

***FASTCAM Multi***  
***Camera Head HS-01***

 **Hardware Manual**

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***Rev. 2.02 E***

**Photron**

#### WARNING

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the users will be required to correct the interference at their own expense.

#### CAUTION:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

- The copyright of this manual is held by PHOTRON LIMITED.
- Product specifications and manual contents are subject to change without notice.
- PHOTRON LIMITED bears no responsibility for any results by using our products nor by applying this manual to any operations.

# Introduction

Thank you for your purchase of Photron's high-speed camera system, the "FASTCAM Multi Camera Head HS-01" (referred to below as the system).

This manual contains the operating instructions and warnings necessary for using the system.

Before using the system, please read the entire manual.

If any part of this manual is unclear, contact Photron using the contact information printed at the back of the manual.

After you finish reading the manual, store it in a safe place along with the warranty card and refer back to it when necessary.

# Manual Notation

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

Icon/Symbol	Description
	This symbol indicates content that should always be read.
	This symbol indicates instructions that should always be followed when using the software, or things to be careful of when using the software.
	This symbol indicates supplementary items to be aware of when using the system.
	This symbol indicates the location of a reference.
	This symbol indicates a space for you to make notes.
“ ”	This symbol is used to indicate the names of items on a screen, references, dialog names, and connectors.
[ ]	This symbol is used to indicate menu names, and sub-menu names.



# Using the Manual

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This section explains the layout of the manual. For other options, please refer to each manual.

◆ Introduction

The introduction explains the manual and safety precautions.

◆ Chapter 1. Overview

This chapter gives an overview of the system and an explanation of its features. It also explains a list of items that should be checked before using the system, and the procedure for connecting each component of the system.

◆ Chapter 2. Function

This chapter explains the system's functions. Refer to the "Photron FASTCAM Viewer User's Manual" for additional details on using a PC to control the system.

◆ Chapter 3. Specifications

This chapter explains the system's specifications.

◆ Chapter 4. Warranty

This chapter explains about the warranty.

◆ Chapter 5. Contacting Photron

This chapter lists the contact information to use when contacting Photron if the system malfunctions or if a portion of the manual is unclear.

## Using System Safety and Correctly

In order to prevent injury to yourself and others, and to prevent damage to property, carefully observe the following safety precautions.

Photron has given its full attention to the safety of this system. However, the extent of damage and injury potentially caused by ignoring the content of the safety precautions and using the system incorrectly is explained next. Please pay careful attention to the content of the safety precautions when using the system.



### **Warning**

This symbol indicates actions that carry the risk that a person could receive a serious injury.



### **Caution**

This symbol indicates actions that carry the risk that a person could receive a moderate injury, or that damage to physical property might occur.

◆ The safety precautions to be observed are explained with the following symbols.



This symbol indicates actions that require caution.



This symbol indicates actions that are prohibited and must be avoided.



This symbol indicates actions that must always be performed.



## Warning



- Do not perform actions that will damage the AC cable or plug.

(Do not damage the cable, modify it, use it near a heater, excessively bend, twist or pull on it, place heavy objects on it, or bundle it.)

Using the cable when damaged can cause fire, electric shock, or a short circuit.



- Do not use the system in a manner which will exceed the rating of the power outlet or wiring equipment used.

Exceeding the power rating might cause a fire from excessive heat.



- Do not insert metallic objects inside, or pour liquids such as water on, the system.

Doing so can cause fire, electric shock, or malfunction from short circuit or heat.



- Do not disassemble or modify the system.

There are high voltages inside the system that can cause electric shock.



- Do not plug in or unplug the power cord with wet hands.

Doing so can cause electric shock.



- This chapter lists the contact information to use when contacting Photron if the system malfunctions or if a portion of the manual is unclear.

Not fully plugging in the power cable can cause fire from electric shock or heat.



- When something is wrong with the system, unplug the power cable immediately.

- When a foreign substance or liquid, such as metal or water, gets inside.

- When the outer case is broken or damaged, such as from a fall.

- When the system produces smoke, a strange smell, or strange sound. Using the system in these conditions might cause a fire or electric shock.



- Do not use the accessories by the usage that a manufacturer does not specify. It may cause damage of protection.

## Caution



■ Always unplug the system when cleaning it or when it is unused for a long period of time. Leaving or storing the system connected to the power source might cause fire from insulation deterioration or electrical discharge.



■ Please consult us in advance when you perform an event by which laser light or direct rays fall on the image sensor surface.



■ Do not set the system in a location where the temperature gets unusually hot. The trunk and inside of a car can get especially hot in summer. Doing so can cause the outer case and internal components to deteriorate or cause a fire.



■ Do not place the system in a location prone to oily smoke or steam, or in a location with a lot of humidity or dust. Oil, moisture, and dust conduct electricity, which can cause a fire or electric shock.



■ Do not obstruct the air intake and exhaust port, when the system is installed.



■ Ambient temperature 0-45° C, humidity 80% RH or lower, maximum altitude 2,000m or lower. In addition, if exceeding these limits, use in a condensation-free environment. Doing so can cause malfunction.



■ Do not store the equipment in a location where the temperature goes below -20°C or higher than 60°C. Also, prevent condensation from forming during shipment.



■ When shipping, remove the connecting cable and use the original packaging or a dedicated carrying case. Do not ship the equipment in an environment where the temperature goes below -20°C or higher than 60°C. Also, prevent condensation from forming during shipment.



■ The rubber foot used in this product might be hydrolyzed if it is stored or used in a high humidity environment for a long time. Moreover, it might be hot melted if it is stored or used in a high temperature environment for a long time.



## European Union (and EEA) only



“CE” mark indicates that this product complies with the European requirements for safety, health, environment and customer protection. “CE” mark equipments are intended for sales in Europe.



These symbols indicate that this product is not to be disposed of with your household waste, according to the WEEE Directive (2002/96/EC), the Battery Directive (2006/66/EC) and/or your national laws implementing those Directives.



This product should be handed over to a designated collection point, e.g., on an authorized one-for-one basis when you buy a new similar product or to an authorized collection site for recycling waste electrical and electronic equipment (EEE) and batteries and accumulators.

Improper handling of this type of waste could have a possible impact on the environment and human health due to potentially hazardous substances that are generally associated with EEE. Your cooperation in the correct disposal of this product will contribute to the effective usage of natural resources.

For more information about the recycling of this product, please contact your local city office, waste authority, approved scheme or your household waste disposal service or visit [www.photron.com](http://www.photron.com).

(EEA: Norway, Iceland and Liechtenstein)

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU (Class A) on the approximation of the laws of the Member States relating to electromagnetic compatibility.

**Warning:** This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.



## Cleaning of the Image Sensor Surface

Electrostatic Discharge (ESD) events may cause immediate and unrecoverable damage to the image sensor. Please read the following instructions and take **EXTREME CARE** when cleaning the image sensor surface.



- ALWAYS take appropriate anti-static precautions when cleaning or working near the Image sensor.
- DO NOT use any form of cleaning equipment using electrostatic or 'charged fiber' technology.



- Please discharge any electrostatic build up in your body by touching a grounded metallic Surface before working near the camera sensor.
- Very gently, use only clean and dry air to remove dust from surface of the image sensor.
- To remove stubborn contamination, use the highest grade (e.g. VLSI grade) pure Isopropyl alcohol (IPA) with optical wipes of 'clean room' grade.
- Extreme care must be taken! Gently wipe across the sensor in a single action.  
(DO NOT rub to avoid abrasive damage to delicate optical coatings on the glass surface.)



## Camera Cable



■ Minimum curve radius of the camera cable is 125 millimeters. Be careful when using or storing camera cable to give an ample space for the curvature.



■ Do not give an excessive impact or load to camera cables to avoid damage.



■ Whenever the cables are out of use, place the attached connector caps for protection of the connectors.



■ In operation, connect the main unit's connector cap and the camera cable's connector cap each other to avoid dirt and pollution and to keep clean inside.



The camera cable includes optics fibers. If dust or dirt is in inside of a connector, it may cause a communication error. Keep clean the inside of connectors. If a connector is polluted, clean the fiber edges by following instruction or using the bundled cleaning kit.



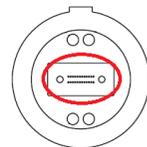
■ DO NOT use hard and/or sharp materials for cleaning.



■ Very gently, use only clean and dry air to remove dust from surface of the image sensor.

■ To remove stubborn contamination, use the highest grade (e.g. VLSI grade) pure Isopropyl alcohol (IPA) with optical wipes of 'clean room' grade.

■ Fibers are indicated with a red circle over the cable cross-section.





# Table of Contents

<b>Chapter 1. Overview</b>	<b>1</b>
1.1. Product Overview and Features .....	2
1.2. System's Components and Accessories.....	3
1.2.1. Components.....	3
1.2.2. Accessories/Options .....	3
1.2.3. Type .....	4
1.3. Part Names .....	5
1.3.1. Camera Head.....	5
1.3.2. Camera Head Part Names.....	6
1.3.3. Interchangeable Lens Mounts.....	7
1.4. Connection .....	8
<b>Chapter 2. Functions</b>	<b>11</b>
2.1. Selecting Frame Rate .....	12
2.2. Selecting Resolution .....	12
2.3. Selecting Shutter Speed .....	13
2.4. Selecting Trigger Mode.....	14
2.4.1. START Mode.....	14
2.4.2. CENTER Mode .....	14
2.4.3. END Mode.....	15
2.4.4. MANUAL Mode .....	15
2.4.5. RANDOM Mode .....	15
2.4.6. RANDOM RESET Mode .....	16
2.4.7. RANDOM CENTER Mode .....	17
2.4.8. RANDOM MANUAL Mode .....	18
2.5. LOW LIGHT Mode .....	19
2.6. VARIABLE Setting .....	19
2.7. White Balance Adjustment (Color Model Only) .....	20
2.7.1. Using Preset White Balance (Color Model Only).....	20
2.7.2. Using User White Balance (Color Model Only).....	20
2.8. Color Enhancement Function (Color Model Only).....	21
2.9. Look-Up Table (LUT) Operations.....	21
2.9.1. Using a Custom LUT.....	24
2.10. Edge Enhancement Function .....	24
2.11. Partition Memory & Record.....	24
2.12. Event Marker Function.....	25
2.13. Direct Trigger / Direct Start Mode .....	25
2.14. Fan Control .....	26

**Chapter 3. Specifications** 27

- 3.1. Specifications ..... 28
  - 3.1.1. Product Specifications ..... 28
  - 3.1.2. General Specifications ..... 29
  - 3.1.3. Frame Rate and Resolution (Saving to Memory) ..... 30
  - 3.1.4. Frame Rate and Resolution (Stream Recording to FAST Drive) ..... 33
  - 3.1.5. Shutter Speed List ..... 36
  - 3.1.6. Recordable Frames / Resolution (Saving to Memory) ..... 37
  - 3.1.7. Recordable Frames / Resolution (Stream Recording to FAST Drive) ..... 38
  - 3.1.8. Recordable Time / Resolution (Saving to Memory) ..... 39
  - 3.1.9. Recordable Time / Resolution (Stream Recording to FAST Drive) ..... 40
- 3.2. Dimensions ..... 41
  - 3.2.1. Camera Body ..... 41
  - 3.2.2. Clearance for Camera Cable Connection ..... 44
  - 3.2.3. Clearance for Camera Cable Connection ..... 45

**Chapter 4. Warranty** 46

- 4.1. About the Warranty ..... 47

**Chapter 5. Contacting Photron** 48

- 5.1. Contact Information ..... 49



# **Chapter 1. Overview**

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**1.1. Product Overview and Features**

**1.2. System's Components and Accessories**

**1.3. Part Names**

**1.4. Connection**

## 1.1. Product Overview and Features

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The Multi camera head HS-01 is a compact and lightweight camera head specifically designed for the FASTCAM Multi. It only weighs 0.98 kg and supports 1,280 x 1,024 pixels resolution at 4,800 frames per second. The Multi camera head HS-01 can be utilized in a variety of applications including industrial R&D (design, quality control, and component technology development), science, medical, and aerospace.

The Multi camera head HS-01 has adopted a robust design where circuit boards are completely sealed from the outside and a FAN OFF function is a standard feature for image measuring purposes. It also offers a wide range of optional parts such as Micro Four-Thirds (MFT) lens control and built-in LED lights.

Use the Multi camera head HS-01 in a variety of applications with its multi-function, high-performance, robust, and expandable specifications to take full advantage of it.



**FASTCAM Multi Camera Head**

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## 1.2. System's Components and Accessories

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### 1.2.1. Components

Refer to the attached packing list for this product's standard components and accessories.

#### Supplement

- Lens is not included in the product package.

### 1.2.2. Accessories/Options

Connect this camera to the FASTCAM Multi Main Unit for operation. The following optional items are available to choose from (as of March 2015).

1. FASTCAM Multi Camera Cable 5m (102481)
2. FASTCAM Multi Camera Cable 10m (102482)
3. FASTCAM Multi LED Light Option (102483)
4. Micro Four Thirds Lens Option For FASTCAM Multi (102484)

#### Supplement

- In addition to the above, optional accessories such as lenses and lighting equipment are available. For details, ask your local sales representative, or see the contact information in Chapter 5.1.

### 1.2.3. Type

Four different types are available to choose from the below table.

Max Frame Rate	Sensor	Type
750,000fps	Monochrome	FASTCAM Multi Camera Head HS-01 type 750K - M
	Color	FASTCAM Multi Camera Head HS-01 type 750K - C
200,000fps	Monochrome	FASTCAM Multi Camera Head HS-01 type 200K - M
	Color	FASTCAM Multi Camera Head HS-01 type 200K - C

 **Caution**

- Export-controlled model type 200K is subject to restriction on the frame rate and shutter speed.
- Subject to restrictions under Export Trade Control Order, your camera may NOT be used depending on the country where you intend to use. If you are considering using your camera outside Japan, check with Photron first. Contact information is given in 5.1. Contact Information.

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## 1.3. Part Names

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For each of the system components.

- Do not expose to shock.
- Do not use in an area where flammable gas or dust is present.
- Do not place in an unstable location such as on an unstable platform or an incline.
- Do not disassemble or modify.
- Do not expose to liquids such as water.
- Do not subject to excessive force.

### 1.3.1. Camera Head

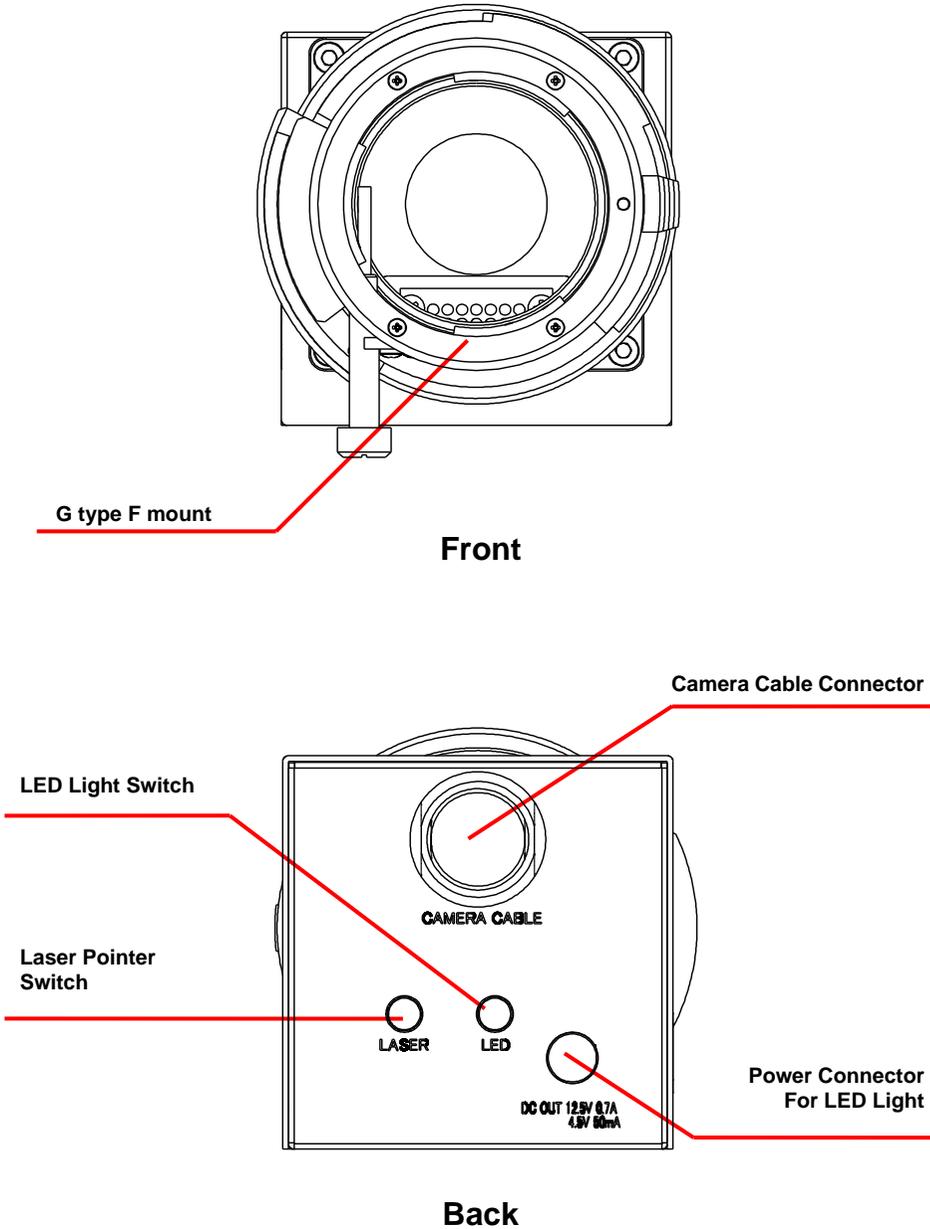
This is a camera head specifically designed to shoot a fast-moving object. It has imaging function only and the image data is transferred via the camera cable to the memory built in the main unit. On the rear panel of the camera, there are a connector for the camera cable to be used for communication between the camera and the main unit, and a power connector to feed power to the LED light option.



## FASTCAM Multi Camera Head HS-01

1.3.2. Camera Head Part Names

**FASTCAM Multi Camera Head HS-01**



Power Connector for LED Light, LED Light Switch and Laser Pointer Switch are used with FASTCAM Multi LED Light Option.

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### 1.3.3. Interchangeable Lens Mounts

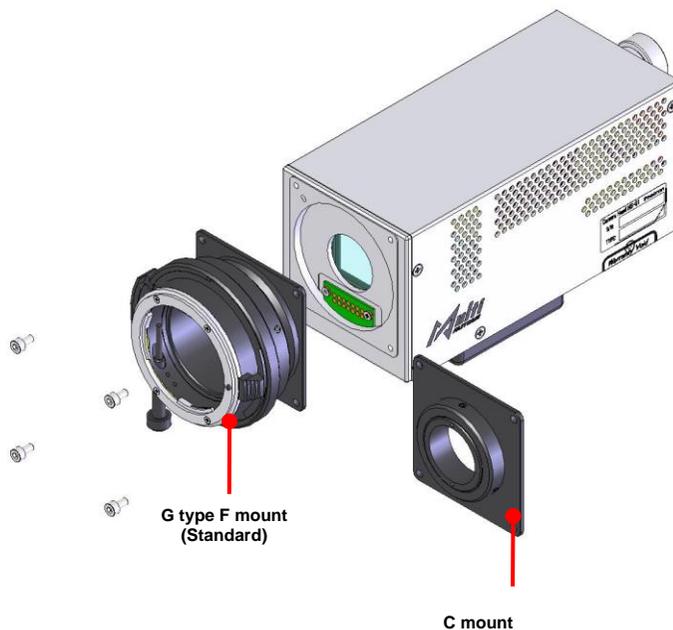
The lens mount on the system can be changed according to the recording purpose.

There are 2 types of interchangeable lens mounts: “G type F-mount” and “C-mount”.

In addition, it is possible to change over to the Micro Four Thirds lens mount by acquiring a “Micro Four-Thirds Lens Option for FASTCAM Multi”.

◆ How to change the lens mount (G type F-mount to C-mount)

1. Remove the four M3 Hex Socket Cap screws using the hexagonal wrench.
2. Remove the G type F-mount portion as a unit.
3. Install the C-mount unit using the Hex Socket Cap screws in the 90° diagonal holes.
4. After installation, always verify that the unit is not loose and does not rattle.



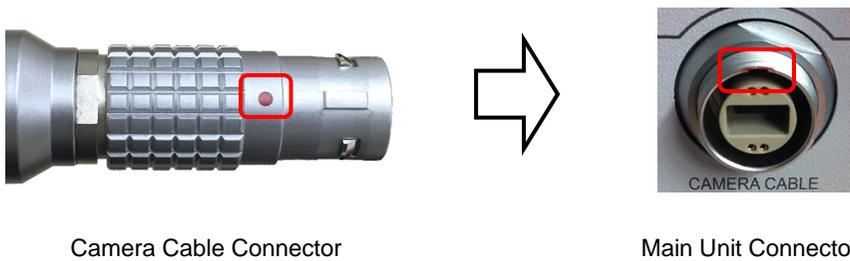
## 1.4. Connection

Following the below steps, connect between Main Unit and a camera head using the dedicated cables.

1. Make sure the power to the Main Unit is off.
2. Grasp and slide the grip of the connector, and then remove the cap from the camera cable. Connect the caps each other to avoid dirt and pollution and to keep clean inside.



3. Connect the camera cable. Make sure of the connector on the camera head and Main Unit. See the position of the red mark on the cable-mount connector and the box-mount connector to be connected.

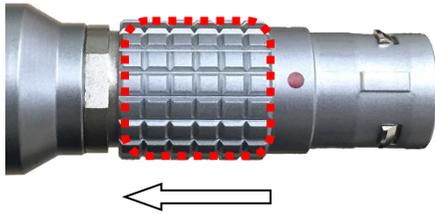


Main Unit



Camera Head

- 
- When disconnecting the camera cables, first shut down the system.  
Grasp and slide the grip of the connector, and then disconnect the camera cable.



Camera Cable Connector

 **Supplement**

- The camera cable has no dedicated orientation: the connector on either end can be connected to either the processor or the camera head.



Be sure to verify if the camera cable has been correctly and firmly inserted. If the camera cable is disconnected for any reason while the camera is active, an error will result.



Be sure to shut down the Main Unit before connecting or disconnecting the camera head. If the camera head is connected or disconnected while the system is powered, an error will result.



# **Chapter 2. Functions**

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- 2.1. Selecting Frame Rate**
- 2.2. Selecting Resolution**
- 2.3. Selecting Shutter Speed**
- 2.4. Selecting Trigger Mode**
- 2.5. LOW LIGHT Mode**
- 2.6. VARIABLE Setting**
- 2.7. White Balance Adjustment (Color Model Only)**
- 2.8. Color Enhancement Function (Color Model Only)**
- 2.9. Look-Up Table (LUT) Operations**
- 2.10. Edge Enhancement Function**
- 2.11. Partition Memory & Record**
- 2.12. Event Marker Function**
- 2.13. Direct Trigger / Direct Start Mode**
- 2.14. Fan Control**

## 2.1. Selecting Frame Rate

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Images can be recorded with the system from 50 fps to 4,800 fps using the full 1,280x1,024 pixels resolution of the image sensor. For frame rates higher than 4,800 fps, high-speed recording is achieved by limiting the read area of the image sensor.

### Reference

- Please refer to “3.3 Setting and Registering the Frame Rate/Resolution” of “Photron FASTCAM Viewer 3 Operation section”, or “4.3 Setting Shooting Conditions” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

### Supplement

- Even if a limited horizontal resolution is applied, Frame Rate cannot be increased. This specification is different from other systems. Please refer to “3.1.3. Frame Rate and Resolution” for available frame rate.

### Caution

- Export-controlled model type 200K is subject to certain restriction on the frame rate.

## 2.2. Selecting Resolution

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The maximum resolution of the image sensor is 1,280 x 1,024: total 1,310,720 pixels. By reducing the resolution, images can be taken with even faster frame rates, or the recording duration can be extended accordingly.

### Reference

- Please refer to “3.3 Setting and Registering the Frame Rate/Resolution” of “Photron FASTCAM Viewer User’s Manual”, or “4.3 Setting Shooting Conditions” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

## 2.3. Selecting Shutter Speed

The shutter speed (Exposure time) is independent of the frame rate, and it is possible to control the exposure time in the frame using the electric shutter. By making an exposure that is of a shorter period than the frame rate, high-speed objects can be photographed blur-free.

The shortest setting value of shutter speed is 1/949,668 sec (1.053  $\mu$ sec).

### Reference

- Please refer to “3.4 Setting the Shutter Speed” of “Photron FASTCAM Viewer User’s Manual”, or “4.3 Setting Shooting Conditions” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

### Supplement

- When two cameras are connected, the shutter speed can be set by each camera.

### Supplement

- A minimum exposure time depends on a set up frame rate.

Frame Rate	Limitation
50fps	1/60 ~ 1/312,500 sec (3.20 $\mu$ sec) are selectable
60fps to 200,000fps	1/frame ~ 1/312,500 sec (3.20 $\mu$ sec) are selectable
240,000fps	1/frame sec (4.17 $\mu$ sec) is only available
250,000fps	1/frame sec (4.00 $\mu$ sec) is only available
300,000fps to 600,000fps	1/frame ~ 1/750,000 sec (1.33 $\mu$ sec) are selectable
625,000fps	1/frame sec (1.60 $\mu$ sec) is only available
750,000fps	1/frame sec (1.33 $\mu$ sec) is only available

### Caution

- Export-controlled model type 200K is subject to certain restriction on the shutter speed.

## 2.4. Selecting Trigger Mode

In order to reliably capture high-speed phenomena, many kinds of trigger modes have been made available. These trigger modes are explained next.

There are eight types of trigger modes which are listed below.

START	CENTER	END	MANUAL
RANDOM	RANDOM RESET	RANDOM CENTER	RANDOM MANUAL

### Reference

- Please refer to “3.5 Setting the Trigger Mode” of “Photron FASTCAM Viewer User’s Manual”, or “4.4 Setting Trigger Mode” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

### 2.4.1. START Mode

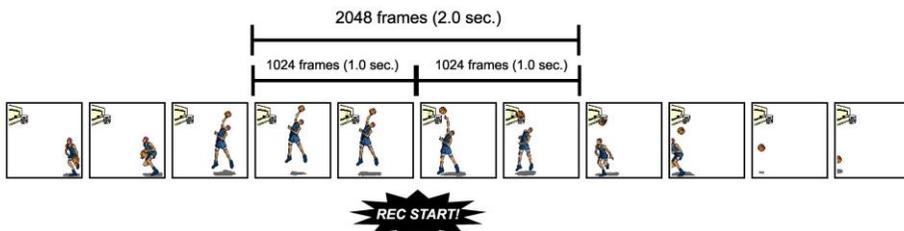
START mode is a trigger mode where recording starts the instant the trigger is input, the scene is recorded until the memory is full, and then recording ends. This mode is suitable for taking images of high-speed phenomena when what will happen, and when it happens, is known in advance.

For example, in a situation with a maximum useable memory of two seconds of recording, two seconds of high-speed video is saved immediately after the trigger is input.



### 2.4.2. CENTER Mode

CENTER mode is a trigger mode where an equal amount of content recorded before and after the trigger is input is saved to memory. This mode is suitable for viewing before and after an important instant. For example, in a situation with a maximum useable memory for two seconds of recording, one second before and one second after the trigger was input is recorded for a total of two seconds of high-speed video.



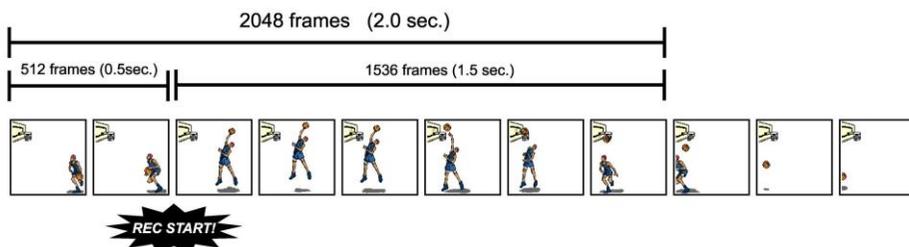
### 2.4.3. END Mode

END mode is a trigger mode where the content recorded immediately before the trigger is input is saved to memory. This mode is suitable for recording high-speed phenomena where it is hard to predict when the important action will start or stop. For example, in a situation with a maximum useable memory for two seconds of recording, the two seconds of high-speed video immediately before the trigger input is saved.



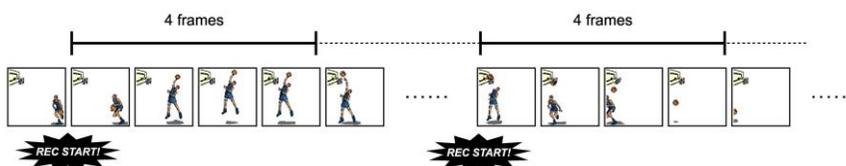
### 2.4.4. MANUAL Mode

MANUAL mode is a trigger mode, similar to CENTER mode, where the content recorded before and after the trigger is input is saved to memory, but the proportion of time before and after the trigger can be set as required. For example, in a situation with a maximum record time of two seconds, 0.5 seconds before and 1.5 seconds after the trigger is input are recorded and saved, a total of two seconds of high-speed video.



### 2.4.5. RANDOM Mode

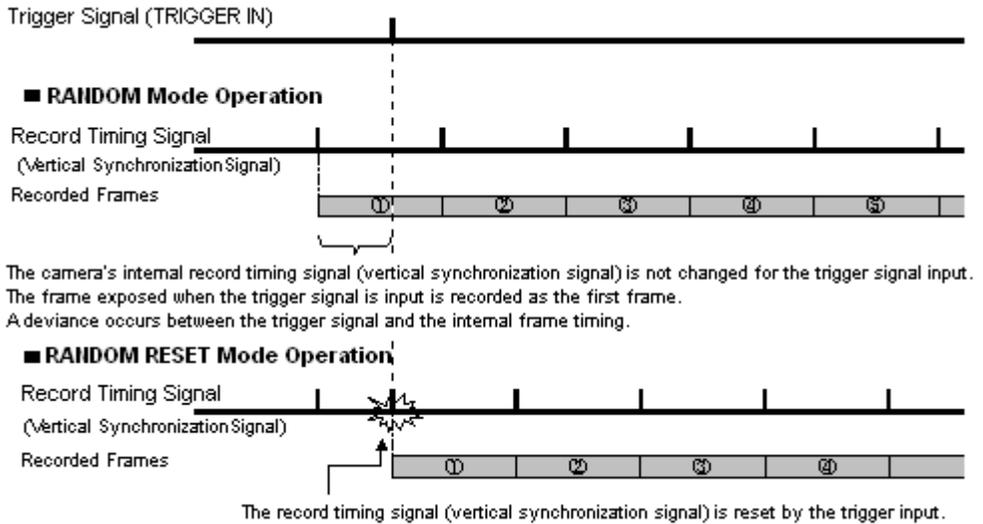
RANDOM mode is a trigger mode where each time a trigger is input only a predetermined number of frames are saved to memory. For example, this function is convenient for a subject which is an irregular and repeated phenomenon which can have a trigger output produced for each cycle or occurrence. The number of frames recorded each time the trigger is input can be set as desired, in one frame increments, from one frame to the maximum of all the recordable frames available.



### 2.4.6. RANDOM RESET Mode

RANDOM RESET mode is explained here by comparing its operation with the normal mode.

RANDOM RESET mode is a mode to improve the temporal accuracy of the record start timing and the timing of the trigger input, where, to put it simply, with the input of the trigger signal, at the timing that it is input, the camera's record timing is reset.



When the camera is set to the normal RANDOM mode (the same as START mode) and RANDOM RESET mode, the difference in the recording operation for the trigger input is shown graphically.

In the normal RANDOM mode and START mode, the camera starts recording when the trigger is input, but the internal record timing signal is independent, and it operates regardless of when the trigger is input. For this reason, there may be situations where the start time of the first frame when the trigger is input is advanced almost a full frame. The range of this overlap also cannot be known.

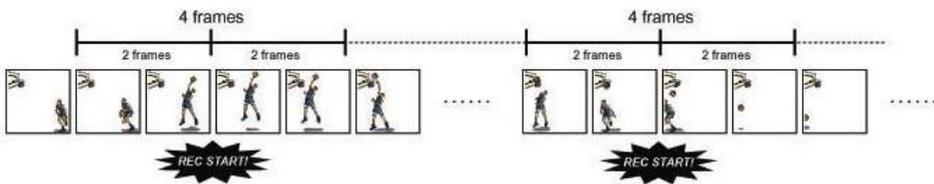
On the other hand, in RANDOM RESET mode, the camera's internal record timing signal is reset by the trigger input and operates anew. For this reason, the trigger input time and the timing of the start of the first frame are the same. The interval from when the trigger is input until the exposure begins is approximately 1.75  $\mu\text{sec}$  at slower than 256,000fps, 0.74  $\mu\text{sec}$  at faster than 256,001fps.

#### ! Caution

- When continuously shooting in Random Reset mode, DO NOT use an interval longer than 1-frame length (ex. 1/1000 sec interval in 1000 fps operation).

## 2.4.7. RANDOM CENTER Mode

RANDOM CENTER mode is a trigger mode, similar to RANDOM mode, where each time a trigger is input only a predetermined number of frames are saved to memory. The difference between this mode and RANDOM mode is that in RANDOM mode the frames of specified number are recorded directly after the trigger signal, whereas in RANDOM CENTER mode, at the timing of the trigger signal, the frames before and after the trigger remain in the recording memory. For example, this function is convenient for a subject which is an irregular and repeated phenomenon which can have a trigger output produced for each cycle or occurrence, and you want to check the action before and after the trigger timing. The number of frames recorded each time the trigger is input can be set as desired, in one frame increments, from one frame to the maximum of all the recordable frames available.



### ◆ Setting the RANDOM CENTER mode frame count

Setting the frame count in RANDOM CENTER mode is the same as setting the frame count for RANDOM mode.

### ◆ Setting the RANDOM CENTER mode record count

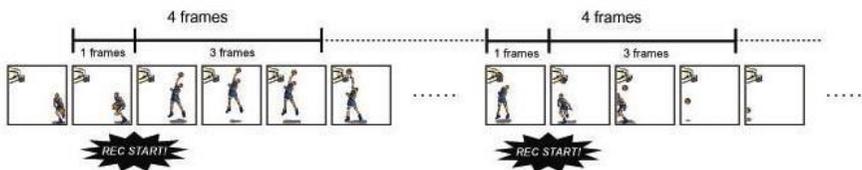
The number of trigger inputs that can be accepted in RANDOM CENTER mode is a maximum of 10. Set the number of trigger inputs in advance, and the recording operation can be ended when that amount of trigger inputs is finished.

## Reference

- For how to setup of RANDOM Mode, refer to “2.4.5.RANDOM Mode” page 15.

### 2.4.8. RANDOM MANUAL Mode

RANDOM MANUAL mode is a trigger mode, similar to RANDOM mode, where each time a trigger is input only a predetermined number of frames are saved to memory. The difference between this mode and RANDOM mode is that in RANDOM mode the frames of specified number are recorded directly after the trigger input, whereas in RANDOM MANUAL mode, at the timing of the trigger input, the frames before and after the trigger, each specified as desired, remain in the recording memory. For example, this function is convenient for a subject which is an irregular and repeated phenomenon which can have a trigger output produced for each cycle or occurrence, and you want to check the action before and after the trigger timing. The number of frames recorded each time the trigger is input can be set as desired, in one frame increments, from one frame to the maximum of all the recordable frames available.



- ◆ **Setting the RANDOM MANUAL mode record count**  
Setting the record count in RANDOM MANUAL mode is the same as setting the record count for RANDOM CENTER mode.
- ◆ **Setting the RANDOM MANUAL mode frame count**  
To use RANDOM MANUAL mode, the proportion of frames to record before and after the trigger must be set in advance before recording.

#### Reference

- For how to setup of RANDOM Mode, refer to “2.4.5.RANDOM Mode” page 15.

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## 2.5. LOW LIGHT Mode

The more you increase the frame rate or shutter speed of the camera, the more the amount of light entering the camera decreases, making the displayed image darker. Low light mode is a function that temporarily increases the exposure time, making the displayed image easier to see to enable you to focus and setup the camera.

The default shutter speed of this product is 1/50 second.

### Reference

- Please refer to “3.6 Using Low Light Mode” of “Photron FASTCAM Viewer User’s Manual”, or “4.3.1 About Items in [Setup]” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

## 2.6. VARIABLE Setting

In the recording conditions settings, the frame rate and resolution can be set to the desired value following the conditions listed below.

### ◆ Saving to Memory

- FRAMERATE can be set from 54 frame rates between 50 fps and 750,000 fps.
- The resolution can be set in 128 (horizontal) and 8 (vertical) increments.
- The minimum resolution is 640 (horizontal) x 8 (vertical)
- The resolution is limited as of 128 (horizontal) and 8(vertical) at 300,000fps or above.

### ◆ Stream recording to FAST Drive

- FRAMERATE can be set from 44 frame rates between 50fps and 200,000fps.
- The resolution can be set in 128 (horizontal) and 8 (vertical) increments.
- The minimum resolution is 640 (horizontal) x 8 (vertical)
- The resolution is limited as of 128 (horizontal) and 8 (vertical) at 187,500fps or above.

### Reference

- Please refer to “3.3 Setting and Registering the Frame Rate/Resolution” of “Photron FASTCAM Viewer User’s Manual”, or “4.3.5 About Detailed Settings of Variables” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

### Supplement

- The area cannot be moved to the vertical direction at the variable setting of the system.

### Caution

- Export-controlled model type 200K is subject to certain restriction on the frame rate and the shutter speed.

## 2.7. White Balance Adjustment (Color Model Only)

On digital video cameras, photographing white as pure white is described as "having the appropriate white balance." On the system's color models as well, in order to take images with the correct color representation, the white balance must be adjusted for the color temperature of the light source used. The intensity of each color, R, G, and B, can be adjusted on this system. By adjusting the balance of those three colors to match the light source used, the appropriate white balance can be achieved.

Two methods are available for adjusting the white balance, preset and user-editable white balance. These methods are explained in this section.

### 2.7.1. Using Preset White Balance (Color Model Only)

With the system, there are two types of white balance presets (5100K, 3100K) for use with common light sources. The suggested color temperature for these presets is listed below.

- 5100K (Daylight, Outdoors)
- 3100K (Halogen Light Source)

### 2.7.2. Using User White Balance (Color Model Only)

User white balance can be set in order to achieve the most appropriate white balance for the light source used with the system and the conditions during recording.

The values set here are stored in the Main Unit's internal memory as the user preset, and they can be loaded by selecting USER.

There are also two methods for setting user white balance, AUTO USER and EDIT USER.

#### Reference

- Please refer to "3.8 Other Settings" of "Photron FASTCAM Viewer User's Manual", or "8.1.2 Color Adjustment" of "Photron FASTCAM Viewer 4 User's Manual" for the details of the setup.

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## 2.8. Color Enhancement Function (Color Model Only)

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Color models feature an image color enhancement setting. The image color enhancement level can be adjusted in five steps, including the OFF setting.

Menu Display	Contents
OFF	Turns the color enhancement mode off
x0.5 (LEVEL1)	Sets x0.5 color enhancement
x1 (LEVEL2)	Sets x1 (default) color enhancement
x1.5 (LEVEL3)	Sets x1.5 color enhancement
x2 (LEVEL4)	Sets x2 color enhancement

### Reference

- Please refer to “3.8 Other Settings” of “Photron FASTCAM Viewer User’s Manual”, or “8.1.2 Color Adjustment” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

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## 2.9. Look-Up Table (LUT) Operations

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The LUT (Look-Up Table) refers to a reference table that defines the relationship between the pixel brightness gradation of the original image data taken and the brightness gradation displayed on a computer screen or video monitor.

The system contains a hardware LUT function, and you can display the image data taken with improved contrast (light and dark sharpness) or make an object in the image stand out by emphasizing a specified gray level range.

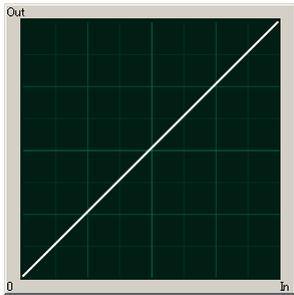
The LUT in the system and the relationship between it and video output and the PC software is explained below.

### Caution

- When an image is saved with its brightness converted with the LUT, the image saved is the image that has had its brightness converted.

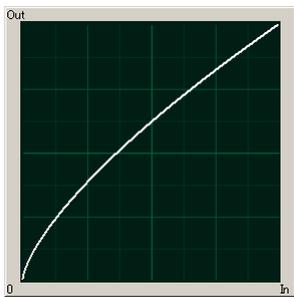
◆ D1: Gain 1x

The input is always linear output. This LUT is used for normal conditions.



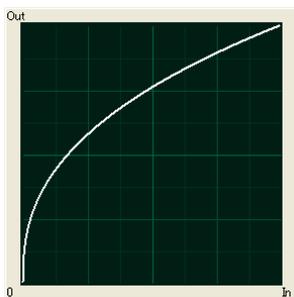
◆ D2: Gamma 0.6

This LUT is 0.6 gamma correction



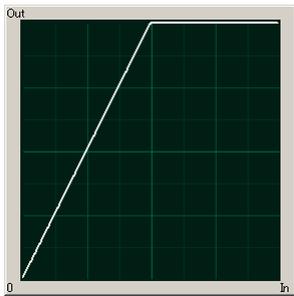
◆ D3: Gamma 0.45

This LUT is 0.45 gamma correction.



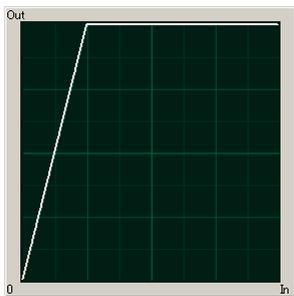
◆ D4: Gain 2x

The gain is doubled, and you can display the dark areas of the image emphasized.



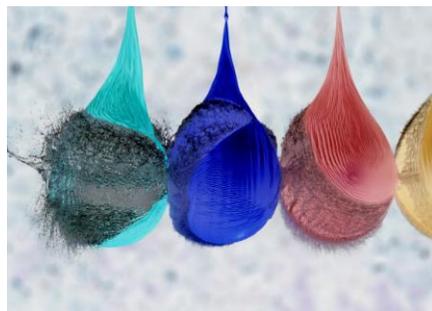
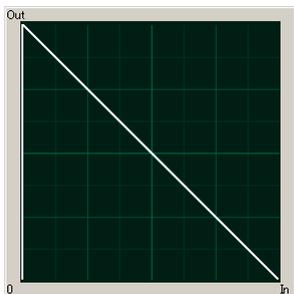
◆ D5: Gain 4x

The gain is quadrupled, and you can display the dark areas of the image emphasized. This LUT emphasizes the dark portions even more than D4.



◆ D6: Reverse Gradation

The input gradation is reversed and then displayed.



### 2.9.1. Using a Custom LUT

Creating a LUT pattern is done with PFV.

#### Reference

- For the creation method of a LUT pattern, refer to “Photron FASTCAM Viewer User’s Manual”.

## 2.10. Edge Enhancement Function

With the system’s edge enhancement setting, you can enhance the edges in the recorded image in four steps, including the OFF setting.

Menu Display	Contents
OFF	Edge enhancement off.
LEVEL1	Edge enhancement set to weak.
LEVEL2	Edge enhancement set to medium.
LEVEL3	Edge enhancement set to strong.

#### Reference

- Please refer to “3.8 Other Settings” of “Photron FASTCAM Viewer User’s Manual”, or “8.1.3 Filter Setting” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

## 2.11. Partition Memory & Record

The system contains internally 8 GB standard, or a maximum of 32 GB, of high-capacity memory for recording use.

This recording memory can be partitioned and assigned to each recording. Memory is partitioned into equal sizes and a maximum of 64 partitions can be set. The partitioned sections are managed by ID numbers.

Each section can be set with completely independent recording conditions, so this feature is convenient when taking consecutive recordings with changed conditions.

#### Reference

- Please refer to “3.8 Other Settings” of “Photron FASTCAM Viewer User’s Manual”, or “10.4 Recording Setting” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

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## 2.12. Event Marker Function

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With the system, it is possible to input an external signal during recording, at the instant the frame number is stored, and during playback you can immediately access, or jump to, the stored frame numbers (event markers). This a separate feature from the trigger point, by marking interesting points during recording, these points can be easily called up for review during playback. The event marker can store ten positions within a sequence.

The frame number recording occurs on the pulse's edge, and the next frame after the pulse's edge is input is stored as the event marker. Event marker settings can be made with the "Remote controller (optional)" or PFV.

## 2.13. Direct Trigger / Direct Start Mode

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The system recording operation responding to an input trigger signal can be configured according to varies of customer's needs.

DIRECT TRIGGER Mode (This mode is NOT supported on PFV software trigger)

- START TRIGGER Mode  
Recording starts immediately upon the second trigger input.
- CENTER, END, MANUAL TRIGGER Mode  
Once the trigger signal is input, the camera will be shifted to endless recording state.

DIRECT START Mode

- START TRIGGER Mode  
The same operation as when the direct trigger mode is off.
- CENTER, END, and MANUAL TRIGGER Modes  
Once the trigger signal is input, the camera is shifted to endless recording state. In this circumstance, either the "RECORD" button of PFV software or the GENERAL IN Connector under ReadyPos state, furthermore the "RECORD" button of LCD Remote Controller can trigger a record signal to the camera.

### Reference

- For details of how to set the camera to DIRECT START Mode, refer to "Remote Controller User's Manual" or "Photron FASTCAM Viewer User's Manual".
- For details of GENERAL IN signal settings, refer to "4.4.1. GENERAL IN Signal Setting" of "FASTCAM Multi Hardware Manual".

## 2.14. Fan Control

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This camera head has a cooling fan inside. The fan can be stopped. And the functional condition is limited as within a safe temperature.

The fan is operated forcibly when a camera is heated up. And this function is disabled until the internal camera head temperature falls down to under a threshold.

### Reference

- Please refer to “3.8 Other Settings” of “Photron FASTCAM Viewer User’s Manual”, or “4.3.1 About Items in [Setup]” of “Photron FASTCAM Viewer 4 User’s Manual” for the details of the setup.

# Chapter 3. Specifications

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**3.1. Specifications**

**3.2. Dimensions**

### 3.1. Specifications

#### 3.1.1. Product Specifications

Image Sensor	CMOS image sensor	
Sensor Resolution	1,280 x 1,024 pixels	
Pixel Size	10 $\mu$ m	
Frame Rate	When full frame: 4,800fps max. When a frame segment: 750,000fps max.	
Lens Mount	G type F mount, C mount, Micro Four Thirds mount (Option)	
Recording Bit Depth	Monochrome	12bit
	Color	RGB, each 12bit (Bayer color filter method)
Shutter Method	Electronic shutter	
Recording Method	IC memory	
Trigger Mode	START, CENTER, END, MANUAL, RANDOM RANDOM RESET, RANDOM CENTER, RANDOM MANUAL	
Gain Control	Hardware LUT on camera Controllable via software	
Digital Interface	Exclusive multi optical interface	

### 3.1.2. General Specifications

Environment Conditions	
Storage Temperature	-20°C to 60°C (No Condensation) -4°F to 140°F (No Condensation)
Storage Humidity	85% or less (No Condensation)
Operating Temperature	0 to 45°C (No Condensation) 32°F to 113°F (No Condensation)
Operating Humidity	80% or less (No Condensation)
Pollution degree	Degree 2 according to IEC60664-1
Overvoltage category	Category II according to IEC60664-1
Maximum use altitude	2,000m or lower
External Dimensions	
Camera Body	69.9 (H) x 69.0 (W) x 150.9 (D) mm, excluding protrusion 2.8" (H) x 2.7" (W) x 6.0" (D)
DC Power Supply	
Power Voltage	28V
Power Consumption	25VA
Power Consumption (with LED Light Option)	37VA
Weight	
Camera Body	0.98 kg (2.16lbs)



Photron has verified two types of AC cables, type A (standard for Japan, USA, Canada, etc.) and type SE (standard for Germany, France, etc.). However, when those cables cannot properly receive power when plugged in, use the proper AC cable for the region's standards and verify that AC cable works properly.

For inquires regarding the recommended AC cable for each region, contact that region's Photron branch office or the distributor.

3.1.3. Frame Rate and Resolution (Saving to Memory)

1,280 x 1,024 to 1,280 x 144

Resolution \ Frame Rate (fps)	1,280 x 1,024	1,280 x 1,000	1,280 x 960	1,280 x 824	1,280 x 720	1,280 x 656	1,280 x 616	1,280 x 488	1,280 x 384	1,280 x 296	1,280 x 232	1,280 x 176	1,280 x 144
50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
125	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1,000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2,000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3,000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4,000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4,800	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5,000		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6,000				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7,500						✓	✓	✓	✓	✓	✓	✓	✓
8,000							✓	✓	✓	✓	✓	✓	✓
10,000								✓	✓	✓	✓	✓	✓
12,500									✓	✓	✓	✓	✓
16,000										✓	✓	✓	✓
20,000											✓	✓	✓
25,000												✓	✓
30,000													✓
40,000													
50,000													
60,000													
75,000													
80,000													
100,000													
125,000													
200,000													
300,000													
400,000													
500,000													
600,000													
750,000													

The ✓ mark indicates a possible setting. The green items are the maximum resolution setting at that frame rate.

This table is the list of default settings. Even finer settings are possible with the variable setting.

1,280 x 96 to 1,280 x 16

Resolution Frame Rate (fps)	1,280 x 104	1,280 x 72	1,280 x 56	1,280 x 48	1,280 x 40	1,280 x 32	1,280 x 16
50	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓
125	✓	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓	✓	✓	✓
500	✓	✓	✓	✓	✓	✓	✓
1,000	✓	✓	✓	✓	✓	✓	✓
2,000	✓	✓	✓	✓	✓	✓	✓
3,000	✓	✓	✓	✓	✓	✓	✓
4,000	✓	✓	✓	✓	✓	✓	✓
4,800	✓	✓	✓	✓	✓	✓	✓
5,000	✓	✓	✓	✓	✓	✓	✓
6,000	✓	✓	✓	✓	✓	✓	✓
7,500	✓	✓	✓	✓	✓	✓	✓
8,000	✓	✓	✓	✓	✓	✓	✓
10,000	✓	✓	✓	✓	✓	✓	✓
12,500	✓	✓	✓	✓	✓	✓	✓
16,000	✓	✓	✓	✓	✓	✓	✓
20,000	✓	✓	✓	✓	✓	✓	✓
25,000	✓	✓	✓	✓	✓	✓	✓
30,000	✓	✓	✓	✓	✓	✓	✓
40,000	✓	✓	✓	✓	✓	✓	✓
50,000		✓	✓	✓	✓	✓	✓
60,000			✓	✓	✓	✓	✓
75,000				✓	✓	✓	✓
80,000				✓	✓	✓	✓
100,000					✓	✓	✓
125,000						✓	✓
200,000							✓
300,000							
400,000							
500,000							
600,000							
750,000							

The ✓ mark indicates a possible setting. The green items are the maximum resolution setting at that frame rate.

This table is the list of default settings. Even finer settings are possible with the variable setting.

1,024 x 768 to 640 x 8

Resolution Frame Rate (fps)	1,024 x 768	1,024 x 576	896 x 672	896 x 504	768 x 576	768 x 432	640 x 480	640 x 360	640 x 8
50	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓	✓	✓
125	✓	✓	✓	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓	✓	✓	✓	✓	✓
500	✓	✓	✓	✓	✓	✓	✓	✓	✓
1,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
2,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
3,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
4,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
4,800	✓	✓	✓	✓	✓	✓	✓	✓	✓
5,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
6,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
7,500		✓		✓	✓	✓	✓	✓	✓
8,000				✓		✓	✓	✓	✓
10,000						✓	✓	✓	✓
12,500								✓	✓
16,000									✓
20,000									✓
25,000									✓
30,000									✓
40,000									✓
50,000									✓
60,000									✓
75,000									✓
80,000									✓
100,000									✓
125,000									✓
200,000									✓
300,000									✓
400,000									✓
500,000									✓
600,000									✓
750,000									✓

The [check] mark indicates a possible setting. The green items are the maximum resolution setting at that frame rate.

This table is the list of default settings. Even finer settings are possible with the variable setting.

Type 200K model cannot be set 300,000fps and faster frame rate.

### 3.1.4. Frame Rate and Resolution (Stream Recording to FAST Drive)

1,280 x 1,024 to 1,280 x 144

Resolution Frame Rate (fps)	1,280 x 1,024	1,280 x 1,000	1,280 x 960	1,280 x 824	1,280 x 720	1,280 x 656	1,280 x 616	1,280 x 488	1,280 x 384	1,280 x 296	1,280 x 232	1,280 x 176	1,280 x 144
50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
125	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1,000					✓	✓	✓	✓	✓	✓	✓	✓	✓
2,000									✓	✓	✓	✓	✓
3,000											✓	✓	✓
4,000												✓	✓
4,800													✓
5,000													✓
6,000													
7,500													
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200,000													
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400,000													
500,000													
600,000													
750,000													

The ✓ mark indicates a possible setting. The green items are the maximum resolution setting at that frame rate.

This table is the list of default settings. Even finer settings are possible with the variable setting.

1,280 x 96 to 1,280 x 16

Resolution Frame Rate (fps)	1,280 x 104	1,280 x 72	1,280 x 56	1,280 x 48	1,280 x 40	1,280 x 32	1,280 x 16
50	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓
125	✓	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓	✓	✓	✓
500	✓	✓	✓	✓	✓	✓	✓
1,000	✓	✓	✓	✓	✓	✓	✓
2,000	✓	✓	✓	✓	✓	✓	✓
3,000	✓	✓	✓	✓	✓	✓	✓
4,000	✓	✓	✓	✓	✓	✓	✓
4,800	✓	✓	✓	✓	✓	✓	✓
5,000	✓	✓	✓	✓	✓	✓	✓
6,000	✓	✓	✓	✓	✓	✓	✓
7,500	✓	✓	✓	✓	✓	✓	✓
8,000		✓	✓	✓	✓	✓	✓
10,000		✓	✓	✓	✓	✓	✓
12,500			✓	✓	✓	✓	✓
16,000				✓	✓	✓	✓
20,000					✓	✓	✓
25,000						✓	✓
30,000							✓
40,000							✓
50,000							✓
60,000							
75,000							
80,000							
100,000							
125,000							
200,000							
300,000							
400,000							
500,000							
600,000							
750,000							

The ✓ mark indicates a possible setting. The green items are the maximum resolution setting at that frame rate.

This table is the list of default settings. Even finer settings are possible with the variable setting.

1,024 x 768 to 640 x 8

Resolution Frame Rate (fps)	1,024 x 768	1,024 x 576	896 x 672	896 x 504	768 x 576	768 x 432	640 x 480	640 x 360	640 x 8
50	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓	✓	✓
125	✓	✓	✓	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓	✓	✓	✓	✓	✓
500	✓	✓	✓	✓	✓	✓	✓	✓	✓
1,000	✓	✓	✓	✓	✓	✓	✓	✓	✓
2,000				✓	✓	✓	✓	✓	✓
3,000						✓	✓	✓	✓
4,000								✓	✓
4,800									✓
5,000									✓
6,000									✓
7,500									✓
8,000									✓
10,000									✓
12,500									✓
16,000									✓
20,000									✓
25,000									✓
30,000									✓
40,000									✓
50,000									✓
60,000									✓
75,000									✓
80,000									✓
100,000									✓
125,000									✓
200,000									✓
300,000									
400,000									
500,000									
600,000									
750,000									

The ✓ mark indicates a possible setting. The green items are the maximum resolution setting at that frame rate.

This table is the list of default settings. Even finer settings are possible with the variable setting.

Type 200K model cannot be set 300,000fps and faster frame rate.

### 3.1.5. Shutter Speed List

Shutter Speed		
50	6,000	80,000
60	7,500	100,000
125	8,000	120,000
250	9,600	125,000
500	10,000	150,000
750	12,000	187,500
1,000	12,500	200,000
1,500	16,000	240,000
1,600	20,000	250,000
2,000	25,000	300,000
2,000	30,000	312,500
2,400	37,500	375,000
2,500	40,000	400,000
3,000	48,000	500,000
3,200	50,000	600,000
4,000	60,000	625,000
4,800	62,500	750,000
5,000	75,000	

The unit in the chart is 1/x sec,

#### Supplement

- At a frame rate 50 to 200,000fps, a shutter speed of 1/frame sec or lower in the green area in the above table can be selected.
- At a frame rate 240,000fps, 250,000fps, 625,000fps and 750,000fps, a shutter speed of 1/frame sec is only available.
- At a frame rate 300,000 to 600,000fps, every 1/frame sec or lower shutter speed can be selected.
- For the type 200K, a shutter speed 1/375,000 sec or lower cannot be selected.

### 3.1.6. Recordable Frames / Resolution (Saving to Memory)

Resolution	8GB Type Rec. Frames	16GB Type Rec. Frames	32GB Type Rec. Frames
1,280 x 1,024	4,363	8,733	17,471
1,280 x 1,000	4,467	8,942	17,890
1,280 x 960	4,654	9,315	18,636
1,280 x 824	5,422	10,853	21,712
1,280 x 720	6,206	12,420	24,848
1,280 x 656	6,811	13,632	27,272
1,280 x 616	7,254	14,518	29,043
1,280 x 488	9,157	18,326	36,662
1,280 x 384	11,683	23,290	46,591
1,280 x 296	15,098	30,214	60,443
1,280 x 232	19,264	38,549	77,117
1,280 x 176	25,394	50,815	101,655
1,280 x 144	31,038	62,108	124,246
1,280 x 104	42,977	85,996	172,033
1,280 x 72	62,078	124,217	248,493
1,280 x 56	79,816	159,708	319,491
1,280 x 48	93,119	186,327	372,740
1,280 x 40	111,743	223,592	447,289
1,280 x 32	139,680	279,491	559,111
1,280 x 16	279,362	558,983	1,118,224
1,024 x 768	7,273	14,555	29,119
1,024 x 576	9,698	19,408	38,826
896 x 672	9,500	19,012	38,033
896 x 504	12,667	25,349	50,712
768 x 576	12,931	25,877	51,768
768 x 432	17,242	34,504	69,025
640 x 480	18,622	37,264	74,547
640 x 360	24,830	49,686	99,396
640 x 8	1,117,455	2,235,937	4,472,899

\* Recordable Time = Recordable Frames x 1/frame rate (fps)

## 3.1.7. Recordable Frames / Resolution (Stream Recording to FAST Drive)

Resolution	Recordable Frames without Internal DAQ	Recordable Frames with Internal DAQ in use
1,280 x 1,024	976,752	976,684
1,280 x 1,000	1,000,144	1,000,076
1,280 x 960	1,041,840	1,041,768
1,280 x 824	1,213,800	1,213,716
1,280 x 720	1,389,120	1,389,024
1,280 x 656	1,524,640	1,524,536
1,280 x 616	1,623,664	1,623,552
1,280 x 488	2,049,460	2,049,320
1,280 x 384	2,604,600	2,604,420
1,280 x 296	3,379,048	3,378,812
1,280 x 232	4,311,000	4,310,400
1,280 x 176	5,682,600	5,681,808
1,280 x 144	6,945,400	6,944,432
1,280 x 104	9,616,992	9,614,976
1,280 x 72	13,890,800	13,886,928
1,280 x 56	17,860,128	17,853,888
1,280 x 48	20,836,816	20,829,536
1,280 x 40	25,003,728	24,993,264
1,280 x 32	31,255,224	31,237,752
1,280 x 16	62,510,448	62,444,928
1,024 x 768	1,627,920	1,627,808
1,024 x 576	2,170,568	2,170,420
896 x 672	2,126,168	2,126,020
896 x 504	2,834,944	2,834,748
768 x 576	2,894,000	2,893,800
768 x 432	3,858,664	3,858,396
640 x 480	4,167,360	4,166,784
640 x 360	5,556,548	5,555,772
640 x 8	250,046,608	248,998,048

\* Recordable Time = Recordable Frames x 1/frame rate (fps)

### 3.1.8. Recordable Time / Resolution (Saving to Memory)

Resolution	MAX Frame Rate	8GB Type Rec. Time	16GB Type Rec. Time	32GB Type Rec. Time
1,280 x 1,024	4,800	0.91	1.82	3.64
1,280 x 1,000	5,000	0.89	1.79	3.58
1,280 x 960	5,000	0.93	1.86	3.73
1,280 x 824	6,000	0.90	1.81	3.62
1,280 x 720	6,000	1.03	2.07	4.14
1,280 x 656	7,500	0.91	1.82	3.64
1,280 x 616	8,000	0.91	1.81	3.63
1,280 x 488	10,000	0.92	1.83	3.67
1,280 x 384	12,500	0.93	1.86	3.73
1,280 x 296	16,000	0.94	1.89	3.78
1,280 x 232	20,000	0.96	1.93	3.86
1,280 x 176	25,000	1.02	2.03	4.07
1,280 x 144	30,000	1.03	2.07	4.14
1,280 x 104	40,000	1.07	2.15	4.30
1,280 x 72	50,000	1.24	2.48	4.97
1,280 x 56	60,000	1.33	2.66	5.32
1,280 x 48	80,000	1.16	2.33	4.66
1,280 x 40	100,000	1.12	2.24	4.47
1,280 x 32	125,000	1.12	2.24	4.47
1,280 x 16	200,000	1.40	2.79	5.59
1,024 x 768	6,000	1.21	2.43	4.85
1,024 x 576	7,500	1.29	2.59	5.18
896 x 672	6,000	1.58	3.17	6.34
896 x 504	8,000	1.58	3.17	6.34
768 x 576	7,500	1.72	3.45	6.90
768 x 432	10,000	1.72	3.45	6.90
640 x 480	10,000	1.86	3.73	7.45
640 x 360	12,500	1.99	3.97	7.95
640 x 8	750,000	1.49	2.98	5.96

The unit in the chart is sec

## 3.1.9. Recordable Time / Resolution (Stream Recoring to FAST Drive)

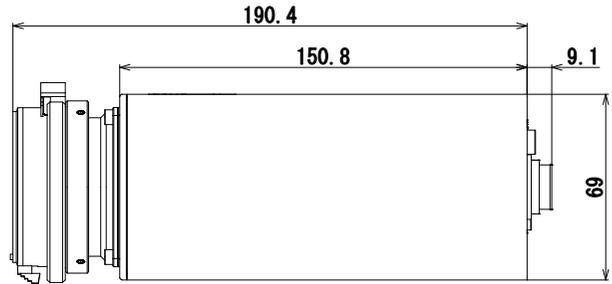
Resolution	Max. Frame Rate	Recordable Time without Internal DAQ	Recordable Time with Internal DAQ in use
1,280 x 1,024	750	21min. 42sec.	21min. 42sec.
1,280 x 1,000	750	22min. 13sec.	22min. 13sec.
1,280 x 960	750	23min. 9sec.	23min. 9sec.
1,280 x 824	750	26min. 58sec.	26min. 58sec.
1,280 x 720	1,000	23min. 9sec.	23min. 9sec.
1,280 x 656	1,000	25min. 24sec.	25min. 24sec.
1,280 x 616	1,000	27min. 3sec.	27min. 3sec.
1,280 x 488	1,600	21min. 20sec.	21min. 20sec.
1,280 x 384	2,000	21min. 42sec.	21min. 42sec.
1,280 x 296	2,500	22min. 31sec.	22min. 31sec.
1,280 x 232	3,200	22min. 27sec.	22min. 27sec.
1,280 x 176	4,000	23min. 40sec.	23min. 40sec.
1,280 x 144	5,000	23min. 9sec.	23min. 8sec.
1,280 x 104	7,500	21min. 22sec.	21min. 21sec.
1,280 x 72	10,000	23min. 9sec.	23min. 8sec.
1,280 x 56	12,500	23min. 48sec.	23min. 48sec.
1,280 x 48	16,000	21min. 42sec.	21min. 41sec.
1,280 x 40	20,000	20min. 50sec.	20min. 49sec.
1,280 x 32	25,000	20min. 50sec.	20min. 49sec.
1,280 x 16	50,000	20min. 50sec.	20min. 48sec.
1,024 x 768	1,000	27min. 7sec.	27min. 7sec.
1,024 x 576	1,600	22min. 36sec.	22min. 36sec.
896 x 672	1,600	22min. 8sec.	22min. 8sec.
896 x 504	2,000	23min. 37sec.	23min. 37sec.
768 x 576	2,000	24min. 7sec.	24min. 6sec.
768 x 432	3,000	21min. 26sec.	21min. 26sec.
640 x 480	3,200	21min. 42sec.	21min. 42sec.
640 x 360	4,000	23min. 9sec.	23min. 8sec.
640 x 8	200,000	20min. 50sec.	20min. 44sec.

## 3.2. Dimensions

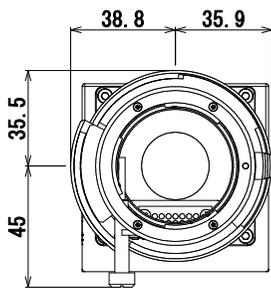
### 3.2.1. Camera Body

#### FASTCAM Multi Camera Head HS-01 (G type F mount)

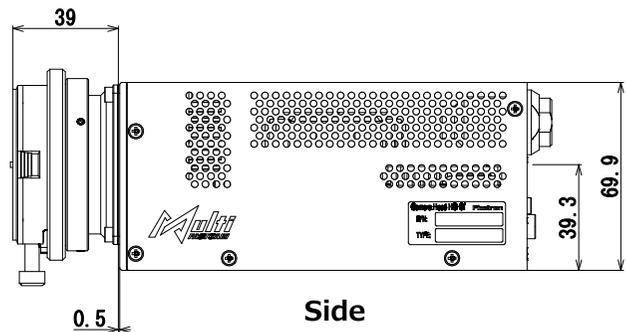
(mm)



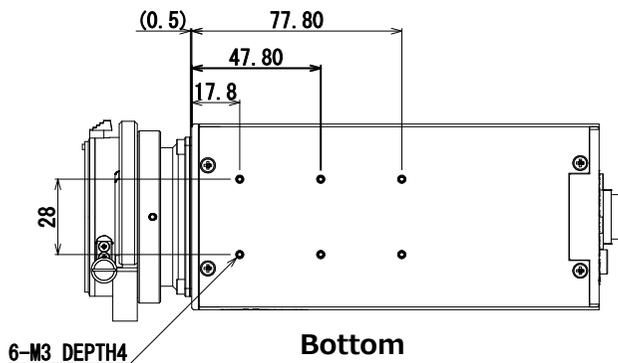
Top



Front



Side



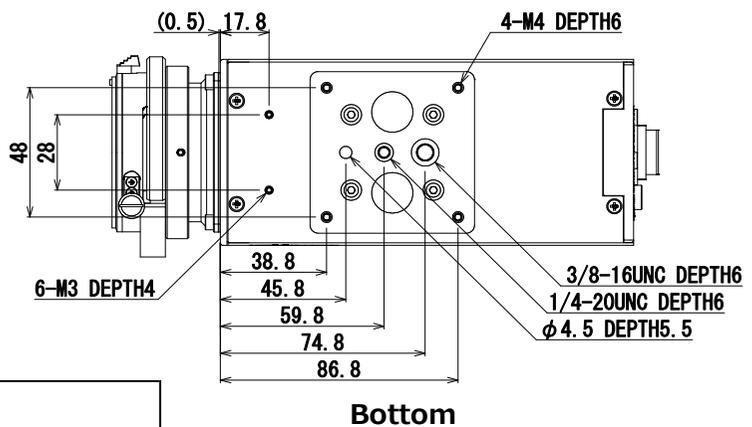
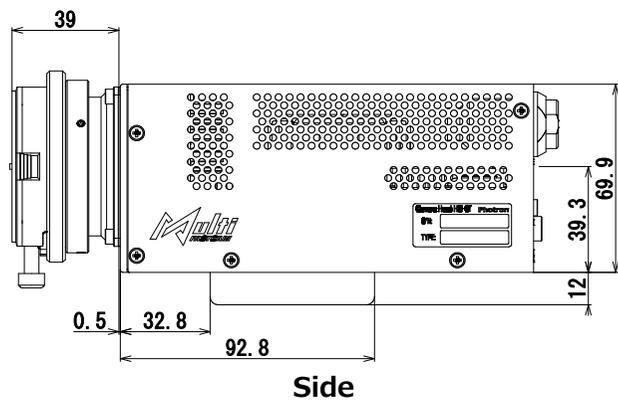
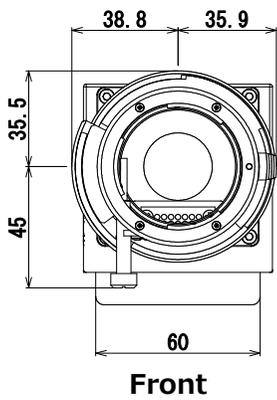
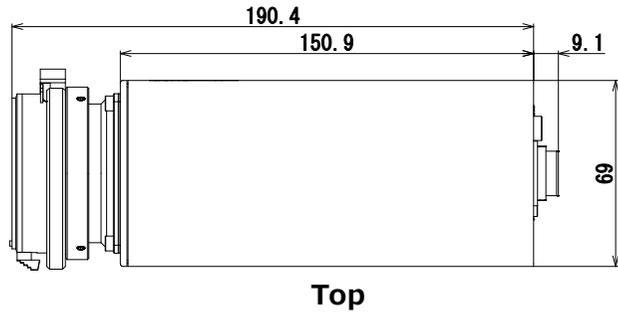
Bottom

**\*Caution**

If installing a longer screw than the specified depth (in mm), its screw hole or the camera may be damaged.

**FASTCAM Multi Camera Head HS-01 (G type F mount) with Tripod Adapter**

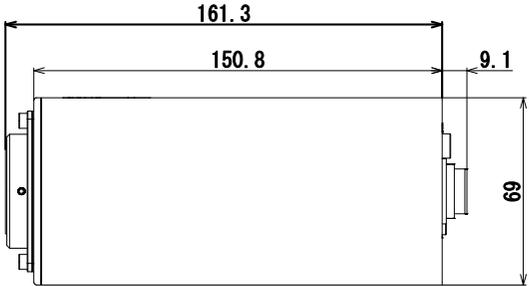
(mm)



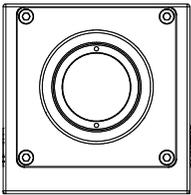
**\*Caution**  
 If installing a longer screw than the specified depth (in mm), its screw hole or the camera may be damaged.

**FASTCAM Multi Camera Head HS-01 (C mount)**

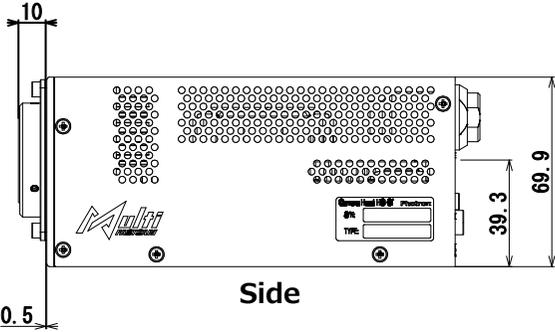
(mm)



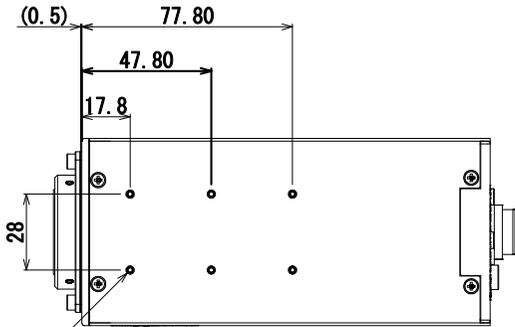
**Top**



**Front**



**Side**



6-M3 DEPTH4

**Bottom**

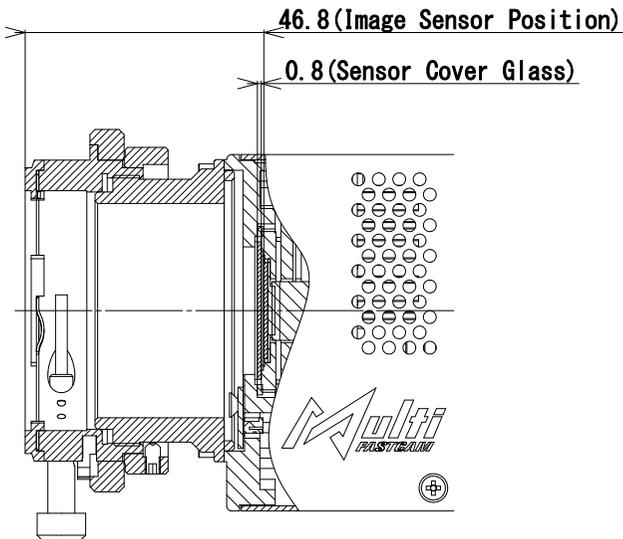
**\*Caution**  
 If installing a longer screw than the specified depth (in mm), its screw hole or the camera may be damaged.

3.2.2. Clearance for Camera Cable Connection

**FASTCAM Multi Camera Head HS-01 (G type F mount)**

(mm)

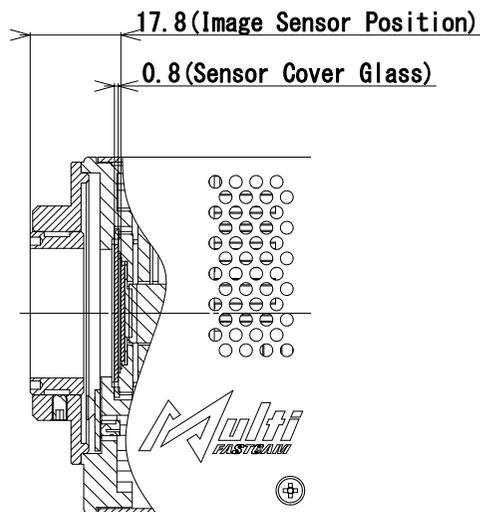
(Side Sectional Drawing)



**FASTCAM Multi Camera Head HS-01 (C mount)**

(mm)

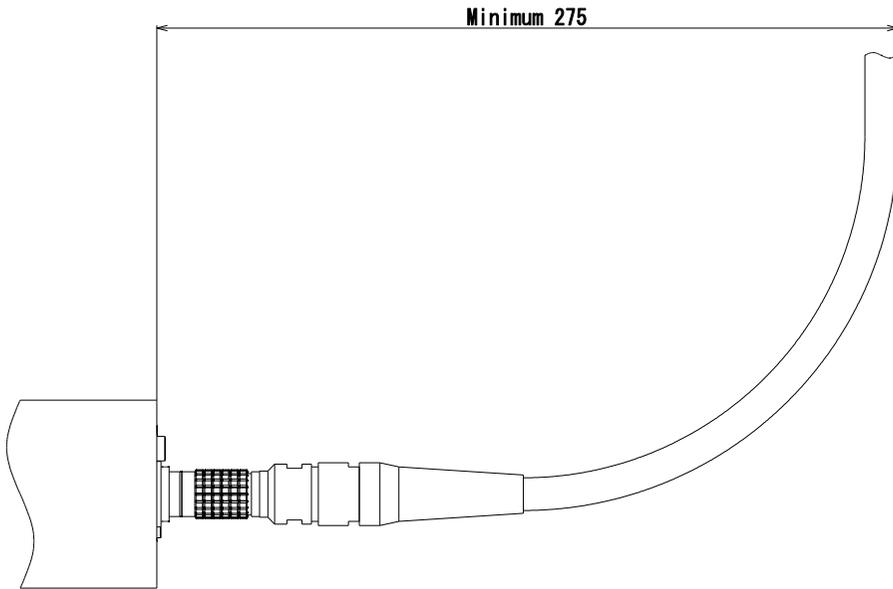
(Side Sectional Drawing)



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### 3.2.3. Clearance for Camera Cable Connection

(mm)



# Chapter 4. Warranty

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## 4.1. About the Warranty

## 4.1. About the Warranty

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This system has been shipped having undergone rigorous testing. However, in the unlikely event that it malfunctions due to a manufacturing defect, it will be repaired, at no charge, within the warranty period.

### ◆ Warranty Exceptions

The following exceptions will result in fee-based repair, even within the warranty period.

1. Damage or malfunction as a result of fire, earthquake, water damage, lightning, other natural disasters, pollution, or the effects of abnormal voltage.
2. Damage or malfunction as a result of dropping or mishandling during shipment or when moving after purchase or misuse.
3. Consumable goods (cables)
4. When repair, adjustment, or alteration done by an entity other than Photron service has been performed on the system, or damage or malfunction that is determined to be attributed to a fault in the use the product.

For inquires related to malfunction, contact the dealer where the product was purchased, or the nearest Photron office.



### Reference

- For inquires related to our product, refer to “5.1. Contact Information” page 49.

# Chapter 5. Contacting Photron

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## 5.1. Contact Information

## 5.1. Contact Information

For inquiries related to FASTCAM Multi Camera Head HS-01, 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 address.
Product Name	FASTCAM Multi Camera Head HS-01
Serial Number	Check on the nameplate seal.
Condition of the system and what is known about it.	

Contact Information	
In Americas and Antipodes	<p><b>PHOTRON USA, INC.</b>            9520 Padgett Street, Suite 110, San Diego, CA 92126-4426, USA            Phone: +1 (800) 585 2129 or +1 (858) 684 3555            Fax: +1 (858) 684 3558            E-mail: image@photron.com            Web: www.photron.com</p>
In UK, Africa and India	<p><b>PHOTRON (EUROPE) LIMITED</b>            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            Web: www.photron.com</p>
In Europe outside the UK	<p><b>Photron Deutschland GmbH</b>            Ziegelweg 3, 72764 Reutlingen, Germany            Phone: +49 (0) 7121 699 7950            Fax: +49 (0) 7121 699 7943            E-mail: image@photron.com            Web: www.photron.com</p>
In China	<p><b>PHOTRON (SHANGHAI) LIMITED</b>            Room 20C Zhao-Feng World Trade Building, No. 369 Jiangsu Road            Chang Ning District, Shanghai 200050, China            Phone: +86 (21) 5268 3700            Fax: +86 (21) 5268 3702            E-mail: info@photron.cn.com            Web: www.photron.cn.com</p>
In other areas	<p><b>PHOTRON LIMITED</b>            21F, Jinbocho Mitsui Bldg.,            1-105 Kanda Jimbocho, Chiyoda-Ku, Tokyo 101-0051, Japan            Phone: +81 (3) 3518 6271            Fax: +81 (3) 3518 6279            E-mail: image@photron.co.jp            Web: www.photron.co.jp</p>

# ***FASTCAM Multi*** ***Camera Head HS-01***

Hardware Manual      Rev. 2.02 E

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21F, Jimbocho Mitsui Bldg.,  
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