slightest error in setting.

Item		Description
Start	Sets the recording	start and stop conditions.
	Software	Input the trigger in conjunction with the PFV Record button
	External Down	External trigger falls
	External Up	External trigger rises
Stop	Sample Num	When the specified number of samples is obtained (stop trigger only)
	Level Up	When the voltage input to the channel passed the voltage level set in [Level] in the rising direction
	Level Down	When the voltage input to the channel passed the voltage level set in [Level] in the falling direction
Channel	When "Level Up" of "Stop"), a channel used as analog trig	or "Level Down" is specified for trigger condition ("Start" or is assigned to accept input analog signal, which is to be gger signal.
	For a Level Trigge specified. Howeve basically.	er shooting, either "APF10" or "Dev1/ai0 \sim 15" may be er, the use of "APF10" terminal is recommended
Post Trigger Deley	Enter the delay co From the input of by the amount of t	unt. the trigger, start/end the actual sampling of data delayed he delay count entered here.

Caution

- When "Auto Setup" is checked, the settings change in conjunction with changes in the camera settings.
- "APF10" or terminals "Dev1/ai0~15" may be specified as a channel for input level detection. However, if one of "Dev1/ai0~15" terminals is specified, ONLY that specified channl can be used for measuring input voltage.

3.7. Inputting a Rec Start trigger

To start a recording on the FASTCAM camera in collaboration with NI DAQ, there are two different ways.

① To start measurement on NI DAQ at a start trigger signal issued by the camera by pressing the "Record" button on the PFV.

The whole operation starts going on when the "Record" button is pressed on PFV. The NI DAQ system automatically starts and ends its measurement cycle.

amera	Data Save Fi	le View
iew style	s :	
C	Camera tree	Standard style
Camera Head : Setup :	Camera No. Head No.1	1 - Show inf Edit info Graph
(Frame Rate	Shutter
Č	Resolution	Trigger Mode
C	Shading	Low Light
C	Partition	Update
C	amera Option	Save Setup
(F	ecord Option	Variable
)isplay :	S	napshot Comment
C Live	Stop 📀 L	ive C Memory
isplay : C Live	Si Stop © L	napshot Commer ive C Mem

② To trigger camera for shooting at an input level trigger issued by the NI DAQ. A trigger signal is sent to the camera from the waveform input board appropriately set up to certain conditions at "Trigger setting".

The camera should be set in advance for [Trigger In] or for [Endless Rec] by REC button.

Camera	Data Save File View	
View style	es :	
0	🖱 Camera tree 💿 💿 Standard sty	le
Camera : Head : Setup :	Camera No.1 V Show info Head No.1 V Edit info Graph)
F	rame Rate Shutter	
-	Resolution Trigger Mode	
	Shading Low Light	
	Partition Update	
Ca	mera Option Save Setup	
Re	cord Option Variable	
Display :	Snapshot Comment	
C Live	Stop 💿 Live 🔿 Ma	
End	Iless Rec Rec Done	

3.8. Graphic Display of Waveform Input Data

This step sets the camera to graphically display external data at a recording.

① After recording, have the [Camera] tab displayed on the control panel and, within the [Camera] tab, select the camera that has recorded the waveform input data to be replayed.

ew sty	/les :	
	C Camera tree 📀 Standard style	
Camer Head Setup	a : All camera : All camera Camera No.1 : Camera No.2 Camera No.2	o
	Frame Rate Shutter	
	Resolution Trigger Mode	
	Shading Low Light	
	Partition Update	
	Camera Option Save Setup	
	Record Option Variable	
splay	Snapshot Comment	
C Li	ive Stop 💿 Live 🔿 Memory	

2 Select and check [Memory] in the [Display] field.

w style:	s :	
C	Camera tree	Standard style
amera : ead :	Camera No.1 Head No.1	Show info Edit info
tup :		Cirapin
	Frame Rate	Shutter
C	Resolution) (Trigger Mode
C	Shading	Low Light
C	Partition	Update
C	amera Option	Save Setup
R	ecord Option) (Variable
play :	Sna	pshot Comment
Live	Stop C Live	Memory

③ Click the [Graph] button. Note, however, if waveform input data has not been recorded during the recording, this button is grayed out.

ew style	S :	
C	Camera tree	Standard style
Camera :	Camera No.1	▼ Show info
Head :	Head No.1	Edit info
Setup :		(Graph)
C	Frame Rate	Shutter
(Resolution) (Trigger Mode
C	Shading	Low Light
C	Partition	Update
C	amera Option	Save Setup
R	ecord Option) (Vanable
isplay :	Snap	shot) Comment
Clive	Stop C Live	Memory

③ The desired data is downloaded and [Graph Setup] dialog box is displayed. The camera name or waveform input board name that captured the waveform input data is displayed in "Device".

Check Analog to select the recorded data for display.

C Digital	Select All	Channel	Line Style	Conversion fact	or Color Scheme
Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
Camera No.1	Analog A		— [M]	1.000000	0.000000
Camera No.1	Analog B	-	— M	1.000000	0.000000
Camera No.1	Analog C	-	[V]	1.000000	0.000000
Camera No. 1	Analog D	-	— M	1.000000	0.000000
Max	r	-	T-Unit		s
1818	V Aut	o Scaling	frame .		(Current
0.01	Aut	o Scaling	Current Bar —		(Axis Min (Axis Max
	C Digital Device Camera No. 1 Camera No. 1 Camera No. 1 Camera No. 1 IB18 IB18 0.01	C Digital Select All Device Channel Camera No.1 Analog A Camera No.1 Analog B Camera No.1 Analog C Camera No.1 Analog D	Digital Select All Channel Device Channel Line Style Camera No.1 Analog A Camera No.1 Analog B Camera No.1 Analog C Camera No.1 Analog C Camera No.1 Analog D Image: State Sta	C Digital Select All Channel Line Style Device Channel Line Style Y-Unit Camera No.1 Analog A M Camera No.1 Analog B M Camera No.1 Analog C M Camera No.1 Analog C M Image: State of the state of th	Digital Select All Channel Line Style Conversion Fact Device Channel Line Style Y-Unit Slope Camera No.1 Analog A M 1.000000 Camera No.1 Analog B M 1.000000 Camera No.1 Analog C M1 1.000000 Camera No.1 Analog C M1 1.000000 Camera No.1 Analog D M1 1.000000 Camera No.1 Analog D M1 1.000000 Image: State S

Select channels to display.
 Check the desired channels in the [Select] column and click the [OK] button.

Analog	C Digital	Select All	Channel	Line Style	Conversion fac	tor Color Schem
Select	Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
✓ On/Off	Camera No.1	Analog A		[V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog B	-	[V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C	-	[V]	1.000000	0.000000
I⊻I On/Off	amera No.1	Analog D		— [Ŋ	1.000000	0.000000
Avie				- T.J. Init-		
Min	Мах			frame		/off
T: 0 Y: -0.01	1818		to Scaling	Current Bar		Y Current Y Axis Min

6 Graph is displayed.

• An example of graphically displayed analog waveform data.



3.8.1. Settings for Graphic Display of Waveform Data

After download of waveform input data, or by right-clicking on the graph and clicking [Graph Setup], the [Graph Setup] dialog box appears.

In the [Graph Setup] dialog box, parameters such as the width, color and gradient for the graph can be set.

Analog	C Digital	Select All	Channel	Line Style	Conversion fact	tor Color Scheme
Select	Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
✓ On/Off	Camera No.1	Analog A		[V]	1.000000	0.000000
✔ On/Off	Camera No.1	Analog B	-	— M	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C	-	[M]	1.000000	0.000000
On/Off	Camera No.1	Analog D		[M]	1.000000	0.000000
Axis	Max	ç		T-Unit		ls IOFF
т: 0	1818	Auto	o Scaling	i πame		Y Current
Y: -0.01	0.01	Auto	o Scaling	Current Bar		Y Axis Min Y Axis Max

Item	Description
Select	Sets Hide/Unhide for the recorded data.
Device	Shows the name of the camera that has recorded waveform data.
Channel	Shows the channel name.
	The name can be changed by double clicking on it.
Line style	Shows the style of lines to display graph - color, type, width, etc. of lines.
	A right click can change line styles.
Y-Unit	Shows the unit of displayed data.
	A right click can change units.
Slope	Shows the slope of graph of displayed data.
	A right click can change slope values.
Y-Intercept	Shows the Y-intercept of displayed data.
	A right click can change intercept values.

3.8.2. Changing the Channel Name

① Select the channel to change and click the [Channel] button.

Analog	C Digital	Select All	Channel		ine Style	Conversion facto	Color Scheme
Select	Device	Channel	Line Style		Y-Unit	Slope	Y-Intercept
✓ On/Off	Camera No.1	Analog A		_ 1	M	1.000000	0.000000
✓ On/Off	Camera No.1	Analog B			M	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C	-	- 1	[V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog D			[V]	1.000000	0.000000
Axis Min	Max				nit		off
T: 0	1818	Aut	to Scaling	-0.0	rent Bar		Current
Y: -0.01	0.01	Aut	to Scaling	Г	Center	ΓY	Axis Min Axis Max

② Enter the desired name in "Channel Name" and click the [OK] button. The channel name is reset to the original channel name (displayed in "Channel") by clicking the [Reset] button.

All the channel names are reset by clicking the [Reset All] button.

Channel	Chann	nel Name
Analog A		og A
Re	set	Reset All
C	к	Cancel

3.8.3. Setting Style of Displayed Graph

① Click on the channel where setting should take place.

Analog	C Digital	Select All	Channel	Line Style	Conversion fact	or Color Scheme
Select	Device	Channel	Line Style	T-ONIC	siope	r-intercept
🗹 On/Off	Camera No.1	Analog A		[V]	1.000000	0.000000
On/Off	Camera No. 1	Analog B	12	- M	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C	-	[M]	1.000000	0.000000
✔ On/Off	Camera No.1	Analog D		— M	1.000000	0.000000
Axis	Max			T-Unit		s /Off
т: 0	1818	Aut	o Scaling	Currant Pan		(Current
Y: -0.01	0.01	Aut	o Scaling	Content bar		(Axis Min (Axis Max

② Click [Line style] and select a color, style and width from the displayed list. Setting can also be made by right clicking on the [Line style] column of selected channels.

Analog	C Digital	Select All	Channel	Line Style	Conversion fac	tor Color Scheme
Select	Device	Channel	Line Style	Color	•	Y-Intercept
✔ On/Off	Camera No.1	Analog A		Style	000	0.000000
✔ On/Off	Camera No.1	Analog B	-	Width	> 000	0.000000
On/Off	Camera No.1	Analog C	-	[V]	1.00000	0.000000
✔ On/Off	Camera No.1	Analog D		- M	1.000000	0.000000
Axis Min	Мах			T-Unit		ls /Off
T: 0	1818	Aut	to Scaling			Y Current
Y: 0.01	0.01	Aut	to Scaling	Current bar		Y Axis Min Y Axis Max
	OK		Cancel			T Axis Min T Axis Max

3.8.4. Setting Display Unit, Gradient and Segment

① Click the [Conversion factor] button.

Analog	C Digital	Select All	Channel	Line Style	Conversion fact	or Color Schem
Select	Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
✔ On/Off	Camera No.1	Analog A		[V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog B		— M	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C	-	[M]	1.000000	0.000000
On/Off	Camera No.1	Analog D	-	— M	1.000000	0.000000
Axis Min T: 0		: 17 Aut	o Scaling	T-Unit frame	Legend I⊄ On, I⊄ N	s /off / Current / Avis Min
Y: -0.01	0.01	Aut	o Scaling	Center		Axis Min Axis Max

② Set a unit from the [Y Unit] list and click the [OK] button. Select [user] and set any value.

Y Unit	Y Unit V
101	Y = A(Slope)X + B(Y-Intercept)
	1 0

Caution

• Slope and Y-Intercept can be set to each channel independently.

A unit cannot be set independently on each channel. One same unit is set and reflected on all channels.

3.8.5. Setting Range of Graphic Display

Axis (scale or calibrations)

A range of display can be set.

Check the [Auto Scaling] checkbox of [T] field, and the time axis range of the displayed graph is interlocked with the playback range on the play control panel.

Check the [Auto Scaling] checkbox of [Y] field, the Y-axis range is automatically controlled and readjusted so that all the data in the Y direction can be displayed.

Analog	C Digital	Select All	Channel	Line Style	Conversion facto	or Color Scheme
Select	Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
✓ On/Off	Camera No.1	Analog A		- [V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog B	<u>.</u>	- [M]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C		- [V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog D	-	- [V]	1.000000	0.000000
Axis Min	Max			T-Unit	↓ Legends	off
T: 0 Y: -0.01	0.01	Auto	o Scaling	Current Bar		Current Axis Min Axis Max Axis Min

🔷 T-Unit

The unit for the time axis set is set.

Analog	C Digital	Select All	Channel	Line Style	Conversion factor	Color Scheme
Select	Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
✓ On/Off	Camera No.1	Analog A		M	1.000000	0.000000
On/Off	Camera No.1	Analog B	-	[V]	1.000000	0.000000
✓ On/Off	Camera No.1	Analog C	-	[V]	1.000000	0.000000
✔ On/Off	Camera No. 1	Analog D		M	1.000000	0.000000
-Axis	Max		(⁻	-Unit	Legends	off
T: 0 Y: -0.01	0.01	Aut	o Scaling	frame sec msec micro-sec		Current Axis Min Axis Max

Display of current bar

Check the [Center] checkbox and the current bar is fixed in the center of the display screen. In usual playback operations, the image display screen and the current bar on the graph are displayed interlocked with each other.

When "Center" is checked, only the maximum value of the time axis can be changed (the minimum value is fixed at 0).

Analog	C Digital	Select All	Channel	Line Style	Conversion factor	Color Schem
Select	Device	Channel	Line Style	Y-Unit	Slope	Y-Intercept
✓ On/Off	Camera No.1	Analog A		[V]	1.000000	0.000000
✓ On/Off ✓ On/Off ✓ On/Off	Camera No.1 Camera No.1 Camera No.1	Analog B Analog C Analog D		[V] [V] [V]	1.000000 1.000000 1.000000	0.000000 0.000000 0.000000
Axis Min	Max 1818	(Scaling T	-Unit	Legends On/O	ff
Y: -0.01	0.01			Current Bar Center		xis Min xis Max

Legends

When [On/Off] is checked, the legend window is displayed.

The information provided by legend covers the maximum and minimum values and the current value.

Analog	C Digital	Select All	Channel	Line Style	Conversion fact	tor Color Schem
Select	Device	Channel	Line Style	e Y-Unit	Slope	Y-Intercept
✓On/Off	Camera No.1	Analog A		[V]	1.000000	0.000000
On/Off	Camera No.1	Analog B		— M	1.000000	0.000000
🗹 On/Off	Camera No.1	Analog C	1 4 <u>6</u>	[V]	1.000000	0.000000
On/Off	Camera No.1	Analog D	-	[M]	1.000000	0.000000
Axis	Max			T-Unit	Legend	ls
T: 0	1818	F Au	to Scaling	frame	✓ M On	/Off Y Current
Y: -0.01	0.01		ito Scaling	Current Bar		Y Axis Min Y Axis Max

3.8.6. Graph View Window

Graph View Window Button Functions

You can set the following with the buttons on the graph view window.



Button	Button Name/Function
Ъ	Area Zoom After clicking this button, drag the cursor drawing a rectangle over the portion of the graph area to display and the specified area is enlarged.
A	Auto-Scale Displays the entire waveform.
	Frame Rewind Rewinds the frame by the data point unit (index unit) when clicked.
▶	Frame Advance Advances the frame by the data point unit (index unit) when clicked.

Adjustment display area

A mouse drag in the horizontal direction on the graph can move the position of the current bar. A mouse drag in the vertical or horizontal direction along the Y-axis or T-axis, respectively, changes the display area.



3.8.7. Storing in CSV format

- ① Graphically display the waveform input data that you wish to store in the PC.
- 2 Right click on the graph and select [Export Data].



③ The "Export data" dialog box is displayed. From "Camera List", select the camera or waveform input board that captured the data to save.

Camera List Camera No.1_export OK	COUTPUT data type CSV Type A CSV Type B	Export
	C For TEMA	Close
Output frame range	Select source Analog A Analog B Analog C Analog D Digital C 1BIT Separate © 6BIT value	
1.819000s (1819)	Option IRIG timecode	

④ Specify a frame range to be stored using the "Output frame range" window.

Camera List	Output data type CSV Type A C CSV Type B	Export
	C For TEMA	Close
Dutput frame range	Select source Analog A Analog B Analog C Analog D Digital C 1BIT Separate 6 6BIT value	
1.819000s (1819)	Option	

Select an output format by "Output data type", check data type checkboxes and click the [Export] button.

amera List Camera No. 1_export OK	Output data type CSV Type A CSV Type B	Export
	C For TEMA	Close
utput frame range	- Select source Analog A Analog B Analog C Analog D Digital C 1BIT Separate 6 6BIT value	
1.819000s (1819)	Option I IRIG timecode	

Reference

• For the CSV output format, refer to "8.9. CSV File Structure" in the PFV User's Manual.

6 Specify the file name and the storage to store the file in, and click the [Save] button.

Name	Date modif	Туре	Size	Tags
🅌 Photron				
File name:	cam 001 M	cdlData		▼ Save
	Name Photron	Name Date modif	Name Date modif Type	Name Date modir Type Size

After export is done, click the [OK] button.
 Click the [Close] button of the "Graph data output" dialog box to close it.

When there is an error in a waveform input board setting, the [Alert] button on the waveform input board bar is displayed in red.

If you click the [Alert] button, a message box is displayed and you can confirm the content of the alert. This error is also displayed in "Alert" on the "Analog Board Setup" dialog box.

When "Auto Setup" is checked, an alert may be displayed when the frame rate or resolution is changed.



Error Display	Error Content
Frequency Over	The sampling frequency exceeds the range that can be set.
Samples / frame not integer error	The sampling frequency is not an integral multiple of the frame rate.
Frequency change Error	The intended sampling frequency was not set. The sampling frequency has been set with the nearest possible value.
Number of Sampling Over	The number of samples exceeds the value that can be set.
Camera Trigger mode Error	The present trigger mode cannot be synchronized with the waveform input board.
Channel Error	The number of channels that can be set has been exceeded.

Product specification serves as the following.

Item	Specification				
Analog Input					
Isolated specification	Unisolated				
Туре	Single-ended, Referenced Single-ended, Differential				
Input channels	8ch				
Input range	$\pm 10V$, $\pm 5V$, $\pm 2V$, $\pm 1V$, $\pm 0.5V$, $\pm 0.2V$, $\pm 0.1V$				
Input impedance	10G Ω				
Resolution	16bit				
Sampling rate	1.00 MS/s (It divides at two or more times of ch use)				
General Specification					
Size	286 (W) x 170 (H) x 69 (D) mm Excluding protrusions				
Weight	42.3oz (1.2kg)				
Operating environment					
Operating temperature	0 to 45°C				
Storage temperture	-20 to 70°C				
Humidity	10 to 90% (No Condensation)				
Pollution degree	2				
Overvoltage category	Ι				

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.		

Contact Information		
In Americas and Antipodes	PHOTRON USA, INC. 9520 Padgett Street, Suite 110 San Diego, CA 92126-4426, USA Phone : 800-585-2129 or 858-684-3555 Fax : 858-684-3558 E-mail : image@photron.com www.photron.com	
In Europe, Africa and India	PHOTRON EUROPE LIMITED The Barn, Bottom Road, West Wycombe, Buckinghamshire, HP14 4BS, U.K. Phone : +44(0) 1494 48 1011 Fax : +44(0) 1494 48 7011 E-mail : image@photron.com www.photron.com	
In other areas	PHOTRON LIMITED 21F, Jimbocho Mitsui Bldg., 1-105 Kanda Jimbocho, Chiyoda-Ku, Tokyo 101-0051 Phone : +81 3 3518 6271 Fax : +81 3 3518 6279 E-mail : <u>image@photron.co.jp</u> www.photron.co.jp	

Photron FASTCAM Viewer

for High Speed Digital Imaging

FASTCAM NI DAQ software option User's Manual Revision 1.10E

Publication DateJuly. 2015PublisherPHOTRON LIMITED21F, Jimbocho Mitsui Bldg.,1-105 Kanda Jimbocho, Chiyoda-Ku, Tokyo 101-0051