

FASTCAM
Orion S

Hardware Manual

Rev. 4.01 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 user will be required to correct the interference at his 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.

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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 Orion S40" (referred to below as the system).

This manual is the hardware manual for **Orion S40** (hereafter S40).

For Photron FASTCAM Viewer 4 (PFV4), please refer to the "PFV4 User's Manual".

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

Using the Manual

This section explains the layout of the manual.

- Introduction

The introduction explains the manual and safety precautions.

- Chapter 1, Setup

This chapter gives an overview of the components that make up the system. It also explains basic keypad operation and a list of items that should be checked before using the system.

- Chapter 2, Recording

This chapter explains operations related to recording.

- Chapter 3, Product 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.

Manual Notation

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

Icon/Symbol	Description
 IMPORTANT	This symbol indicates content that should always be read.
 CAUTION	This symbol indicates instructions that should always be followed when using the software, or things to be careful of when using the software.
 NOTE	This symbol indicates supplementary items to be aware of when using the system.
 REFERENCE	This symbol indicates the location of a reference.
“ ”	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 System Safely and Correctly

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. 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.



- Make sure the power plug is fully insert into the socket.
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 emits 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.



- Consult Photron 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.



- Use the system in an environment with an ambient temperature of 0 to +40 °C, humidity of 85 % RH or lower, maximum altitude of 2,000 m or lower, and no condensation. Use in a condition out of the above limits can cause malfunction.



- Do not store the equipment in a location where the temperature goes below -20 °C or higher than +60 °C. Be sure not to allow condensation to form inside the system.



- 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.



- When installing the camera with a tripod, check the tripod load capacity and be careful not to exceed the load bearing capacity. Also, when using a tripod, make sure that the tripod, tripod screw, panhead, and others are properly set, and be careful not to let the tripod fall down.



- Depending on the temperature of this system at startup, startup may take time.



Handling of the AC Adapter

To ensure safe use of the Photron FASTCAM series, please follow the instructions for proper storage of the supplied AC adapter.

If there is any problem with the AC adapter or cable, stop using it immediately and contact your local Photron office.

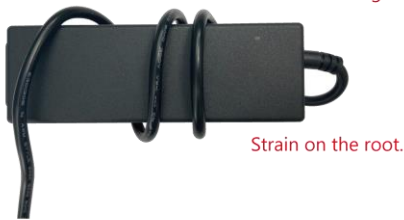
■ Storage Method

- When storing the AC adapter or cable, make sure that no stress is placed on the root of the AC adapter or the cable.
- Do not wrap the cable around the AC adapter, but loosely bundle it.
- When storing the AC adapter in the camera's carrying case, store it so that no strain is placed on the root of the AC adapter and the cable.



Bad example

Cable is wound too tightly.



Strain on the root.



Good example

No strain on the root.



Cable is loosely bundled.

■ Appearance Check

- Before use, check the appearance of the AC adapter and cable for any abnormalities.
- If there are any cracks or tears on the surface, it may cause fire, electric shock, or short circuit.

Immediately stop using the AC adapter and contact your local Photron office.





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, contact your local city office, waste authority, approved scheme or your household waste disposal service or visit 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.

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.



- 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.

Contents

Chapter 1 Setup	14
1.1 Components and Accessories	15
1.1.1 Components	15
1.1.2 Options	15
1.1.3 Type	16
1.2 Part Names	17
1.2.1 Camera Body	17
1.2.2 Camera Body Part Names	18
1.2.3 Interchangeable Lens Mount	19
1.2.4 Status Display LEDs on the Rear of the Camera Body	20
1.2.5 Power Switch	21
1.2.6 Power Supply Connector, DC Cable	22
1.2.7 Gigabit Ethernet (10GbE)	24
1.2.8 RESET Switch	25
1.3 Input/Output Signal Types	27
1.3.1 TRIG SW IN Connector	27
1.3.2 INPUT 1, 2, 3	28
1.3.3 IO INPUT Circuit Diagram	29
1.3.4 OUTPUT 1, 2, 3	30
1.3.5 Using External Synchronization Signals	31
1.3.6 Synchronization with a variable frequency	33
1.3.7 Setting of Input/Output Signals and Sync Output Rate	34
1.3.8 IRIG IN (External Time Synchronization)	35
1.3.9 IRIG-sync Operation	36
1.4 Device Connections	37
1.4.1 Minimum Equipment Connection	37
Chapter 2 Recording	38
2.1 Selecting Frame Rate / Resolution	39
2.1.1 Low Shutter Speed Mode	39
2.2 Selecting Shutter Speed	40
Chapter 3 Product Specifications	41
3.1 Specifications	42
3.1.1 Product Specifications	42
3.1.2 General Specifications	43
3.1.3 AC Adapter	43
3.1.4 Other Supported Function	44
3.1.5 Frame Rate and Resolution	45
3.1.6 Recordable Frames / Resolution	46

3.1.7	Recordable Time / Resolution.....	47
3.1.8	Shutter Speed List.....	48
3.1.9	Timing Diagram.....	49
3.1.10	Random Reset Delay / Inter Frame Time.....	54
3.2	Dimensions	56
3.2.1	Camera Body	56
3.2.2	AC Adapter	60
Chapter 4	Warranty	61
4.1	About the Warranty.....	62
Chapter 5	Contacting Photron	63
5.1	Contact Information	64
A.	Appendix	65
A.1.	Reference Information	66
A.1.1	Relative Spectral Response (monochrome).....	66
A.1.2	Quantum Efficiency (monochrome).....	66
A.1.3	Relative Spectral Response (color)	67
A.1.4	Quantum Efficiency (color).....	67

1

Chapter 1 Setup

This chapter gives an overview of the components that make up the system. It also explains a list of items that should be checked before using the system.

1.1 Components and Accessories

1.1.1 Components

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

1.1.2 Options

The following options are available for the system.

1. Carrying Case
2. C Mount Adapter
3. Canon EF Remote Control Mount Adapter

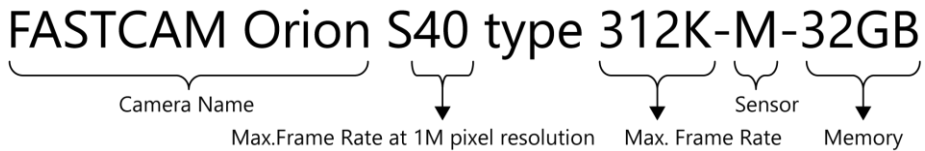


Use only the components and options specified on the “1.1 Components and Accessories” for AC adapter / AC cable and others.

1.1.3 Type

For the system, there are monochrome and color versions, and for each of these versions, there are standard memory type of 32GB and high capacity memory types of 64GB, and 128GB. When purchasing, it is possible to select from these models according to the application or your demands. The type categories are listed as follows.

◆ Camera type name and category



Item	List	Explanation
Max.Frame Rate at 1M pixel resolution	S40	37,500 fps
Max. Frame Rate	312K	312,500 fps
	312KS	312,500 fps, shutter speed 1 μsec control type
	200KS	200,000 fps, shutter speed 1 μsec control type
Sensor	M	monochrome
	C	color
Memory	32GB	32 gigabytes
	64GB	64 gigabytes
	128GB	128 gigabytes

 **CAUTION**

- Export-controlled model: type 312KS is subject to certain restrictions on the shutter speed.
- Export-controlled model: type 200KS are subject to certain restrictions on the frame rate and shutter speed.

 **REFERENCE**

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 exporting your camera, check with Photron first. Contact information is given in “5.1 Contact Information” on page 64.

1.2 Part Names

The system is composed of components including the camera body, AC adapter, and the “Photron FASTCAM Viewer” control software (referred to below as PFV).



For the camera body and the AC adapter

- Do not expose the camera body, AC adapter and other optional components to shock.
- Do not use the system 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 an excessive force.

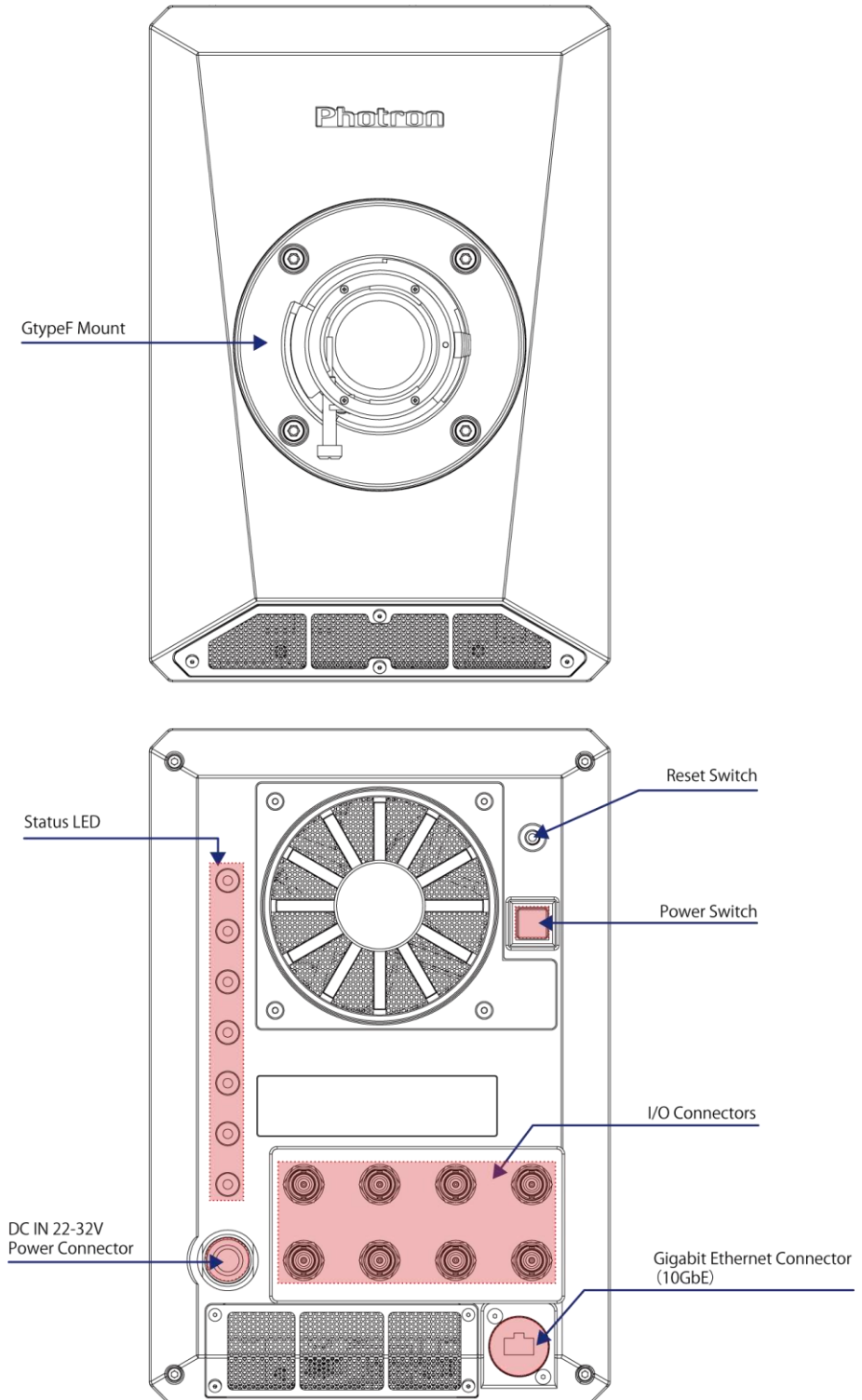
1.2.1 Camera Body

The camera body contains IC memory for image recording and has been designed to be able to record high-speed images uncompressed.

The back of the camera body is equipped with the Gigabit Ethernet interface (10GbE), which permits full camera control and data download possible via connection to a PC; the input/output connector, which allows external synchronization signals, trigger signals, IRIG time code.

1.2.2 Camera Body Part Names

◆ S40 G type F Mount

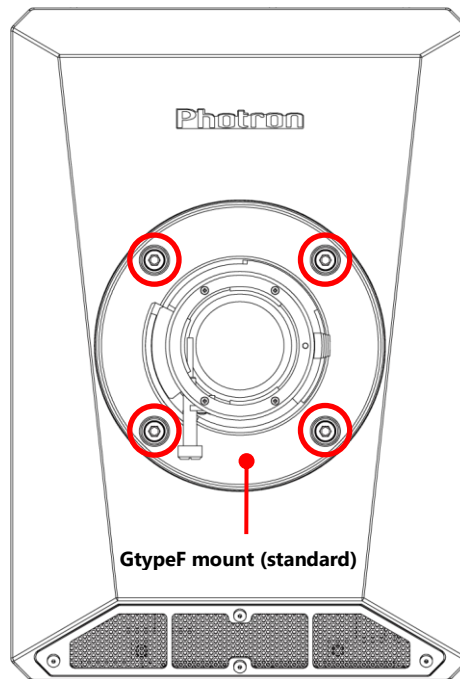


1.2.3 Interchangeable Lens Mount

The lens mount on the system can be changed according to the recording purpose. There are four types of interchangeable lens mounts, including options: “G type F Mount”, “C Mount”, and “EF Mount”. The system has mechanical shutter as a standard feature.

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

1. Remove the four M5 bolts with the hexagonal holes using the hexagonal wrench.
2. Remove the G type F Mount portion as a unit.
3. Install the C Mount unit using the bolts with hexagonal holes in the 90° diagonal holes.
4. After installation, always verify that the unit is not loose and does not rattle.



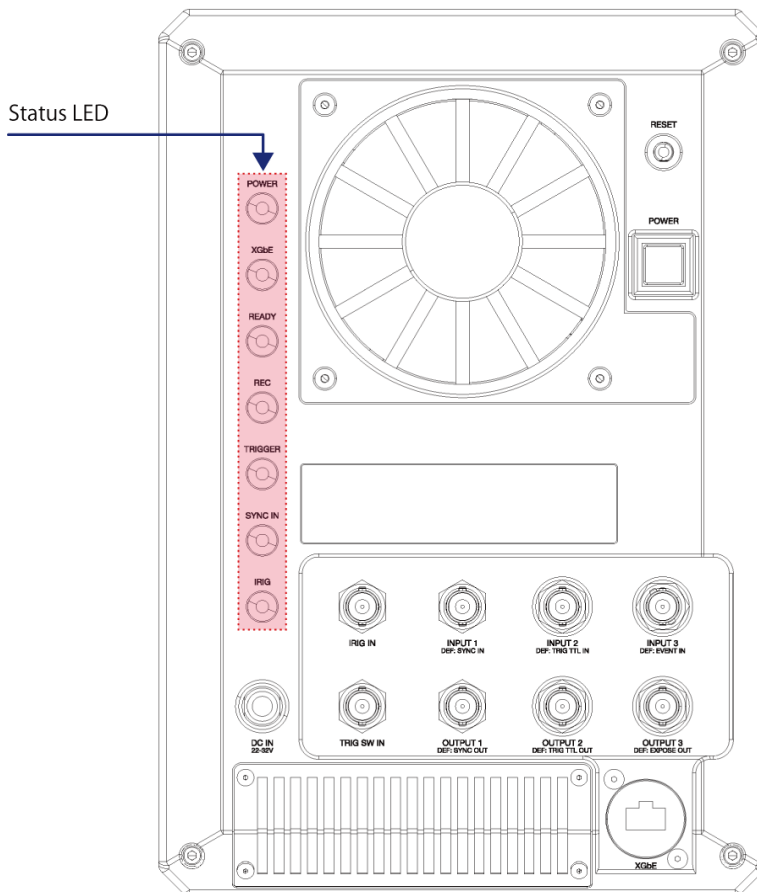
CAUTION

- For G type F Mount: Electronic aperture control for Nikon E type lenses is not supported.
- For EF Mount: Canon EF-S, EF-M, and RF type lenses cannot be attached.
- When using a C-mount, the following restrictions apply to the lens to be used.
C-mount: Protrusion from the lens mount flange to the image sensor (a) 9.5 mm maximum



1.2.4 Status Display LEDs on the Rear of the Camera Body

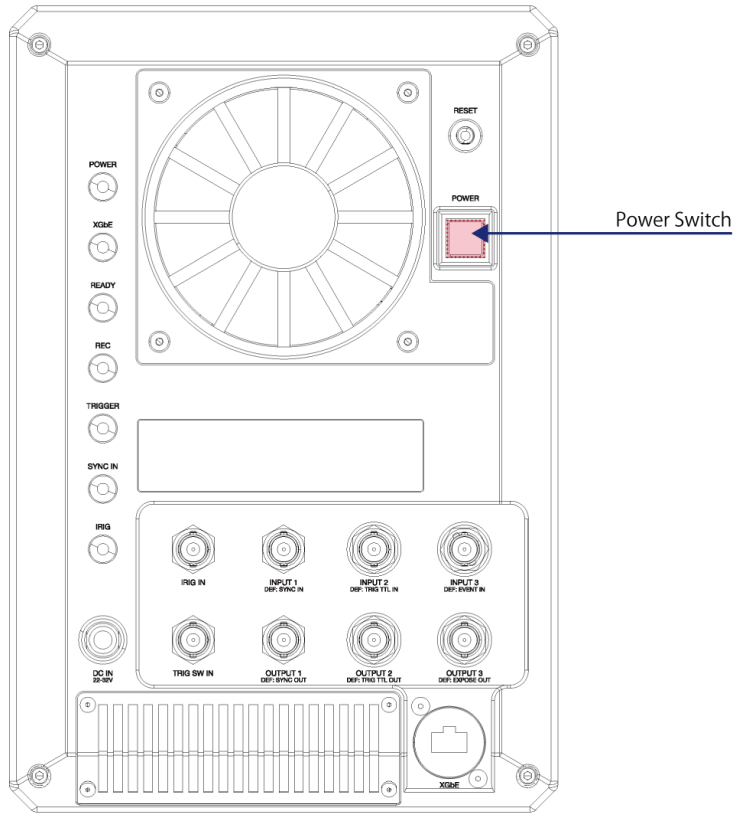
There are a number of LEDs on the rear of the camera body. These LEDs indicate the status of the camera. The function of each LED is explained here.



Item	Color	ON	FLASHING	OFF
POWER	■	Power On	—	Power Off
XGbE	■	The Gigabit Ethernet interface is connected	Data is transferring	The Gigabit Ethernet interface is not connected
READY	■	—	Ready to record	Not ready to record
REC	■	Recording	ENDLESS recording	Not recording
TRIGGER	■	A trigger signal is present (being input) (The LED will illuminate for 0.1 second when the trigger signal is input)	—	The trigger signal is not present
SYNC IN	■	Synchronization signal is not input in external synchronization mode	Synchronization signal is input in external synchronization mode	Internal synchronization mode
IRIG	■	IRIG signal is not input in IRIG mode	IRIG signal is input in IRIG mode	IRIG mode off

1.2.5 Power Switch

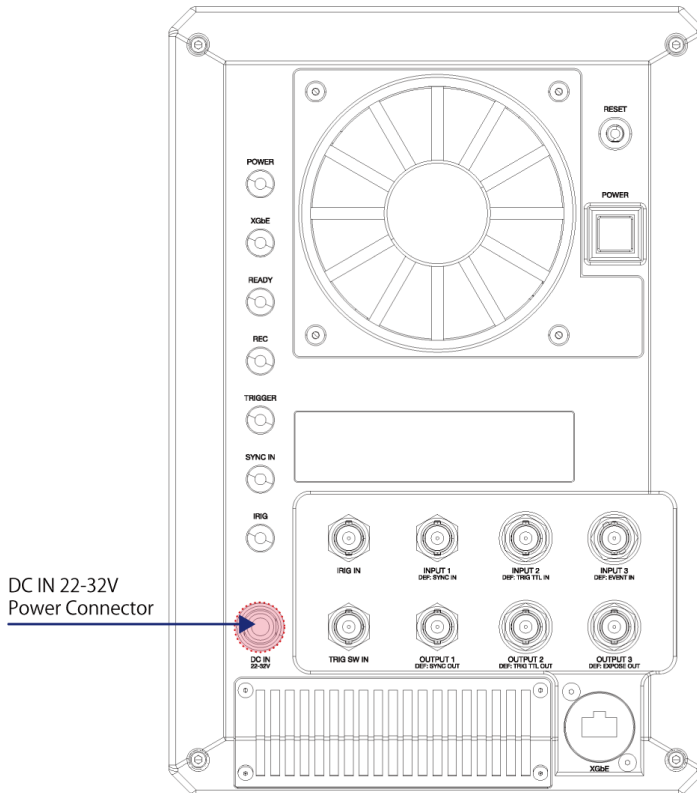
Press the power switch on the back of the camera to turn the power on and off.



1.2.6 Power Supply Connector, DC Cable

This is a DC power supply input connector. Connect to the supplied AC adapter.

The cable connector is optionally available. When using other power supplies, construct a cable using the pin diagram below as a reference.



Warning

When using the connector pins directly, refer to the chart above and ensure the wiring is correct. If the wiring is incorrect, not only is there the danger of the system malfunctioning, but also of fire and electric shock.



Warning

Do not use a power supply which does not meet the system's specifications, or a power supply you cannot guarantee the safety of.

By using a power supply out of the system specifications, not only is there the danger of the system malfunctioning, but also of fire and electric shock.



Warning



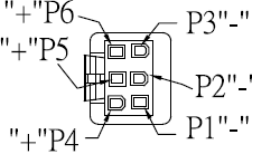
Use an external power supply with the suitable rating which was estimated by IEC 61010-1:2010/AMD1:2016 and separated from the main circuit by double insulation or reinforced insulation.



Warning

Although this camera can be used outdoors, the AC adapter is not usable outdoors. When using the system outdoors, prepare another power supply.

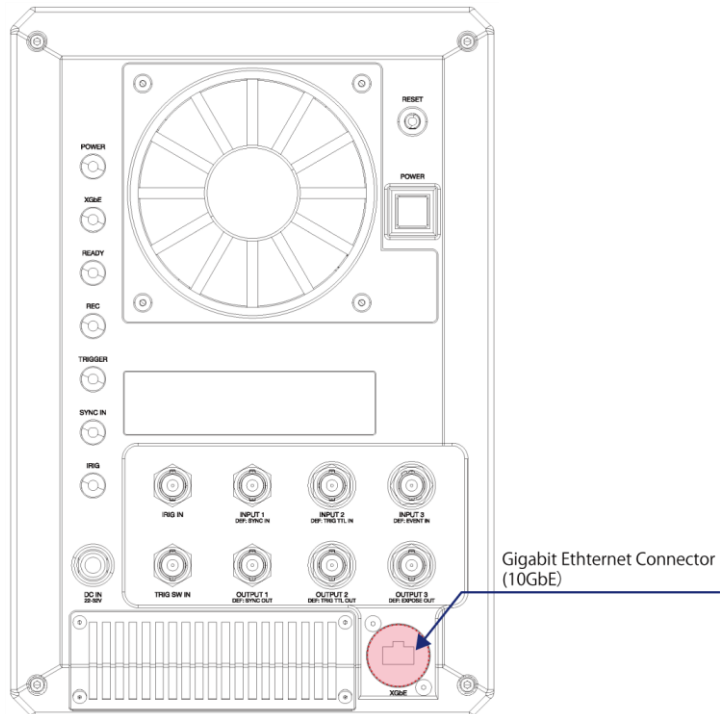
◆ S40 Power Connector (DC IN 22-32V)

Power Connector Pin Diagram	DC Cable (Connector side) Pin Diagram	DC Cable (Adapter side) Pin Diagram
		
ECJ.3B.306.CLD	FGJ.1B.304.CYMD62Z	39-01-2065

Connector Name	Signal Name	Pin No.	Connector Model Name (Manufacturer)
Power connector	GND	1	ECJ.3B.306.CLD (LEMO)
	GND	2	
	GND	3	
	+Vo	4	
	+Vo	5	
	+Vo	6	
DC Cable (Connector side)	GND	1	FGJ.1B.304.CYMD62Z (LEMO)
	GND	2	
	GND	3	
	+Vo	4	
	+Vo	5	
	+Vo	6	
DC Cable (Adapter side)	GND	1	39-01-2065
	GND	2	
	GND	3	
	+Vo	4	
	+Vo	5	
	+Vo	6	

1.2.7 Gigabit Ethernet (10GbE)

This system has an Ethernet connector (common RJ45 connector) for communicating with the PC. Connect a 10GBASE-T compatible interface board (commercially available) and this product with a LAN cable. For the LAN cable, prepare a Cat 7 (Category 7) or higher STP cable. Being compliant with the 10GBASE-T specification, the maximum cable length is 100 m. One PC can connect to a maximum of 64 Photron Gigabit Ethernet interface equipped cameras using a hub. When connecting multiple devices, connect through a switching hub that can connect to 10GBASE-T. The maximum length of the cable that connects the system (or PC) to the switching hub is also 100 m.



IMPORTANT

The camera's factory default IP address is below:

IP ADDRESS: 192.168.0.10

PORT: 2000 (UDP, fixed, unchangeable)



CAUTION

- Photron recommends using an STP cable over long distances or in noisy locations.
- Depending on the environment, 10GbE connection may not be stable. Check the operation in advance or contact Photron for support.
- When connecting via 10GbE, make sure that the PC's network card and hub are compatible with 10GBASE-T. If you connect the camera to a network card that does not support 10GBASE-T via a hub that supports 10GBASE-T, the PC will not be able to receive commands from the camera and the camera will freeze and will not operate properly. Use a network card that supports 10GBASE-T.

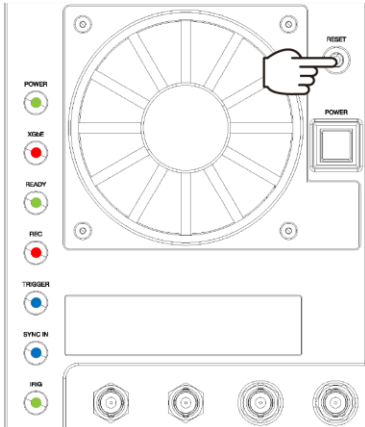
1.2.8 RESET Switch

There is RESET switch on the back of the system.

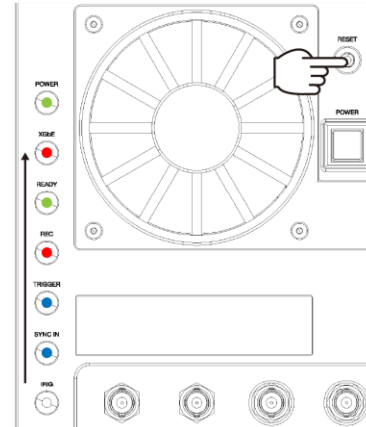
■ Camera IP Address Initialization

When the IP address is not sure, for instance after changing the address, an IP Address Initialization operation is recommended. In this case, the IP address will be reset to **192.168.0.10** as the factory settings.

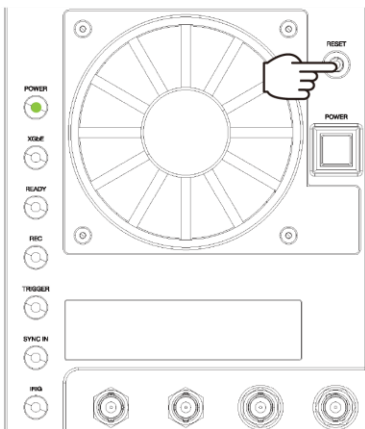
① Press and hold the RESET switch on the rear side. All LEDs light up.



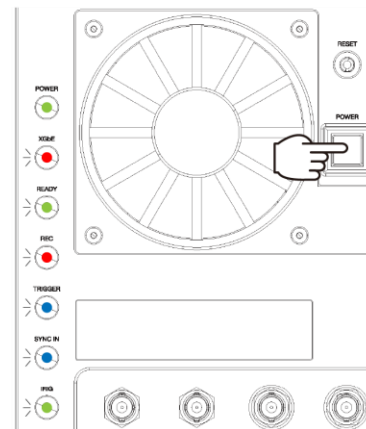
② The LEDs turn off in order from bottom to top.



③ All LEDs except "Power" turn off.



④ All LEDs except "Power" blink twice. Release the RESET switch and reboot the camera.



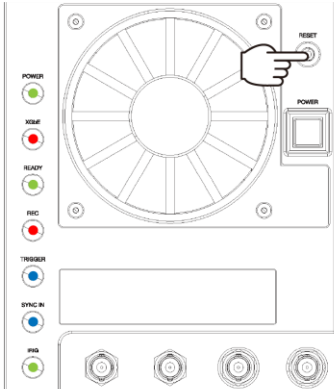
CAUTION

- If the RESET switch is released while the LEDs light up and turn off repeatedly from bottom to top, the IP address initialization will not be completed. Be sure to keep pressing the switch until all LEDs except the "Power" blink twice.
- If you continue to hold down the RESET switch after IP address initialization, "Reset to the Factory Default" will be executed.

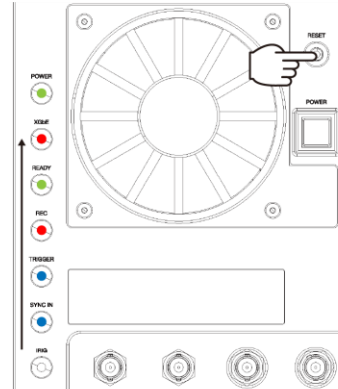
■ Reset to the Factory Default

Camera settings can be reset to the factory default state by the following procedure.

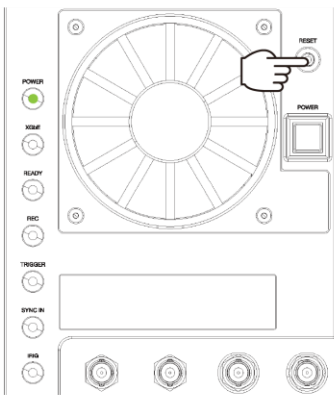
① Press and hold the RESET switch on the rear side. All LEDs light up.



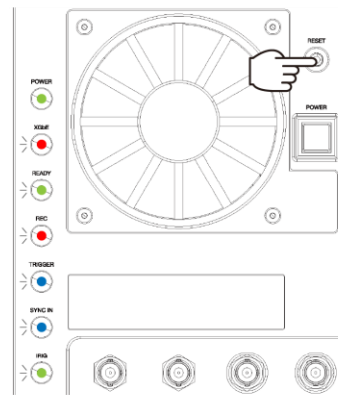
② The LEDs turn off in order from bottom to top.



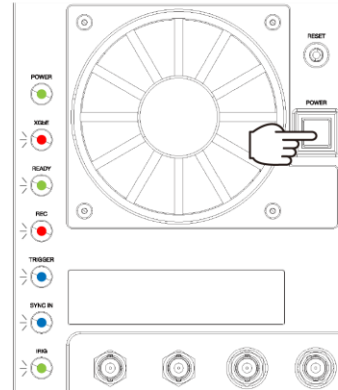
③ All LEDs except "Power" turn off.



④ All LEDs except "Power" blink twice.



⑤ All LEDs except "Power" keep blinking. Release the RESET switch and reboot the camera.



... x 3 times

CAUTION

- If you release the RESET switch before the LEDs keep blinking, only the IP address initialization is performed.
- When the factory default is performed from PFV, all the LEDs keep lighting up, when the initialization is accomplished.

1.3 Input/Output Signal Types

With the system, many signals can be input and output through the I/O connector. Signals that can be input and output from the I/O connectors are listed below.



A signal other than the specified signal must not be input to the respective connectors. Use extreme caution as there is a risk of damage to both, the input device and the output device.

1.3.1 TRIG SW IN Connector

This trigger is input during the READY or ENDLESS recording state by contact between the BNC connector's shield and a center pin (switch closure). The center pin normally has voltage flowing through it. Use caution to avoid contact with other pins.

Connector Name (Input System)	Menu	Signal
TRIG SW IN	None	Contact signal

1.3.2 INPUT 1, 2, 3

The effect when a signal is input is described below and can be optionally selected and set.

The input voltage is 0 V to +12 V (H level +3.3 V to +12 V), positive or negative polarity, pulse width is 200 nsec or greater.

Menu Display	Description	Signal (Input Signal Conditions)
TRIG POS	Inputs a positive polarity trigger signal.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Positive Polarity
TRIG NEG	Inputs a negative polarity trigger signal.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Negative Polarity
READY POS	Inputs a positive polarity READY signal. By inputting in the live state, switch READY ON/OFF. In addition, by inputting while recording, cancel the recording state.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Positive Polarity
READY NEG	Inputs a negative polarity READY signal. By inputting in the live state, switch READY ON/OFF. In addition, by inputting while recording, cancel the recording state.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Negative Polarity
SYNC POS	Inputs the signal with positive polarity. Input the synchronization signal from the camera or external device.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Positive Polarity
SYNC NEG	Inputs the signal with negative polarity. Input the synchronization signal from the camera or external device.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Negative Polarity
EVENT POS	Input the signal with positive polarity. By inputting during recording, "Event marker" is displayed separately from the trigger point in the data after recording.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Positive Polarity
EVENT NEG	Input the signal with negative polarity. By inputting during recording, "Event marker" is displayed separately from the trigger point in the data after recording.	FET Input 0 V to +12 V (H level +3.3 V to +12 V), Negative Polarity

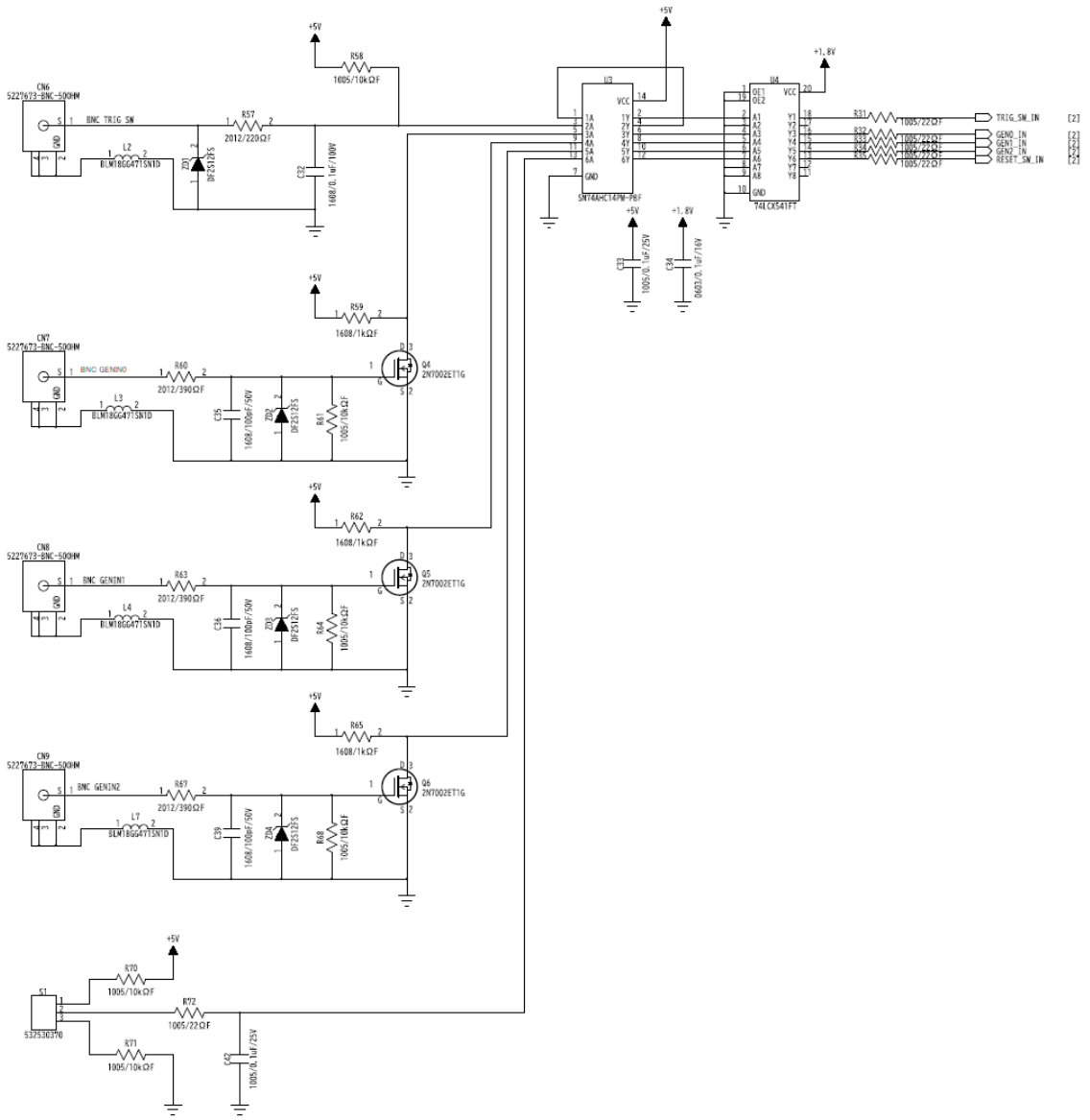


NOTE

The event marker can store ten positions within a sequence.

1.3.3 IO INPUT Circuit Diagram

◆ S40



1.3.4 OUTPUT 1, 2, 3

These are also BNC connectors. The signals below can be changed and output from PFV. The output voltage is 0 V to +5 V, positive or negative polarity, pulse width can be changed.

Menu Display	Contents	Signal Type
SYNC POS	Outputs a positive polarity vertical synchronization signal.	+5 V CMOS output, Positive Polarity
SYNC NEG	Outputs a negative polarity vertical synchronization signal.	+5 V CMOS output, Negative Polarity
EXPOSE POS	Outputs the sensor's exposure interval at H level.	+5 V CMOS output, Positive Polarity
EXPOSE NEG	Outputs the sensor's exposure interval at L level.	+5 V CMOS output, Negative Polarity
REC POS	Outputs an interval signal during recording at H level.	+5 V CMOS output, Positive Polarity
REC NEG	Outputs an interval signal during recording at L level.	+5 V CMOS output, Negative Polarity
TRIG POS	Outputs the trigger signal received by the camera at H level.	+5 V CMOS output, Positive Polarity For TRIG SW IN Normally Open, approx. 19 µsec Normally Close, approx. 416 µsec For TRIG TTL IN POS: approx. 135~146 nsec NEG: approx. 164~175 nsec
TRIG NEG	Outputs the trigger signal received by the camera at L level.	+5 V CMOS output, Negative Polarity For TRIG SW IN Normally Open, approx. 20 µsec Normally Close, approx. 421 µsec For TRIG TTL IN POS: approx. 146~157 nsec NEG: approx. 175~185 nsec
READY POS	Outputs a signal at H level during the trigger wait state (ENDLESS recording state with MANUAL trigger). Available only for MANUAL trigger.	+5 V CMOS output, Positive Polarity
READY NEG	Outputs a signal at L level during the trigger wait state (ENDLESS recording state with MANUAL trigger). Available only for MANUAL trigger.	+5 V CMOS output, Negative Polarity
IRIG RESET POS	Outputs the camera's internal IRIG reset signal (1PPS) at H level.	+5 V CMOS output, Positive Polarity
IRIG RESET NEG	Outputs the camera's internal IRIG reset signal (1PPS) at L level.	+5 V CMOS output, Negative Polarity

1.3.5 Using External Synchronization Signals

An external synchronization mode to synchronize to an external signal is provided on the system. By using an external synchronization signal, recording can be conducted using multiple cameras to synchronize the timing of the shots or to also synchronize the shots with external measuring devices and lighting. The procedure and precautions for using the external synchronization signal are explained below.

■ Inputting an External Synchronization Signal

When SYNC POS/NEG is selected for INPUT 1, 2, or 3, an external synchronization signal can be input with the system. See the chart below for external synchronization input settings.

Menu Display	Description
OFF	Sets external synchronization off, operates independently.
ON CAM	The camera synchronizes external signals lower than the currently set frequency. The frequency set at the beginning is displayed.
ON OTHERS	The camera synchronizes the signal that was input when the setting is changed to ON OTHERS. The frequency at the time of setting change is displayed, and the system synchronizes signals lower than this frequency. After synchronization setting, shutter speed and resolution can be changed but frame rate can not be changed.

NOTE

When changing to the “ON OTHERS” setting without inputting the synchronization signal from the outside, the state will be “50 Hz (E-Sync)”. After that, even if you input the synchronization signal, it will operate at 50 Hz so execute “ON OTHERS” setting again after inputting the synchronization signal.

CAUTION

- The frequency which can input during ON OTHERS setting is limited to integer frequency. Inputting a signal for instance at 1000.5 Hz may cause dropped frames.
- When synchronizing the system at 7,200 fps or less and 1/frame shutter speed, the exposure time is slightly shorter. For rough indication, the reduced time is approx. 0.1 μsec for 1,000 Hz operation, approx. 1.8 μsec for 50 Hz, and approx. 9 μsec for 10 Hz.

■ Outputting an External Synchronization Signal

The system can externally output a synchronization signal. See the chart below for external synchronization output settings.

Menu Display	Description	Signal Type	Delay Time
SYNC POS	Outputs a positive polarity vertical synchronization signal.	CMOS (74ACT541 buffer) output, positive polarity	Approx. 309~322 nsec
SYNC NEG	Outputs a negative polarity vertical synchronization signal.	CMOS (74ACT541 buffer) output, negative polarity	Approx. 338~351 nsec

■ When the external sync signal is interrupted

When the external sync setting is “ON CAM” or “ON OTHERS”, the operation while no external sync signal input is as follows.

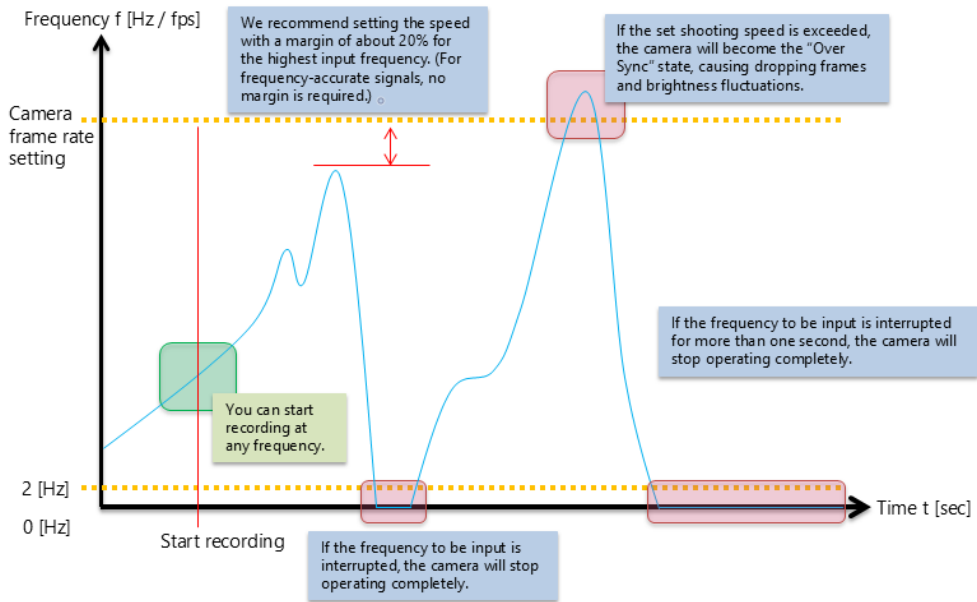
- No sync signal with “ON CAM” setting:
Stop updating live image (frame rate is setting value on PFV4).
- No sync signal with “ON OTHERS” setting:
Stop updating live image (frame rate synchronized with the sync signal if the sync signal was input at the time of ON OTHERS setting, or 50 fps if the sync signal was not input at the time of setting).

1.3.6 Synchronization with a variable frequency

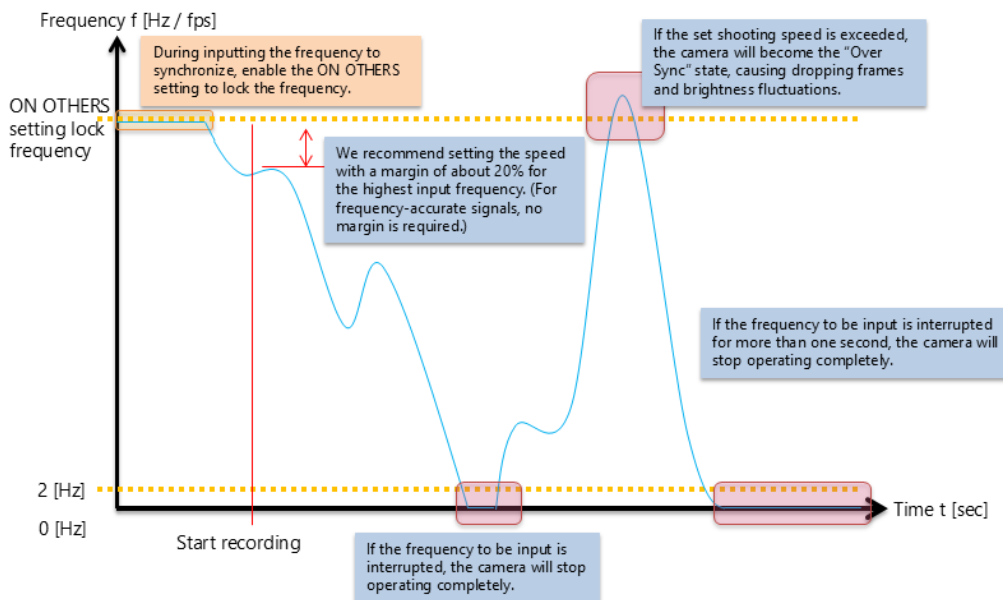
When the system receives synchronization signal via external input terminals, the system can operate with the frame rate and resolution specified at the start of recording as the maximum value, following the synchronization signal up to 2 Hz even in the recording mode.

NOTE

- When an input sync signal is variable, or when it exceeds the upper limit frequency, the output image quality might be poor.
- Example of the variable frequency synchronization (ON CAM).



- Example of the variable frequency synchronization (ON OTHERS).



1.3.7 Setting of Input/Output Signals and Sync Output Rate

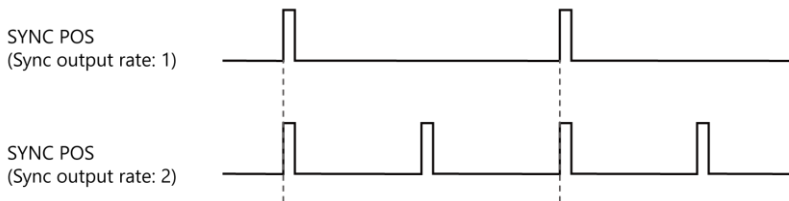
With the system, you can set the signal delay time or pulse width for the various signals that are input and output. Pulse width and delay settings are made with PFV or the remote controller (optional). The content of each setting is listed in the chart below.

Setting Item	Setting Range (Value)
TRIG TTL IN DELAY	0 to 1 sec, 0.1 μ sec units
SYNC IN DELAY	0 to 1/frame rate (sec), 0.1 μ sec units
GENERAL IN DELAY	0 to 5 sec, 0.1 μ sec units
TRIG OUT WIDTH	0 to 1 msec, 0.1 μ sec units
SYNC OUT DELAY	0 to 1/frame rate (sec), 0.1 μ sec units
SYNC OUT WIDTH	0 to 1000 μ sec * In case of 1,000fps or more, 1/frame rate (sec), 100 nsec units
EXPOSE OUT DELAY	0 to 1/frame rate (sec), 0.1 μ sec units
Sync output rate	0.5, 1, 2, 4, 6, 8, 10, 20, 30 (* x1 is the default setting)

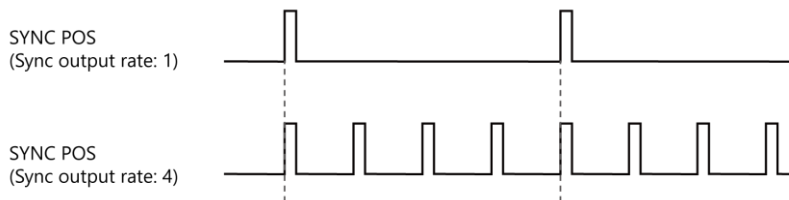
◆ Sync output rate

Output a SYNC (vertical synchronization signal) from SYNC OUT that is x times SYNC.

■ Example: For Sync output rate setting of 2.



■ Example: For Sync output rate setting of 4.



CAUTION

- There are settings that will cause frequency errors if the Sync output rate is increased at a high frame rate.
- There are the following limitations in Sync output rate function.

Frame Rate	Restriction
to 60,000 fps	No Limit
60,001 fps to 90,000 fps	x30 is unavailable
90,001 fps to 200,000 fps	x20 and x30 are unavailable

- The following signal input cannot be accepted during the delay period.
Example: If 100 msec of delay is applied, the trigger is recognized 100 msec after trigger input, but the trigger input during that 100 msec will be canceled.

1.3.8 IRIG IN (External Time Synchronization)

The system supports IRIG-B input and can add an IRIG code to each recorded frame. The sample timing for the IRIG code is once each frame.

The recorded IRIG code is displayed on “PFV”.

◆ IRIG Code Input Specification

Connector	BNC
Code Format	IRIG-B (122) Analog
Amplitude	1.0Vp-p min, 8.0Vp-p max
Modulation Ratio	3:1 to 6:1
Typical modulated carrier signal ratio	10:1



CAUTION

Limitation of use of IRIG code

With the Image Trigger function, IRIG code cannot be used when the specified number of frames is 32 or fewer in RANDOM MANUAL trigger mode.



NOTE

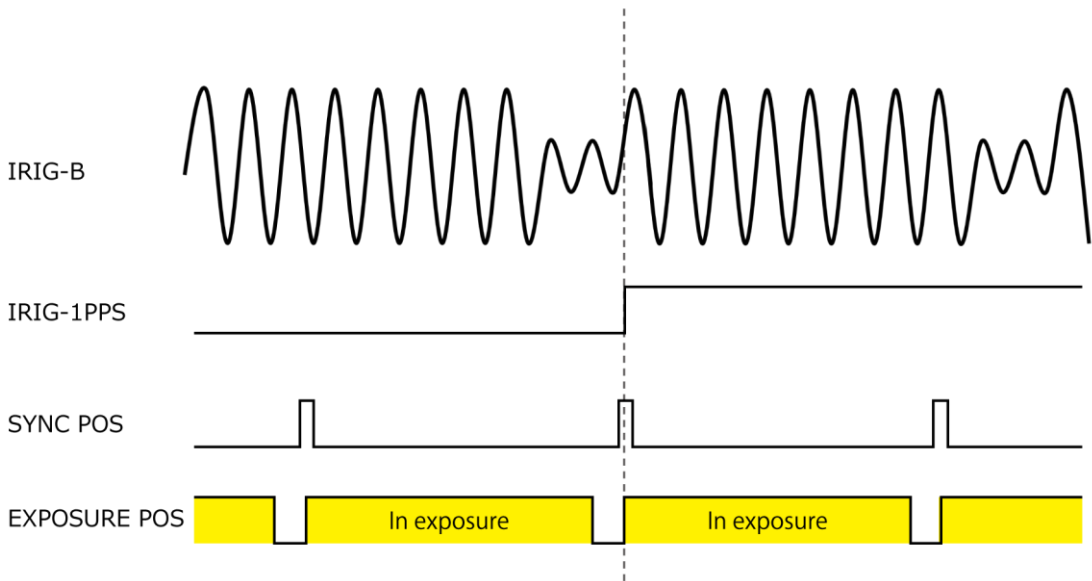
- IRIG Time Code is used when temporally synchronizing a camera with external equipment.
- It is a convenient function when apparatus is physically separated.
- When the IRIG code is being input, the IRIG code is displayed in white, and □ is displayed to the left.
- When the IRIG code is not being input, the IRIG code is displayed in grey. At that time, the counter is the camera's internal counter, and it continues to count.

1.3.9 IRIG-sync Operation

This camera system supports IRIG-sync operation, in which the sensor drive signal is synchronized with the input of IRIG-B signal.

◆ How IRIG-sync operation works?

In IRIG-sync operation, the image sensor is driven by the timing signal shown below. Exposure to the sensor starts at the start of the IRIG-1PPS signal.



IRIG-B : IRIG code that is input to the camera
IRIG-1PPS : 1PPS timing of the IRIG code
SYNC POS : Camera's vertical sync signal
EXPOSURE POS : Exposure to the camera sensor



CAUTION

- The maximum frame rate for IRIG-sync operation is as follows.
 - S40: 90,000 fps
- The IRIG signal must be input to the camera from the IRIG signal generator before enabling IRIG synchronous recording.
If the IRIG synchronous recording setting is preset, the IRIG signal must be input to the camera from the IRIG signal generator before the camera is activated.

1.4 Device Connections

1.4.1 Minimum Equipment Connection

The minimum connection for using the camera is as follows.

◆ S40



REFERENCE

Refer to “Photron FASTCAM Viewer 4 User’s Manual” for software operation.

2

Chapter 2 Recording

This chapter explains operations related to recording.

2.1 Selecting Frame Rate / Resolution

◆ S40

Images can be recorded with the system from 1,000 fps to 31,250 fps using the full 1,280 x 1,024 pixels (1,310,720 pixels) resolution of the image sensor.

For frame rates higher than the full frame rate, the high-speed recordings are achieved by restricting the readout area of the image sensor.

Restricting resolution enables higher speed recording. It also reduces data amount and then it enables longer time shooting/recording.



CAUTION

Export-controlled model: type 200KS are subject to certain restrictions on the frame rate and shutter speed.



REFERENCE

For the detailed setting, refer to “3.1.5 Frame Rate and Resolution” on page 45.

2.1.1 Low Shutter Speed Mode

It is possible to configure the low shutter speed mode of below 750 fps (750 fps, 500 fps, 250 fps, 125 fps, 60 fps).

This mode is disabled as a default setting. Detailed configuration is possible when it is enabled.



CAUTION

- Note that the image quality lowers when this function is used.
- When using variable settings, you cannot select a frame rate of 750 fps or less even if you have enabled the low shutter speed mode.



REFERENCE

Refer to “10.7 Camera Option” of “Photron FASTCAM Viewer User’s Manual” for the details of the setup.

2.2 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 shot without blur.

◆ S40

The shortest setting value of shutter speed is 1/1,000,000 sec (approx 1.0 μ sec).



CAUTION

- Export-controlled model: type 312KS is subject to certain restrictions on the shutter speed.
- Export-controlled model: type 200KS are subject to certain restrictions on the frame rate and shutter speed.



REFERENCE

- Refer to “4.3 Setting Shooting Conditions” of “Photron FASTCAM Viewer User’s Manual” for the details of the setup.
- For more information of Shutter Speed, refer to “3.1.8 Shutter Speed List” on page 48.

3

Chapter 3 Product Specifications

This chapter explains the system's specifications.

3.1 Specifications

3.1.1 Product Specifications

Image Sensor	CMOS image sensor	
Sensor Resolution	S40: 1,280 x 1,024 pixels	
Pixel Size	16 µm square	
Frame Rate	For full frame 31,250 fps	For segmented frame operation 312,500 fps maximum
Accuracy of frame rate	±50 ppm	
Lens Mount	G type F mount, C mount (optional), EF mount (optional)	
Recording Color Depth	Monochrome	12-bit
	Color	RGB, each 12-bit (Bayer color filter method)
Shutter Method	Electronic shutter (Global shutter)	
Recording Method	IC memory	
Recording Memory Capacity	32GB, 64GB, 128GB	
Trigger Method	START, CENTER, END, MANUAL, RANDOM RESET, RANDOM MANUAL	
Gain Control	Controllable via software	
Image Output Customization	Customizable LUT, brightness is changeable	
External Synchronization Input Signal	+3.3 to +12 V, negative polarity / positive polarity (switchable)	
External Synchronization Output Signal	+5 V, negative polarity / positive polarity (switchable)	
Trigger Input Signal	TTL (+3.3 to +12V) negative polarity/positive polarity, contact	
Other Output Signals	Other timing signal outputs	
External Control	10 Gigabit Ethernet IF (PC)	
Digital Interface	RJ45 (10GBASE-T)	

3.1.2 General Specifications

Environment Conditions	
Storage Temperature	-20 to 60 deg C (No Condensation) -4 to 140 deg F (No Condensation)
Storage Humidity	85% or less (No Condensation)
Operating Temperature	0 to 40 deg C (No Condensation), 32 to 104 deg F (No Condensation)
Operating Humidity	80% or less (No Condensation)
High-G Capability	30 G, 10 msec, 6 axes, 10 times each
Pollution degree	Degree 2 according to IEC60664-1
Overvoltage category	Category II according to IEC60664-1
Maximum use altitude	2,000 m or lower
External Dimensions	
Camera Body	267.0 (H) x 182.0 (W) x 93.6 (D) mm, excluding protrusion 10.51" (H) x 7.16" (W) x 3.68" (D), excluding protrusion
DC Power Supply	
Power Voltage	22 V to 32 V
Power Consumption	300 VA
Weight	
Camera Body	4.07 kg, 8.97 lbs



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

3.1.3 AC Adapter

Manufacturer		Adapter Technology Co., Ltd.
Type		ATM450A2-P240
Rating	Input	AC100-240V, 50-60Hz, 5.3 to 2.2A
	Output	DC24V, 18.75A
Dimensions		254.0 (L) x 116.0 (W) x 47.0 (H) mm * excluding protrusions 10" (L) x 4.56" (W) x 1.85" (H)
Weight		1.60 kg, 3.52 lbs

3.1.4 Other Supported Function

Supported Function		
Variable Framerate/Resolution	Resolution Lock	Fan Control
Lens Control (optional)	IRIG Input	IRIG Synchronization
Variable Synchronization	Signal Delay Setting	Sync output rate Setting * ¹
Event Marker	Shutter Lock Mode	Signal Width Setting
Record While Save	Direct Start Setting	Stop Fan During Recording
Low Shutter Speed Function	Mechanical Shutter	Memory Partitioning (128)
IRIG Time Stamp's selection function at exposure start/end		

*¹ When using at the frame rate in the vicinity of the limit value when synchronizing the external device, the Sync output rate setting may be limited due to the error of the input frequency.



REFERENCE

Refer to "Photron FASTCAM Viewer 4 User's Manual" for other functions.

3.1.5 Frame Rate and Resolution

◆ S40: 1,280 x 1,024 to 896 x 32

Resolution Frame Rate (fps)	1,280 x 1,024	1,280 x 896	1,280 x 800	1,280 x 640	1,280 x 512	1,024 x 1,024	1,024 x 768	1,024 x 512	896 x 896	896 x 512	896 x 384	896 x 256	896 x 128	896 x 64	896 x 32
60*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
125*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
250*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
500*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
750*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31,250	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37,500			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48,000				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50,000							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56,250					<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62,500								<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80,000										<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
100,000											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
125,000												<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
200,000													<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
250,000														<input type="checkbox"/>	<input type="checkbox"/>
312,500															<input type="checkbox"/>

The ✓ mark indicates a possible setting. Light blue items are the resolutions that will be selected first when you switch the frame rate.

This table shows default settings. Even finer settings are possible with the variable setting feature.

* Frame rate that can be selected when the low shutter speed mode is enabled.

3.1.6 Recordable Frames / Resolution

◆ S40

Resolution	32GB Model Rec. Frames	64GB Model Rec. Frames	128GB Model Rec. Frames
1,280 x 1,024	17,470	34,946	69,899
1,280 x 896	19,966	39,938	79,884
1,280 x 800	22,361	44,731	89,470
1,280 x 640	27,952	55,914	111,838
1,280 x 512	34,940	69,893	139,798
1,024 x 1,024	21,837	43,683	87,373
1,024 x 768	29,117	58,244	116,498
1,024 x 512	43,675	87,366	174,747
896 x 896	28,522	57,055	114,120
896 x 512	49,915	99,847	199,711
896 x 384	66,553	133,129	266,282
896 x 256	99,830	199,694	399,423
896 x 128	199,660	399,388	798,846
896 x 64	399,320	798,777	1,597,692
896 x 32	798,640	1,597,555	3,195,385

* Recording Time = Rec. Frames x 1/frame rate (fps)



NOTE

Contact Photron for the recordable frames for other resolutions.

3.1.7 Recordable Time / Resolution

◆ S40

Resolution	Max Framerate	32GB Model Rec. Time	64GB Model Rec. Time	128GB Model Rec. Time
1,280 x 1,024	31,250	0.559	1.118	2.237
1,280 x 896	31,250	0.639	1.278	2.556
1,280 x 800	37,500	0.596	1.193	2.386
1,280 x 640	48,000	0.582	1.165	2.330
1,280 x 512	56,250	0.621	1.243	2.485
1,024 x 1,024	37,500	0.582	1.165	2.330
1,024 x 768	50,000	0.582	1.165	2.330
1,024 x 512	62,500	0.699	1.398	2.796
896 x 896	50,000	0.570	1.141	2.282
896 x 512	80,000	0.624	1.248	2.496
896 x 384	100,000	0.666	1.331	2.663
896 x 256	125,000	0.799	1.598	3.195
896 x 128	200,000	0.998	1.997	3.994
896 x 64	250,000	1.597	3.195	6.391
896 x 32	312,500	2.556	5.112	10.225

The unit in the chart is seconds.



NOTE

Contact Photron for the recordable time for other resolutions.

3.1.8 Shutter Speed List

◆ S40

- 1/frame sec
- 1/100 sec*
- 1/200 sec *
- 1/500 sec *
- 1/1,000 sec
- 1/2,000 sec
- 1/3,000 sec
- 1/4,000 sec
- 1/5,000 sec
- 1/6,000 sec
- 1/8,000 sec
- 1/9,000 sec
- 1/10,000 sec
- 1/12,000 sec
- 1/16,000 sec
- 1/18,000 sec
- 1/20,000 sec
- 1/25,000 sec
- 1/30,000 sec
- 1/40,000 sec
- 1/50,000 sec
- 1/60,000 sec
- 1/80,000 sec
- 1/90,000 sec
- 1/100,000 sec
- 1/150,000 sec
- 1/200,000 sec
- 1/250,000 sec
- 1/300,000 sec
- 1/400,000 sec
- 1/500,000 sec
- 1/600,000 sec
- 1/900,000 sec

type 312KS, type 200KS

- 1/100,000 sec

* 1/100sec, 1/200sec, and 1/500sec can be selected when the “Low Shutter Speed Mode” is enabled. For details, refer to the “2.1.1 Low Shutter Speed Mode” on page 39.

3.1.9 Timing Diagram

This is a timing diagram that describes the relationship between the input and output signals to the product and the timing to start recording.

This timing diagram is a schematic diagram, and more detailed operations are described in the following pages.

Use it as a reference when linking with other devices or building a system.

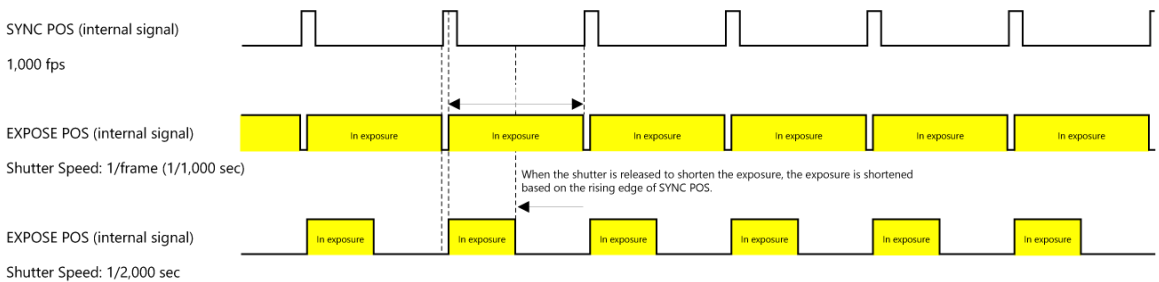


NOTE

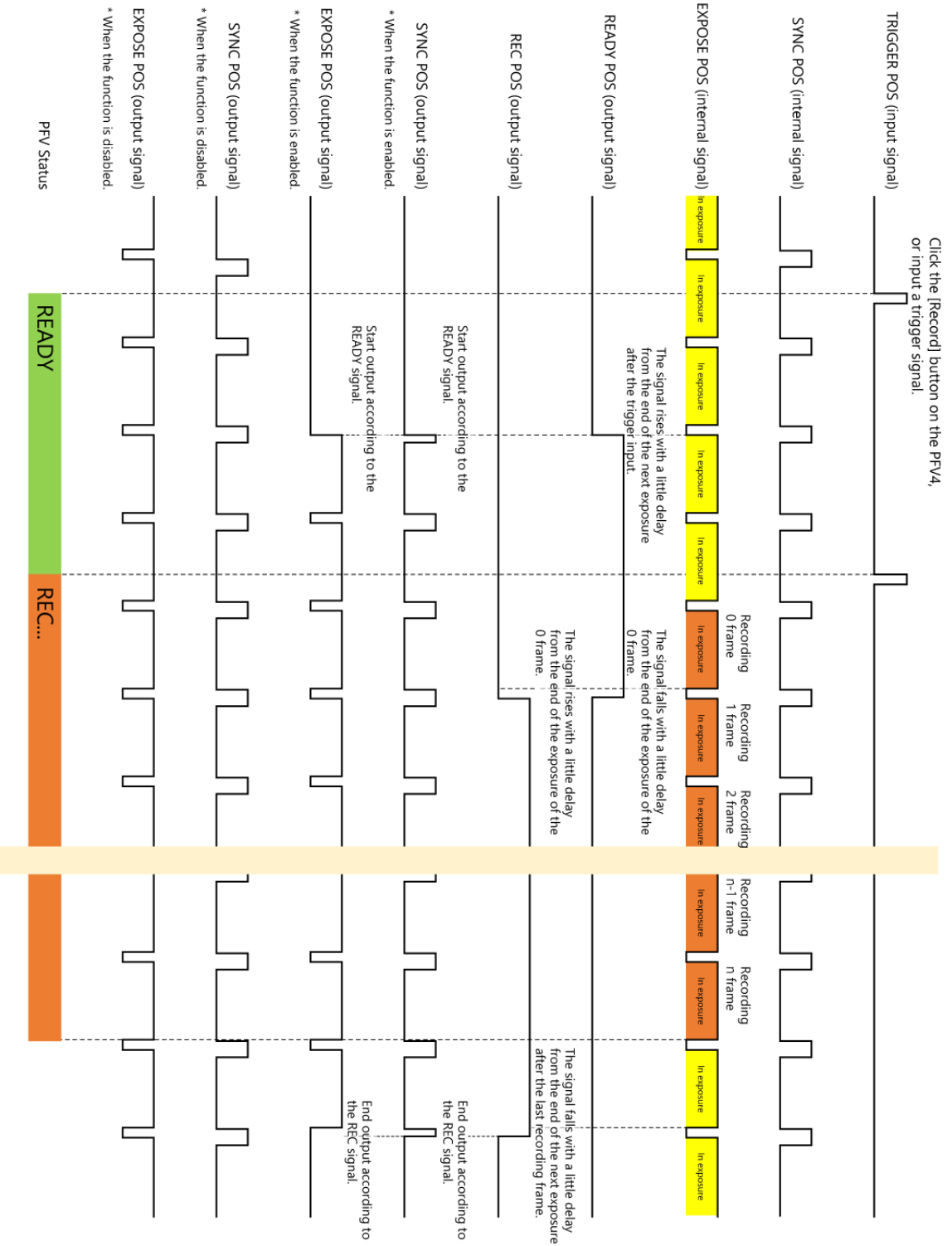
- This timing diagram is a schematic diagram and does not represent the accuracy of the actual signal.
- “n frame” means the number of frames that can be recorded.
- The “* When function is enabled” in diagrams indicates the difference depending on whether the “Output SYNC and EXPOSE only during Ready and Rec states” function is enabled or disabled.
- For more detailed information, refer to “5.1 Contact Information” on page 64 and contact Photron.

■ Relationship between SYNC POS and EXPOSE POS

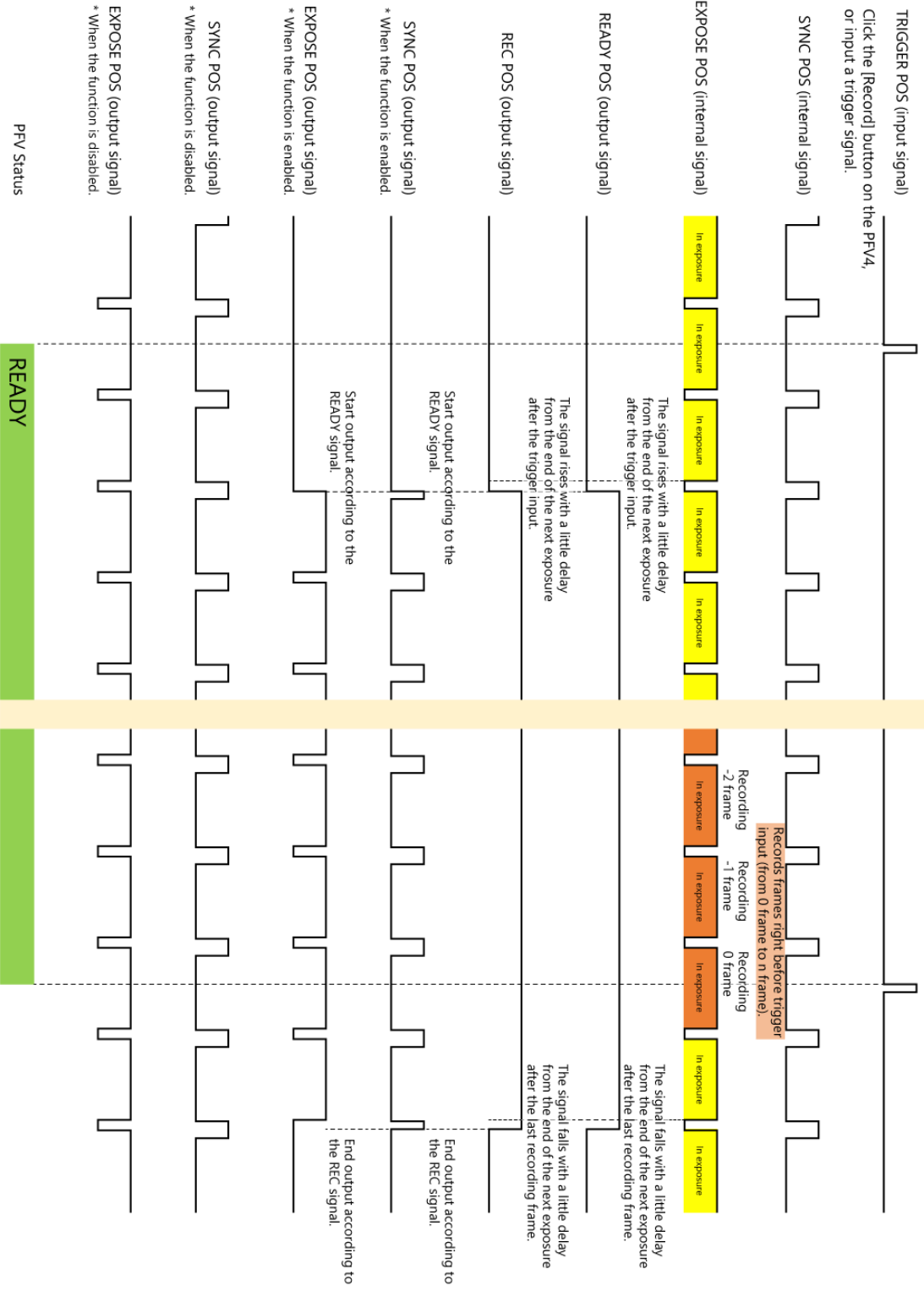
The exposure (EXPOSE) of this system is linked to the SYNC signal (camera drive), and when the shutter is released to shorten the exposure, the exposure is shortened based on the rising edge of SYNC POS.



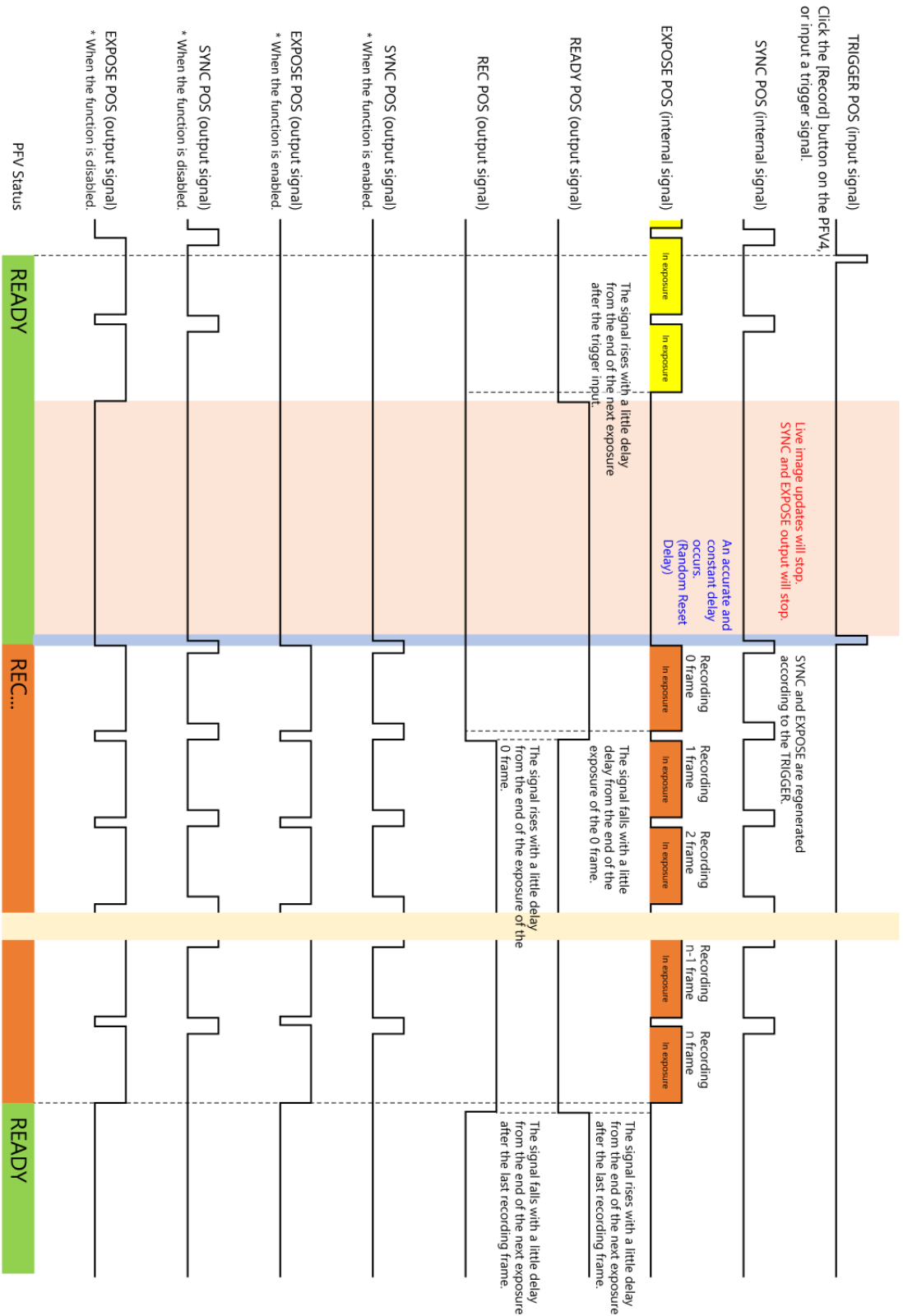
■ Start Trigger Mode



■ End Trigger Mode



■ Random Reset Trigger Mode



3.1.10 Random Reset Delay / Inter Frame Time

With the random reset trigger mode, the exposure starts after a certain delay from the trigger input. This delay from the trigger input is referred to as the “Random Reset Delay”.

In addition, when the shutter speed is set to 1/frame, the shutter is always open numerically, but due to the characteristics of electronic shutters, a reset time is required and there is a small period of time when no exposure occurs. This time is referred to as “Inter Frame Time”.

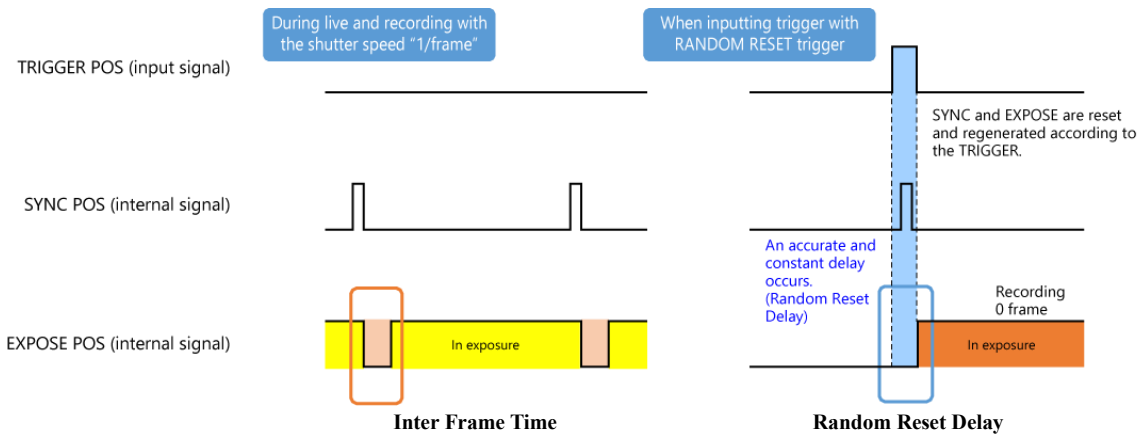
The Inter Frame Time occurs only at 1/frame and does not occur when the shutter is released.

This time can also be checked by setting the shutter speed display to “0.xxx msec” setting in PFV4.

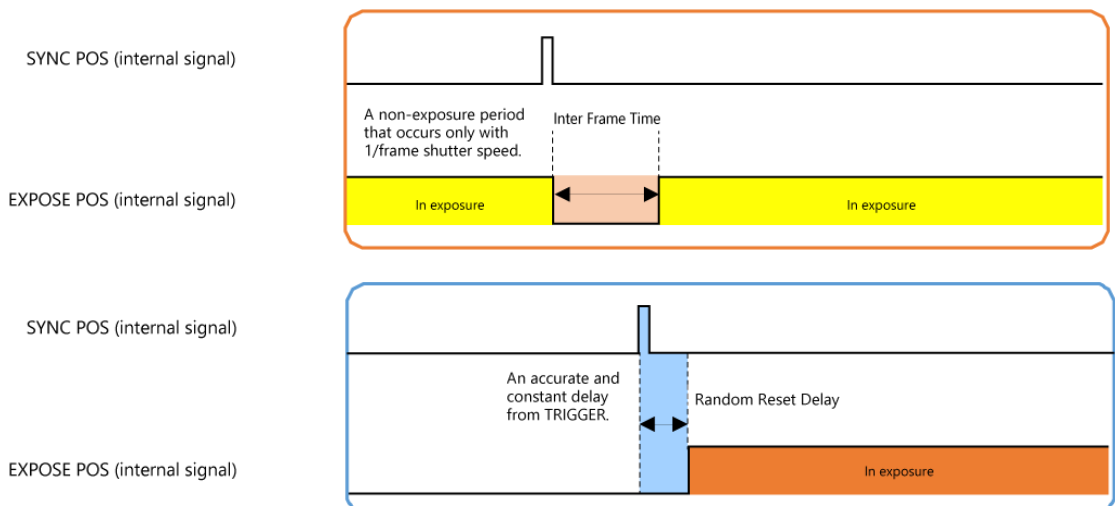
The Random Reset Delay and Inter Frame Time of this system are shown in the timing diagram below and vary depending on the specific frame rate and resolution conditions.

Refer to the two tables on the next page for specific values.

■ Overview diagrams of Inter Frame Time and Random Reset Delay



■ Enlarged diagrams of Inter Frame Time and Random Reset Delay



■ Values for each frame rate and resolution condition

◆ S40

Random Reset Delay	Inter Frame Time
2.7 μ sec	2.73 μ sec * Only 896 x 32: 1.85 μ sec



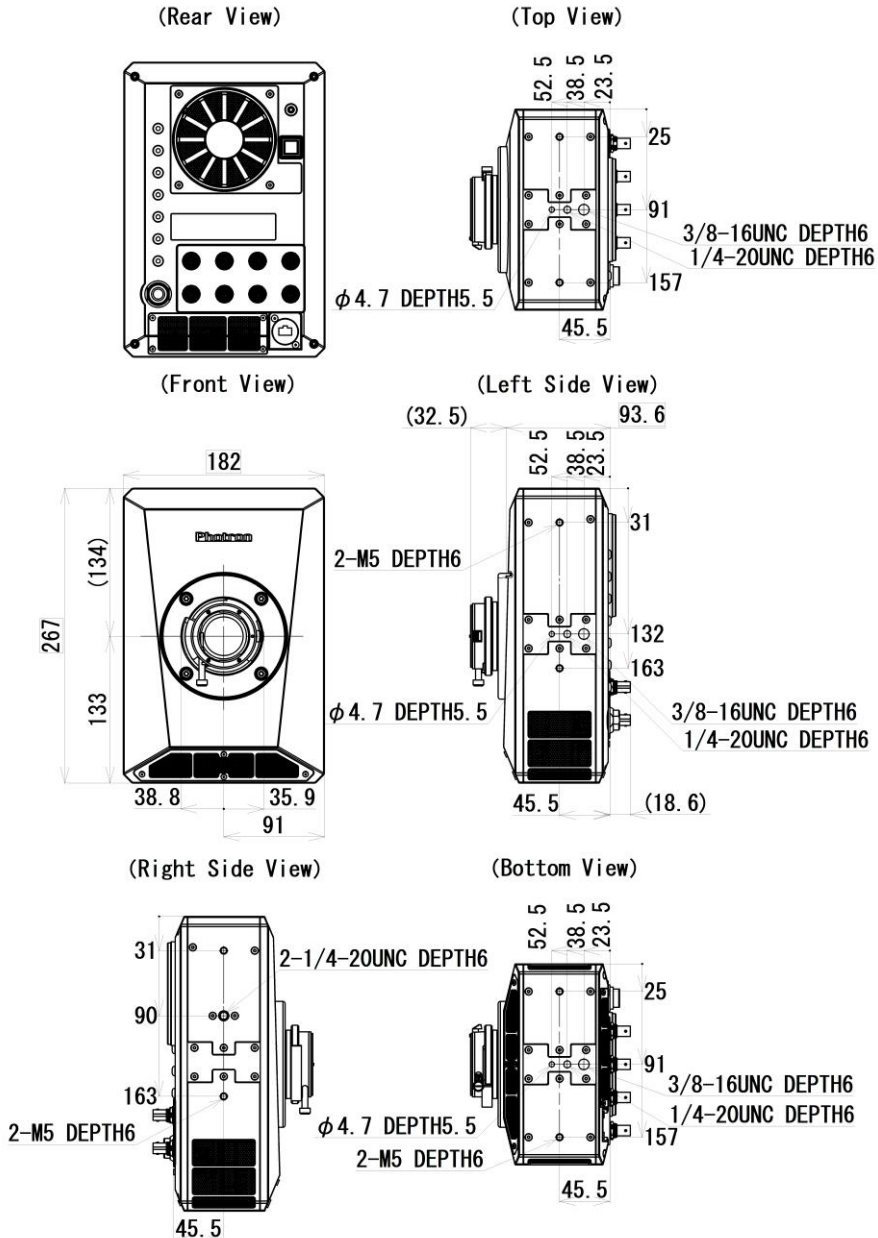
CAUTION

During random reset recording, trigger from either PFV or external input. If trigger is input from both, malfunction may occur.

3.2 Dimensions

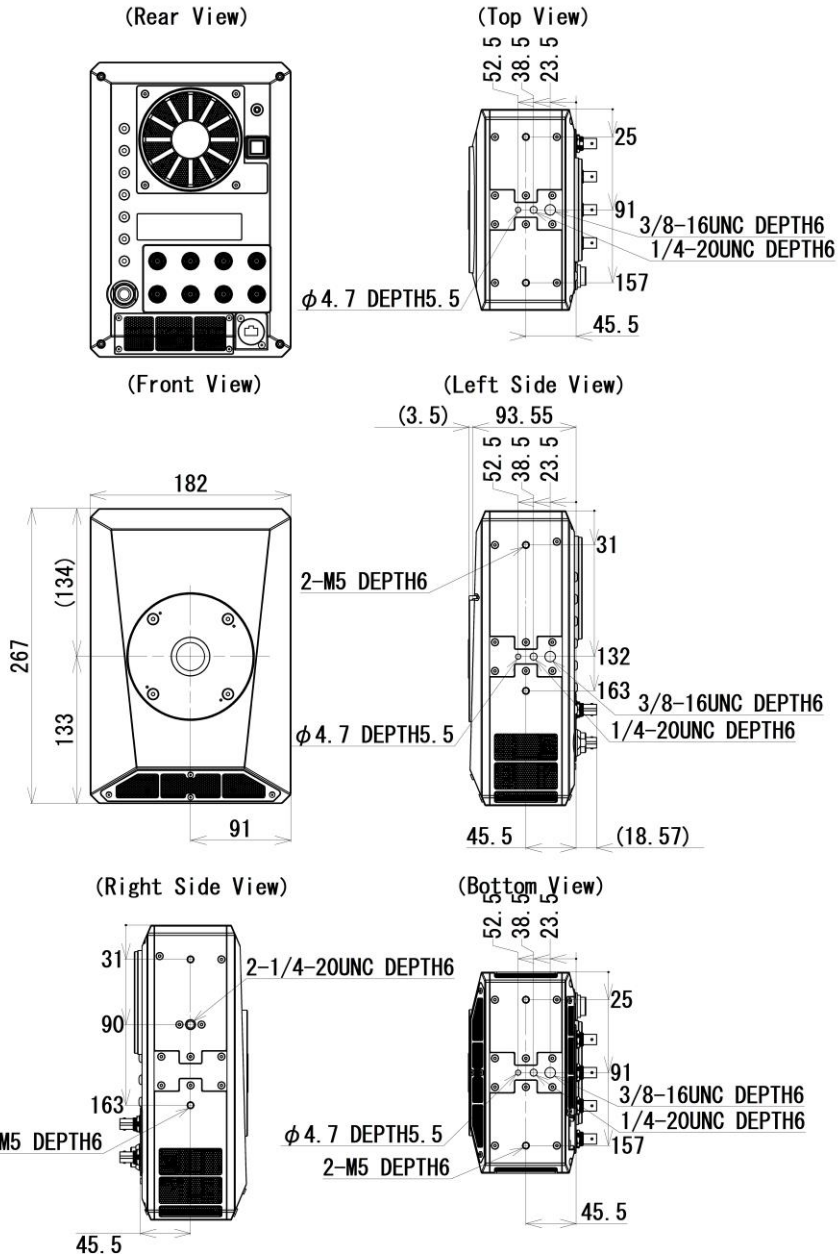
3.2.1 Camera Body

◆ FASTCAM Orion S40 (G type F mount) (mm)



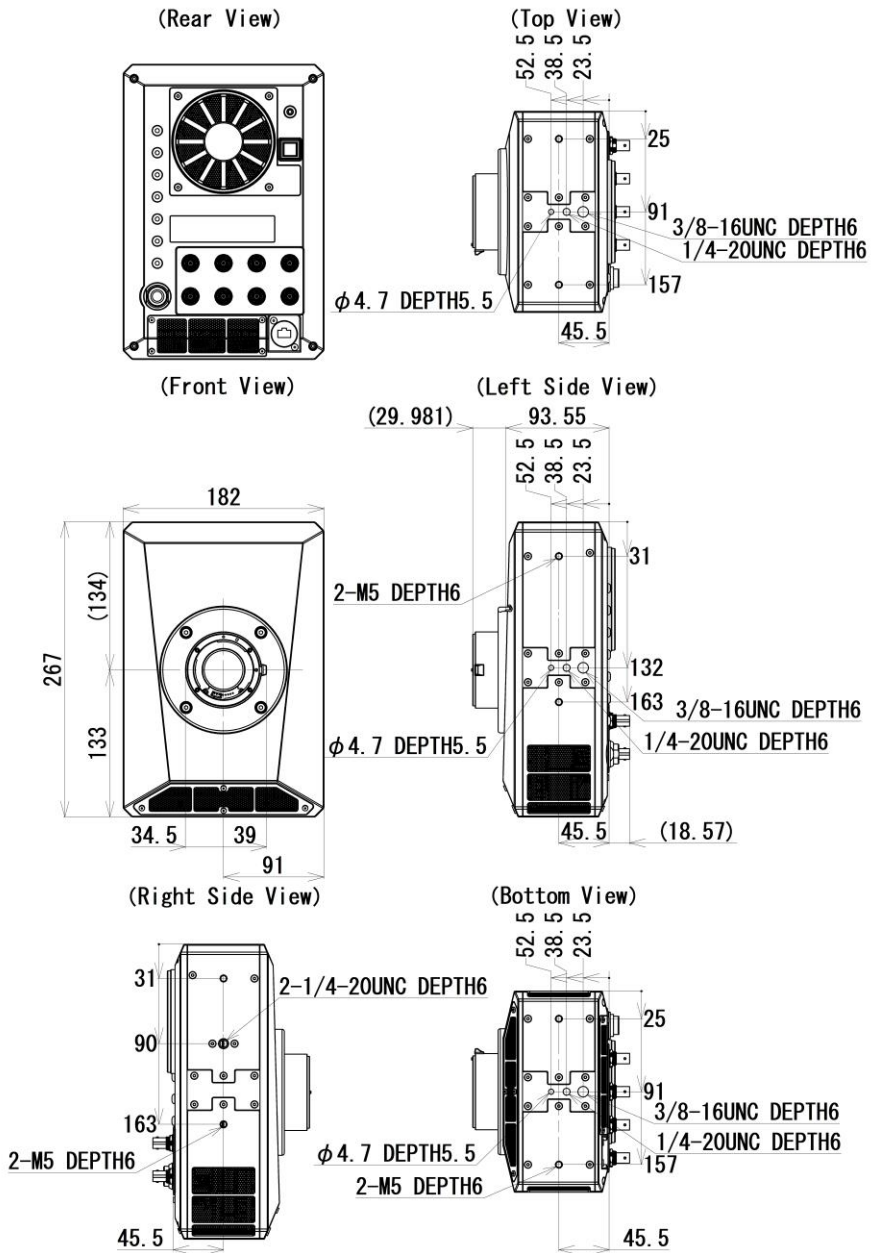
* Caution
 If a screw that is longer than the specified length is forced into the hole, the screw hole and/or the camera may be damaged.

◆ FASTCAM Orion S40 (C mount)
(mm)



* Caution
If a screw that is longer than the specified length is forced into the hole, the screw hole and/or the camera may be damaged.

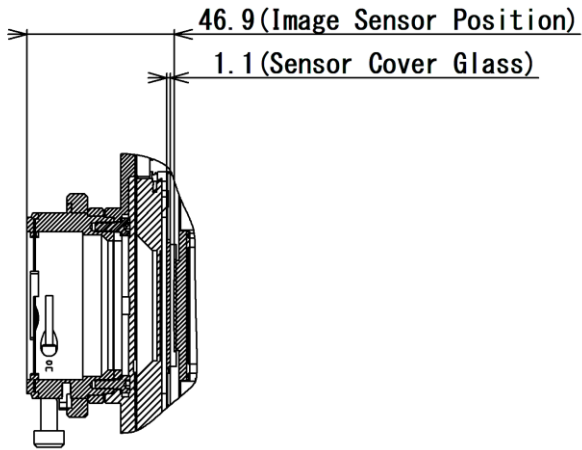
◆ FASTCAM Orion S40 (EF mount)
(mm)



* Caution
 If a screw that is longer than the specified length is forced into the hole, the screw hole and/or the camera may be damaged.

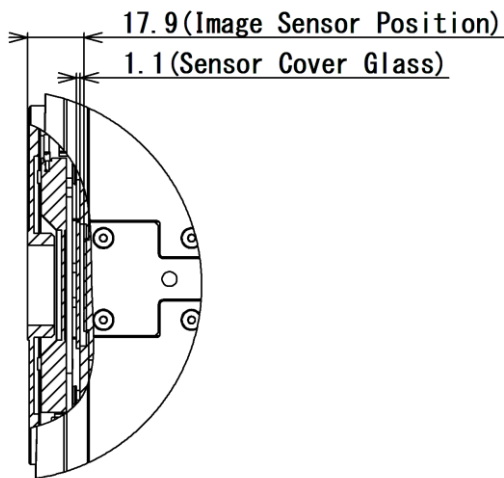
- ◆ FASTCAM Orion S40 Sensor position (G type F mount)
(mm)

(Side Sectional Drawing)



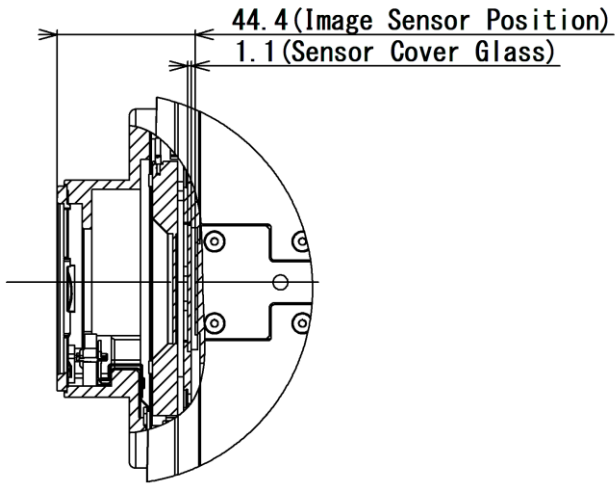
- ◆ FASTCAM Orion S40 Sensor position (C mount)
(mm)

(Side Sectional Drawing)



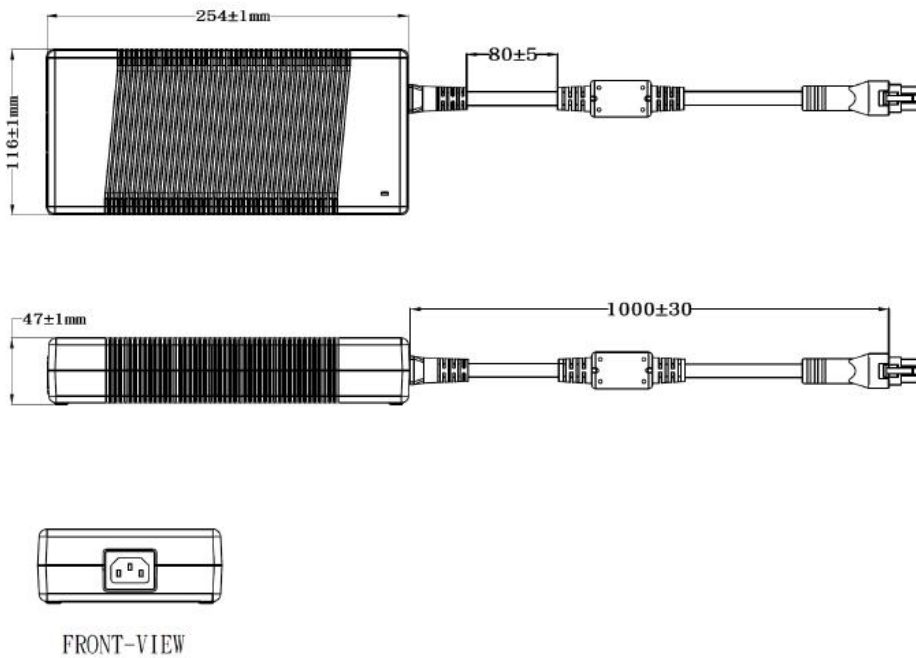
- ◆ FASTCAM Orion S40 Sensor position (EF mount)
(mm)

(Side Sectional Drawing)



3.2.2 AC Adapter

(mm)



4

Chapter 4 Warranty

This chapter explains about the warranty.

4.1 About the Warranty

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 alternation 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” on page 64.

5

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.

5.1 Contact Information

For inquiries related to FASTCAM Orion S40, contact Photron at one of the contact points listed below.

Additionally, the following items will be required for verification when inquiring. You are kindly asked to prepare them in advance.

Items Verified	Required Information
Contact Information	Company, school or organization name, customer contact name, contact phone number, contact e-mail address.
Product Name	FASTCAM Orion S40
Serial Number	Shown in the nameplate seal.
Condition of the system, nature of problem, etc.	

Contact Information	
In Americas and Antipodes	PHOTRON USA, INC. 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
In UK, 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 Web: www.photron.com
In Europe outside the UK	Photron Deutschland GmbH 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
In China	PHOTRON (SHANGHAI) LIMITED Room 1601, No. 1, Lane 600, Tianshan Road, Changning District, Shanghai (TONGDA PROPERTY BUILDING) 200051 China Phone: +86 (21) 5268 3700 Fax: +86 (21) 5268 3702 E-mail: info@photron.cn.com Web: www.photron.cn.com
In other areas	PHOTRON LIMITED 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

A

A. Appendix

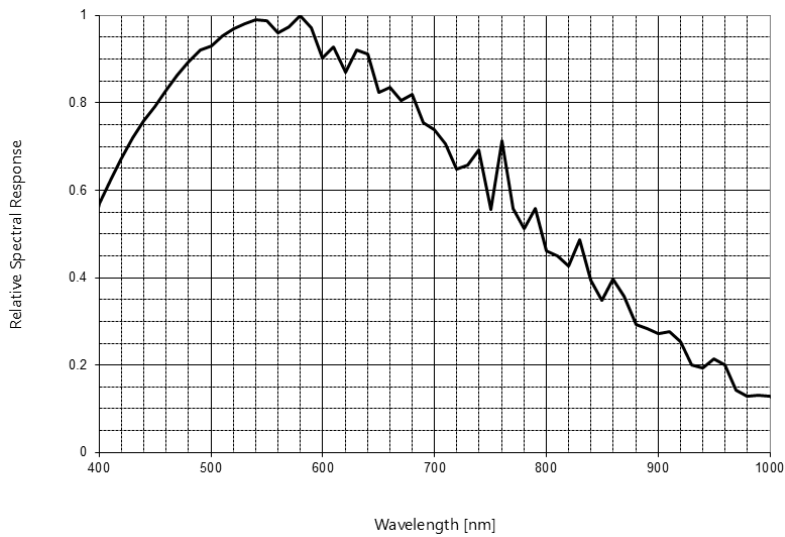
A.1. Reference Information



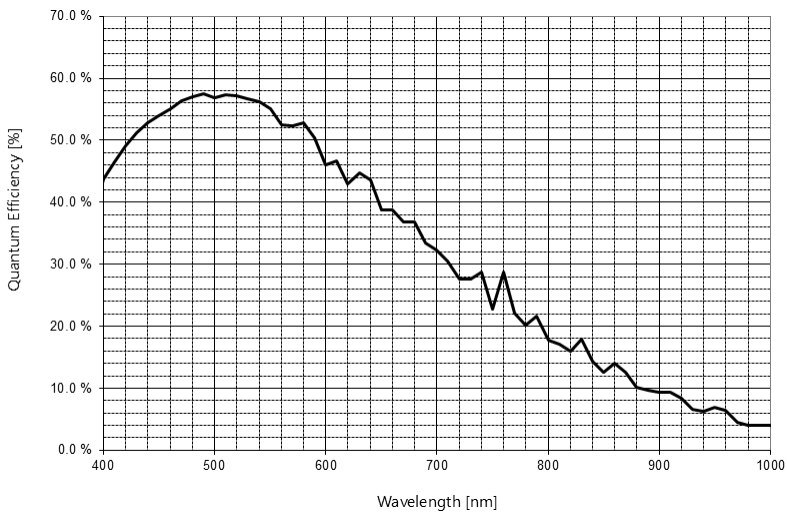
CAUTION

The spectrum response curve and the quantum efficiency curve are nominal (reference) data of the image sensor device.

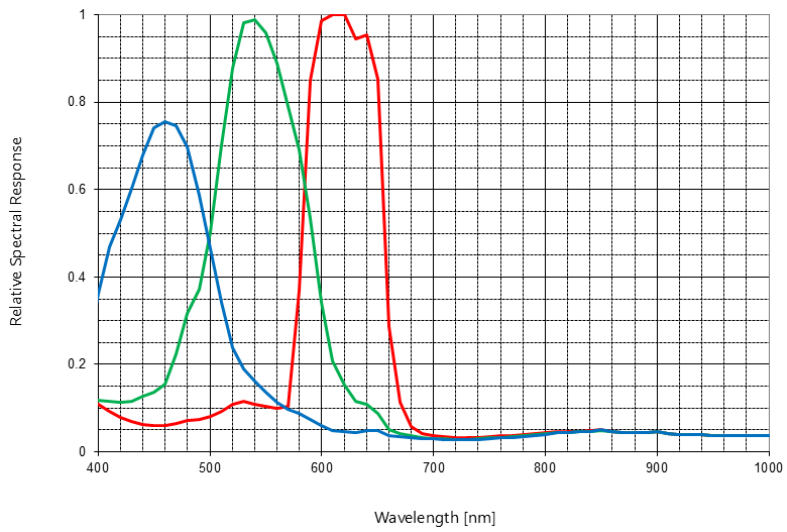
A.1.1 Relative Spectral Response (monochrome)



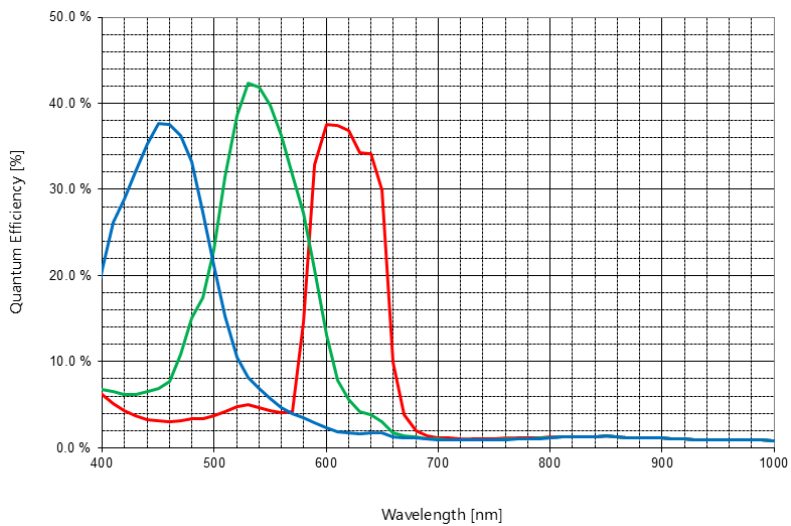
A.1.2 Quantum Efficiency (monochrome)



A.1.3 Relative Spectral Response (color)



A.1.4 Quantum Efficiency (color)



FASTCAM Orion S40

Hardware Manual Rev. 4.01 E

Last Updated November 2025
Written by PHOTRON LIMITED
21F, Jinbocho Mitsui Bldg.,
1-105 Kanda Jimbocho, Chiyoda-Ku,
Tokyo 101-0051, Japan