



High Speed Digital Camera System

MEMRECAM HX-3 / 3L / 3E

Model ST-806

HX-4 / 4E Model ST-824

HX-5 / 5E Model ST-825

HX-6 / 6E Model ST-826

User's Manual

Read before Use

Information to the User

FCC Statement

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note:

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.

CE marking

This product with the CE marking complies with the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC.

Features of this Device

The MEMRECAM HX-3/HX-3L/HX-3E, HX-4/HX-4E, HX-5/HX-5E, HX-6/HX-6E are a high speed digital camera capable of analyzing phenomenon moving faster than the eye can see.

High Speed · High Resolution · High Light Sensitivity

Equipped with a CMOS sensor sensitive to high speed, high resolution color as well as B/W.

The Memrecam HX-3 is high resolution high speed digital CMOS camera capable of 2,000 frames per second at 2560 x 1920 pixels, 10,000 frames per second at 1280 x 720 pixels with a maximum of 1,300,000 frames per second.

The Custom Frame Rate function allows the user to set the record rates in units of 10 frames per second above 50 frames per second.

The sensitivity is 2,000 ISO for color and 10,000 ISO for B/W. The GX Circuit function increases the maximum sensitivity to 8,000 ISO for color and 40,000 ISO for B/W.

Onboard Memory

The Memrecam HX-3 is available with MAX 64GB of on board memory.

(On-board memory changes with models)

At full resolution, 2560x1920, at 10 bits, 5.5 seconds record time is possible at 2,000 fps with 64GB of memory.

The Memory Segmentation function allows the user to segment the memory up to 16 times to capture multiple high speed recordings.

Compact Sealed Unit Housing

The Memrecam HX-3 is a sealed compact camera that prevents air, dirt and dust from contaminating the internal electronics of the camera. This unit is inside of the external camera body. A fan and vents for cooling help to maintain a constant camera temperature and low noise. The sealed camera body allows for high speed imaging in the most severe environments.

Superior Performance

The Memrecam HX-3 is provided with HXLink software for remote operation via a computer. As an option the J-PAD3 Hand Held Remote Controller and Viewfinder allow the user to setup up the camera, display live

images on the Viewfinder or Monitor and record and playback the images without a computer. Continuous recording to the camera memory via the trigger input with confidence that images will not be accidentally lost. Additionally, multiple images can be captured and recorded with multi-trigger recording, recording of images multiple times by receiving trigger images multiple times. The burst recording option, records only the period of time that the trigger signal is active or by using the image trigger function which detects changes in brightness of a specified area in the field of view.

Flexible Image Playback

Recorded images can be replayed in slow motion, frame by frame, forwards or backwards and or replayed in a circular buffer continuously.

High-Speed Network Transfer

Recorded images, data settings and trigger timing can be digitally saved to a PC directly through the GigE interface or network. 1000BASE-T and 100BASE-TX Ethernet is used for high speed transfer of data with high resolution and long recording events. The USB interface allows for direct storage to USB compatible external memory media connected to the USB port on the camera unit.

Memory Backup

The Memrecam HX-3 has a built in Memory Backup Battery function that protects against the loss of valuable data and images during unexpected loss of power to the camera for up to one hour.

Various External Interfaces

The Memrecam HX-3 provides a wide variety of external input and output interfaces including 1000BASE-T, 100BASE-TX Ethernet, USB2.0, exposure start signal input, IRIG-B signal input, discrete status signal input and output, exposure pulse signal output and recording trigger signal input.



- The method of operation for the MEMRECAM HX-3, HX-4, HX-5, and HX-6 is basically the same. This manual primarily describes the HX-3. Refer to the specific device for items unique to the descriptions for the HX-4, HX-5, and HX-6.

Trademark

MEMRECAM is a trademark of NAC Technology.

Microsoft Windows is a trademark of Microsoft Corporation.

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Descriptions of the HX-3/4/5/6 firmware Ver.1.50 and J-PAD3 firmware Ver.2.90 are provided in this manual.

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Safety Precautions

Please adhere to the following precautions to prevent bodily injury or damage.

■ Distinctions between the levels of bodily injury and damage.

The distinctions between the levels of bodily injury and damage occurring from improper use are described below.

	Danger	Extreme danger that may result in death or serious injury.
	Warnings	Potential danger that may result in death or serious injury.
	Caution	Potential danger that may result in minor injury or damage to the camera.

■ Warning Labels

Descriptions are provided for the following warning labels.

	Prohibited item
	Mandatory item.

Danger

Using the AC Adapter



- Only use the Memrecam HX-3 dedicated AC adapter with the Memrecam HX-3 camera.
(Malfunction or fire may occur.)
-

Warnings

Using the Memrecam HX-3 camera



- **Do not dismantle or alter**

Do not loosen screws on the main camera unit or open the cover.

⇒ Contact your service center for inspection · maintenance · repair.

- **Do not use in locations with smoke, flammable or corrosive gases and strong magnetic fields**

A malfunction, injury or fire may occur.

⇒ Do not use in dirty, dusty or humid locations.

- **Do not subject to strong vibration or impact**

The MEMRECAM HX-3 does not have vibration or impact resistance properties based on actual impact testing. If subjected to strong impact or vibration a malfunction or injury may occur.

⇒ Contact your service center for use in harsh environments.



- **If there is a malfunction turn the power off and unplug the AC adapter**

If water or foreign matter gets inside, if the exterior breaks due to dropping, if the camera becomes hotter than normal, or if smoke, odors or noises are emitted. The camera becomes warmer during operation and is not considered to be a malfunction.

⇒ Contact your service center.

Using the cables



- **Do not unplug the camera power cable with the power on**

- **Do not put foreign articles such as metal, trash or water inside the connector.**

A malfunction or electrical shock may occur if the cable is connected or removed with the power on.

⇒ Unplug the camera power cable only after turning off the power.

- **Do not touch the plug or connector with wet hands**

A malfunction, electrical shock or fire may occur.

Verify input power



- **Verify the input power before connecting**

- During AC adapter use : AC100~264V/47~63Hz

- During DC power connection : DC20~32V

A malfunction, electrical shock or fire may occur if connected to the wrong power supply.

Warnings

Using the AC Adapter



- **Do not dismantle or alter**

(Do not loosen the screws on the AC adapter or open the cover even if the AC adapter malfunctions.)

⇒ Contact the store where purchased for inspection · maintenance · repair.

- **Do not use in locations with smoke, flammable or corrosive gases and strong magnetic fields**

A malfunction, injury or fire may occur.

⇒ Do not use in dirty, dusty or humid locations.

- **Do not subject to strong vibration or impact**

(The AC adapter does not have vibration or impact resistance properties based on actual impact testing. If subject to strong impact or vibration, malfunction or injury may occur.)

⇒ Contact your service center for use in harsh environments.



- **If there is a malfunction turn the power off and unplug the AC adapter**

(The AC adapter does not have vibration or impact resistance properties based on actual impact testing. If subject to strong impact or vibration, malfunction or injury may occur.)

⇒ Contact your service center.

Caution

Using the main camera unit



- **Do not interfere with the release of heat from the camera**

The Memrecam HX-3 has a fan that cools the camera. Do not block the intake ports or vents. Do not place the camera where there is no air circulation on carpet or bedding. If heat builds up inside, malfunction or fire may occur.

- **Do not put fingers or objects in the lens mount**

The sensor can be seen if the lens or cap on the lens mount of the camera is removed. If fingers or items are placed inside the sensor may be scratched or soiled so the image quality may be adversely affected.

- **Do not carry this camera mounted on the tripod**

If the camera is mounted on a tripod the handle of the camera is weighed down by the tripod which may damage the handle or result in bodily injury.
⇒ It is recommended that the camera be removed from the tripod prior to moving it.

- **Do not place heavy items on the camera**

If tipped over or dropped the exterior may be damaged which may result in bodily injury. If heavy items are placed on it the exterior may be damaged causing the inside components to be damaged and malfunction.



- **Verify the ambient temperature of the location where used and stored.**

- Use temperature range : 0~40°C, humidity 30~80%RH, no condensation
- Storage temperature range : -10~60°C, humidity 20~80%RH, no condensation

Handle the battery with care



- **Do not leave the Memrecam HX-3 at high temperature: i.e. in a vehicle or outdoors**

The Memrecam HX-3 has the built-in battery for memory backup and abnormally high temperatures may cause liquid leakage of the battery and or shorten the battery life.

Handling while moving or transporting



- **Use the dedicated storage case for moving or transporting the camera**

To protect the camera from malfunction use the camera storage case for transport.



Caution

Using the AC adapter



● **Do not interfere with the release of heat from the AC adapter**

(The AC adapter is cooled by a fan. Do not block the intake ports or vents. Additionally, do not place in narrow locations where there is no air circulation, or on carpet or bedding. If heat builds up inside, malfunction or fire may occur.)

● **Usage environment**

- Do not use in locations with smoke or flammable or corrosive gases, or strong magnetic fields
- Do not put in locations subject to direct sunlight, rain or salt water.
- Do not use in dirty, dusty or humid locations.



● **Check the input power**

(Check the power voltage, wavelength and polarity before connecting the AC adapter to an AC100~264V, 47~63Hz power source.)

● **Before using, check the ambient temperature of the location where used and stored**

- Use temperature range : 0~60°C, humidity 5~95%RH, no condensation
- Storage temperature range : -40~85°C, humidity 10~90%RH, no condensation

● **Make sure to ground the device**

(Make sure to ground the AC3 pin connector. If not grounded, electrical shock may occur when the HX camera or GX-HUB is touched.)

Handling the AC adapter when moving or transporting



● **Make sure the power is turned off and the cable is disconnected**

(Make sure the power is turned off when moving the AC adapter, and move it after disconnecting the cable. Fire or electrical shock or malfunction may occur.)

Problems may occur depending on the use of and conditions of the camera. Therefore, carefully read this manual in addition to HXLink Users Guide regarding handling the camera and use of peripheral devices. Contact your service center for additional questions about the use of the Memrecam HX-3 camera.

■ Warning Labels

There are warning labels located on the Memrecam HX-3 camera that require precautions for safe use. Please read these warnings before operating. Please read the HXLink Users Guide or Instruction Manual for safe and proper use. Contact your service center for additional questions.

Symbols Used on Warning Labels

This describes the symbols shown on the warning labels.



● **Safety Alert symbol**

This is an alert for users of the potential danger that can occur when using the camera. Carefully read the message next to this symbol and follow the instructions for safe use of the camera.



● **Grounding Terminal symbol**

Indicates the site of a protective grounding terminal. If not grounded, electrical shock may occur from the metal housing or other parts of the camera. Make sure to ground the camera whenever possible to avoid electrical shock.



● **High Voltage Warning symbol**

Indicates the area of high voltage that is dangerous if touched. When replacing fuses in the AC Power Adapter make sure to unplug the power cable from the outlet. Do not open the cover. Depending on the device some parts may generate high voltage internally so opening the cover may result in electrical shock.

■ Regular Replacement of Parts

· Clock Battery

The internal clock battery for the MEMRECAM HX-3 will last approximately 3 years. Replacement cannot be performed by users. Contact your service center for replacement.

· Memory Backup Battery

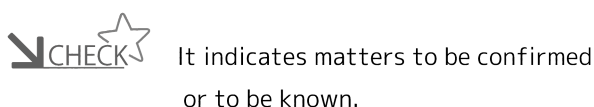
Replace the memory backup battery with a new battery about 1 year after purchase. But if you notice a quick discharge or something abnormal in operation replace it immediately. Contact your service center for replacement.

■ Warranty Information

The warranty is valid for one year after purchase.
See the attached warranty for details.



"to be continued to next page".



- Indicates the page referenced

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1

Introduction

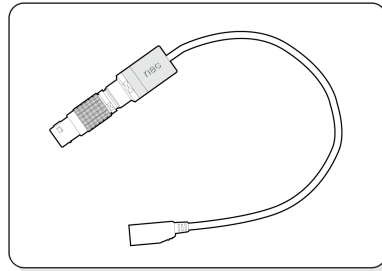
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Check the Standard Components

The standard components of the MEMRECAM HX-3 include the following. Check to make sure all of them are included.



● MEMRECAM HX-3 main unit :
(Lens sold separately.)



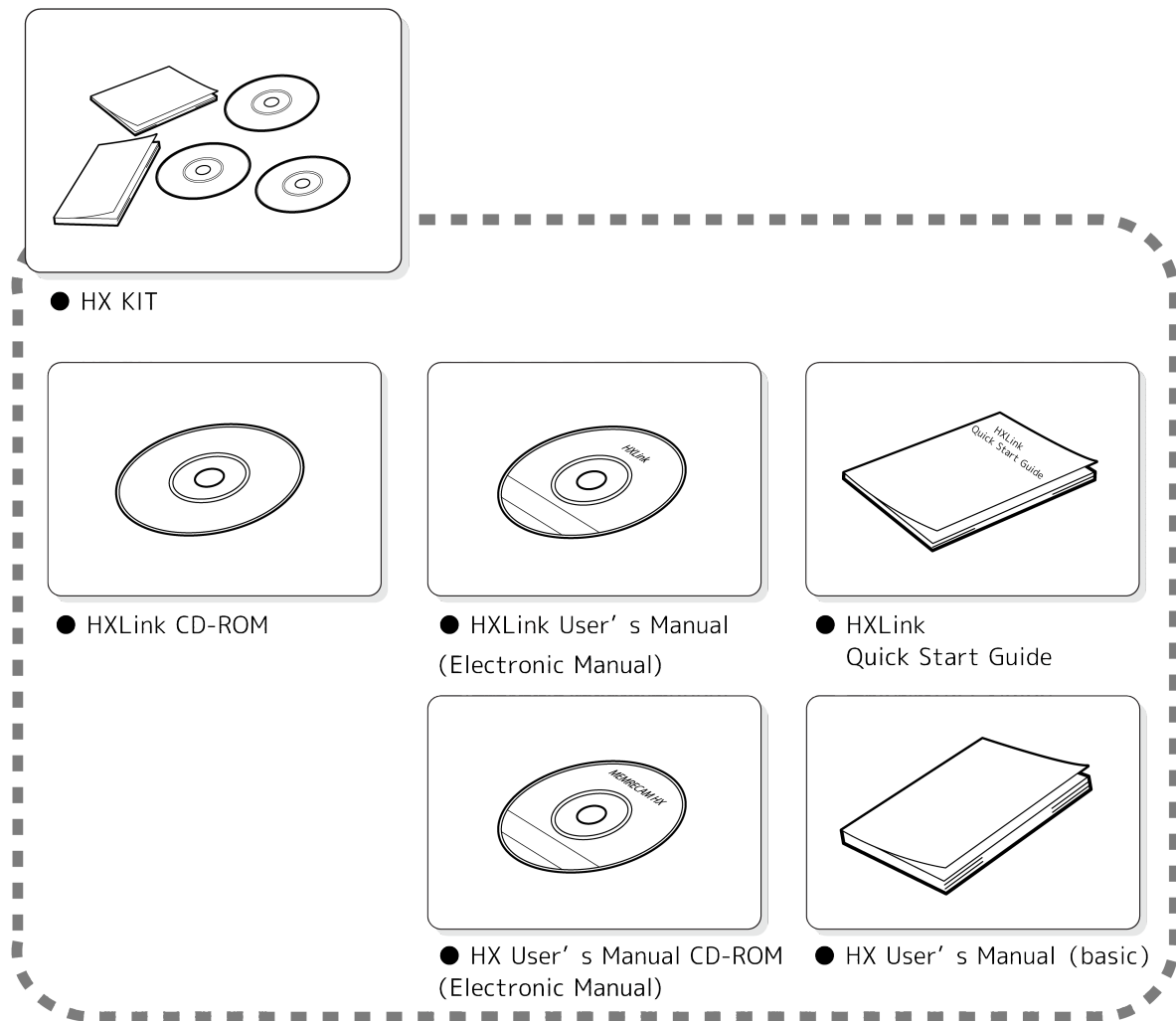
● Simple J3 Cable

- MEMRECAM HX-3 main unit : HX-3 camera unit
- Simple J3 Cable : Cable to connect to control PC



Attention

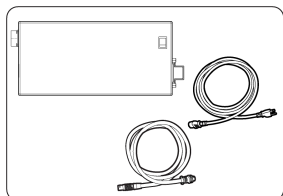
- MEMRECAM HX-3/4/5/6 includes the following memory configurations.
 - Memory : 16 / 32 / 64 GB HX-3、HX-3L、HX-3E、HX-4、HX-4E、HX-5、HX-5E
: 8 / 16 / 32 GB HX-6、HX-6E
 - Lens mount : F mount / C mount / NM mount / EF mount
- Make sure the model you purchased matches the contents.
- Memory verification method (▶ 8-29)



- HX KIT : HX-3 PC control software and instruction manual set
 - HXLink CD-ROM : PC Control Software CD-ROM
 - HXLink User's Manual : HXLink Detailed User's Manual(Electronic Manual)
 - HXLink Quick Start Guide : HXLink Simple Users Guide
 - HX user's Manual (basic) : HX camera Basic Operation User's Manual
 - HX user's Manual CD-ROM : HX camera Users Manual (Electronic Manual)
(this guide)

Optional Products Sold Separately

The main products for the MEMRECAM HX-3 sold separately (options) are as follows.



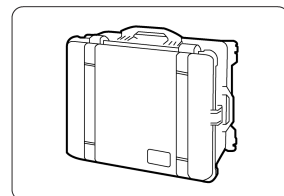
● AC POWER SYSTEM



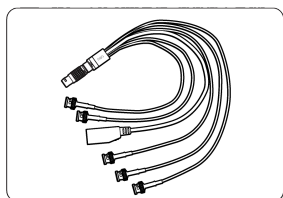
● J-PAD3
Remote Controller



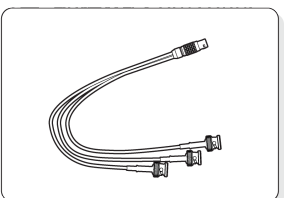
● Viewfinder



● HX-3 Carrying Case



● J3 Splitter Cable



● CTL Cable

- | | |
|------------------------------|--|
| • AC POWER SYSTEM : | HX-3 dedicated AC adapter, power cable set |
| • J-PAD3 Remote Controller : | HX-3 wired controller for settings and operation |
| • Viewfinder : | LCD Monitor |
| • HX-3 Carrying Case : | Case that holds the HX-3 unit and peripherals for safe transport |
| • J3 Splitter Cable : | Input/output cable for both HX and GX series |
| • CTL Cable : | HX-3 dedicated ARM IN/OUT, FAULT STS OUT input/output cable |



- This manual describes HX-3 operation using the J-PAD3 Remote Controller. Refer to the HXLink Users Manual for operation with the HXLink software.



Attention

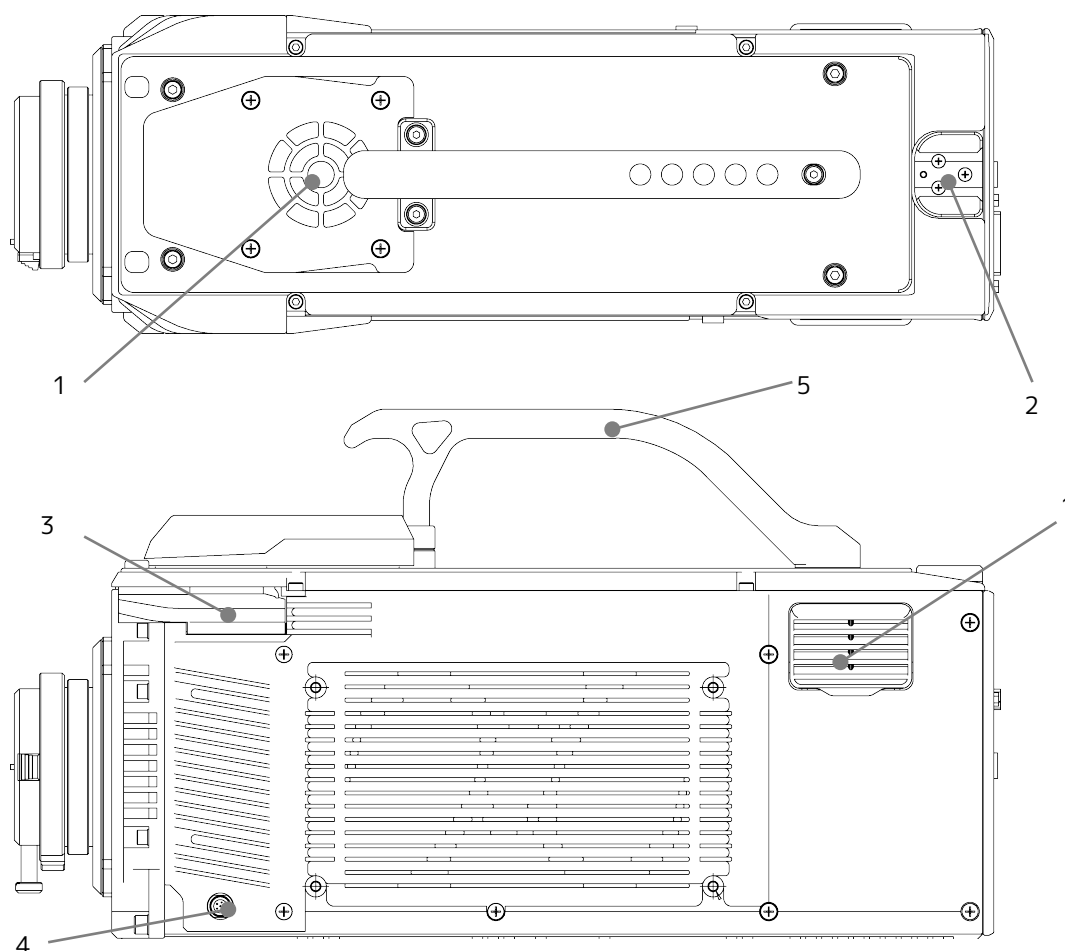
- This manual refers to the optional accessories listed above with the exception of the Memrecam HX-3 Carrying Case.

Exterior View and Names of Each Part

The functions and use of each part can be found on the page listed for each item.

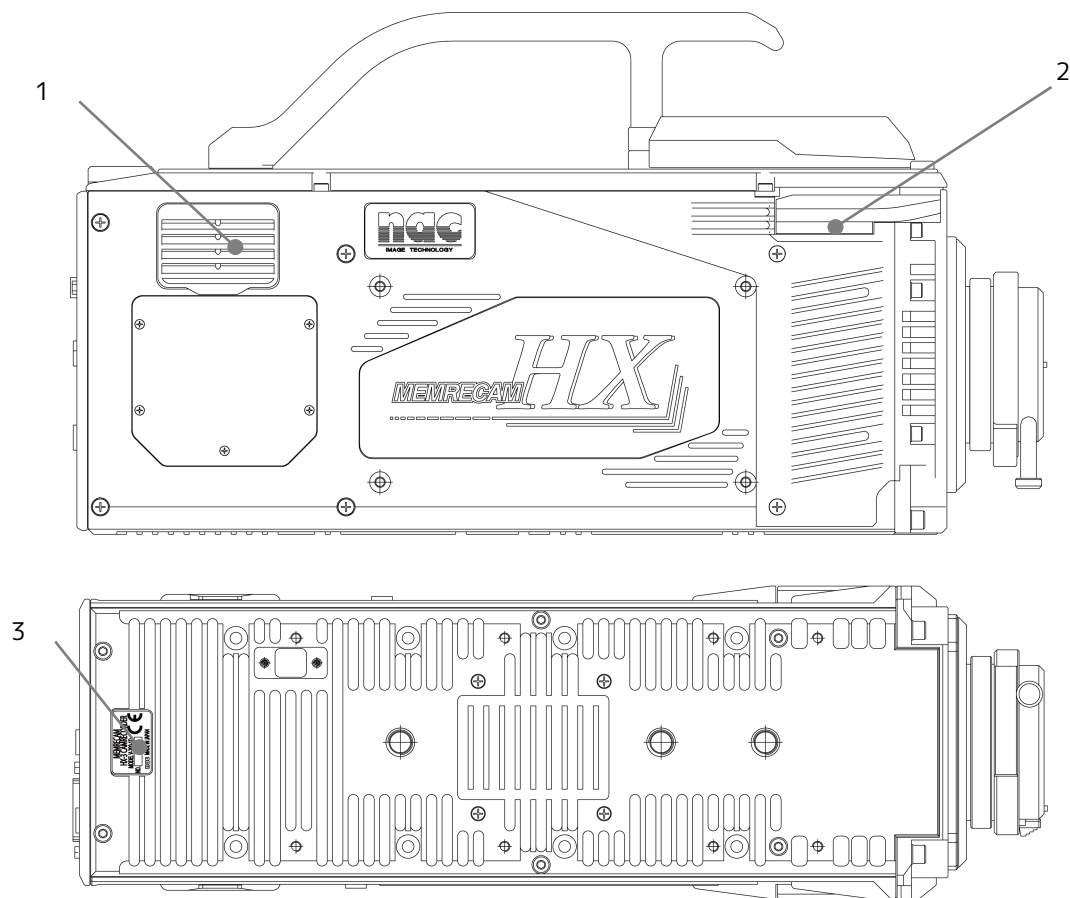
■ External View and Names on Main Unit

Right Side



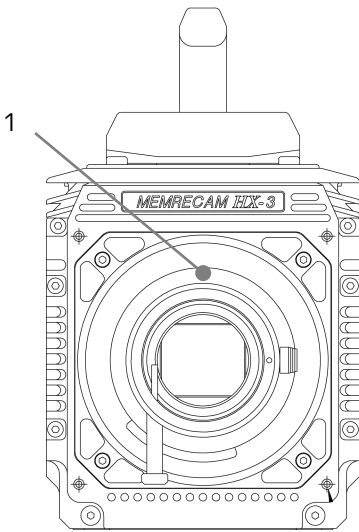
- 1 Intake ports ▶▶ 2-2
- 2 Viewfinder shoe fitting ▶▶ 2-5
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Left Side

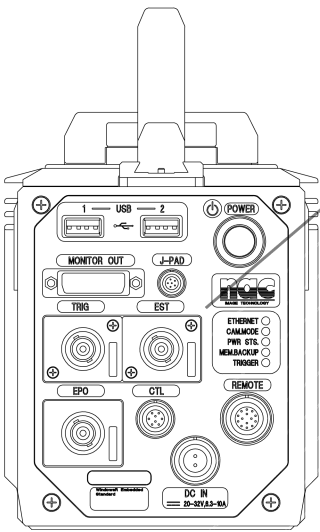


- 1 Intake ports ► 2-2
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- 3 Nameplate (where the serial number is located)

Front and Back

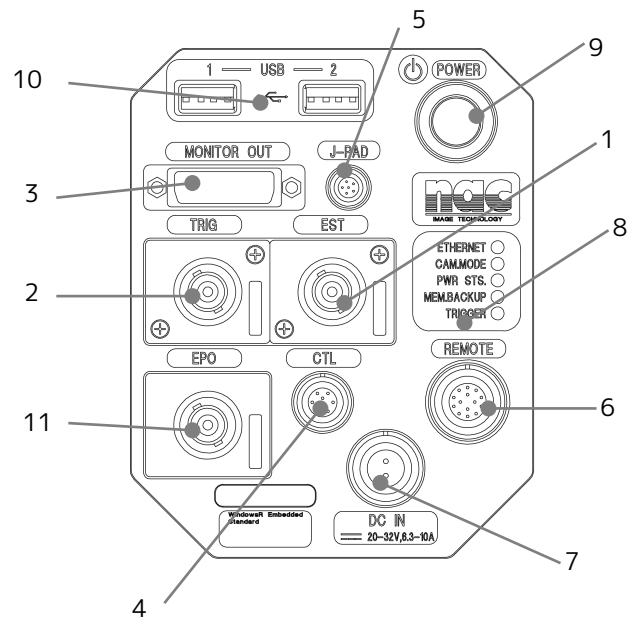


1 Lens mount ▶▶ 2-3



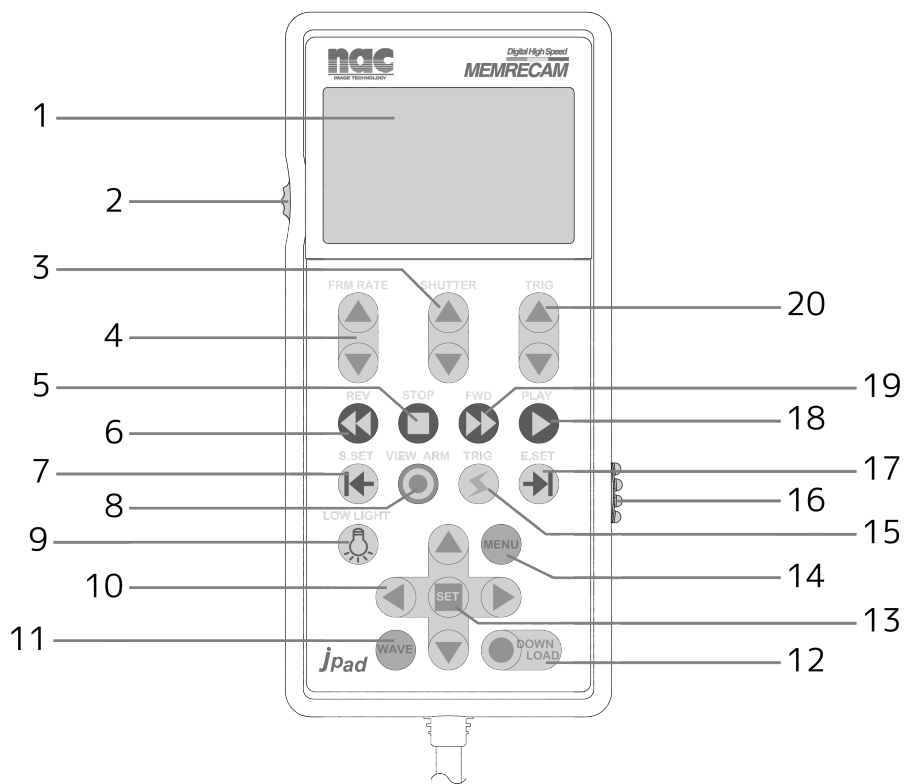
Rear Panel
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Rear Panel




- 1 EST1 connector ▶▶ 4-67
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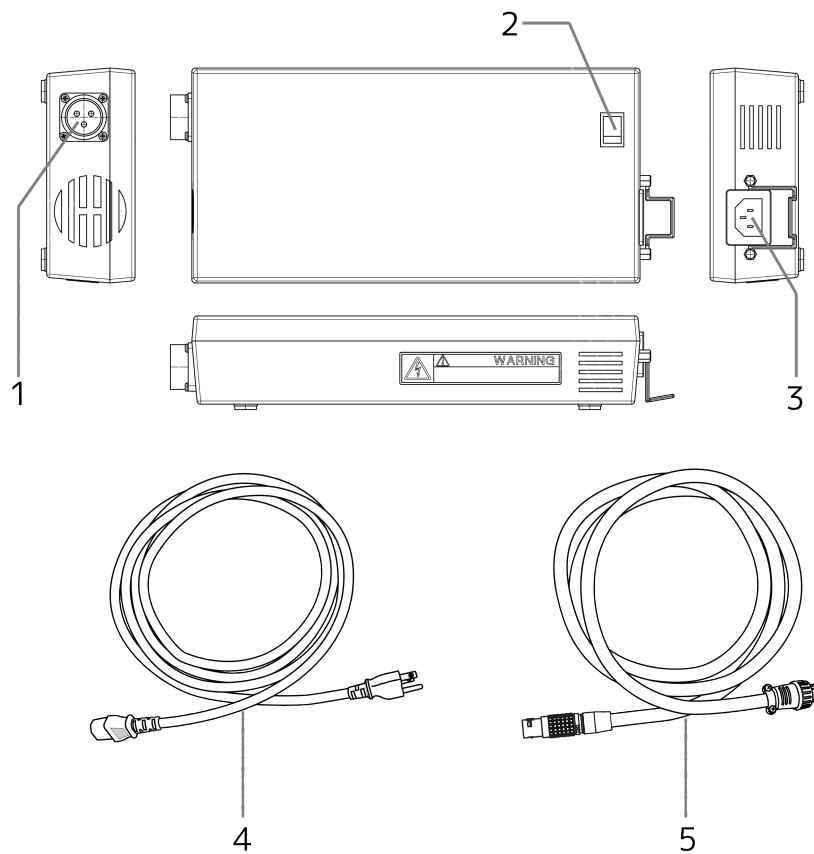
■ External View Names on J-PAD3 (Remote controller)



- | | |
|---------------------------------------|-------------------------------|
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| 8 VIEW/ARM button ▶▶ 3-15、3-19 | 18 PLAY button ▶▶ 3-26 |
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| 10 Up/down · Left/right arrows ▶▶ 3-9 | 20 TRIG Direct button ▶▶ 3-18 |

 Attention J-PAD3 (remote controller) sold separately.

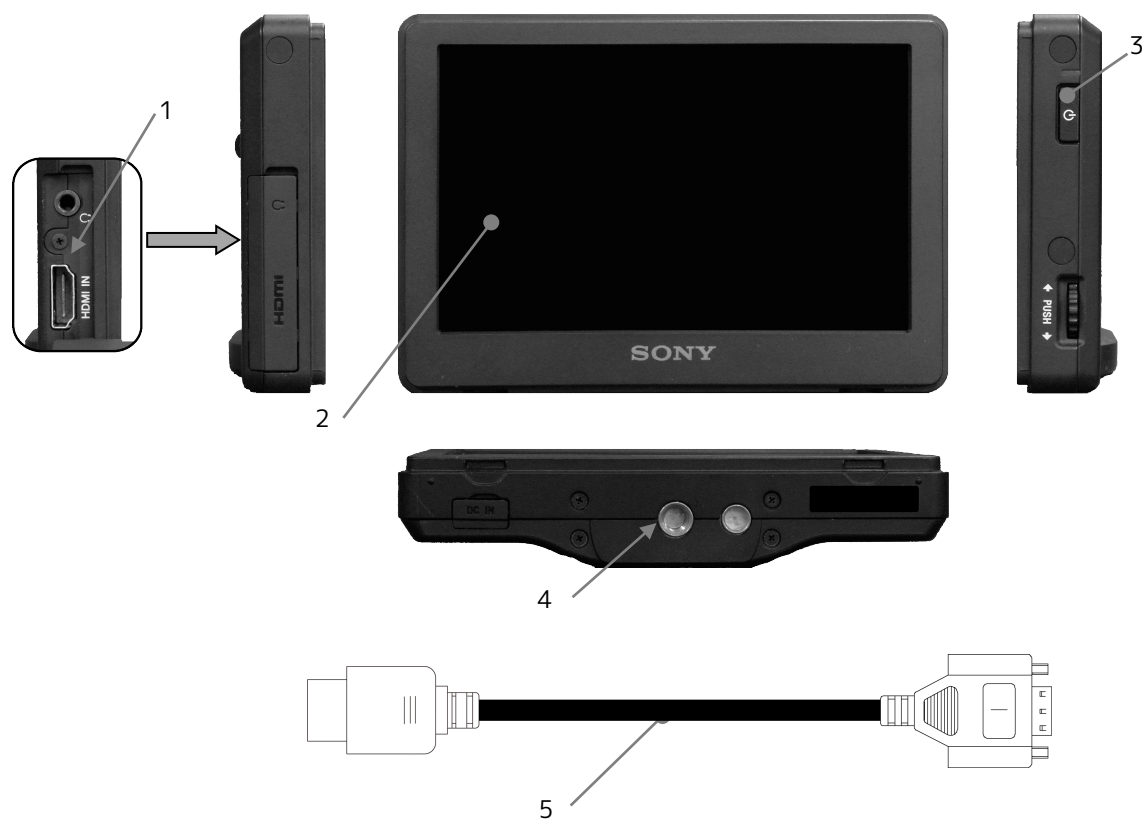
■ External View of the Memrecam HX-3 AC Power Supply



- 1 DC connector ▶▶ 2-8
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- 4 AC cable ▶▶ 2-8
- 5 DC cable ▶▶ 2-8

 Attention AC POWER SYSTEM sold separately.

■ External View and Names on the Viewfinder



- 1 HDMI connector
- 2 Liquid crystal display ▶▶ 3-2
- 3 Power switch ▶▶ 2-12
- 4 Shoe fitting
- 5 HDMI-DVI Cable



• The appropriate image resolution of a view finder is 800x480.



Viewfinder sold separately.

Refer to the viewfinder's manual for details.

Flow of Operations

There are four ways to operate the Memrecam HX-3.

J-PAD3 remote control operation

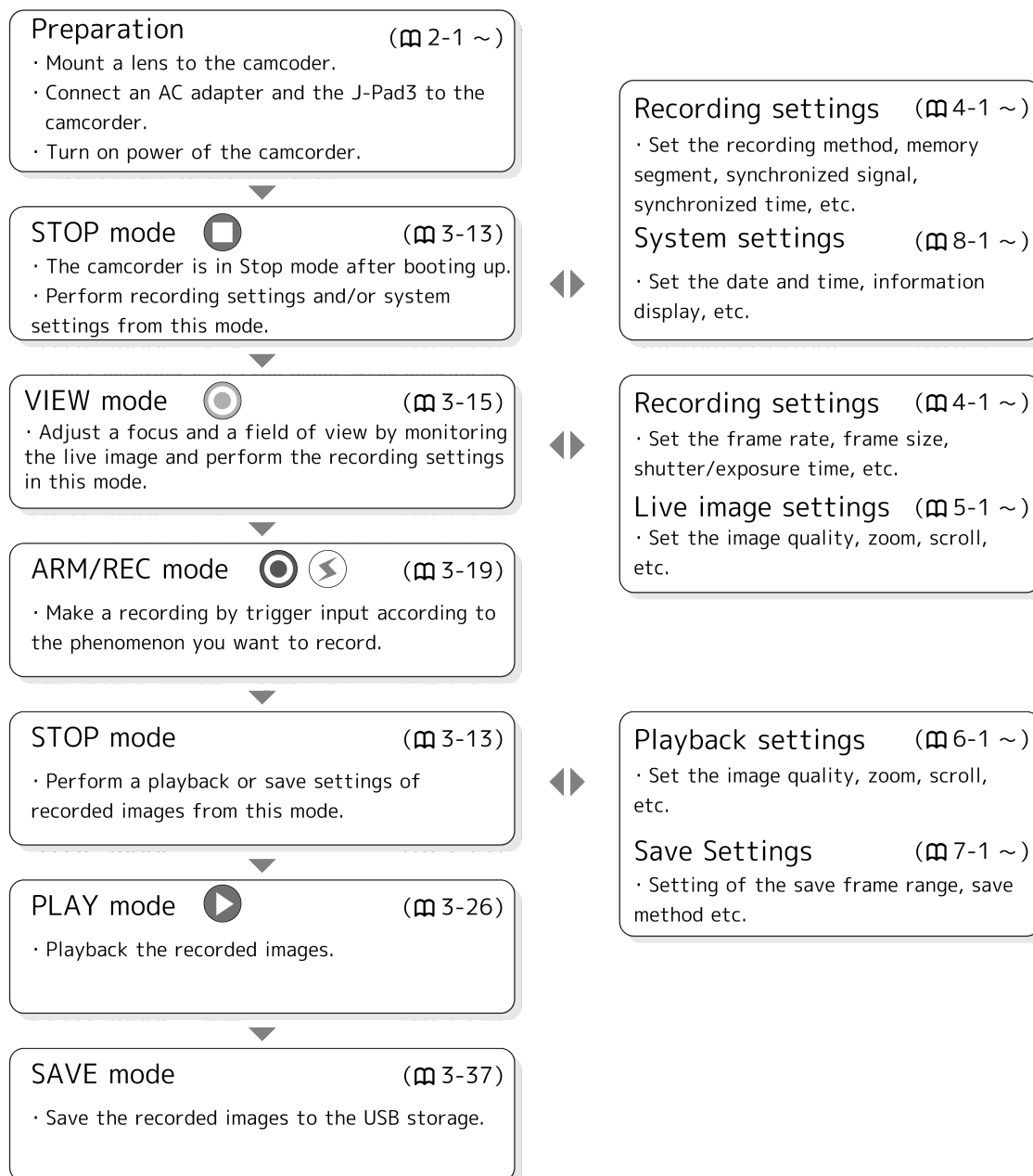
Windows control software HXLink operation

External input signal operation

Auto pilot from the sequence file on the USB storage device

This manual describes operation using the J-PAD3 remote control.

The flow of basic recording, playback and saving using this device is as shown in the following chart.



• Please read the “HXLink Users Guide” for operations with the control software HXLink and operations with auto pilot.

2

Preparations

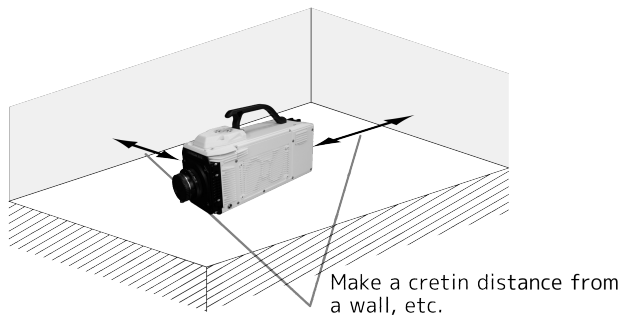
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Mount the EF lens	2-18

Camera Installation

The MEMRECAM HX-3 can be setup on a level table or tripod.

■ Camera Installation on a Level Table

The Memrecam HX-3 can be setup on a level table or desk.



Attention

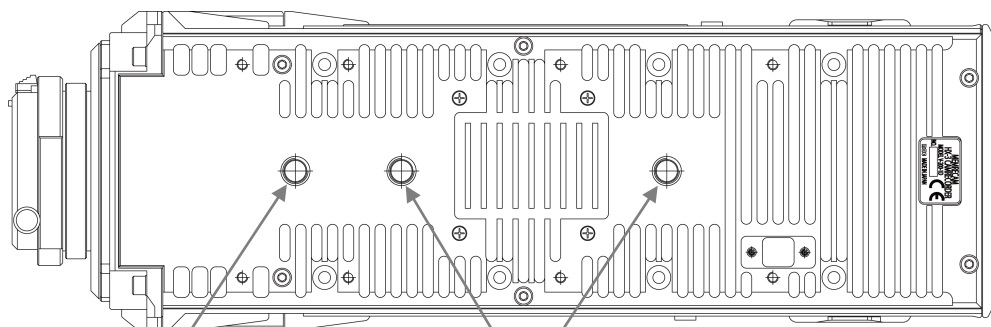
There are intake ports and exhaust vents on the front, back, left and right sides of the camera for ventilation using the fan.

To avoid hampering the air flow, install away from walls. If possible, install in a location with good ventilation.

Make sure not to obstruct or cover the intake ports or exhaust vents.

■ Connecting the Memrecam HX-3 to a Tripod

The Memrecam HX-3 requires two 3/8-16UNC diameter screws less than 11mm in length and one 3/8-16UNC diameter screw less than 8mm for mounting to a Tripod.



Mounting screw (Depth 8mm)

Mounting screws (Depth 11mm)



Attention

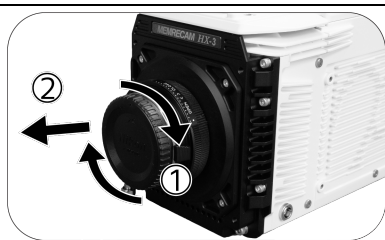
- The weight of this device alone is approximately 5.3-6.1kg or 11.68-13.44lbs. not including the handle and lens mount. Use a tripod rated for this weight including the lens and cabling.
- Contact your Sales Representative for the recommended tripod.

Mounting the Lens

Secure the lens mount adapter to the front panel of the MEMRECAM HX-3 using the four screws. The four variations of mount adapters include the F mount, C mount, NM mount and EF mount. This describes the installation of the lens with the F mount.

A Nikon F mount lens can be mounted to the MEMRECAM HX-3 F mount adapter.

■ Mounting the Lens



1 Remove the Protective Caps

- Remove the Memrecam HX-3 mounting cap and lens caps.



2 Mount the lens

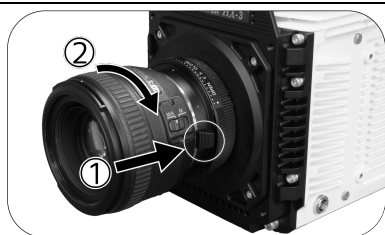
- Align the Red indicators of the lens and the mount adapter (①) and turn the lens in the direction of the arrow until it is locked. (②)

3 Select Manual Focus Mode

- The Memrecam HX-3 F Mount does not have an auto focus function.

Refer to your lens User Guide for details on using the lens.

■ Removing the Lens



1 Removing the Lens

- While pressing the lens removal button on the mount adapter (①), turn in the direction of the arrow (②).



- Attention**
- It is recommended to put the mounting cap on the MEMRECAM HX-3 when a lens is not attached. Avoid having dirt, dust or other foreign matter adhere to the interior of the mount.
 - Depending on the image resolution a portion of the lens may have Vignetting. (Ex: Nikon DX Nikkor lens)

Adjusting the Lens Aperture

This describes the F mount lens aperture adjustment. The diaphragm on the Memrecam HX-3 can be used for adjusting lenses without diaphragms or external aperture rings.

There is a diaphragm adjustment on the F mount adapter of the MEMRECAM HX-3.

The aperture can be adjusted using the diaphragm on the main camera unit even when mounting lenses without diaphragms or external aperture rings.



■ Adjusting the Aperture

The method of adjusting the aperture is different based on whether or not the lens has an aperture ring.

If the lens has a diaphragm



Adjust the aperture with the diaphragm on the lens

- Turn the diaphragm in the CLOSE direction until it stops.
- The diaphragm function is disabled.
- Next, turn the diaphragm on the lens to adjust the aperture.

(Ex. : SIGMA ASPHERICAL 24mm 1:1.8D EX
DG MACRO)



Attention • If using a lens with a diaphragm and the diaphragm is not turned in the CLOSE direction, the proper aperture will not be possible even if the aperture is adjusted with the diaphragm on the lens. Make sure to turn the diaphragm in the CLOSE direction until it stops.

If the lens does not have a diaphragm



(Ex. : Nikon ED AF-S NIKKOR 70-300mm
1:4.5.6G)

Adjust the aperture with the diaphragm

- Turn the diaphragm to adjust the aperture.
- The aperture closes when turned in the CLOSE direction.
- Image darkens
- The depth of field and focal range are increased
- The aperture opens when turned in the OPEN direction.
- Image brightens
- The depth of field narrows (The focus range narrows)

The mark (●) on the diaphragm is the standard so adjust while verifying the actual image.

Connecting the Camera and Cables

This describes the peripherals and cable connections including the power source, J-PAD3 and monitor.

■ Input/Output Connectors

List of Input/output Connectors

Name of Connector	Name of Branch Connector	Input/output Signal
EST	—	Exposure start signal input (EST1)
TRIG	—	External trigger input (TRIG1)
MONITOR OUT	—	Monitor signal output
CTL	ARM IN (※1)	ARM start signal input
	ARM OUT (※1)	ARM status signal output
	FAULT (※1)	FAULT status signal output
J-PAD	—	For connecting the J-PAD3
REMOTE	ETHER	10/100/1000BASE-T Ethernet
	TRIG2 (※2)	External trigger input (TRIG2)
	EST2 (※2)	Exposure start signal input / event input (EST2)
	IRIG-B (※2)	IRIG-B time code input
	EPO (※2)	Exposure pulse output (EPO) (※4)
	PWRCNT (※2)	Power control signal input
DC IN	—	Power input
USB	—	USB2.0 compatible device connection
LENS CTL (※3)	—	Lens control signal for EF mount
EPO	—	Exposure pulse output (EPO) (※4)

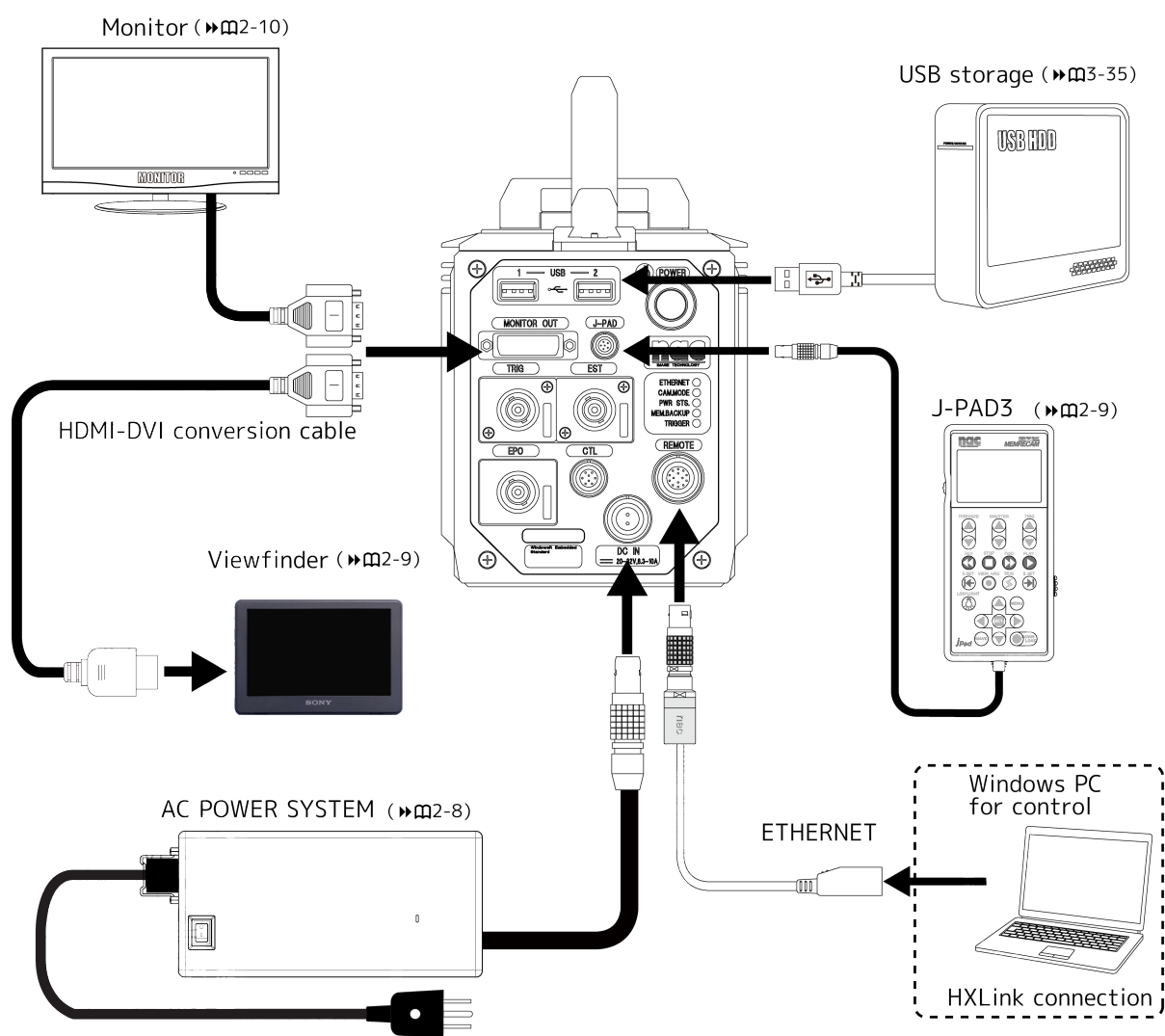
※1 Requires CTL cable (optional) .

※2 Requires J3 split cable (optional) .

※3 On the right side of the front of the main unit.

※4 Identical signals are output.

Diagram of Input/Output Connections on the Rear Panel

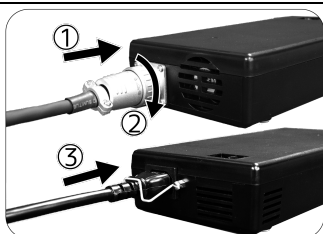


■ Power Connections

Connecting the AC Power Supply.

1 Turn the power switch to OFF. (▶▶ 2-15)

- Turn the power switch on the AC adapter to OFF.



2 Connect the power cable to the AC adapter.

- Match the shape of the DC OUT connector with that of the DC cable plug and insert (①). Turn the shell of the cable plug in the direction of the arrow (②) clockwise to lock the cable.
- Insert the AC cable directly into the AC IN connector (③).

3 Plug in the AC cable.



4 Connect the DC cable to the HX-3

- Align the DC IN connector on the rear panel of the HX-3 with the red mark on the DC cable plug and insert until a clicking sound is heard.
- When removing the DC cable from the MEMRECAM HX-3 grasp the shell of the plug and pull straight out.



Attention • When inserting and removing the DC and AC cables turn off the power to the main Memrecam HX-3 camera and the AC adapter. Turn off the main Memrecam HX-3 power before turning OFF the AC adapter switch. (▶▶ 2-15)

- Do not open the cover on the AC adapter. Dangerously high voltage is generated in some areas. Electrical shock may occur if used without properly grounding the power supply.
- If connecting to an outlet using a 3P-2P conversion plug connect the grounding wire of the conversion plug to external grounding.
- Do not use the MEMRECAM HX-3 dedicated AC adapter on other devices.

■ Connecting the J-PAD3 Remote Controller



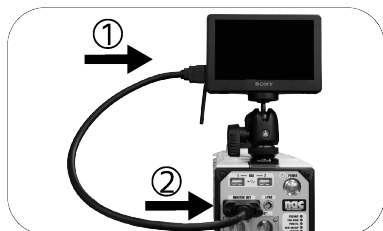
1 Connect the J-PAD3 cable

- Insert the J-PAD3 cable to the J-PAD3 connector on the rear panel of the Memrecam HX-3 main unit.
- Once the Memrecam HX-3 power is ON, power is automatically supplied to the J-PAD3.



The J-PAD3 cable can be left inserted into the HX-3 power or unplugged.

■ Connect the Viewfinder



1 Connect the HDMI-DVI Conversion Cable

- Connect a HDMI connector of the HDMI-DVI conversion cable to a HDMI connector of the Viewfinder (①) .
- Connect a DVI connector of the HDMI-DVI conversion cable to a MONITOR OUT connector of the rear panel of the MEMRECAM HX-3 (②) .



Attention • The proper image resolution for the viewfinder (▶ 1-11) is 800×480. Please set the display resolution during use. (▶ 8-5)

■ Connect the Monitor

Connecting a digital monitor.

Monitor Specifications

Connectors	DVI terminal (DVI-D)
Monitor signals	DVI-D (single link)
Scanning frequency	60~85Hz
Screen resolution	640 × 480
	800 × 600
	1024 × 768
	1280 × 1024
	1920 × 1080 (recommended resolution)

Recommended monitor display resolution 1920 × 1080 LCD monitor



- Monitors with other resolutions other than those stated above and those with less than 1920 x 1080 can be used.
- There are resolutions that cannot be set on some monitors. (Ex. Some monitors with a panel resolution of 1920 × 1200 cannot be set to a resolution of 1920 × 1080).



1 Connect the monitor cable.

- Connect the DVI connector of the monitor cable to the MONITOR OUT connector of the rear panel of the Memrecam HX-3.



- If display on the monitor is not possible at the optimal resolution, set the display resolution.
(▶▶ 8-5)

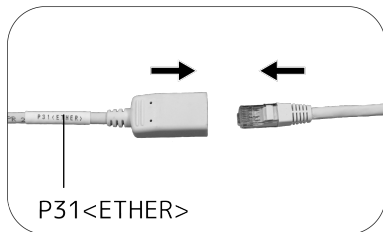
■ Connect the Control Windows PC

Connect using the Ethernet to connect to a PC.



1 Connect the easy J3 branch cable to the REMOTE connector

- Connect the easy J3 branch cable or the J3 branch cable (sold separately) to the REMOTE connector.



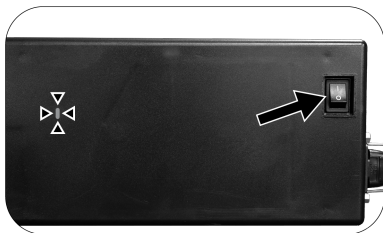
2 Connect the Ethernet cable to the JC branch cable Ethernet connector

- Connect the Ethernet cable to the J3 branch cable Ethernet (RJ45) connector. Connect the other Ethernet cable to the Windows PC.

Turning the Power ON/OFF

Power on the MEMRECAM HX-3.

■ Starting the HX-3



1 Turn the AC adapter power switch ON.

- Turn the switch ON after confirming that the AC and DC cables are connected to the AC adapter and the MEMRECAM HX-3 (▶▶ 2-8) .
- The AC adapter power switch LED lights up.



2 Turn the Viewfinder power switch ON.

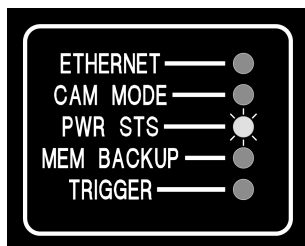


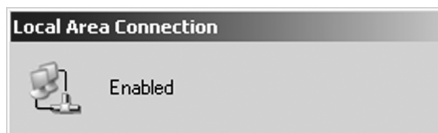
When turning on the viewfinder after starting up the camera, there may be nothing displayed in the viewfinder, or the display may not be at the proper resolution.



3 Press the power switch for the HX-3 to startup the camera.

- Press the power switch (target : 2 seconds) and the PWR STS status LED on the rear panel lights up in green. Once the light turns green, remove your finger from the power switch.
- If the J-PAD3 is connected, the J-PAD3 is also powered.





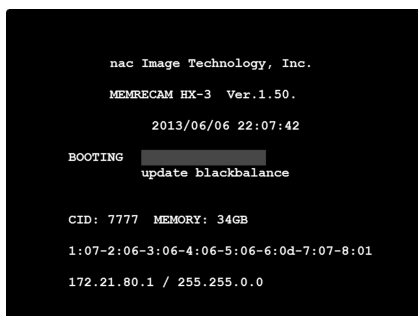
4 The Memrecam HX-3 will start up and perform a self-diagnosis.

- ① If the Viewfinder is connected the initial screen for the Viewfinder is displayed.

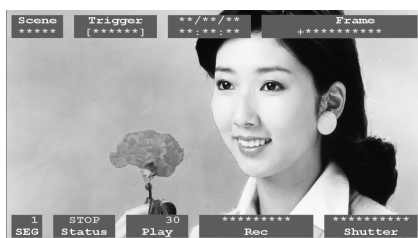
- ② Wait a bit and "BOOTING" appears at the top left of the monitor or viewfinder. After several seconds, the "Local Area Connection" dialogue appears in the center of the screen.



- Cameras with firmware version 1.30 and later do not show the "Local Area Connection" dialogue. If these cameras are powered with the network (Ethernet) connected, it may take several seconds to start up the camera. (▶▶ 2-10)



- ③ The system information is then displayed on the Monitor or Viewfinder. The self-diagnosis of the camera is performed automatically. During self-diagnosis, the firmware version, camera identification number, amount of memory and network settings are displayed.



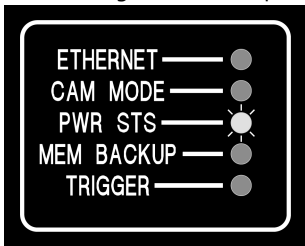
- ④ When the self-diagnosis is complete the Memrecam HX-3 switches to the STOP mode (▶▶ 3-13). A photographed image is displayed during self-diagnosis. If started up with the image recorded in the memory, the recorded image is displayed. (▶▶ 3-24)



- In addition to the rear panel power button the Memrecam HX-3 power can also be controlled remotely from the external input/output Power Control Input signal or PWRCNT.

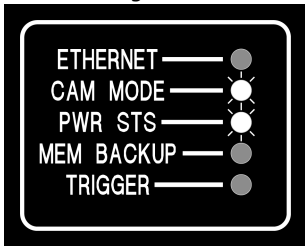
■ Status LED Display during Startup

The Power Status, PWR STS, on the rear panel of the Memrecam HX-3 is red until the power button is pressed and the self-diagnosis is complete.



During
Start Up The PWR STS:Lit Red

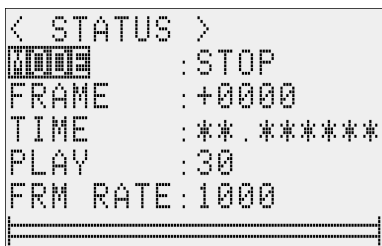
Once the self-diagnosis is done and startup is complete the PWR STS goes green and the CAM MODE is lit blue.



Startup
completed PWR STS : Lit green
 CAM MODE : Lit blue
 (STOP mode)

■ J-PAD3 Startup

The J-PAD3 is powered when the Memrecam HX-3 is powered on. There is no power switch on the J-PAD3.



After the Memrecam HX-3 startup is complete the J-PAD3 startup will also be complete. The STOP mode status screen is displayed on the LCD of the J-PAD3.

■ Turning Off the Memrecam HX-3 Power

1 Turning off the HX Link and HX-3 connection with a Windows PC

- Save any required images before turning off.
- Disconnect the HX Link and the HX-3.

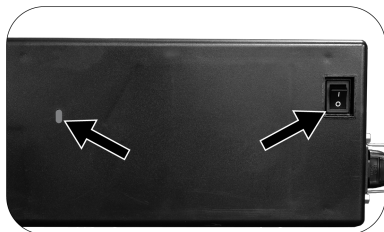


2 Continually press the HX-3 power switch to turn OFF.

- Continually press the power switch (target: 2 seconds) and the viewfinder screen will go dark so remove the finger pressing the power switch.
- The J-Pad3 and PWR STS LED turn off for a while after the display disappears.
- If there are the recorded images in memory the Memory Backup, MEM BACKUP LED will be lit. (▶ 3-24)



3 Turn the Viewfinder power switch OFF (Only when the viewfinder is connected.)



4 After checking to make sure the PWR STS on the back of the Memrecam HX-3 is not lit turn the AC adapter power switch to OFF.



Attention

- The recorded images may be lost by turning off the AC adapter if the built in memory backup battery is not charged. (▶ 3-24)
- Before turning off the power download the recorded images to a USB storage device or computer.
- Refer to the "HXLink Users Guide" for downloading to a computer or USB storage device. (▶ 3-37)

Mount the EF mount adapter

This describes the installation of the optional EF mount adapter.



Attention

Make sure the HX-3 power is turned off when mounting or removing the EF mount adapter.
(▶▶ 2-15)

Adjust the lens mounting adapter for the EF mount adapter and such for each camera. Do not mount on other cameras.

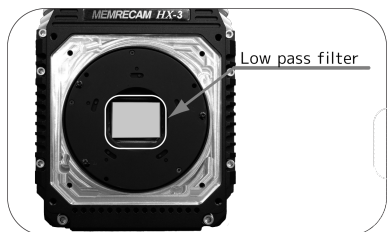
■ Mount the EF mount adapter

1 Turn off the power to the HX-3 and the AC adapter.



2 Remove the screw securing the lens mount attached to the HX-3.

- Do not lose the screw.



3 Remove the lens mount attached to the HX-3.



Attention

Removing the EF mount adapter exposes the low pass filter. Do not touch the surface. The image quality may deteriorate if dirt adheres to the surface.

Additionally, the filter is a part that is damaged easily. Return to the retail outlet for cleaning if dirt such as oil adheres.



4 Mount the EF mount adapter to the HX-cable is at the top.

- Mount so the cable is at the top.



5 Secure the EF mount adapter with the screw removed in #2

- Mount so the cable is at the top.



6 Connect the cable to the HX-3.

Mount the EF lens

This describes the installation of the optional EF lens.

A Canon EF lens mount can be mounted on the EF mount adapter HX-3, however it is not compatible with "EF-S lens" and "EF-M lens"

■ Mount the EF lens



1 Remove the cap

- Remove the HX-3 mounting cap and back cover of the lens.



2 Mount the lens

- Align mark on the lens and the mounting adapter (red) (①) and turn the lens in the direction of the arrow until a clicking sound indicates it is locked (②).



3 Switch the focus mode of the lens to "AF"

- To learn about how to handle the lens, refer to the user's guide for the lens used.

■ Remove the EF lens



1 Remove the lens

- Turn in the direction of the arrow (②) while pressing the lens removal button on the mounting adapter (①).



- When mounting the lens to the MEMRECAM HX-3, make sure to mount the mounting cap. Also, use caution to avoid getting dirt or dust inside the mount.

3

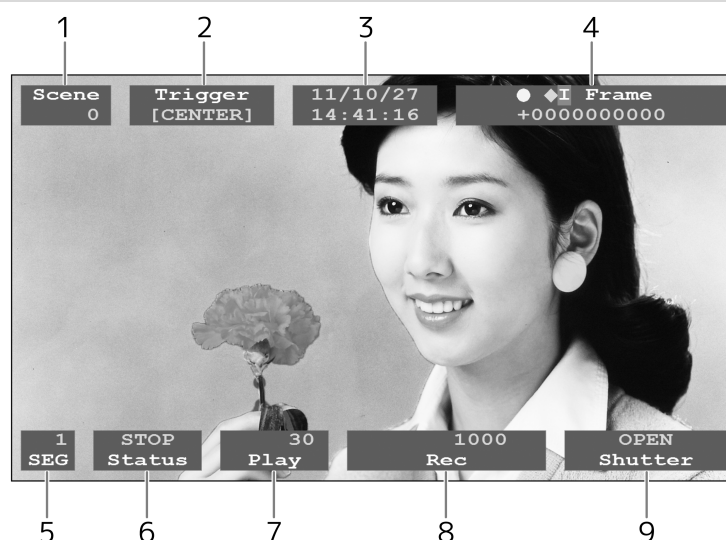
Basic Operations

Screen Display.....	3-2
J-PAD3 Operation.....	3-7
Stop (STOP Mode)	3-13
Display Live Video (VIEW Mode)	3-15
Basic Recording Settings.....	3-17
Start Recording (ARM Mode)	3-19
Trigger Input (REC Mode)	3-22
Memory Backup	3-24
Playback (PLAY Mode)	3-26
Repeated Playback (LOOP Mode).....	3-28
Frame advance · Fast Forward · Quick Reverse	3-30
Jump to a Specific frame	3-31
Change the Playback Speed	3-32
Set the range for playback · saving	3-33
Save the image.....	3-37
Lens Control	3-40

Screen Display

The status information displayed on the Monitor, Viewfinder screen and J-PAD3 LCD screen are described in this section. The recording and playback settings and information are superimposed on the live image and playback image on the Monitor and Viewfinder.

Viewfinder and Monitor Display



1 Scene (▶▶ 4-50)

Displays the Scene number which increases by 1 for each recording.

2 Trigger (▶▶ 3-18)

Displays the current trigger settings.

3 Trigger Date and Time (▶▶ 3-22)

Displays the time and date of the trigger input of the recorded images.

4 Frame (▶▶ 8-13)

Displays the current frame number or the remaining recordable frames and the marks of the frame information.

5 SEG (▶▶ 4-51)

Displays the memory segment number currently being recorded or played back.

6 Status

Displays the operational mode for the camera.

7 Play (▶▶ 3-32)

Playback speed for the video.
(Units : Frames/second)

8 Rec (▶▶ 3-17)

Displays the record or frame rate. During the STOP and PLAY modes the recorded images are displayed. The VIEW, ARM and REC modes display the current values. (Units: Frames/second)

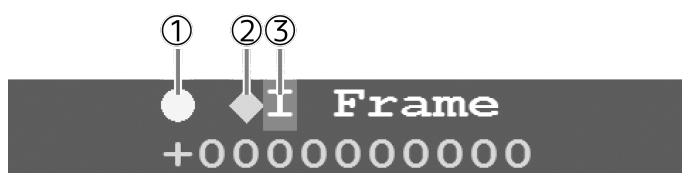
9 Shutter (▶▶ 3-17)

Displays the shutter exposure time. During the STOP and PLAY modes the recorded images are displayed. The VIEW, ARM and REC modes display the current values.
(Units : Microseconds/Milliseconds)

The contents of the information displayed changes according to the operation mode and settings. Please refer the HXLink Users Guide for details of each function.

Symbols Shown on the Frame Counter

Symbols showing the frame status during recording or playback are displayed on the frame counter.

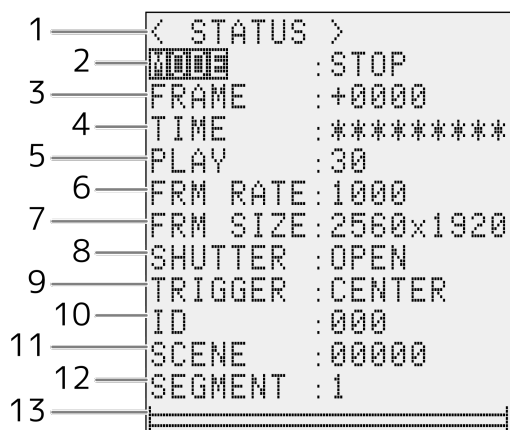


Number	Symbol	Description	▶▶
①		Trigger or event symbol (yellow) The currently displayed frame is the trigger or the event frame.	3-26 9-22
②		EVENT input symbol (light blue) The signals input with EST2/EVENT input are frames with valid polarity.	4-67
③		IRIG symbol (Green : IRIG synchronizing, Red : no IRIG synchronizing) The IRIG signals and synchronization status are shown when set to IRIG time synchronization.	4-74

Please refer the pages for each function for details on the symbols displayed.

J-PAD3 Status Display

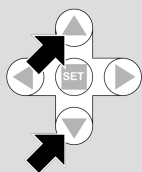
In the STOP, VIEW, ARM and REC modes there are 11 status indicators. Press the MENU key to display the MENU settings.



- | | |
|--|--|
| 1 STATUS: Current display Status | 8 SHUTTER: Displays the shutter speed |
| 2 MODE: Displays camera status | 9 RIGGER: Displays the trigger timing |
| 3 FRAME: Displays current frame number | 10 ID: Displays the ID number of the recording |
| 4 TIME: Displays current frame time | 11 SCENCE: Displays the scene number |
| 5 PLAY: Playback speed | 12 SEGMENT: Displays the segment number |
| 6 Frame rate | 13 Playback range bar |
| 7 PLAY: Playback speed | |

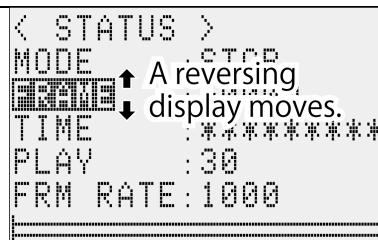
There are six lines of information displayed on the LCD at one time for the bar and status of 2~13. The items and sequence displayed vary according to the operational mode of the camera. Read the pages for each mode for details on the items displayed.

■ Verifying the Display Status



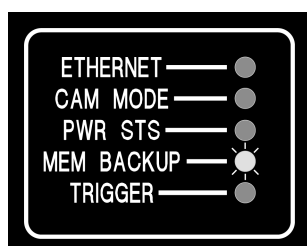
Press the up/down arrows on the J-PAD3

- Repeatedly press the up/down arrows on the J-PAD3 to move the selected item (reverse display) scroll the screen up and down along with the selected item.
- If the left/right arrows are pressed for the frame time TIME the time display scrolls to the left/right.



LED Panel Display Status

There are 5 status LEDs on the rear panel of the Memrecam HX-3 camera.

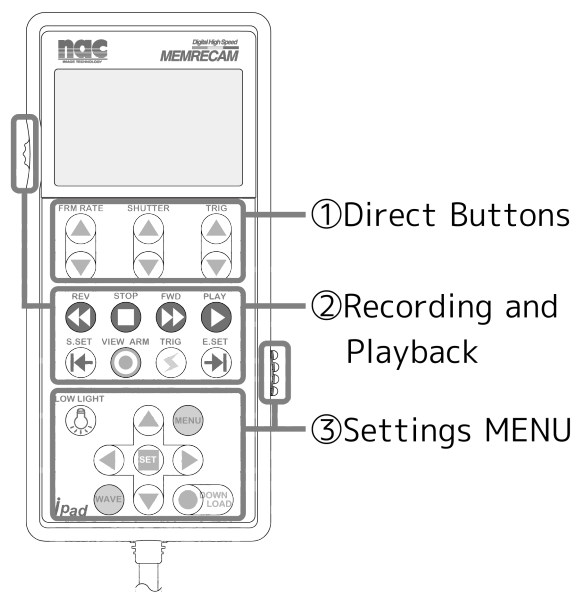


LED	LED Status	Operation	▶▶
ETHERNET	Lit orange	1000BASE-T network communication	—
	Flashing green	100BASE-TX network communication	—
	Off	No network connection	—
CAM MODE	Lit Blue	STOP mode, PLAY mode, LOOP mode, SAVE mode, DOWNLOAD mode	3-13
	White (Flashing)	VIEW mode (Flashing with EST synchronized settings)	3-15
	Purple (Magenta) (Flashing)	ARM mode (Flashing with EST synchronized settings)	3-19
	Orange (Flashing)	REC mode (Flashing with EST synchronized settings)	3-22
	Off	Power OFF	—
PWR STS	Lit Green	Power ON, normal status (no warning display)	2-14
	Lit Red	Power ON, fail status (no warning display)	9-44
	Off	Power OFF	—
MEM BACKUP	Lit Green	Memory backup is valid by AC adapter (Charge: High)	3-24
	Flashing Green	Memory backup is valid by built-in battery only (Charge: High)	
	Lit Orange	Memory backup is valid by AC adapter (Charge: Medium)	
	Flashing Orange	Memory backup is valid by built-in battery only (Charge: Medium)	
	Lit Red	Memory backup is valid by AC adapter (Charge: Low)	
	Flashing Red	Memory backup is valid by built-in battery only (Charge: Low)	
	Off	Memory backup is invalid	
TRIGGER	Lit Red	After trigger input	4-62
	Off	Before trigger input	

J-PAD3 Operation

The MEMRECAM HX-3 camera setup and playback operation can be made from the J-PAD3.

Buttons and Switches



① Direct Buttons

FRM RATE



FRM RATE Direct button (▶▶ 3-17)
Changes the frame rate.

SHUTTER



SHUTTER Direct button (▶▶ 3-17)
Changes the shutter speed.

TRIG



TRIG Direct button (▶▶ 3-18)
Changes the trigger timing.

② Recording and Playback

STOP



STOP button (▶▶ 3-13)

Switches the operational mode to the STOP mode. Return to the status display from the settings MENU.

VIEW ARM



VIEW ARM button (▶▶ 3-15, 3-19)






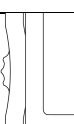

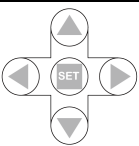
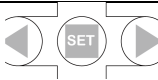




Switches the operational mode to the VIEW mode and ARM mode.

TRIG



TRIG button (▶▶ 3-22)

Trigger input to record images.

	PLAY button (▶▶ 3-26) Switches the operational mode to the PLAY mode or LOOP mode and plays back the video.
	REV button (▶▶ 3-30) Quick reverse, frame advance reverse.
	FWD button (▶▶ 3-30) Fast forward, frame advance forward.
	S.SET button (▶▶ 3-33) Sets the playback start frame.
	E.SET button (▶▶ 3-33) Sets the playback last frame.
	Dial Changes the value selection up/down and playback speed.
③ Settings MENU	
	MENU button (▶▶ 3-9) Sets each selection by switching to the MENU.
	Up/down arrows · Left/right arrows (▶▶ 3-9) Selects the desired setting ...Increases or decreases the set values.
	SET button Sets the values or selection.
	LOW LIGHT button (▶▶ 5-13) Initiates the low light function.
	DOWNLOAD button (▶▶ 3-37) Downloads the recorded images.
	WAVE button Using a part of functions, it is operated combining this button. (Ex. : Lens control of EF mount adapter etc(▶▶ 3-40) , A cooling fan is stopped(▶▶ 4-86)etc.)
	Hold switch Temporarily disables operations from the J-PAD3.

MENU Display

J-PAD3 recording or playback settings and saving of recorded images can be changed with the direct button and the display can be switched to any MENU from the MENU button.

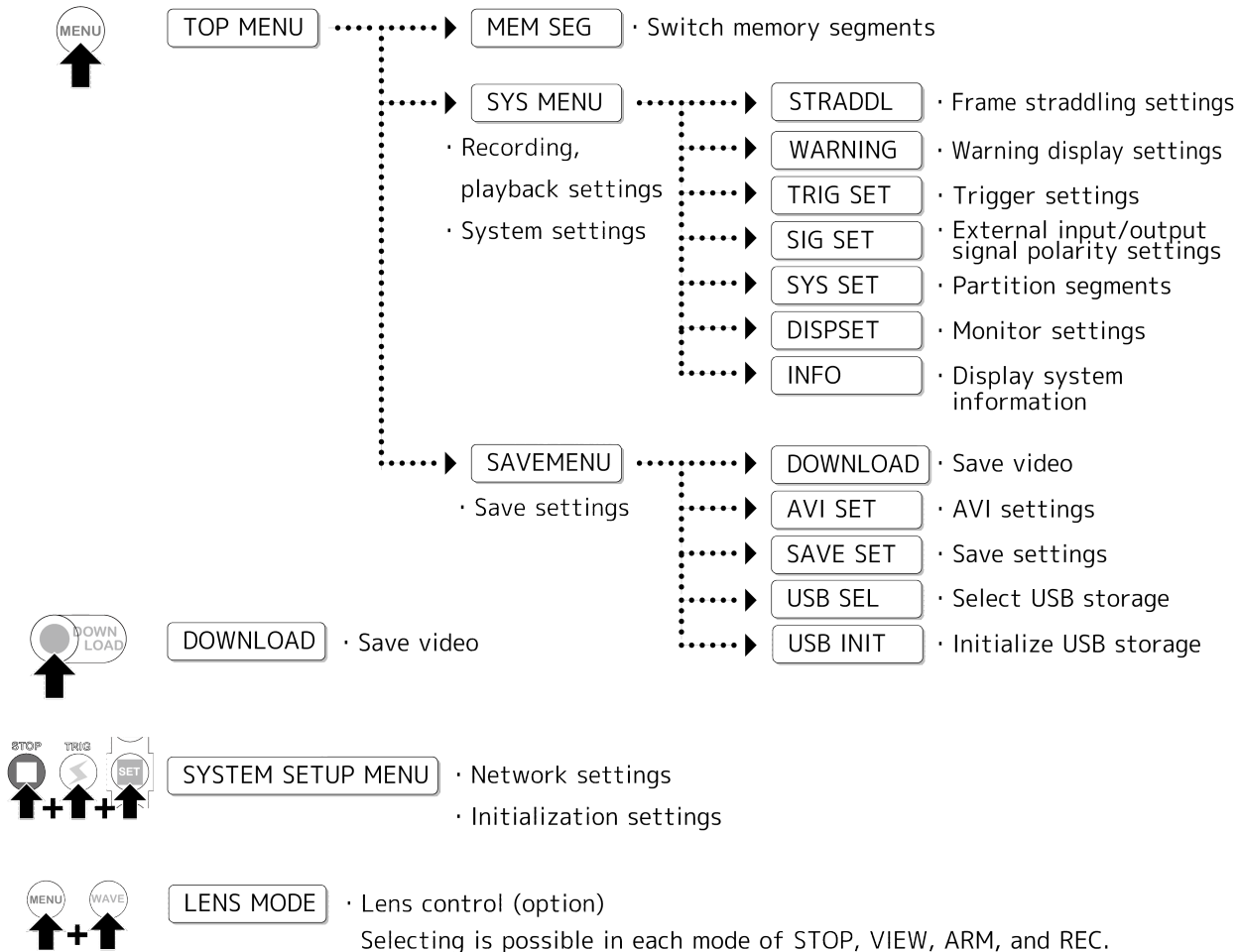
MENU displayed during the STOP mode

- During status display in the STOP mode press the MENU button to switch the LCD display to the TOP MENU. Recording or playback settings can be made in the TOP MENU. As shown on the next page all types of setting screens can be accessed from the TOP MENU.
- During status display in the STOP mode press the DOWNLOAD button to switch to DOWNLOAD. Images can be saved to USB media on the DOWNLOAD screen.
- During status display in the STOP mode simultaneously press the STOP, TRIG and SET buttons to switch to the SYSTEM SETUP MENU. You can also restore the network settings or factory settings with the SYSTEM SETUP MENU.

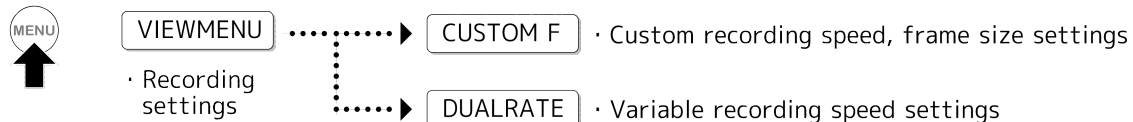
MENU displayed during the VIEW mode

- During status display in the VIEW mode press the MENU button to switch to the VIEW MENU. Recording settings can be made in the VIEW MENU.

• STOP Mode



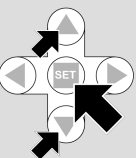
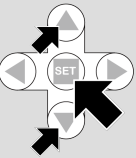


• VIEW Mode




■ Accessing the Desired Setting Screen from the TOP MENU

The following describes the transition from the STATUS display to INFO.

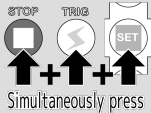
	1 Access the STOP mode (□ A 3-13) <ul style="list-style-type: none"> • If in the VIEW mode or ARM mode, switch to the STOP mode. 	
	2 Press the MENU button to display the TOP MENU <ul style="list-style-type: none"> • <TOP MENU> is shown on the first line. 	<pre> <TOP MENU> BLK BAL : REG SET D-GAIN : NORMAL H> WHT BAL : AUTO 3100 ENHANCE : NORMAL H> GAMMA : NORMAL CHROMA : 100 150 > </pre>
 Select and SET	3 Use the up/down arrows to select SYS MENU and press the SET button <ul style="list-style-type: none"> • Use the up/down arrows to the desired selection then select SYS MENU and press the SET button. • Press the SET button to display the SYS MENU sub-menu. (TOP MENU > SYS MENU) 	<pre> <TOP MENU> LUMINANC : NORMAL L> GXC : OFF ON LOCK : OFF PC L> MFM SER : > SYS MENU : > SAVEMENU : > </pre>
 Select and SET	4 Use the up/down arrows to select INFO and press the SET button <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display), select INFO and press the SET button. 	<pre> TOP MENU > SYS MEN WARNING : > TRIG SET : > SIG SET : > SYS SET : > DISPSET : > INFO : > </pre>
	5 Displays the selections in INFO <ul style="list-style-type: none"> • Move to INFO. (TOP MENU > SYS MENU > INFO) 	<pre> > SYS MENU > INFO MODEL : ECAM HX-3 VERSION : 1.50 CID : 7777 MEM SIZE : 34155 REVISION : 1:07-2:06 NETWORK : ETHERNET </pre>

■ Accessing the SYSTEM SETUP MENU




1 Access the STOP MODE (▶▶ 3-13)

- If in the VIEW mode or ARM mode, switch to the STOP mode.




2 Simultaneously press the STOP, TRIG, and SET buttons

- Simultaneously press the STOP, TRIG and SET buttons.
- The SYSTEM SETUP MENU appears.




```
< SYSTEM SETUP MEN
DHCP : OFF
IP ADDR : 172.021.0
MAC ADDR: 70:58:12:
RESET :
REBOOT :
```

■ Displaying the VIEW MENU




1 Access VIEW (▶▶ 3-15)

- If in the STOP mode or ARM mode, switch to the VIEW mode.



2 Press the MENU button to display the VIEW MENU

- <VIEW MENU> is displayed on the first line.



```
<VIEW MENU>
BLK BAL : SET
SCENE : 00000
TRIGGER : CENTER E>
FRM RATE: 1000 2000
FRM SIZE: 1920x1080
CUSTOM F:>
```

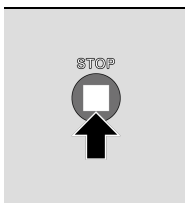


• Please refer to this book for saving images with the DOWNLOAD button (▶▶ 3-37)

STOP (STOP Mode)

The MEMRECAM HX-3 defaults to the STOP mode after startup.
During the STOP mode the image is not live.

Selecting the STOP Mode



Press the STOP button while in the STATUS screen on the J-PAD3

- Select the STOP mode from any camera mode including VIEW mode and ARM mode.
- Press the STOP button once while the MENU is displayed to select the Status display and then press the STOP button again.
- The status LED for CAM MODE on the rear panel of the camera lights up in blue.

STOP Mode Monitor and Viewfinder Display



- The images saved in the camera memory appear on the screen.
- Information relating to the saved images and playback is displayed and the status indicates STOP mode. (①).
- If there are no images saved in memory the test image recorded for auto diagnosis during startup appears. The on-screen display information is displayed with " * " (②).
- If starting up after recording the memory backup displays the image previously recorded. (▶▶ 3-24)

STOP Mode J-PAD3 Display



LCD STATUS Display

The image saved in the memory and the information on recording and playback settings are displayed.

- MODE : STOP (current camera mode)
 - FRAME : FRAME Number is Displayed
 - TIME : Frame Time is Displayed
 - PLAY : Set Playback Speed
 - FRM RATE : Set Record Rate
 - FRM SIZE : Set Image Size
 - SHUTTER : Set Shutter Speed
 - TRIGGER : Set Trigger Timing
 - ID : Current ID Number Setting
 - SCENE : Next Scene Number to be Recorded
 - SEGMENT : Current Memory Segment Number
-
- The mark for the position of the current image display is shown on the playback range bar. If no images are saved in memory the playback range bar will be empty.
 - If no images are saved in memory, the TIME is displayed as 「 * * / * * / * * * * : * * : * * . * * * * * 」 .)



Operating Panel Display

- The word STOP above the STOP button flashes.



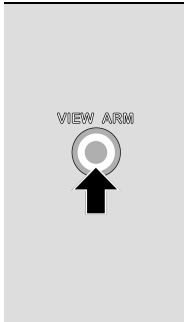
The settings for record, playback and save can be made in the STOP mode.

- Recording settings (▶▶ 4-1) • Playback settings (▶▶ 6-1) • Save settings (▶▶ 7-1)

Display Live Video (VIEW Mode)

Displays the live image in the VIEW mode, camera setup and lens adjustment.

Selecting to the VIEW Mode



Press the VIEW/ARM button while the STOP mode status is displayed

- Switch to the VIEW mode from the STOP mode.
- If the MENU is displayed press the STOP button once. After switching to the status display press the VIEW/ARM button again.
- The camera will automatically perform a black balance when switching to the VIEW mode. (▶▶ 8-25)
- Adjust the lens aperture and focus, subject and camera settings in the VIEW mode.
- The status LED for CAM MODE on the rear panel of the camera lights up in white.

VIEW Mode Monitor and Viewfinder Display



- The image to be recorded is displayed live in View mode.
- The current recording settings are shown as on-screen display information in red and the status is displayed as VIEW (①).
- On-screen information in the STOP mode prior to switching to the VIEW mode is displayed. (②)

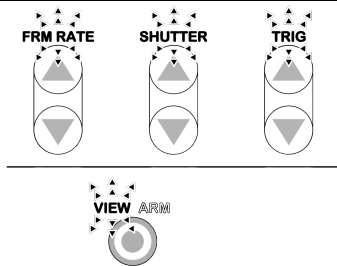
VIEW Mode J-PAD3 Display

```
< STATUS >
MODE :VIEW
FRM RATE:1000
FRM SIZE:1920x1080
SHUTTER :OPEN
TRIGGER :CENTER
ID :000
SCENE :00000
PLAY :30
FRAME :+0000
TIME :11/11/16
SEGMENT :1
```

LCD STATUS Display

The information for the recording settings and the information just before the STOP mode is displayed.

- MODE : VIEW (current camera mode)
 - FRM RATE : Displays current Record Rate
 - FRM SIZE : Displays current Image Size
 - SHUTTER : Displays current Shutter Speed
 - TRIGGER : Displays current Trigger Timing Settings
 - ID : Displays current ID Number
 - SCENE : Displays next Scene Number to be Recorded
 - PLAY : Displays Playback Rate
 - FRAME : Displays the Frame Number just before the STOP mode
 - TIME : Displays the Frame Time just before the STOP mode
 - SEGMENT : Displays current Memory Segment Number
-
- The playback range bar is not displayed.
 - If an image is not saved in the camera memory the TIME is displayed as 「**/**/** ** : ** : **, *****」.



Operating Panel Display

- The word VIEW above the VIEW/ARM button flashes.
- The word FRM RATE above the FRM RATE direct button flashes.
- The word SHUTTER above the SHUTTER direct button flashes.
- The word TRIG above the TRIG direct button flashes.



The record settings and live display settings can be made in the VIEW mode.

- Recording settings (▶▶ 4-1), live display settings (▶▶ 5-1)

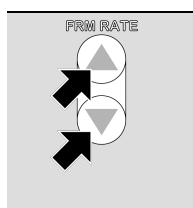
Basic Recording Settings

Select the frame rate, shutter speed and trigger timing according to the phenomenon recorded.

Select the Frame Rate

Set the frame rate, frames per second, according to the speed of the event to be recorded.

- 1 Access the VIEW mode or STOP mode
 - Switch to the STOP or VIEW mode. (▶▶ 3-13)
 - The status is shown on the J-PAD3 display.



- 2 Press the FRM RATE direct button to select the frame rate
 - Press the FRM RATE direct arrows up or down to select the frame rate.
 - The frame size is determined by the frame rate. As the frame rate increases the frame size is changed accordingly.
 - Read (▶▶ 4-11) for the frame rates and frame sizes that can be selected.

The frame rate can be changed from MENU. Custom settings are also available.

- Go to (▶▶ 4-25) to set the frame rate from MENU.
- Go to (▶▶ 4-23) to set a custom frame rate.

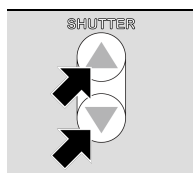


Attention After changing the frame rate, perform a black balance. (▶▶ 4-35)

Select the Shutter Speed

Set the shutter speed, exposure time, according to the speed of the event to eliminate motion blur.

- 1 Access the VIEW mode or STOP mode
 - Switch to the STOP or VIEW mode. (▶▶ 3-13)
 - The status is shown on the J-PAD3 display.



- 2 Press the SHUTTER direct button to select the shutter speed
 - Press the SHUTTER arrows up or down to select the shutter speed.
 - Read (▶▶ 4-28) for the shutter speeds that can be selected.

The shutter speed can be changed from the MENU. Custom settings are also available.

- Go to (▶▶ 4-26) to set the shutter speed from MENU.
- Go to (▶▶ 4-28) to set a custom shutter speed.



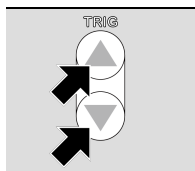
Attention After changing the shutter speed perform a black balance. (▶▶ 4-35)

■ Select the Trigger Timing

Set the trigger timing for capturing the event.

The type of Trigger Timing depends on the number of frames recorded from the start of recording to when the trigger is received and the number of frames recorded from the trigger input to the end of the recording.

- 1 Access the VIEW mode or STOP mode
 - Switch to the STOP or VIEW mode. (▶▶ 3-13)
 - The status is shown on the J-PAD3 display.



- 2 Press the TRIG button to select the trigger timing
 - Press the TRIG arrows up or down to switch the trigger timing.

Trigger Timing

Start trigger (START) :	Use a START Trigger for starting a recording immediately after trigger input.
Center trigger (CENTER) :	Use a Center Trigger for recording pre and post images after trigger input.
End trigger (END) :	Use an END Trigger for recording images after trigger input (ending upon trigger input).
Custom trigger (+000%) :	Custom setting by user.
Post trigger (000000001) :	Use a Post Trigger to record after a set time or number of frames after trigger input.

Read section 4-29 “Set Trigger Timing” for details on trigger timing.




The Trigger Timing and Custom and Post Trigger values can be changed from MENU.

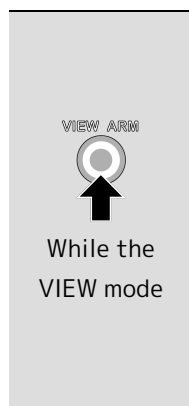
- Go to (▶▶ 4-32) to set the Trigger Timing from MENU.
- Go to (▶▶ 4-33) to set Custom Trigger values.
- Go to (▶▶ 4-34) to set the Post Trigger values.

Start Recording (ARM mode)

After setting the camera frame rate, exposure time, trigger type in the VIEW mode switch to the ARM mode to start recording.


-  **Attention** • Before switching to the ARM mode save the images recorded to the memory. (▶▶ 3-37)
- Switch to the ARM mode and the images recorded to the memory are overwritten and erased.
 - Switch to the ARM mode only after verifying that the images are saved and can be erased.

Switch to the ARM Mode



Press the VIEW/ARM button while the VIEW mode is being displayed.

- Switch to the ARM mode from the VIEW mode.
- If switching from the STOP mode to the ARM mode first select the VIEW mode and then select the ARM mode.
- If the MENU is displayed press the STOP button once. Select the status display and press the VIEW/ARM button again.
- The black balance is automatically acquired when selecting the ARM mode. (▶▶ 8-25)
- Camera settings cannot be changed while in the ARM mode.
- The status LED for CAM MODE on the rear panel of the camera lights up in purple.

-  **CHECK** • External input signals, ARM command, can be used to select ARM. (▶▶ 9-42)
- Using multiple triggers will automatically select the ARM mode and automatically switch blocks and memory segments. (▶▶ 4-57)
 - A cooling fan can be stopped in order to prevent the shake of the image by vibration of a camera. (▶▶ 4-86)

ARM Mode Monitor and Viewfinder Display



- The image to be recorded is shown live in VIEW mode.
- The current camera settings are shown on the display screen with information in red and the status displayed as ARM (①).
- The number of frames recorded after trigger input is shown on the frame counter (②).
- “*” is shown in the trigger time (③).

ARM Mode J-PAD3 Display

```
< STATUS >
MODE : ARM
FRM RATE : 1000
FRM SIZE : 1920x1080
SHUTTER : OPEN
TRIGGER : CENTER
ID : 000
SCENE : 00000
PLAY : 30
FRAME : +0000
TIME : **/**/**
SEGMENT : 1
```

LCD STATUS Display

The information for the current recording settings appears.

- MODE : ARM (current camera mode)
 - FRM RATE : Displays current Record Rate
 - FRM SIZE : Displays current Image Size
 - SHUTTER : Displays current Shutter Speed
 - TRIGGER : Displays current Trigger Timing Settings
 - ID : Displays current ID Number
 - SCENE : Displays current Scene Number to be Recorded
 - PLAY : Displays Playback Rate
 - FRAME : Displays Frame Number just before STOP mode (+0000)
 - TIME : **/**/** **: **: **: *****
 - SEGMENT : Displays current Memory Segment
- The playback range bar is not displayed.



Operating Panel Display

- The word ARM above the VIEW/ARM button flashes.



Attention • Camera recording settings cannot be changed in the ARM mode. Select the STOP mode and then change the camera recording settings.

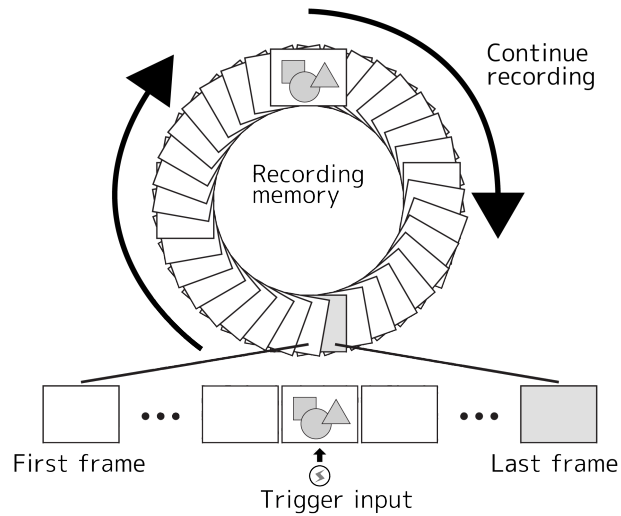
Black Balance has been previously explained in the Black Balance section

The noise of the image from the image sensor of the MEMRECAM HX-3 changes according to the speed. This noise is called fixed pattern noise, which has a different pattern from each sensor. The HX-3 reduces noise by correcting the fixed pattern noise as well as noise from temperature variations. The correction value used for this correction is called the black balance. With the HX-3, the black balance is automatically obtained with the sensor when “switching to the VIEW mode”, “switching to the ARM mode” and “when REC is finished”.

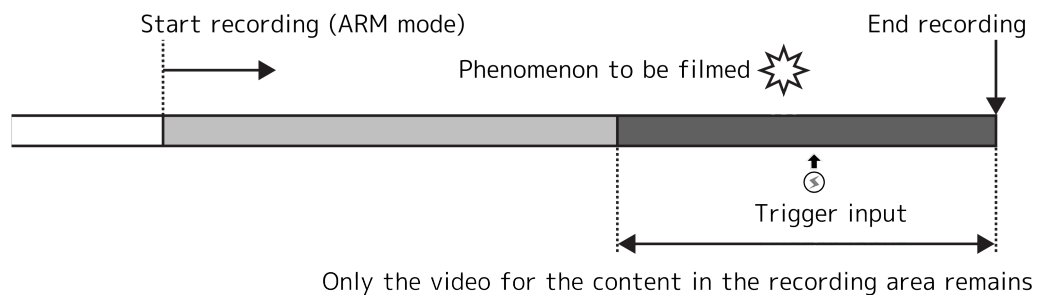
- Manually obtain the black balance (▶▶ 4-35)
- Automatically obtain the black balance (▶▶ 8-25)

Ring Buffer

In the ARM mode the Memrecam HX-3 continuously records images to the memory. The camera records in a ring buffer, first in, first out writing over its memory until stopped.



The Memrecam HX-3 continues to record over its memory until the trigger is received.

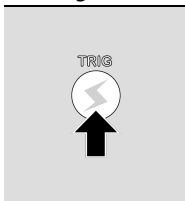


Trigger Input (REC mode)

Using the correct Trigger Input for the event to be recorded.

■ Trigger Input

Input the trigger for the event to be recorded and to stop the recording with the correct trigger timing settings.



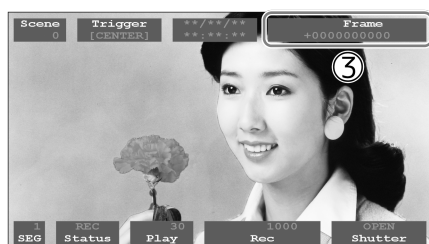
Press the TRIG button while in the ARM mode

- After recording the number of frames set for the trigger type the camera will automatically switch from the REC mode to the STOP mode.
- On the rear panel of the camera the status LED for TRIGGER lights up in red during trigger input and the status LED for CAM MODE lights up in orange during REC mode.



- In addition to the J-PAD3 buttons, you can input using the trigger.
- Input TRIG with external trigger input signals (TRIG1 · TRIG2) (▶▶ 4-60)
- Automatic trigger input after changing images during recording (Image trigger) (▶▶ 4-41)

REC Mode Monitor and Viewfinder Display



- The image being recorded is shown live.
- The current camera settings are shown on the screen display with information in red and the status displayed as REC (①).
- After trigger input, the value on the frame counter decreases for each image recorded (②). Recording stops when it reaches 0 (③).
- “*” is shown in the trigger time. After switching to the STOP mode when the recording stops the input trigger time appears. (④)

REC Mode J-PAD3 Display

```
< STATUS >
MODE : REC
FRM RATE : 1000
FRM SIZE : 1920x1080
SHUTTER : OPEN
TRIGGER : CENTER
ID : 000
SCENE : 00000
PLAY : 30
FRAME : +0000
TIME : **/**/**
SEGMENT : 1
```

LCD STATUS Display

The information for the current recording settings appears.

- MODE : REC (current camera mode)
- FRM RATE : Displays current Record Rate
- FRM SIZE : Displays current Image Size
- SHUTTER : Displays current Shutter Speed
- TRIGGER : Displays current Trigger Timing Settings
- ID : Displays current ID Number
- SCENE : Displays current Scene Number
- PLAY : Displays Playback Rate
- FRAME : Displays Frame Number (+0000)
- TIME : **/**/** **:**:**:*****
- SEGMENT : Displays Memory Segment Number

The playback range bar is not displayed.



Operating Panel Display

- The word ARM above the VIEW/ARM button flashes.
- The word TRIG above the TRIG button flashes.

Memory Backup

The Memrecam HX-3 has a built-in battery that retains the recorded images in memory in the event of a loss in power to the camera for up to 1 hour.



Attention

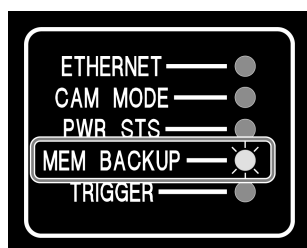
- The recorded images may be lost when you turn off the power to the camera if the built-in battery is not charged enough.
- The memory backup is a supplementary function to prevent losing images by an accidental power failure. We strongly recommend you save the images before turning off the power. (▶▶ 3-37)

■ Enable Memory Backup

After using the trigger input to switch to the REC mode, it automatically switches to the STOP mode upon completion of recording. Once recording begins, the memory backup function is enabled, and the image recording immediately before can be saved by the power supplied from the AC adapter or the internal backup battery (hereafter, 'battery'), even if the power to the main unit is turned OFF during recording. If there is no power supplied from the AC adapter, it switches to memory backup by the battery.

Memory Backup Status LED

While the Memory Backup is valid, a status LED of MEM BACKUP turns on or blinks as follows.



Lit Green: Memory Backup is valid
(by AC adapter plus built-in battery)

- The MEM BACKUP LED turns on while the Memory Backup is valid by the AC adapter plus built-in battery.
- When the MEM BACKUP LED turns on if there are the recorded images in the memory.
- Charge: High

Flashing Green: Memory Backup is valid
(by built-in battery only)

- MEM BACKUP LED flashes on and off while Memory Backup is valid in the built-in battery.
- Charge: High

Lit Orange: Memory Backup is valid
(by AC adapter plus built-in battery)

- Charge: Medium

Flashing Orange: Memory Backup is valid
(by built-in battery only)

- Charge: Medium

Lit Red: Memory Backup is valid
(by AC adapter plus built-in battery)

- Charge: Low
- Memory Backup time is getting short. Use Memory Backup function after charging.

Flashing Red: Memory Backup is valid
(by built-in battery only)

- Charge: Low
- Charge the built-in battery using the AC adapter as soon as possible (charging the built-in battery while the power is supplied to the MEMRECAM from the AC adapter). If not charged the images in memory may be lost due to over discharge of the protection circuit.


No Light: Memory backup is invalid.

- The MEM BACK UP LED turns off if the Memory Backup is not charged or if there are no images in the camera memory.

Playback (PLAY Mode)

Plays back the recorded images.

■ Playback

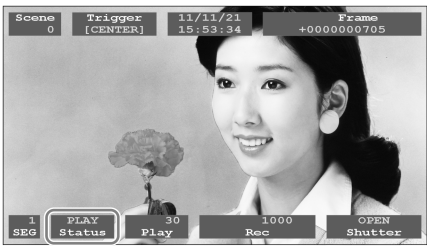


While the
STOP mode

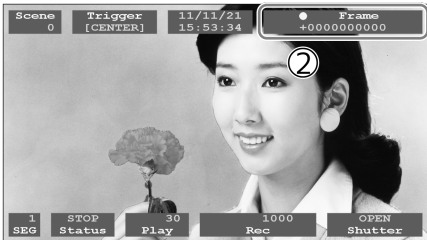
Press the PLAY button while the STOP mode status is displayed
(or press the dial)

- Select the PLAY mode from the STOP mode to play the recorded images.
- If the MENU is displayed press the STOP button once. After switching to the status display press the PLAY button again.
- Or press the dial instead of the PLAY button to playback the recorded images.

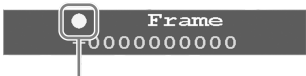
Monitor and Viewfinder Display during Playback (PLAY Mode)



- The recorded images in memory are played back.
- Information relating to the recorded images and playback information is displayed on screen. The status is displayed as PLAY (①).

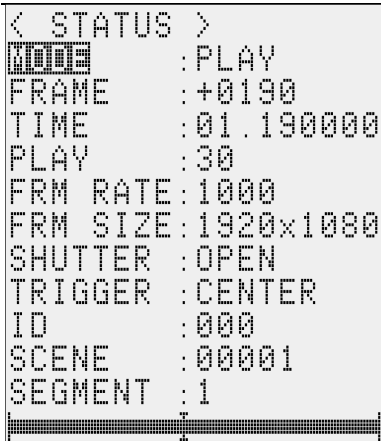


- A yellow event mark is displayed on the frame counter in the trigger frame (▶ 3-22) and the event frame (▶ 9-22) (②).
- An event mark is displayed in the trigger frame and event frame even during the STOP mode and LOOP mode (▶ 3-28).



Event mark

PLAY Mode J-PAD3 Display



LCD STATUS Display

Information on the current playback · recording settings appears.

- MODE : PLAY (current camera mode)
- FRAME : Displays current Frame Number
- TIME : Displays Recorded Time
- PLAY : Displays Playback Rate
- FRM RATE : Display Record Rate
- FRM SIZE : Displays the Image Size
- SHUTTER : Displays the Shutter Speed
- TRIGGER : Displays Trigger Timing
- ID : Displays current ID Number
- SCENE : Displays next Scene Number to be Recorded
- SEGMENT : Displays current Memory Segment Number

- The mark for the current playback position is shown on the playback range bar. This mark moves to the playback end frame and returns to the STOP mode upon completion of playback.
- FRM RATE, FRM SIZE, SHUTTER and TRIGGER are the camera settings and not settings for playing back recorded images.





- In the STOP and PLAY modes, settings for checking the recorded images, fast forward/quick reverse and repeat playback are available.
 - Frame advance (▶▶ 3-30)
 - Fast forward/quick reverse (▶▶ 3-30)
 - Move to a particular frame (Jump) (▶▶ 3-31)
 - Change the playback speed (▶▶ 3-32)
 - Set the playback range (▶▶ 3-33)
 - Play in a repeated loop (▶▶ 3-28)

Repeated Playback (LOOP mode)

Repeated playback of the playback range or the entire recorded range. (Loop playback)

■ Loop Playback

 <p>While the PLAY mode</p>	<p>Press the PLAY button again while playing back in the PLAY mode</p> <ul style="list-style-type: none"> • Switch to the LOOP mode from the PLAY mode and repeatedly playback the playback range.
<p>Or</p>  <p>Hold down</p>	<p>Hold down the PLAY button while the STOP mode status is displayed</p> <ul style="list-style-type: none"> • Select to the LOOP mode from the STOP mode and repeatedly playback the playback range. • Directly Select to the LOOP mode without going through the PLAY mode.

See “Playback and Save Range Settings” (▶ 3-33) for the repeat position in the LOOP mode.

Monitor and Viewfinder Display during Playback (LOOP Mode)



- The recorded images in memory are played back.
- Information relating to the images recorded in the memory and playback information are shown on the screen display. The status is shown as LOOP (①).

LOOP Mode J-PAD3 Display

```
< STATUS >
MODE      : LOOP
FRAME     : +0190
TIME      : 01.190000
PLAY      : 30
FRM RATE  : 1000
FRM SIZE  : 1920x1080
SHUTTER   : OPEN
TRIGGER   : CENTER
ID        : 000
SCENE     : 00001
SEGMENT   : 1
```

LCD STATUS Display

Information on the current playback · recording settings appears.

- MODE : LOOP (current camera mode)
 - FRAME : Displays current Frame Number
 - TIME : Displays previously Recorded Time
 - PLAY : Display the Playback Rate
 - FRM RATE : Displays the Frame Rate
 - FRM SIZE : Displays the Image Size
 - SHUTTER : Displays the Shutter Speed
 - TRIGGER : Displays the Trigger Timing
 - ID : Displays the current ID Number
 - SCENE : Displays the previously recorded Scene Number
 - SEGMENT : Displays the current Memory Segment Number
-
- The mark for the current playback position is shown on the playback range bar. When this mark gets to the playback end frame, it returns to the playback start frame and continue playback.
 - FRM RATE, FRM SIZE, SHUTTER and TRIGGER are settings for the camera and are not settings for playing back recorded images.



Operating Panel Display









- The word PLAY above the PLAY button flashes.

Frame Advance · Fast Forward · Quick Reverse

Repeated playback of the playback range or the entire recorded range. (Loop Playback)

■ Frame Advance, Reverse Frame, Fast Forward, Quick Reverse

Frame advance, reverse frame, fast forward and quick reverse are performed during the STOP mode. The J-PAD3 LCD display shows the status.

Function	Operation		Description
Frame advance			Press the FWD button to move ahead one frame (or turn the dial up).
Reverse Frame			Press the REV button to reverse one frame (or turn the dial down).
Fast Forward			Continue pressing the FWD button for fast forward. Release to stop. Or, Press the dial and turn up. Release to stop.
Quick Reverse			Continue pressing the REV button for quick reverse. Release to stop. Or, Press the dial and turn down. Release to stop.







Use either the FWD or REV buttons or the dial to operate.

Jump to a Specific frame

Jump to a start or end frame of a recording, a frame where the trigger has been input or the frame where the event trigger has been input for event recording (▶▶ 4-54)

■ Jump Frames

Available in the STOP mode. The J-PAD3 LCD display shows the status.

Destination	Operation	Description
Trigger Frame		Move to the trigger frame (frame with trigger input). (※ 1)
Start Frame	 +  Press the TRIG and REV buttons	Move to the start frame of the recorded video.
End Frame	 +  Press the TRIG and FWD buttons	Move to the end frame of the recorded video.
Event Frame (※ 2)		Move to the next event frame when pressed. Move to the trigger frame with the first operation.

※ 1 If there is no trigger frame in the recording it moves to the beginning frame.

※ 2 Use the event recording function only when recording event frames.

See (▶▶ 4-54) for Event Recording.

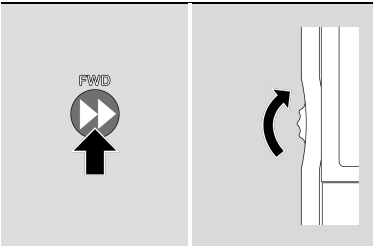
Change the Playback Speed

Changes the playback rate. Reverse playback can also be set. Changes to the playback speed are done during playback.

■ Change the Playback Speed

Change the playback speed during playback (PLAY or LOOP mode). Select the PLAY mode or LOOP mode.

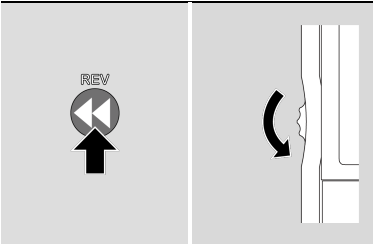
Speed up the playback speed



Press the FWD button during playback or turn the dial in the direction of the arrow

- The playback speed increases each time it is pressed.
During reverse playback the speed of the reverse playback decreases.
(If slowed down past -1 during reverse playback, playback is in the forward direction.)

Slow down the playback speed



Press the REV button during playback or turn the dial in the direction of the arrow

- The playback speed decreases each time it is pressed. If the playback speed is less than 1, the playback speed is negative (reverse playback).
- During reverse playback, the speed of reverse playback increases.

Playback Direction	Playback Speeds (Unit : Frames/second)
Play	1、 2、 5、 10、 15、 30、 60、 120、 240、 480、 960、 1920
Reverse	-1、 -2、 -5、 -10、 -15、 -30、 -60、 -120、 -240、 -480、 -960、 -1920

Set the Range for Playback · Saving

Set the playback range, and set the position to end playback or the position to repeat during loop playback.
This set range also becomes the range for saving the recorded images.

■ Set and Cancel the Playback and Save Range

Set the playback and save range in the STOP mode. The playback start frame and playback end frame are set for the frame currently displayed.

- 1

Access the frame to be set

 - Move to the frame to be set for the playback start position frame or the playback end frame with fast forward, quick reverse (▶⏮ 3-30) or jump frame (▶⏮ 3-31).
- 2

Set the playback start frame and playback end frame.

 - Press the S.SET and E.SET buttons to set the playback start frame and playback end frame.
 - Also, hold down to cancel the settings.

Setting the Playback Start Frame and Playback End Frame			
Function	Operation		Description
Set the playback start frame	<div>S.SET </div>	<div>STOP </div> + <div></div>	Sets the current frame as the playback start frame. If set, the word S.SET above the S.SET button flashes.
Set the playback end frame	<div>E.SET </div>	<div>STOP </div> + <div></div>	Sets the current frame as the playback end frame. If set, the word E.SET above the E.SET button flashes.
Cancel the playback start frame	<div>S.SET </div> <div>Hold</div>	<div>STOP </div> + <div></div> <div>Press (Cancel both)</div>	Cancels the playback start frame settings. (The first frame for the recorded video becomes the playback start position.)
Cancel the playback end frame	<div>E.SET </div> <div>Hold</div>		Cancels the playback end frame settings. (The last frame for the recorded video becomes the playback end position.)

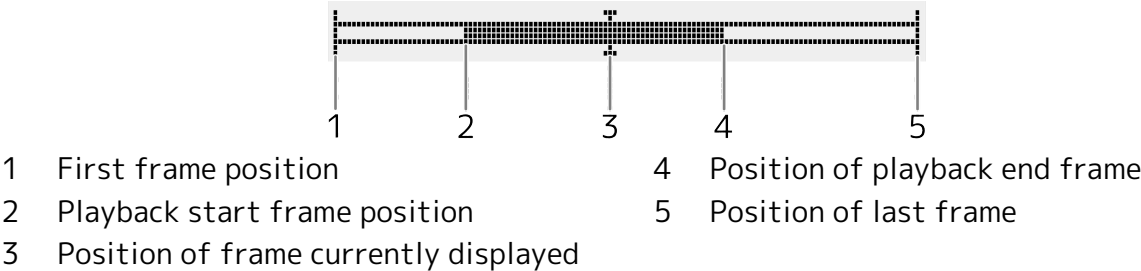
Settings for playback start and end frame can be made with the S.SET and E.SET buttons or the STOP button + dial.

If setting a frame after the playback end frame as the playback start frame, the current frame is set as both the playback start frame and the playback end frame. Only the frame currently displayed is the playback range.


Additionally, if setting a frame before the playback start frame as the playback end frame, the current frame is set as both the playback start frame and the playback end frame.

J-PAD3 Playback Range Bar Display

When setting the playback start frame and the playback end frame, the position is shown on the J-PAD3 playback range bar.



The playback range, playback start frame and playback end frame, are set from the recorded frames displayed in black.

 Attention There is no jump function to the position of the set playback start frame or playback end frame.

Playback of Set Playback Range

If played back in the PLAY mode (▶▶ 3-26)

Playback Start Position	Operation
Before the playback end frame	Plays back to the playback end frame and stops. (Switches to the STOP mode)

During reverse playback the playback start frame or first frame plays and then stops.

If played back in the LOOP mode (▶🔁 3-28)







Playback Start Position	Operation
Before the playback end frame	Plays back to the playback end frame, returns to the playback start frame and repeatedly plays back the playback range.
After the playback end frame	Plays back to the end frame, returns to the playback start frame and repeatedly plays back the playback range.

During reverse playback the playback start frame or first frame plays then returns to the playback end frame and repeatedly plays back the playback range.

On-screen Display Information on the Monitor and Viewfinder when Setting the Playback Range

In addition to the current display frame number shown by the on-screen display information on the monitor and viewfinder, it shows whether or not a playback range is set as well as a symbol showing the relationship between the current frame position and the playback range.

On-screen Display Information for the Playback Range

Setting and Playback Position for the Playback Range	J-PAD3 Playback Range Bar Display	Monitor Frame On-screen display Information
Playback Range Not Set · Playback start frame : Not set · Playback end frame : Not set · Current frame : +50		Frame +0000000050
	No marks are shown at both ends of the frame.	
Playback Start Frame Set · Playback start frame : -1000 · Playback end frame : Not set · Current frame : +50		[Frame +0000000050
	" [" shown to the left of the Frame.	
Playback End Frame Set · Playback start frame : Not set · Playback end frame : +1000 · Current frame : +50		Frame] +0000000050
	"] " shown to the right of the Frame.	
Playback from Before the Playback Start Frame · Playback start frame : -1000 · Playback end frame : +1000 · Current frame : -2000		<Frame] -0000002000
	" < " shown to the left of the frame. ("] " shown to the right of the frame since the playback end frame is set.)	
Playback after the Playback End Frame · Playback start frame : -1000 · Playback end frame : +1000 · Current frame : +2000		[Frame > +0000002000
	" > " shown to the right of the frame. (" [" shown to the left of the frame since the playback start frame is set.)	
Playback in Playback Range · Playback start frame : -1000 · Playback end frame : +1000 · Current frame : +50		[Frame] +0000000050
	" [" shown to the left of the frame and "] " shown to the right of the frame.	

If 32GB model, recording at 1 segment, top frame : -2315 If start frame 2315, trigger frame : 0

Saving the Images

The recorded images can be saved on a USB connected flash memory or a hard disk.

■ Connect USB Storage

Connect a USB2.0 flash memory or hard disk to store recorded images.

USB Device Specifications

Standard	USB mass storage class
Interface	USB 2.0
Terminal Type	USB A socket
Compatible Formats	FAT / FAT32 / exFAT / NTFS


Format the USB storage device (USB media) for the PC playing back the saved images (PC using HXLink control software) or the Memrecam HX-3. (▶ 7-16)

Read the user guide with the USB device for use of the USB storage device.

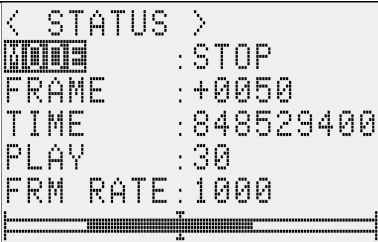

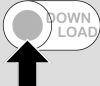

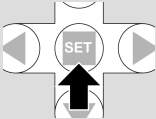
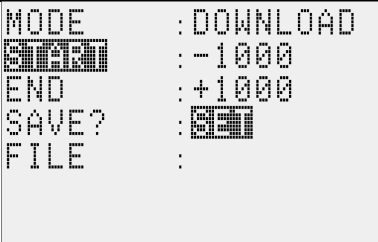
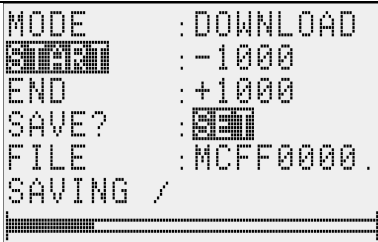
Connect to USB Port

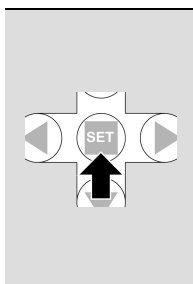


- While in the STOP mode, plug the USB storage device into the MEMRECAM HX-3 USB port.
- There are two USB ports on the rear panel.
- Do not connect the device in modes other than the STOP mode.
- Do not turn on the HX-3 power and start it up with the USB storage device connected. Make sure to connect after startup has been completed.
- If connecting 2 USB storage devices (▶ 7-15)

 **Attention** • The Memrecam HX-3 uses Windows Embedded in the camera operating system. Write protection is not performed in the system area for camera system protection. Use caution and avoid viruses when using USB devices.

■ Save

	<p>1 Set the save range</p> <ul style="list-style-type: none">• After saving the images to the memory set the save range for the recording.• The range set for the playback range is the range saved on the USB storage device. (▶▶3-33)	
	<p>2 Access the STOP mode</p> <ul style="list-style-type: none">• Select to the STOP mode. (▶▶3-13)• The status display is on the J-PAD3 display.	
	<p>3 Press the DOWNLOAD button</p> <ul style="list-style-type: none">• The J-PAD3 display switches to the SAVE mode.• The LED on the top right of the DOWNLOAD button lights up.• The save start frame (START) and the save end frame (END) appears. The range cannot be changed here.	
	<p>4 Press the SET button</p> <ul style="list-style-type: none">• The word SET flashes. Press the SET button to start saving.	
	<p>5 Start saving</p> <ul style="list-style-type: none">• The save file name is automatically set and shown as FILE : MCFF0000.MCF.• The save progress status is displayed on the bar.• The LED to the top right of the DOWNLOAD button lights up.• Press the STOP button to stop saving.	



6 Press the SET button after saving is done

- Once saving to the recording media is done the word SAVE is replaced by the word COMPLETE.
- Make sure the word SET is flashing and press the SET button to finish saving.
- After making sure the USB media is not being accessed, remove the USB media.

```

MODE       : DOWNLOAD
START      : -1000
END        : +1000
COMPLETE   : SET
FILE       : MCFF0000.
  
```



- Attention**
- If there is not enough space the recording cannot be saved. Either set a smaller save range or use a USB device with adequate space.
 - The save time varies according to the performance of the device connected.
 - Saved video files cannot be played back on the MEMRECAM HX-3. Play back the saved video file with the control software HXLink. See the HXLink User's Guide for details.



- MCFF is the video file format for MEMRECAM. (▶▶ 7-8)
- Save the video from MENU. (▶▶ 7-3)
- Save in the AVI format. (▶▶ 7-10)
- Save in the Motion JPEG format. (▶▶ 7-12)
- Files can be saved directly from HXLink to the control PC. See the HXLink User's Guide for details.

Lens Control

If using the optional EF mount adapter, lens adjustment and focus can be controlled with a simple key stroke.



- Menu for the EF mount adapter. Does not operate other lens mount options.

■ Display LENS MODE



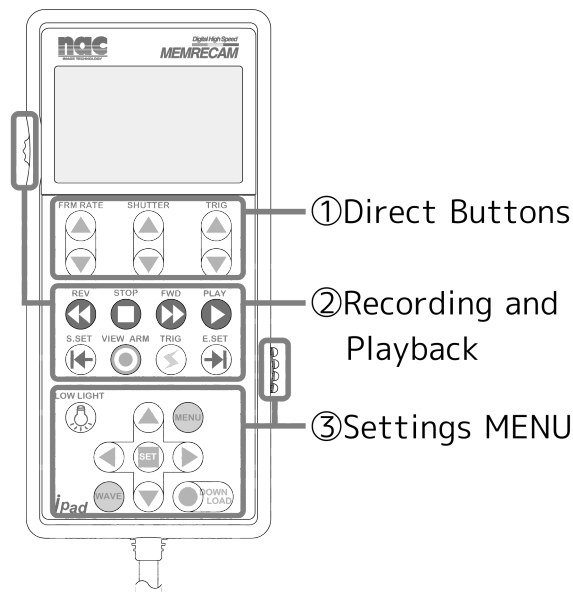
↑ + ↑
Press the MENU
key while
pressing
the WAVE key

The MENU key is pressed, pressing the WAVE key.

- The “LENS MODE” will appear.








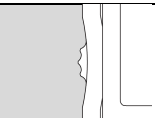

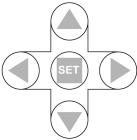



```
<LENS MODE>
FOCUS      : 0
IRIS       : 0
FOCSSTEP  : 100 1000
FOCSINIT   :
IRISINIT   :
ZOOM      : 100 FIT2
```


■ Key operation



In the following explanation, the operation for lens control which operates in LENS MENU is indicated by the highlight.

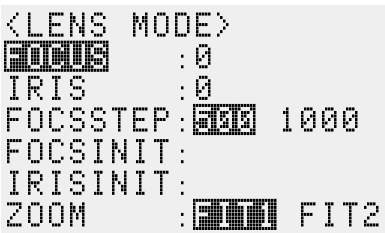
① Direct Buttons	
<div>FRM RATE</div> <div></div>	<div>FRM RATE direct keys</div> <div>Changes the recording speed.</div>
<div>SHUTTER</div> <div></div>	<div>SHUTTER direct keys</div> <div>Changes the shutter speed.</div>
<div>TRIG</div> <div></div>	<div>TRIG direct keys</div> <div>Changes the focus step.</div>
② Recording and Playback	
<div>STOP</div> <div></div>	<div>STOP key</div> <div>It returns from LENS MODE to a status screen display.</div> <div>LENS MODE Inside is VIEW and ARM even if it presses the STOP key. A state is continued.</div>

	VIEW ARM key Switches the operating mode to VIEW or ARM mode.
	TRIG key Inputs the trigger.
	PLAY key Changes the focus value.
	REV key Changes the focus value.
	FWD key Switches operation with the dial (focus/iris). The menu selection selects "FOCUS" or "IRIS" according to operation of the dial.
	S.SET key Changes the f-stop value.
	E.SET key Changes the f-stop value.
	Dial Changes the focus/f-stop value. Also, press and turn to change the focal step.
③ Settings MENU	
	MENU key Switches to the status screen display from the LENS MODE.
	Up/down/left/right keys Selects the item and changes the set values.
	SET key Sets the settings values and items.
	LOW LIGHT key Uses the low light function.
	DOWNLOAD key Performs black balance calculations.

	<div>Hold switch</div> <div>Temporarily disables operation from the J-PAD3.</div>
---	---

While pressing the [WAVE] key during the status screen display of J-PAD3 in Temporarily disables operation from the J-PAD3. STOP mode[MENU] If a key is pressed, a display will change to the "LENS MODE" menu.

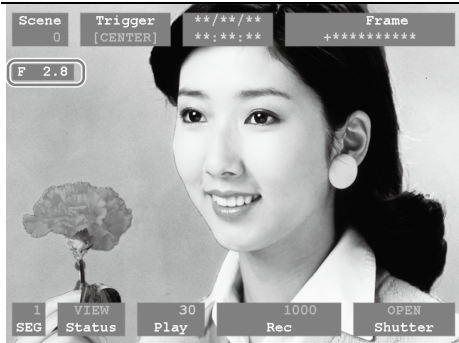
■ Items performed with lens control



Settings	Details	Refer to page »
FOCUS	Focus value/change the focus value with the dial	3-48
IRIS	Changes the f-stop value with the f-stop value/dial.	3-47
FOCSTEP	Changes the focus value with the focus change amount/dial.	3-48
FOCINIT	Changes the focus value with the focus initialization/dial	3-46
IRISINIT	Changes the f-stop value with the iris initialization/dial.	3-46
ZOOM	Changes the focus value with the zoom/dial.	5-4

Items shown with a dark background are those not described in “Recording Settings”.
Press the STOP or MENU keys to return to the status screen from the “LENS MODE”.

The monitor by lens control, the display of a view finder



- An iris diaphragm of a lens is displayed on superposition information with F number.
- Attention • An iris diaphragm of a lens is displayed on superposition information with F number. The display of IRIS (iris diaphragm value) of J-PAD3 is not F value, and the value showing a "stage" is displayed. For example, when the lens corresponding to 22 steps of iris diaphragms is being used, it is displayed in 0-21.

■ Initialization

Make sure to perform initialization in the following instances when using the EF lens mount.

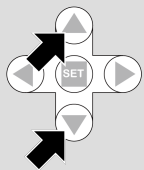
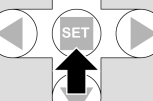
- When turning the power on to the HX-3
- When changing lenses



- Turn the focus mode switch on the EF lens mount to “AF”.
- Initialize again if the power to the HX-3 is cut off.
- When the focal ring of EF mount lens is manually turned after initialization work, a focus may be unable to adjust in the right range by subsequent lens control. In that case, please do the initialization work of a focus again.

■ Initialize iris from the LENS MODE

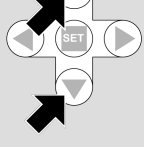
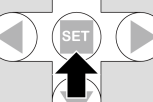
- 1 Access the LENS MODE (▶▶ 3-40)
 - Access the LENS MODE from the status screen.

	<ol style="list-style-type: none">2 Select "IRISINT" with the up/down arrows	<pre><LENS MODE> FOCUS : 0 IRIS : 0 FOCUSSTEP : 500 1000 FOCUSINIT : IRISINT : ZOOM : 500 FIT2</pre>
	<ol style="list-style-type: none">3 Press the SET key<ul style="list-style-type: none">• Warning is displayed to press the SET key.When initializing, the SET key is pressed once again.	<pre><LENS MODE> Iris will be init YES:Push SET key NO :Push any key FOCUSINIT : IRISINT : ZOOM : 500 FIT2</pre>

■ Initialize focus from the LENS MODE

Initialize the focus.

- 1 Access the LENS MODE (▶▶ 3-40)
 - Access the LENS MODE from the status screen.

	<ol style="list-style-type: none">2 Select "FOCUSINT" with the up/down arrows	<pre><LENS MODE> FOCUS : 0 IRIS : 0 FOCUSSTEP : 500 1000 FOCUSINT : IRISINIT : ZOOM : 500 FIT2</pre>
	<ol style="list-style-type: none">3 Press the SET key<ul style="list-style-type: none">• Press the SET key to perform focus initialization.	<pre><LENS MODE> FOCUS : 0 IRIS : 0 FOCUSSTEP : 500 1000 FOCUSINT : IRISINIT : ZOOM : 500 FIT2</pre>

■ Adjust the iris from the LENS MODE

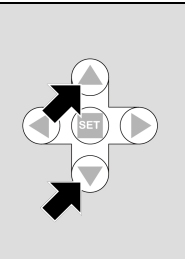
Adjust the iris from the LENS MODE.

- 1
- Access the LENS MODE (▶▶ 3-40)
- Access the LENS MODE from the status screen.



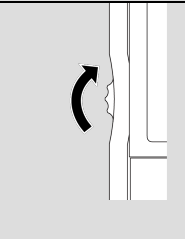
- There are three kinds of adjustment methods of an iris.
- ① Change by the S.SET key and an E.SET key (▶▶ 3-42)
- ② Change by the dial key
- ③ Change by the up/down arrows

② Change by the dial key



- 2
- Select “IRIS” with the up/down arrows
- Move the selected item (reverse display) with the up/down arrows and select either “IRIS” or “IRISINT”. The figure is an example selecting “IRIS”.

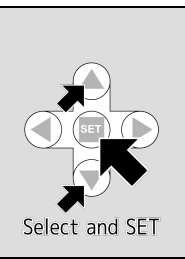
```
<LENS MODE>
FOCUS      : 0
IRIS       : 0
FOCSSTEP   : 500 1000
FOCSINIT   :
IRISINIT   :
ZOOM       : FIT1 FIT2
```



- 3
- Adjust the iris “IRIS” with the dial
- Change the f-stop value and the f-stop value after the change is displayed in “IRIS”.

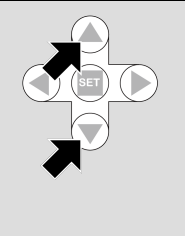
```
<LENS MODE>
FOCUS      : 0
IRIS       : 1
FOCSSTEP   : 500 1000
FOCSINIT   :
IRISINIT   :
ZOOM       : FIT1 FIT2
```

③ Change by the up/down arrows



- 2
- Select “IRIS” with the up/down arrows

```
<LENS MODE>
FOCUS      : 0
IRIS       : 0
FOCSSTEP   : 500 1000
FOCSINIT   :
IRISINIT   :
ZOOM       : FIT1 FIT2
```



- 3
- Adjust the iris “IRIS” with the up/down arrows
- Change the f-stop value and the f-stop value after the change is displayed in “IRIS”.

```
<LENS MODE>
FOCUS      : 0
IRIS       : 1
FOCSSTEP   : 500 1000
FOCSINIT   :
IRISINIT   :
ZOOM       : FIT1 FIT2
```

■ Adjust the focus from the LENS MODE

Adjust the focus.

- 1 Access the LENS MODE (▶▶ 3-40)
 - Access the LENS MODE from the status screen.

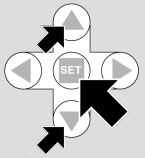
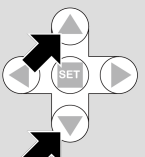


- A focal step can also be changed by the TRIG UP key and the TRIG DOWN key. (▶▶ 3-41)
 - The focal step displays the size of the amount of change of the focus of a lens.
 - A focus has three kinds of adjustment methods.
- ① Change by the REV key and the PLAY key (▶▶ 3-42)
 - ② Change by the dial key
 - ③ Change by the up/down arrows

② Change by the dial key

	<p>2 Select “FOCUS” with the up/down arrows</p> <ul style="list-style-type: none">• Move the selected item (reverse display) with the up/down arrows and select “FOCUS”, “FOCSSTEP”, “FOCSINIT” or “ZOOM”. The figure is an example selecting “FOCUS”.	<pre><LENS MODE> FOCUS :0 IRIS :0 FOCSSTEP :500 1000 FOCSINIT : IRISINIT : ZOOM :FIT1 FIT2</pre>
	<p>3 Adjust the focus step by pressing the dial while turning</p> <ul style="list-style-type: none">• Change the focus step and the step value after the change is displayed in “FOCSSTEP”. Select the focus step from 1, 2, 5, 10, 20, 50, 1000, 200, 500 and 1000. <p>The initial value is set to 500.</p>	<pre><LENS MODE> FOCUS :0 IRIS :1 FOCSSTEP :200 500 > FOCSINIT : IRISINIT : ZOOM :FIT1 FIT2</pre>
	<p>4 Adjust the focus with the dial</p> <ul style="list-style-type: none">• Turn the dial to raise or lower the focus value in focus step units.• Change the focus value and the focus value after the change is displayed in “FOCUS”.	<pre><LENS MODE> FOCUS :200 IRIS :1 FOCSSTEP :200 500 > FOCSINIT : IRISINIT : ZOOM :FIT1 FIT2</pre>

③ Change by the up/down arrows

 <p>Select and SET</p>	<p>2 Select "FOCUS" with the up/down arrows</p>	<pre><LENS MODE> FOCUS :0 IRIS :0 FOCSSTEP: 500 1000 FOCSINIT: IRISINIT: ZOOM :FIT1 FIT2</pre>
 <p>Select and SET</p>	<p>3 Adjust the focus with the up/down arrows</p> <p>Change the focus value and the focus value after the change is displayed in "FOCUS".</p>	<pre><LENS MODE> FOCUS :0 IRIS :1 FOCSSTEP: 200 500 > FOCSINIT: IRISINIT: ZOOM :FIT1 FIT2</pre>

4

Recording Settings

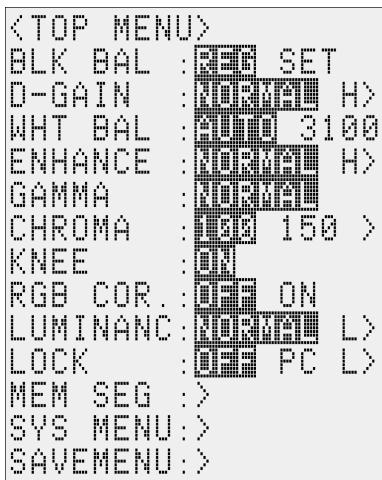
Items that can be Set for Recording	4-2	Synchronized Recording to the External	
Select the Frame rate.....	4-7	Synchronization Signals (EST)	4-63
Select the Frame Size	4-10	Synchronized Record Timing	4-72
Custom Settings for Frame rate and Frame Size		PIV (Particle Image Velocimetry) Recording..	4-76
.....	4-23	Select the Exposure Timing	4-78
Select the Shutter Speed	4-26	Select the External Input/Output Signal Polarity	
Set the Trigger Timing	4-29	4-80
Black Balance	4-35	A cooling fan is stopped	4-86
Select the Sensor Gain	4-35		
Recording with Enhanced Sensitivity.....	4-37		
Set Variable Frame Rates	4-38		
Input the Trigger with Image Trigger	4-41		
Use the Auto Exposure Function	4-46		
Select the Recording Bit Length	4-49		
Set the Recorded Scene Number	4-50		
Partitioning the Memory	4-52		
Select the Recording Method	4-54		
Trigger Input from an External Trigger	4-60		

Items that can be Set for Recording

Set the recording conditions from the MENU to record according to various objectives.

Press the J-PAD3 MENU button while in the STOP mode to switch to the TOP MENU display.

■ Items that can be set from the TOP MENU



Items to Set	Details	Refer to »☰
BLK BAL	Black balance settings	4-35
D-GAIN	Digital gain settings during playback	6-8
WHT BAL	White balance settings during playback	6-9
ENHANCE	Enhance settings during playback	6-10
GAMMA	Gamma settings during playback	6-10
CHROMA	Chroma settings during playback	6-11
KNEE	Knee settings during playback	6-11
RGB COR.	RGB matrix settings during playback	6-12
LUMINANC	Luminance settings during playback	6-12
LOCK	PC operation lock settings	8-7
MEM SEG	Segment selection	4-53
SYS MENU	Jump to SYS MENU(System Menu)	—
SAVEMENU	Jump to SAVEMENU(Save Menu)	7-2

Items in the table with dark backgrounds are items not described in “Recording Settings”.

Press the STOP or MENU buttons to return to the status screen from the TOP MENU.

After accessing the SYS MENU from the TOP MENU, settings can be performed for the system, synchronization, timing and input/output.

■ Items that can be set from the SYS MENU


```

TOP MENU > SYS MEN
ID : 000
DATETIME: 12 10 18
OSD DISP: ALL
OSD MODE: ALWAYS S>
OSD TIME: 1000 CRNT
CAFM DIS: OFF WHT >
FRM DISP: FRAME TI>
FRM TIME: 10000 >
TIMROUND: 3 7
REL TIME: FRAME TR>
EXP TIME: 1/1000 1/2>
SYNCTIME: 1/1000 GX>
SYNC SEL: 1/1000 EST1>
EST VIEW: ON
EST MODE: 1/1000 EST
EST SAFE: OFF ON
STRADDL : >
VIDEOOUT: ON
ZOOM : 100 FIT2
SCROLL : 0 0
BEEP : ON OFF
AUTOVIEW: OFF AUTO>
AUTO BB : ON OFF
SHLNC : OFF ON
WARNING : >
TRIG SET: >
SIG SET : >
SYS SET : >
DISPSET : >
INFO : >

```

Items to Set	Details	Refer to »
ID	ID number settings	8-8
DATETIME	Date and time settings	8-9
OSD DISP	On screen display settings	8-10
OSD MODE	On screen display settings for the camera mode	8-11
OSD TIME	Trigger timing display settings	8-12
CAFM DIS	Video image center mark settings	8-20
FRM DISP	Frame number display settings	8-13
FRM TIME	Frame time display settings	8-16
TIMROUND	Rounding settings	8-14
REL TIME	Relative time display settings	8-18
EXP TIME	Exposure timing settings	4-78
SYNC TIME	Synchronization time settings	4-72
SYNC SEL	Synchronization signal selection settings	4-65
EST VIEW	Synchronization settings for the VIEW mode during external synchronization	4-71
EST MODE	External synchronization accuracy setting	4-66
EST SAFE	Settings to ignore irregular EST signals	4-69
STRADDL	Frame straddling settings	4-76
VIDEOOUT	Video output settings	8-21
ZOOM	Video display zoom display settings	6-5

Items in the table with dark backgrounds are items not described in “Recording Settings”.

Items to Set	Details	Refer to » 
SCROLL	Video display scroll settings	6-6
BEEP	Remote control BEEP settings	8-22
AUTOVIEW	Auto view settings	8-23
AUTO BB	Auto black balance settings	8-25
SHLNC	Shutter line noise correction selecting settings	8-26
WARNING	Warning display settings	8-27
TRIG SET	Trigger settings	4-57 4-61
SIG SET	Input/output signal settings	4-80
SYS SET	System settings	4-52
DISP SET	Monitor resolution settings	8-5
INFO	System information display	8-29

Items in the table with dark backgrounds are items not described in “Recording Settings”.

Press the STOP or MENU buttons to return to the status screen from the SYS MENU.

Press the J-PAD3 MENU button while in the VIEW mode to switch to the VIEW MENU. In VIEW MENU, various settings not needed for recording can be set.

■ Items that can be set from the VIEW MENU

```

<VIEW MENU>
BLK BAL : [OFF] SET
SCENE : 00000
TRIGGER : [ENTER] E>
FRM RATE : 1000 2000
FRM SIZE : 1920x1080
CUSTOM F : >
SHUTTER : [OPEN] 2k >
DUALRATE : >
AOI : [FULL] CEN>
IMG TRIG : [OFF] LOW >
IMGTRULE : [FULL] S>
AEC : [OFF] LOW >
DRES : [OFF] LOW >
LOWLIGHT : 1000 010>
GXC : [OFF] ON
S-GAIN : [LOW] MID >
D-GAIN : [NORMAL] H>
WHT BAL : [AUTO] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : 100 150 >
KNEE : [ON]
RGB COR. : [OFF] ON
LUMINANC : [NORMAL] L>
DEPTH : 10 12
ZOOM : [FIT] FIT2
SCROLL : 0 0

```

Items to Set	Details	Refer to ▶▶
BLK BAL	Black balance settings	4-35
SCENE	Scene number settings	4-50
TRIGGER	Trigger timing settings	4-29
FRM RATE	Frame rate settings	4-7
FRM SIZE	Frame size settings	4-10
CUSTOM F	Custom frame rate, frame size settings	4-23
SHUTTER	Shutter speed settings	4-26
DUALRATE	Variable frame rate settings	4-38
AOI	Photometry area settings	4-44
IMG TRIG	Image trigger settings	4-41
IMGTRULE	Image trigger standard luminance settings	4-43
AEC	Auto exposure function settings	4-46
DRES	DRES settings	4-46
LOWLIGHT	Low light function settings	5-13
GXC	Sensitivity extension function settings	4-46
S-GAIN	Sensor gain settings (Not use)	-
D-GAIN	Digital gain settings	5-7
WHT BAL	White balance settings	5-8
ENHANCE	Enhance settings	5-9
GAMMA	Gamma settings	5-10
CHROMA	Chroma settings	5-10

Items in the table with dark backgrounds are items not described in “Recording Settings”.

Items to Set	Details	Refer to »
KNEE	Knee settings	5-11
RGB COR.	RGB matrix settings	5-11
LUMINANC	Luminance settings	5-12
DEPTH	Recording bit length settings	4-49
ZOOM	Video display zoom settings	5-4
SCROLL	Video display scroll	5-6

Items in the table with dark backgrounds are items not described in “Recording Settings”.

Press the STOP or MENU buttons to return to the status screen from the VIEW MENU.

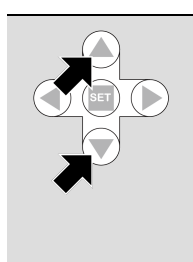
Select the Frame rate

Select the frame rate from the VIEW MENU.

Select the Frame Rate from the VIEW MENU

Select the frame rate, frames per second, based on the speed of the event.

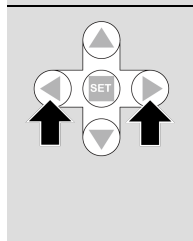
- 1 Access the VIEW MENU(▶▶ 3-12)
 - Access the VIEW MENU from the VIEW mode.



- 2 Select the FRM RATE with the up/down arrows

- Use the up/down arrows to move to the selected frame rate and select FRM RATE.

```
<VIEW MENU>
BLK BAL : [SET] SET
SCENE   : 00000
TRIGGER : [ENTER] E>
FRM RATE: 1000 2000
FRM SIZE: 1280x1080
CUSTOM F:>
```



- 3 Select the Frame Rate

- Select the frame rate to be set using the left/right arrows.
- The frame size automatically changes according to the frame rate.

```
<VIEW MENU>
BLK BAL : [SET] SET
SCENE   : 00000
TRIGGER : [ENTER] E>
FRM RATE: 2000 3000
FRM SIZE: 1920x1080
CUSTOM F:>
```



Attention • Please change into the next setup by HX-3L using 909,090 frames/second .

- SHLNC:OFF (▶▶ 8-26)
- AEC : OFF (▶▶ 4-46)
- SYNC SEL : INT (▶▶ 4-70)
- STRADDL : OFF (▶▶ 4-77)
- EXP TIME : GXnative (▶▶ 4-78)
- SYNC TIME : ASYNC (▶▶ 4-73)

Selectable Frame rates HX-3

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、4,500、5,000、6,000、7,000、7,500、8,000、10,000、20,000、25,000、30,000、40,000、50,000、75,000、100,000、200,000、300,000、400,000、600,000、700,000、900,000、1,300,000 frames/second
--------------------	--

Selectable Frame rates HX-3L

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、4,500、5,000、6,000、7,000、7,500、8,000、10,000、20,000、25,000、30,000、40,000、50,000、75,000、100,000、200,000、300,000、400,000、600,000、640,000、909,090 frames/second
--------------------	--

Selectable Frame rates HX-3E

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、4,500、5,000、6,000、7,000、7,500、8,000、10,000、20,000、25,000、30,000、40,000、50,000、75,000、100,000、200,000、220,000 frames/second
--------------------	--

Selectable Frame rates HX-4

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、5,000、6,000、7,500、8,000、10,000、15,000、20,000、25,000、30,000、40,000、60,000、80,000、100,000、200,000、300,000、400,000、600,000、750,000、1,000,000、1,080,000 frames/second
--------------------	---

Selectable Frame rates HX-4E

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、5,000、6,000、7,500、8,000、10,000、15,000、20,000、25,000、30,000、40,000、60,000、80,000、100,000、200,000、210,000 frames/second
--------------------	---

Selectable Frame rates HX-5	
Preset Frame Rates	50, 60, 100, 250, 500, 1,000, 1,250, 1,500, 2,000, 2,500, 3,000, 3,500, 4,000, 4,500, 5,000, 6,000, 7,000, 8,000, 10,000, 15,000, 20,000, 25,000, 30,000, 40,000, 50,000, 70,000, 100,000, 200,000, 300,000, 400,000, 500,000, 600,000, 900,000 frames/second
Selectable Frame rates HX-5E	
Preset Frame Rates	50, 60, 100, 250, 500, 1,000, 1,250, 1,500, 2,000, 2,500, 3,000, 3,500, 4,000, 4,500, 5,000, 6,000, 7,000, 8,000, 10,000, 15,000, 20,000, 25,000, 30,000, 40,000, 50,000, 70,000, 100,000, 200,000, 210,000 frames/second
Selectable Frame rates HX-6	
Preset Frame Rates	50, 60, 100, 250, 500, 1,000, 1,250, 1,500, 2,000, 2,500, 3,000, 3,500, 4,500, 5,000, 6,000, 8,000, 10,000, 15,000, 20,000, 25,000, 30,000, 50,000, 70,000, 100,000, 150,000, 200,000, 300,000, 350,000, 450,000, 650,000 frames/second
Selectable Frame rates HX-6E	
Preset Frame Rates	50, 60, 100, 250, 500, 1,000, 1,250, 1,500, 2,000, 2,500, 3,000, 3,500, 4,500, 5,000, 6,000, 8,000, 10,000, 15,000, 20,000, 25,000, 30,000, 50,000, 70,000, 100,000, 150,000, 200,000 frames/second



- The frame rates can be changed with the direct button. (▶▶ 3-17)
- See (▶▶ 4-23) for record rates that are not preset
- The frame size that can be set for each frame rate varies. (▶▶ 4-11)

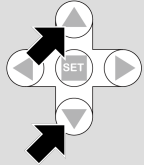
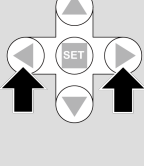
Select the Frame Size


Select the frame size, available pixels, from the VIEW MENU. The recording time increases as the frame size decreases. As the frame size increases the images recorded will have higher resolution in addition to a larger Field of View, FOV.

■ Select the Frame Size from the VIEW MENU

Set the frame size or number of horizontal and vertical pixels per frame.

- 1 Access the VIEW MENU(▶▶ 3-12)
 - Access the VIEW MENU from the VIEW mode.

	<ol style="list-style-type: none">2 Select the FRM SIZE with the up/down arrows<ul style="list-style-type: none">• Use the up/down arrows to select the Frame Size and select FRM SIZE.	<pre><VIEW MENU> BLK BAL : [REDACTED] SET SCENE : 00000 TRIGGER : [REDACTED] E> FRM RATE: 1000 2000 FRM SIZE: 1920x1080 CUSTOM F:></pre>
	<ol style="list-style-type: none">3 Select the frame rate with the left/right arrows<ul style="list-style-type: none">• Select the frame rate to be set using the left/right arrows.• The frame size that can be set changes according to the frame rate.	<pre><VIEW MENU> BLK BAL : [REDACTED] SET SCENE : 00000 TRIGGER : [REDACTED] E> FRM RATE: 1000 2000 FRM SIZE: [REDACTED] CUSTOM F:></pre>

 • See (▶▶ 4-23) to record Frame Sizes that are not preset.

See (▶▶ 10-2) for available frame sizes of the sensor.

See (▶▶ 10-31) for frame rates, frame sizes and recording times.

Frame Rate and Frame Size HX-3

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~2000	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
2,000	2432 × 1824				
2,500	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
3,000	2048 × 1536	1792 × 1792	1920 × 1080	1280 × 960	1280 × 720
	2304 × 1296	1920 × 1440			
4,000	1792 × 1344	1536 × 1536	1920 × 1080	1280 × 960	1280 × 720
	1920 × 1200				
4,500	1920 × 1080	1280 × 960	1280 × 720		
5,000	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720	
6,000	1408 × 1056	1280 × 960	1280 × 720		
7,000	1280 × 1024	1280 × 992	1280 × 960	1280 × 720	
7,500	1280 × 960	1280 × 720			
8,000	1152 × 864	1280 × 720	1408 × 784		
10,000	1280 × 720	1152 × 752	1024 × 768	960 × 960	
20,000	768 × 576	640 × 640	768 × 512		
25,000	640 × 480				
30,000	512 × 512	640 × 384			
40,000	512 × 384	640 × 272			
50,000	384 × 384	512 × 264			
75,000	384 × 272	384 × 208			
100,000	384 × 200	320 × 232	320 × 168		
200,000	320 × 104	320 × 40			
300,000	320 × 64	320 × 8			
400,000	320 × 40				
600,000	320 × 24				
700,000	320 × 16				
900,000	320 × 8				

Recording

Frame rate	Frame Size that can be Selected			
1,300,000	320 × 8			

Frame Rate and Frame Size HX-3L

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~2000	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
2,000	2432 × 1824				
2,500	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
3,000	2048 × 1536	1792 × 1792	1920 × 1080	1280 × 960	1280 × 720
	2304 × 1296	1920 × 1440			
4,000	1792 × 1344	1536 × 1536	1920 × 1080	1280 × 960	1280 × 720
	1920 × 1200				
4,500	1920 × 1080	1280 × 960	1280 × 720		
5,000	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720	
6,000	1408 × 1056	1280 × 960	1280 × 720		
7,000	1280 × 1024	1280 × 992	1280 × 960	1280 × 720	
7,500	1280 × 960	1280 × 720			
8,000	1152 × 864	1280 × 720	1408 × 784		
10,000	1280 × 720	1152 × 752	1024 × 768	960 × 960	
20,000	768 × 576	640 × 640	768 × 512		
25,000	640 × 480				
30,000	512 × 512	640 × 384			
40,000	512 × 384	640 × 272			
50,000	384 × 384	512 × 264			
75,000	384 × 272	384 × 208			
100,000	384 × 200	320 × 232	320 × 168		
200,000	384 × 88	320 × 40			
300,000	320 × 64				
400,000	320 × 40				
600,000	320 × 24				
640,000	320 × 24				
909,090	320 × 16				

Recording

Frame Rate and Frame Size HX-3E

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~2000	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
2,000	2432 × 1824				
2,500	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
3,000	2048 × 1536	1792 × 1792	1920 × 1080	1280 × 960	1280 × 720
	2304 × 1296	1920 × 1440			
4,000	1792 × 1344	1536 × 1536	1920 × 1080	1280 × 960	1280 × 720
	1920 × 1200				
4,500	1920 × 1080	1280 × 960	1280 × 720		
5,000	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720	
6,000	1408 × 1056	1280 × 960	1280 × 720		
7,000	1280 × 1024	1280 × 992	1280 × 960	1280 × 720	
7,500	1280 × 960	1280 × 720			
8,000	1152 × 864	1280 × 720	1408 × 784		
10,000	1280 × 720	1152 × 752	1024 × 768	960 × 960	
20,000	768 × 576	640 × 640	768 × 512		
25,000	640 × 480				
30,000	512 × 512	640 × 384			
40,000	512 × 384	640 × 272			
50,000	384 × 384	512 × 264			
75,000	384 × 272	384 × 208			
100,000	384 × 200	320 × 232	320 × 168		
200,000	320 × 104				
220,000	320 × 96				

Frame Rate and Frame Size HX-4

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~6000	1280 × 960	1280 × 720			
6,000	1280 × 928				
7,500	1152 × 864	1280 × 720			
8,000	1280 × 736	1280 × 720	1280 × 688	1024 × 768	960 × 960
10,000	1152 × 656	1024 × 720	960 × 720	896 × 768	
15,000	896 × 544	768 × 576	640 × 640		
20,000	768 × 464	640 × 480			
25,000	640 × 432	512 × 512	512 × 472		
30,000	512 × 440	512 × 384			
40,000	640 × 264	384 × 384	512 × 264		
60,000	384 × 272	384 × 208			
80,000	384 × 200	320 × 232	320 × 168		
100,000	384 × 160	320 × 120			
200,000	320 × 80	320 × 16			
300,000	384 × 40	320 × 48			
400,000	320 × 32				
600,000	320 × 16				
750,000	320 × 8				
1,000,000	320 × 8				
1,080,000	320 × 8				

Recording

Frame Rate and Frame Size HX-4E

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~6000	1280 × 960	1280 × 720			
6,000	1280 × 928				
7,500	1152 × 864	1280 × 720			
8,000	1280 × 736	1280 × 720	1280 × 688	1024 × 768	960 × 960
10,000	1152 × 656	1024 × 720	960 × 720	896 × 768	
15,000	896 × 544	768 × 576	640 × 640		
20,000	768 × 464	640 × 480			
25,000	640 × 432	512 × 512	512 × 472		
30,000	512 × 440	512 × 384			
40,000	640 × 264	384 × 384	512 × 264		
60,000	384 × 272	384 × 208			
80,000	384 × 200	320 × 232	320 × 168		
100,000	384 × 160	320 × 120			
200,000	320 × 80				
210,000	320 × 80				

Frame Rate and Frame Size HX-5

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~1,250	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
1,500	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
2,000	2432 × 1368	2048 × 1536	1792 × 1792	1920 × 1080	1280 × 960
	1280 × 720				
2,500	1664 × 1584	1792 × 1344	1536 × 1536	1920 × 1080	1280 × 960
	1280 × 720				
3,000	1920 × 1080	1408 × 1408	1664 × 1248	1280 × 960	1280 × 720
3,500	1792 × 1008	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720
4,000	1536 × 1056	1280 × 1264	1408 × 1056	1280 × 960	1280 × 720
4,500	1280 × 1024	1280 × 960	1280 × 720		
5,000	1280 × 960	1280 × 720			
6,000	1024 × 1024	1152 × 864	1280 × 720		
7,000	1280 × 720	1024 × 816			
8,000	1024 × 768	896 × 816			
10,000	1024 × 608	896 × 688	896 × 672	768 × 768	896 × 632
15,000	768 × 528	640 × 624	768 × 464	640 × 480	
20,000	640 × 464	768 × 384	512 × 560	512 × 512	640 × 400
25,000	640 × 368	512 × 448	512 × 384		
30,000	768 × 256	640 × 304	512 × 368	512 × 312	384 × 384
40,000	384 × 288				
50,000	512 × 216	384 × 280	384 × 216		
70,000	384 × 192	320 × 224	320 × 160		
100,000	384 × 128	320 × 152	320 × 88		
200,000	384 × 56	320 × 64	320 × 8		
300,000	320 × 40	384 × 32			
400,000	320 × 24				

Recording

Frame rate	Frame Size that can be Selected				
500,000	320 × 16				
600,000	576 × 8				
900,000	320 × 8				

Frame Rate and Frame Size HX-5E

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~1,250	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
1,500	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
2,000	2432 × 1368	2048 × 1536	1792 × 1792	1920 × 1080	1280 × 960
	1280 × 720				
2,500	1664 × 1584	1792 × 1344	1536 × 1536	1920 × 1080	1280 × 960
	1280 × 720				
3,000	1920 × 1080	1408 × 1408	1664 × 1248	1280 × 960	1280 × 720
3,500	1792 × 1008	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720
4,000	1536 × 1056	1280 × 1264	1408 × 1056	1280 × 960	1280 × 720
4,500	1280 × 1024	1280 × 960	1280 × 720		
5,000	1280 × 960	1280 × 720			
6,000	1024 × 1024	1152 × 864	1280 × 720		
7,000	1280 × 720	1024 × 816			
8,000	1024 × 768	896 × 816			
10,000	1024 × 608	896 × 688	896 × 672	768 × 768	896 × 632
15,000	768 × 528	640 × 624	768 × 464	640 × 480	
20,000	640 × 464	768 × 384	512 × 560	512 × 512	640 × 400
25,000	640 × 368	512 × 448	512 × 384		
30,000	768 × 256	640 × 304	512 × 368	512 × 312	384 × 384
40,000	384 × 288				
50,000	512 × 216	384 × 280	384 × 216		
70,000	384 × 192	320 × 224	320 × 160		
100,000	384 × 128	320 × 152	320 × 88		
200,000	320 × 64				
210,000	320 × 64				

Recording

Frame Rate and Frame Size HX-6

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~1000	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
1,250	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
1,500	2048 × 1536	2048 × 1520	1792 × 1792	1920 × 1080	1280 × 960
	1280 × 720				
2,000	1920 × 1080	1792 × 1344	1536 × 1536	1792 × 1280	1280 × 960
	1280 × 720				
2,500	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720	
3,000	1408 × 1056	1280 × 960	1280 × 720		
3,500	1280 × 1024	1280 × 960	1280 × 720		
4,500	1152 × 864	1024 × 944	1280 × 720		
5,000	1280 × 720	1024 × 896	1024 × 768		
6,000	1152 × 672	1024 × 752	896 × 848	1024 × 688	
8,000	1024 × 560	896 × 624	896 × 576	768 × 720	
10,000	896 × 504	768 × 576	768 × 512	640 × 640	640 × 480
15,000	768 × 384	640 × 448	640 × 384	512 × 512	
20,000	640 × 336	640 × 272	512 × 400	512 × 384	
25,000	512 × 328	512 × 264	384 × 384		
30,000	512 × 272	448 × 304	384 × 280		
50,000	512 × 160	384 × 200	320 × 232	320 × 168	
70,000	512 × 112	384 × 136	320 × 160	320 × 96	
100,000	512 × 72	384 × 96	320 × 112	320 × 48	
150,000	384 × 56	320 × 64	320 × 8		
200,000	448 × 32	384 × 40	320 × 48		
300,000	320 × 24				
350,000	320 × 24				
450,000	320 × 16				

Frame rate	Frame Size that can be Selected			
650,000	320 × 8			

Recording

Frame Rate and Frame Size HX-6E

The frame size that can be set varies according to the frame rate selected.

Frame rate	Frame Size that can be Selected				
50~1000	2560 × 1920	2560 × 1440	1920 × 1080	1280 × 960	1280 × 720
1,250	2560 × 1440	2176 × 1632	1920 × 1920	1920 × 1080	1280 × 960
	1280 × 720				
1,500	2048 × 1536	2048 × 1520	1792 × 1792	1920 × 1080	1280 × 960
	1280 × 720				
2,000	1920 × 1080	1792 × 1344	1536 × 1536	1792 × 1280	1280 × 960
	1280 × 720				
2,500	1536 × 1152	1280 × 1280	1280 × 960	1280 × 720	
3,000	1408 × 1056	1280 × 960	1280 × 720		
3,500	1280 × 1024	1280 × 960	1280 × 720		
4,500	1152 × 864	1024 × 944	1280 × 720		
5,000	1280 × 720	1024 × 896	1024 × 768		
6,000	1152 × 672	1024 × 752	896 × 848	1024 × 688	
8,000	1024 × 560	896 × 624	896 × 576	768 × 720	
10,000	896 × 504	768 × 576	768 × 512	640 × 640	640 × 480
15,000	768 × 384	640 × 448	640 × 384	512 × 512	
20,000	640 × 336	640 × 272	512 × 400	512 × 384	
25,000	512 × 328	512 × 264	384 × 384		
30,000	512 × 272	448 × 304	384 × 280		
50,000	512 × 160	384 × 200	320 × 232	320 × 168	
70,000	512 × 112	384 × 136	320 × 160	320 × 96	
100,000	512 × 72	384 × 96	320 × 112	320 × 48	
150,000	384 × 56	320 × 64			
200,000	320 × 48				

Custom Settings for Frame rate and Frame Size

In addition to the preset selections, custom frame rates and frame sizes can be set.

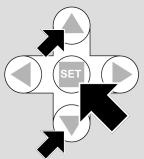
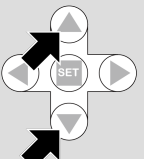
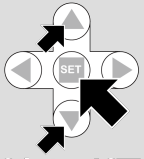
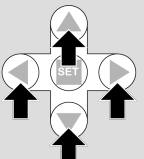
■ Custom Settings for Frame rate and Frame Size

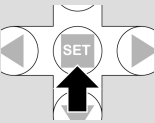
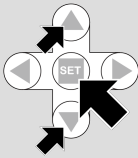
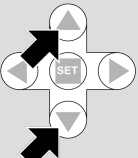
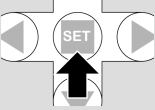
As the frame rate increases, the maximum frame size that can be set decreases.

When custom setting the frame rate and frame size, select one to take priority.

1 Access the VIEW MENU(▶▶ 3-12)

- Access the VIEW MENU from the VIEW mode.

 <p>Select and SET</p>	<h3>2 Select CUSTOM F with the up/down arrows and press the SET button</h3> <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display) and select CUSTOM F. • Press the SET button to display the CUSTOM F sub-menu. 	<pre><VIEW MENU> BLK BAL : [REVERSE] SET SCENE : 00000 TRIGGER : [CENTER] E> FRM RATE: 1000 2000 FRM SIZE: 1280x1080 [REVERSE] : ></pre>
 <p>Select and SET</p>	<h3>3 Select the value for priority using PRIORITY</h3> <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display) and select PRIORITY. • Use the left/right arrows to select either the frame rate or the frame size to have priority for the settings. <ul style="list-style-type: none"> • RATE:Frame rate takes priority • SIZE:Frame size takes priority 	<pre>VIEW MENU > CUSTOM PRIORITY: [RATE] SIZE FRM RATE: 0001000 FRM SIZE: 2560 1920</pre>
 <p>Select and SET</p>	<h3>4 Select FRM RATE and press the SET button</h3> <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display) and select FRM RATE. • Press the SET button to set the frame rate. 	<pre>VIEW MENU > CUSTOM PRIORITY: [RATE] SIZE [FRM RATE]: 0001000 FRM SIZE: 2560 1920</pre>
 <p>Select and SET</p>	<h3>5 Input the frame rate</h3> <ul style="list-style-type: none"> • Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows. 	<pre>VIEW MENU > CUSTOM PRIORITY: [RATE] SIZE [FRM RATE]: [0001000] FRM SIZE: 2560 1920</pre>

	<p>6 Press the SET button</p> <ul style="list-style-type: none">Press the SET button to set the frame rate.	<pre>VIEW MENU > CUSTOM PRIORITY: <u>DATE</u> SIZE FRM RATE: 0001900 FRM SIZE: 2560 1920</pre>
 <p>Select and SET</p>	<p>7 Select FRM SIZE and press the SET button</p> <ul style="list-style-type: none">Use the up/down arrows to move to the selected item (reverse display) and select FRM SIZE.Press the SET button to set the frame rate.	<pre>VIEW MENU > CUSTOM PRIORITY: <u>DATE</u> SIZE FRM RATE: 0001900 <u>FRM SIZE</u>: 2560 1920</pre>
	<p>8 Input the frame size</p> <ul style="list-style-type: none">Use the left/right arrows to increase or decrease the horizontal pixels and the up/down arrows to increase or decrease the vertical pixels.	<pre>VIEW MENU > CUSTOM PRIORITY: <u>DATE</u> SIZE FRM RATE: 0001900 <u>FRM SIZE</u>: <u>2432</u> <u>1904</u></pre>
	<p>9 Press the SET button</p> <ul style="list-style-type: none">Press the SET button to set the frame size.	<pre>VIEW MENU > CUSTOM PRIORITY: <u>DATE</u> SIZE FRM RATE: 0001900 <u>FRM SIZE</u>: 2432 1904</pre>



- The frame rate can be set in units of 10 frames/second.
- The frame size can be set in units of 64 horizontal pixels and 8 vertical pixels (HX-3L: 64 horizontal pixels and 24 vertical pixels).

Priority Settings for Frame rate and Frame Size

If custom setting the frame rate and frame size, select either the frame rate or the frame size to have priority.

- **Frame rate Priority:** The upper limit for the frame size that can be set is limited by the frame rate input. If pressing the SET button to input “a value higher than the upper limit for the frame size” in the frame rate, the maximum frame size that can be set is automatically set. The frame size that can be input is restricted by the frame rate.
- **Frame Size Priority:** The upper limit for the frame rate that can be set is limited by the frame size input. If pressing the SET button to input “a value higher than the upper limit for the frame size” in the frame rate, the maximum frame rate that can be set is set. If the frame size input of “a value higher than the upper limit for the frame rate” increases, the frame rate is automatically decreased.

Limitations on the frame size by the frame rate refer to the limitations on the available pixels (number of horizontal pixels X number of vertical pixels).

- To increase the number of horizontal pixels, reduce the number of vertical pixels and the number of horizontal pixels can be increased.
- To increase the number of vertical pixels, reduce the number of horizontal pixels and the number of vertical pixels can be increased.

Select the preset frame size and frame rate to cancel the custom frame size.

Select the Shutter Speed

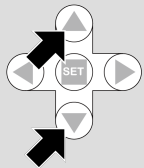
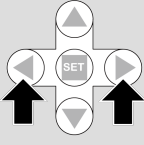
Select the shutter speed from the VIEW MENU.

A value can also be input to set a custom shutter speed.

■ Select a Preset Shutter Speed

Set the shutter speed.

- 1 Access the VIEW MENU(▶▶ 3-12)
 - Access the VIEW MENU from the VIEW mode.

	<ol style="list-style-type: none"> 2 Select SHUTTER with the up/down arrows <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected shutter speed and select SHUTTER. 	<pre> <VIEW MENU> SCENE :000000 TRIGGER :[ENTER] E> FRM RATE :[1000] 2000 FRM SIZE :[1920x1080] CUSTOM F :> SHUTTER :[OPEN] 2k > </pre>
	<ol style="list-style-type: none"> 3 Select the shutter speed with the left/right arrows <ul style="list-style-type: none"> • Use the left/right arrows to select the shutter speed or exposure time. 	<pre> <VIEW MENU> SCENE :000000 TRIGGER :[ENTER] E> FRM RATE :[1000] 2000 FRM SIZE :[1920x1080] CUSTOM F :> SHUTTER :[1/10k] 10k 2> </pre>

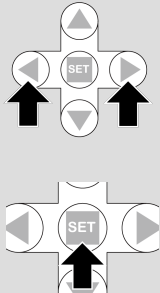
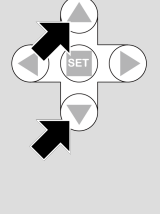
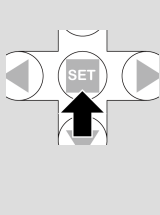
Selectable Shutter Speeds

Preset Shutter Speeds HX-3	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.0μs, 0.9μs, 0.8μs, 0.7μs, 0.6μs, 0.5μs, 0.4μs, 0.3μs, 0.2μs
Preset Shutter Speeds HX-3L	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.0μs
Preset Shutter Speeds HX-3E	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.1μs
Preset Shutter Speeds HX-4/HX-5	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.0μs, 0.9μs, 0.8μs, 0.7μs, 0.6μs, 0.5μs, 0.4μs, 0.3μs
Preset Shutter Speeds HX-4E/HX-5E	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.1μs
Preset Shutter Speeds HX-6	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.0μs, 0.9μs, 0.8μs, 0.7μs, 0.6μs, 0.5μs, 0.4μs
Preset Shutter Speeds HX-6E	OPEN, 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000, 1.1μs



- Attention
- The upper limit for the shutter speed is determined by the frame rate.
 - Shutter speeds that cannot be selected are not displayed.
 - The shutter speed can be selected from the SHUTTER button. (▶▶ 3-17)

■ Custom Settings for Shutter Speed

	<p>1 Select the left side of the shutter speed and press the SET button</p> <ul style="list-style-type: none"> • A 6 digit number such as 000100us is displayed at the left side of the preset. 	<pre><VIEW MENU> SCENE : 000000 TRIGGER : [ENTER] E> FRM RATE : 1000 2000 FRM SIZE : 1920x1080 CUSTOM F : > SHUTTER : 000000us></pre>
	<p>2 Input the shutter speed</p> <ul style="list-style-type: none"> • Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows. • Values are in us "micro second" units. 	<pre><VIEW MENU> SCENE : 000000 TRIGGER : [ENTER] E> FRM RATE : 1000 2000 FRM SIZE : 1920x1080 CUSTOM F : > SHUTTER : 000000us></pre>
	<p>3 Press the SET button</p> <ul style="list-style-type: none"> • Press the SET button to set the shutter speed. 	<pre><VIEW MENU> SCENE : 000000 TRIGGER : [ENTER] E> FRM RATE : 1000 2000 FRM SIZE : 1920x1080 CUSTOM F : > SHUTTER : 500 us></pre>



Attention • The upper limit for the shutter speed is determined by the frame rate.

- If a value higher than the upper limit for the shutter speed is input the maximum value that can be set is determined when the SET button is pressed.

Set the Trigger Timing

Set the trigger timing to the event to be recorded.

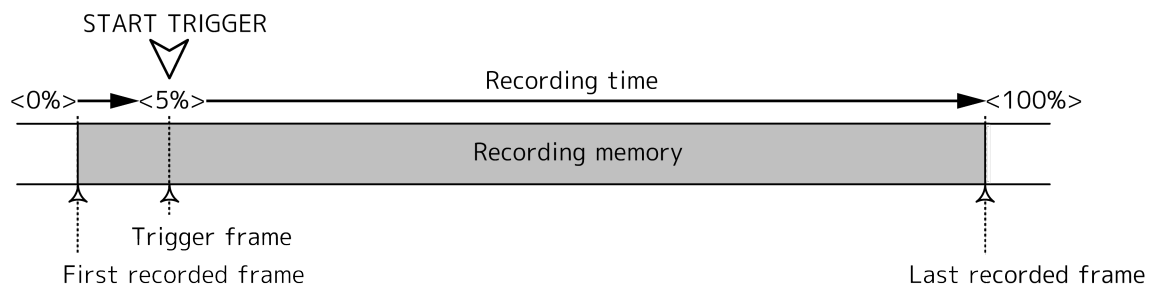
The following five types of trigger timing are available.

- Start Trigger (START)
- Center Trigger (CENTER)
- End Trigger (END)
- Custom Trigger (+000%)
- Post Trigger (000000001)

Recording

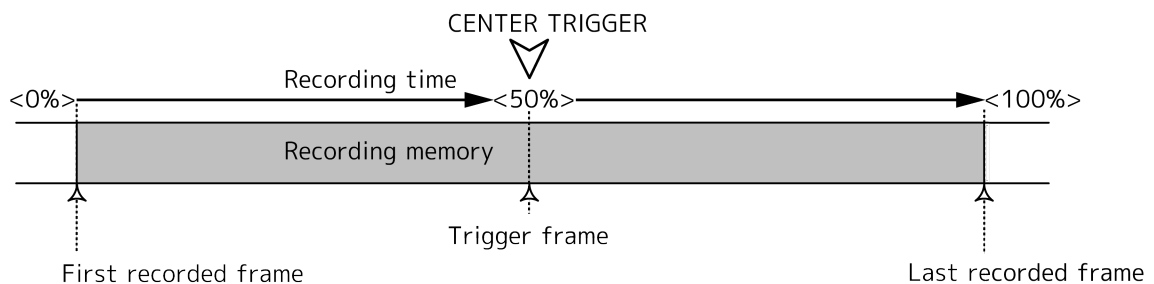
Start Trigger

With the Start Trigger 95% of the record time from the trigger input to the end of recording can be recorded. The Start Trigger is used when recording an event that starts immediately after the trigger is input.



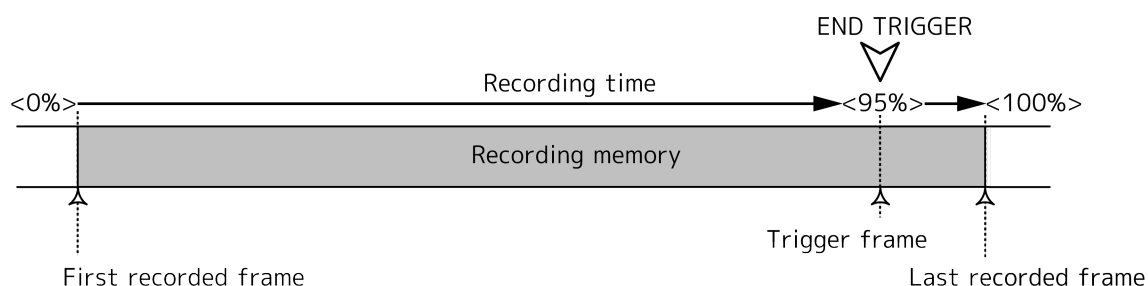
Center Trigger

With the Center Trigger half of the recording time is recorded before and after the trigger input. The Center Trigger is used when recording an event that requires both pre and post images after the trigger is input.



End Trigger

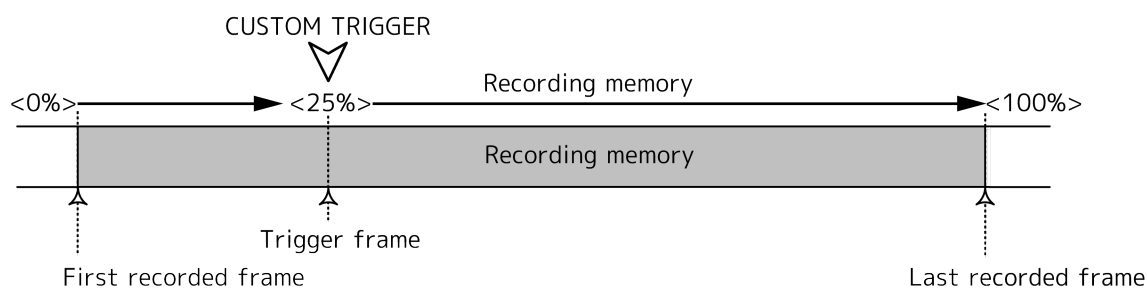
With the End Trigger 95% of the record time is recorded from the start of recording to trigger input. Use the End Trigger when recording an event that ends when the trigger is input.



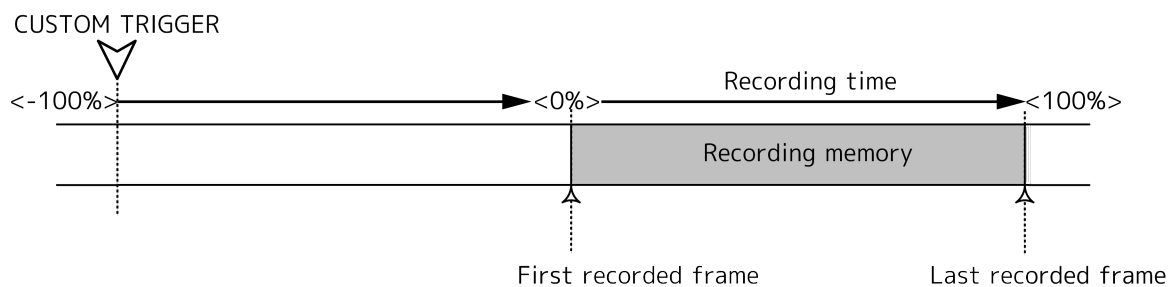
Custom Trigger

With the Custom Trigger, if positive numbers are set, the frame numbers recorded from the start of the recording to the trigger input and the frame rate recorded from the trigger input to the end of recording can be set in 1% increments.

The example in the figure shows a Custom Trigger timing value of +25%.

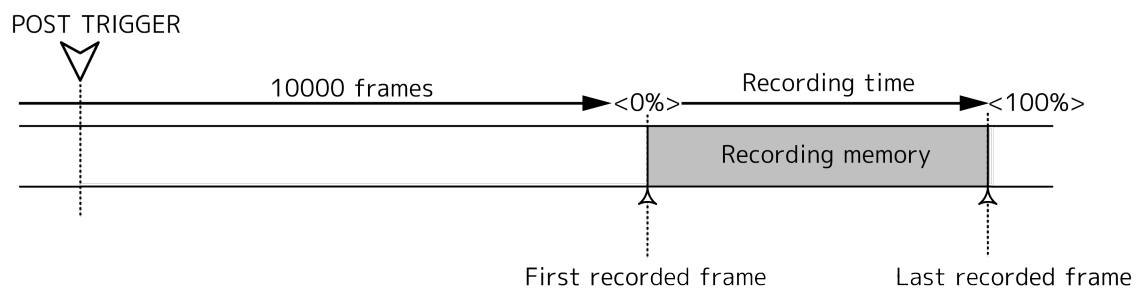


When using a Custom Trigger if a negative number is set it functions as a direct trigger and the recording starts at a set time period after trigger input. For example, if the trigger timing is set to -100%, the recording starts at the point after trigger input when the same time elapses.



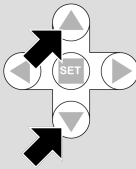
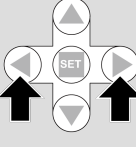
Post Trigger

The Post Trigger also functions as a direct trigger and the frame rate in 1 frame increments can be set for the time from trigger input to the start of recording. The maximum value for the frame rate is the larger of 600 seconds, or 65536 frames. For example, if the frame rate is set to 10000 the recording starts when the amount of time equivalent to 10000 frames has elapsed after trigger input.

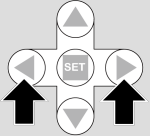
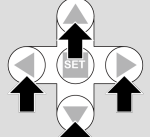



■ Select the Trigger Timing

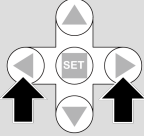
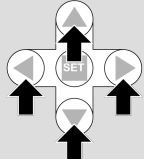
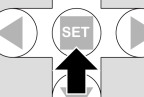
- 1 Access the VIEW MENU(▶▶ 3-12)
 - Access the VIEW MENU from the VIEW mode

	<ol style="list-style-type: none">2 · Select TRIGGER with the up/down arrows· Use the up/down arrows to move to the TRIGGER type and select TRIGGER.	<pre><VIEW MENU> BLK BAL : 000 SET SCENE : 00000 TRIGGER : CENTER E> FRM RATE: 1000 2000 FRM SIZE: 1280x1080 CUSTOM F:></pre>
	<ol style="list-style-type: none">3 Select the trigger timing with the left/right arrows· Use the left/right arrows to select the trigger type.· START Start Trigger· CENTER Center Trigger· END End Trigger· +000% Custom Trigger· 000000001 Post Trigger	<pre><VIEW MENU> BLK BAL : 000 SET SCENE : 00000 TRIGGER : START CE> FRM RATE: 1000 2000 FRM SIZE: 1280x1080 CUSTOM F:></pre>

■ Set the Custom Trigger

	<p>1 Select Custom Trigger and press the SET button</p> <ul style="list-style-type: none"> • When selecting the trigger type use the left/right arrows to select Custom Trigger and press the SET button. • The Custom Trigger position is 2nd from the right and is displayed as +000%. 	<pre> <VIEW MENU> BLK BAL : SET SET SCENE : 00000 TRIGGER : END 0000 FRM RATE: 000 2000 FRM SIZE: 820 130 CUSTOM F:> </pre>
	<p>2 Input the custom trigger value</p> <ul style="list-style-type: none"> • Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows. • Values are in 1% increments. 	<pre> <VIEW MENU> BLK BAL : SET SET SCENE : 00000 TRIGGER : +000% FRM RATE: 000 2000 FRM SIZE: 820 130 CUSTOM F:> </pre>
	<p>3 Press the SET button</p> <ul style="list-style-type: none"> • Press the SET button to set the Custom Trigger. 	

■ Set the Post Trigger

	<p>1 Select the Post Trigger and press the SET button</p> <ul style="list-style-type: none"> • Select the Post Trigger with the left/right arrows when selecting the trigger type and press the SET button. • The Post Trigger position is displayed as 000000001. 	<pre> <VIEW MENU> BLK BAL : 000 SET SCENE : 000000 TRIGGER : 000000001 FRM RATE: 0000 2000 FRM SIZE: 0020x0030 CUSTOM F:> </pre>
	<p>2 Input the Post Trigger value</p> <ul style="list-style-type: none"> • Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows. • Values are in 1 frame increments. 	<pre> <VIEW MENU> BLK BAL : 000 SET SCENE : 000000 TRIGGER : 000000001 FRM RATE: 0000 2000 FRM SIZE: 0020x0030 CUSTOM F:> </pre>
	<p>3 Press the SET button</p> <ul style="list-style-type: none"> • Press the SET button to set the Post Trigger. 	



- Trigger timing type can be selected from the TRIG direct button. (▶▶ 3-18) The Custom Trigger and Post Trigger values cannot be changed with the TRIG direct button.

Black Balance

Black Balance corrects noise, black level data and fixed pattern noise of the sensor.

The noise in the image sensor of the MEMRECAM HX-3 changes according to the sensor temperature or recording settings. This noise is called fixed pattern noise which has a pattern that is unique to each sensor. The Memrecam HX-3 black balance noise and black level correction data are obtained from the sensor and corrected to reduce the fixed pattern noise.



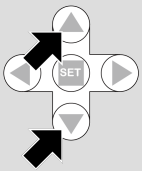
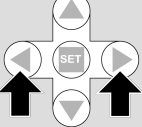
The Memrecam HX-3 factory settings automatically black balance the sensor when switching to the STOP, VIEW and ARM modes.

Automatically set black balance with (▶▶ 8-25)

Recording

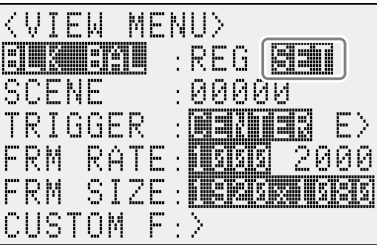
■ Set Black Balance

Sets the black balance correction to enable or disable. Also, the black balance data can be captured manually.

	1 Access the STOP mode or the VIEW mode • If in the ARM mode, switch to the STOP or VIEW mode.	
	2 Press the MENU button to display the MENU(▶▶ 3-9) • If accessed from the VIEW mode the VIEW MENU is displayed. If accessed from the STOP mode the TOP MENU is displayed.	
	3 Select BLK BAL with the up/down arrows • Use the up/down arrows to move to the selected black balance preference and select BLK BAL.	<pre> <VIEW MENU> BLK BAL : REG SET SCENE : 00000 TRIGGER : CENTER E> FRM RATE : 1000 2000 FRM SIZE : 1920x1080 CUSTOM F :> </pre>
	4 Use the left/right arrows to select the black balance settings • Use the left/right arrows to switch the black balance setting details. • OFF No black balance correction • REG Black balance correction • SET Black balance	<pre> <VIEW MENU> BLK BAL : OFF REG > SCENE : 00000 TRIGGER : CENTER E> FRM RATE : 1000 2000 FRM SIZE : 1920x1080 CUSTOM F :> </pre>

5 Perform black balance

- 1 Select SET and the HX-3 black balance mechanical shutter closes to obtain the black balance.
- 2 The setting will automatically switch to REG after retrieving the black balance.



Recording with Enhanced Sensitivity

Use the enhanced sensitivity function (GXC) to record at four times the sensitivity without any increase in noise.

The GXC is operating as standard MEMRECAM HX-4.


GXC Function

Use the GXC function to increase the sensitivity about 4x without increasing the level of noise. However, the maximum frame size is limited to 1/2 at 1280 × 960.

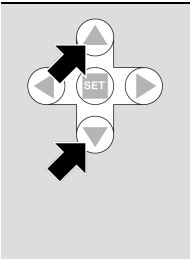
While the maximum frame size is limited to 1/2, the frame size limit does not change with the photographic speed. The maximum photographic speed at the maximum frame size (1280x960) using the GXC function is 7500 frames/sec. (▶▶ 10-2)

The angle of view is twice the frame size when not using GXC. For example, with the GXC function ON, 2560 × 1920 has the same angle of view as 1280 × 960 when the GXC function is OFF.

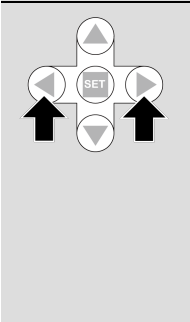
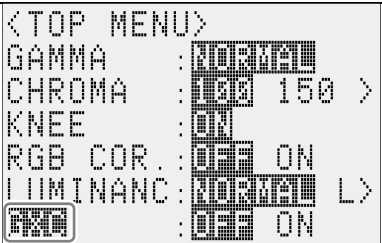
■ Using the GXC Function

- Attention
- If using the GXC function, first set the frame size to 1280 x 960 or less.
 - In HX-4, the GXC function OFF is also hung horizontal 1280 and vertical 960, and is large impossible.
 - Change the frame size (▶▶ 4-10)

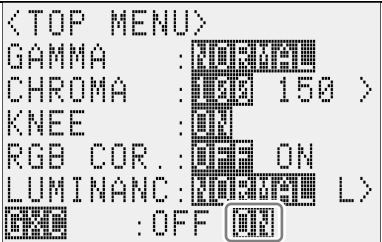
- 1 Access the TOP MENU (▶▶ 3-11)
- Access the TOP MENU from the STOP mode.



- 2 Select GXC with the up/down arrows
- 3 Use the up/down arrows to move to the selected item (reverse display) and select GXC.



- 3 Press the right arrow and select ON
- 4 Press the right arrow to turn the GXC function ON.
- 5 If the frame size is larger than 1280 x 960, the GXC function cannot be turned ON.
- 6 If making the frame size larger than 1280 x 960, turn the GXC function OFF and then change the frame size.



Set Variable Frame Rates

The variable frame rate function (DUALRATE) is a function making the frame rate variable before and after the trigger. With a speed ratio (RATIO) during low speed recording, the number of frames (BASERATE) during normal recording is set.

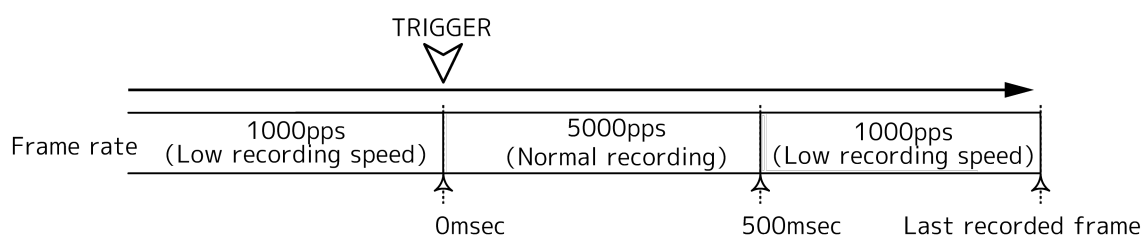
Variable Frame Rate Function

This is a function to record at a frame rate set with only the designated frame rate and to conduct low speed recording before trigger input and after the designated number of frames. This setting is enabled when the event recorded extends over a long period of time but a certain instant is recorded at a high speed, and when recording an entire event over a long period of time.

The speed ratio during low speed recording can be set at a fraction of the normal recording, with a setting range of 2 ~ 100.

Low speed recording is performed until the trigger is input, and recording is conducted at a normal speed only for the frames set after the trigger. After recording the set number of frames, if there is more memory, further recording can be performed at a low speed, until there is no more memory.

The following figure shows the operation with the frame rate is 5000 frames/sec, the normal frame rate frame rate is 2501 frames (about 500ms) and the recording ratio at low speed is 1/5th of 1000 frames/sec.

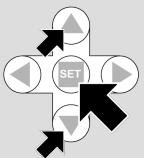
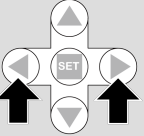
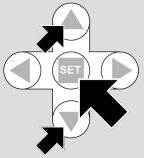
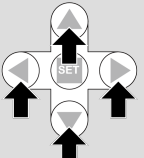


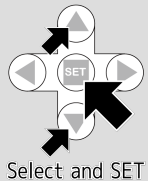
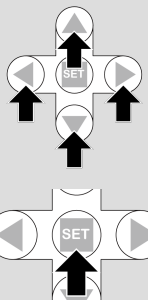
- Attention • EPO (exposure pulse output) outputs exposure pulses at a low frame rate that is the same as the normal frame rate.
- The variable frame rate function is disabled during burst recording.
- During normal recording, the frame rate uses the FRM RATE (▶▶ 4-7) set values.

■ Using the Variable Speed Recording Function

1 Access the VIEW MENU (▶▶ 3-12)

- Access the VIEW MENU from the VIEW mode.

 <p>Select and SET</p>	<h3>2 Select DUALRATE with the up/down arrows and press the SET button</h3> <p>7 Use the up/down arrows to move to the selected item (reverse display) and select DUALRATE.</p> <p>8 Press the SET button to display the DUALRATE sub-menu.</p>	<pre><VIEW MENU> TRIGGER : [ENTER] E> FRM RATE : 0000 2000 FRM SIZE : 0240X1680 CUSTOM F : > SHUTTER : OPEN 2k > DUALRATE : ></pre>
	<h3>3 Turn the variable frame rate ON</h3> <p>9 Use the up/down arrows to move to the selected item (reverse display) and select DUALRATE.</p> <p>10 Select ON with the left/right arrows.</p>	<pre>VIEW MENU > DUALRA DUALRATE : OFF [ON] RATIO : 002 BASERATE : 000006588</pre>
 <p>Select and SET</p>	<h3>4 Select RATIO with the up/down arrows (low speed ratio) and press the SET button</h3> <p>11 Use the up/down arrows to move to the selected item (reverse display) and select RATIO.</p> <p>12 Press the SET button to set the low speed ratio.</p>	<pre>VIEW MENU > DUALRA DUALRATE : OFF [ON] RATIO : 002 BASERATE : 000006588</pre>
	<h3>5 Input the low speed ratio and press the SET button</h3> <p>13 Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.</p> <p>14 Press the SET button to set the low speed ratio.</p>	<pre>VIEW MENU > DUALRA DUALRATE : OFF [ON] RATIO : 002 BASERATE : 000006588</pre>

 <p>Select and SET</p>	<p>6 Select BASERATE (normal frame rate) with the up/down arrows and press the SET button</p> <p>15 Use the up/down arrows to move to the selected item (reverse display) and select BASERATE.</p> <p>16 Press the SET button to set the normal frame rate.</p>	<pre>VIEW MENU > DUALRA DUALRATE:OFF [ON] RATIO :004 BASERATE:000006588</pre>
 <p>Select and SET</p>	<p>7 Input the normal frame rate and press the SET button</p> <ul style="list-style-type: none"> • Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows. • Press the SET button to set the normal frame rate. 	<pre>VIEW MENU > DUALRA DUALRATE:OFF [ON] RATIO :004 BASERATE:000006588</pre>

Input the Trigger with Image Trigger

The trigger can be automatically input when the luminance of an image recorded changes.

Image Trigger (Luminance Detection Auto Trigger Input Function)

This is a function to automatically input the trigger when the luminance in a set area of interest rapidly changes while recording in the ARM mode.

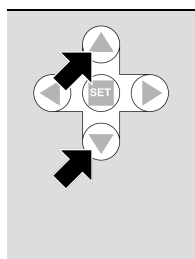
In a quick response to the change in luminance, the delay until the trigger is input is two frames. If using the image trigger, the detection sensitivity and luminance detection area, and standard luminance update method is specified.

Recording

■ Using the Image Trigger

1 Access the VIEW MENU (▶▶ 3-12)

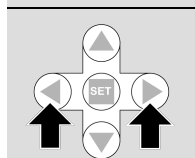
- Access the VIEW MENU from the VIEW mode.



2 Select IMG TRIG with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select IMG TRIG.

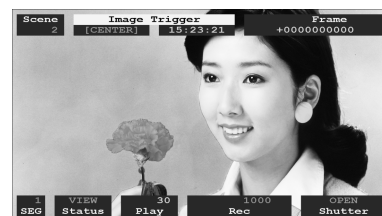
```
<VIEW MENU>
CUSTOM F:>
SHUTTER : OPEN 2k >
DUALRATE:>
AOI      : FULL CEN>
 : OFF LOW >
IMGTRULE: FOLLOW S>
```



3 Use the left/right arrows to select the image trigger detection sensitivity

- Use the left/right arrows to turn the selected image trigger ON (enable) / OFF(disable) and select the detection sensitivity.
 - OFF
 - LOW
 - MID
 - HIGH
 - CUSTOM
- If the image trigger is enabled, the background of the on screen display will be blue and the Image Trigger appears at the top.

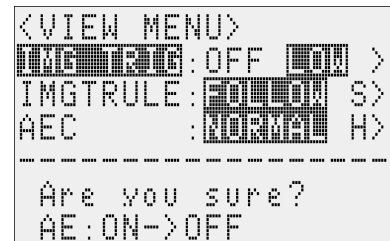
```
<VIEW MENU>
CUSTOM F:>
SHUTTER : OPEN 2k >
DUALRATE:>
AOI      : FULL CEN>
 : OFF LOW >
IMGTRULE: FOLLOW S>
```





Attention

- The image trigger cannot be used at the same time as the auto exposure function (AE).
- If enabling the image trigger while using the auto exposure function, a confirmation message is displayed asking to confirm turning the auto exposure function OFF. At this point, press the SET button to turn the auto exposure function OFF and enable the image trigger.



Detection Sensitivity

The following five settings are available for detection sensitivity.

- OFF: Image trigger function not used.
- LOW: (low) Trigger input at high luminance changes.
- MID: (standard) Trigger input at medium luminance changes.
- HIGH: (high) Trigger input at small luminance changes.
- CUSTOM: Trigger input at the changes in luminance set with HXLink.

If the image trigger set values are not suitable for the image, (①) an unexpected trigger is generated, or (②) a trigger is not generated in the required location.

Take a test photograph, check the trigger and select the appropriate setting.

Sensitivity Setting Standards

Setting	Acceptable	Not acceptable	Do Not Use
LOW	Record in a location with flickering such as with fluorescent lighting	Where large luminance changes are not expected (②)	—
MID	Record where the luminance of the entire area of interest changes, such as an explosion	Where small subjects cross, such as in the area of interest (②)	In a location with flickering such as with fluorescent lighting (①)
HIGH	Record where small subjects cross, such as in the area of interest	Where there are objects other than the photographic subject in the area of interest (①)	

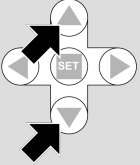

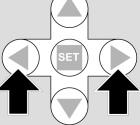



- Read the HXLink users guide for the method of setting the CUSTOM detection sensitivity.

■ Set the Update Method for the Image Trigger Luminance Standard

Set the luminance standard (if a photographic event is not being generated) when the image trigger detects changes in luminance in the image.

- 1 Access the VIEW MENU (▶▶ 3-12)
 - Access the VIEW MENU from the VIEW mode.

	<ol style="list-style-type: none"> 2 Select IMGTRULE with the up/down arrows <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display) and select IMGTRULE. 	<pre> <VIEW MENU> CUSTOM F:> SHUTTER : OPEN 2k > DUALRATE:> AOI : FULL CEN> IMG TRIG: OFF LOW >  : FOLLOW S> </pre>
	<ol style="list-style-type: none"> 3 Use the left/right arrows to select the update method for the image trigger luminance standard. <ul style="list-style-type: none"> • Select the update method for the image trigger luminance standard. <ul style="list-style-type: none"> • FOLLOW: Automatically follow the luminance standard • START: Standard when starting the ARM mode • MANUAL: Standard when updated from the J-PAD3 	<pre> <VIEW MENU> CUSTOM F:> SHUTTER : OPEN 2k > DUALRATE:> AOI : FULL CEN> IMG TRIG: OFF LOW >  : START MA> </pre>

Recording

Updating the Luminance Standard

The following settings are available for the method of updating the luminance standard.

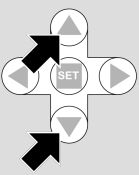
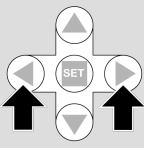
- FOLLOW:** Generally follows the luminance standard. Use if recording outdoors, when the ambient brightness gradually changes in conjunction with cloud cover, time and weather conditions.
- START:** The brightness immediately after switching to the ARM mode is considered the standard. Use if the ambient brightness is fixed or if using trigger input with the gradual changes in luminance.
- MANUAL:** Determines and updates the luminance standard from the J-PAD3 after switching to the ARM mode.

■ Select the Area of interest

The area of interest (AOI: Area Of Interest) can be designated when using the image trigger function (▶▶ 4-41) and the auto exposure function (▶▶ 4-46).

1 Access the VIEW MENU (▶▶ 3-12)

- Access the VIEW MENU from the VIEW mode.

	<h3>2 Select AOI with the up/down arrows</h3> <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display) and select AOI. 	<pre><VIEW MENU> FRM RATE: 1000 2000 FRM SIZE: 1280x1024 CUSTOM F: > SHUTTER : OPEN 2k > DUALRATE: > [SET] : FULL CEN></pre>
	<h3>3 Use the left/right arrows to select the area of interest</h3> <ul style="list-style-type: none"> • Use the left/right arrows to move to the selected item (reverse display) and select the area of interest. • FULL: Complete image recorded • CENTER: Center of the image recorded (25% of the area) • UPPER: Top half of the image recorded • LOWER: Bottom half of the image recorded • LEFT: Left half of the image recorded • RIGHT: Right half of the image recorded • CUSTOM: Area of interest designated by HXLink 	<pre><VIEW MENU> FRM RATE: 1000 2000 FRM SIZE: 1280x1024 CUSTOM F: > SHUTTER : OPEN 2k > DUALRATE: > [SET] : [CUSTOM] U></pre>



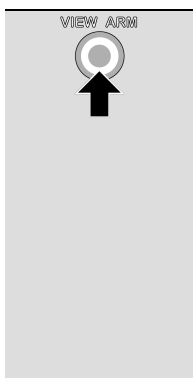
Attention

- The set area of interest can be used for both the auto exposure function and the image trigger function.
- If using HXLink from a control PC, the area of interest (CUSTOM AOI) can be designated in pixel units.
- Selection of an area of interest designated by HXLink (CUSTOM AOI) can be selected from the J-PAD3 but the pixel units for the area of interest cannot be designated.
- Read the HXLink users guide for the method of designating the position of the area of interest.

■ Input Image Trigger to Record

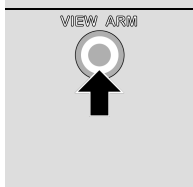
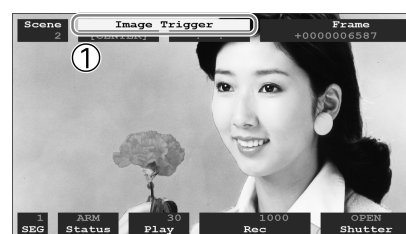
After setting the image trigger, switch to the ARM mode and input the trigger from the luminance changes of the image.

- 1 Set the detection sensitivity, luminance detection area and luminance standard update method
 - Set the image trigger to enable.



- 2 Access the ARM mode

- Switch to the ARM mode to start recording. After switching to the ARM mode, it will immediately switch to the image trigger ready state, and the trigger will input if there are changes to the image.
- The background of on screen display on the monitor or viewfinder screen will be blue, with the Image Trigger (①) displayed above.

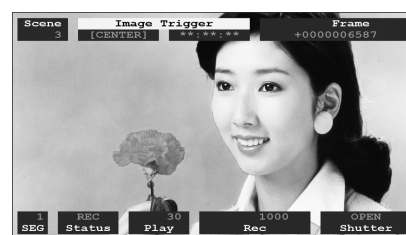


- 3 If the luminance standard update method is set to MANUAL, use the VIEW/ARM button to determine the luminance standard

- Press the ARM button to determine and update the luminance standard.
- The luminance standard can be updated multiple times.

- 4 Create a photographic event and input using the image trigger

- If the luminance changes and the trigger is input, it automatically switches to the REC mode.
- Even if the image trigger is enabled, triggers can be input from the J-PAD3 or external input/output signals, or control PC HXLink.



Use the Auto Exposure Function

The auto exposure function (AEC : Automatic Exposure Control) automatically adjusts the shutter speed to make the image an appropriate brightness using photometry specified for the image photographed. Use when recording outdoors to when the ambient brightness changes due to varying states of cloud cover, time or weather.

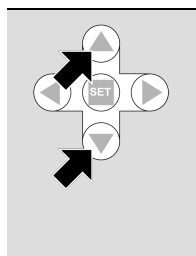
■ Set the Auto Exposure Function

Set the auto exposure function adjustment level (AEC) and area of interest (AOI) to use the auto exposure function.

The area of interest for the auto exposure function has the same settings as the image trigger area of interest (AOI). (▶▶ 4-44)

1 Access the VIEW MENU(▶▶ 3-12)

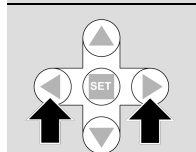
- Access the VIEW MENU from the VIEW mode.



2 Select the AEC with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select AEC.

```
<VIEW MENU>
SHUTTER : [OPEN] 2k >
DUALRATE : >
AOI      : [FULL] CEN>
IMG TRIG : [OFF] LOW >
IMGTRULE : [NORMAL] S>
AEC      : [OFF] LOW >
```



3 Select the adjustment level for the auto exposure function with the left/right arrows

- Use the left/right arrows to turn the auto exposure function ON/OFF and to select the adjustment level.
 - OFF: Do not use the auto exposure function
 - LOW: Adjust the image brightness darker
 - NORMAL: Adjust the image brightness to normal
 - HIGH: Adjust the image brightness to brighten

```
<VIEW MENU>
SHUTTER : [OPEN] 2k >
DUALRATE : >
AOI      : [FULL] CEN>
IMG TRIG : [OFF] LOW >
IMGTRULE : [NORMAL] S>
AEC      : [NORMAL] H>
```




- Attention
- The auto exposure response speed is set low. It does not work with photographs where there are dramatic changes in brightness, such as strobe lights or explosive events.
 - When the auto exposure function is used, the shutter speed is adjusted during the exposure time set with SHUTTER from 10 μ s. This adjusted value is saved for each frame as the shutter speed for the recorded frame
 - Cannot be used at the same time as the image trigger function (▶ 4-41).
 - When the DRES (▶ 4-41) is used, please turn OFF a function.
 - If the AEC is used, there is restriction of a recording rate to effective pixels.

Example: HX-3 At the time of 1920x1080 Recording rate which can be selected (preset)

AEC is used (LOW/NORMAL/HIGH).

A maximum of 4000 fps / second

AEC is not used (OFF).

A maximum of 4500 fps / second

Use the Dynamic Range Expansion Shutter

If DRES (DRES:Dynamic Range Expansion Shutter dynamic range expansion shutter) is used, the sensor of a camera suppresses the saturation for high-intensity, and the large image of a dynamic range can be recorded.

■ Set the Dynamic Range Expansion Shutter



Attention • DREAS is used combining a GAMMA and an iris of a lens. If dress mode is validated, GAIN and the KNEE will become invalid.

1 Access the VIEW MENU(▶▶ 3-12)

- Access the VIEW MENU from the VIEW mode.

	<h3>2 Select the DRES with the up/down arrows</h3> <p>17 Use the up/down arrows to move to the selected item (reverse display) and select AEC.</p>	<pre><VIEW MENU> DUALRATE:> AOI :FULL CEN> IMG TRIG:OFF LOW > IMGTRULE:FULL ON S> AEC :OFF LOW > DRES :OFF LOW ></pre>
	<h3>3 Select the adjustment level for the DRES with the left/right arrows</h3> <p>18 Use the left/right arrows to turn DRES ON/OFF and to select the adjustment level.</p> <p>19 OFF : A dynamic range is set up to about 200%. It is the normal setting.</p> <p>20 LOW : A dynamic range is set up to about 400%.</p> <p>21 MID : A dynamic range is set up to about 800%.</p> <p>22 HIGH : A dynamic range is set up to about 1600%.</p> <p>23 CUSTOM : Custom setting in DRES</p>	<pre><VIEW MENU> DUALRATE:> AOI :FULL CEN> IMG TRIG:OFF LOW > IMGTRULE:FULL ON S> AEC :OFF LOW > DRES :ON HIGH></pre>



- Attention • When using DRES, if AEC (▶▶ 4-46) is valid, it will not operate normally. When using DRES, please turn OFF AEC.
- When Frame Straddling (▶▶ 4-77) is set to ON, DRES always serves as OFF operation.
 - Setting of "CUSTOM" is performed from HXLink of the personal computer for control. Please read a "HXLink operation manual" about the setting method.

Select the Recording Bit Length

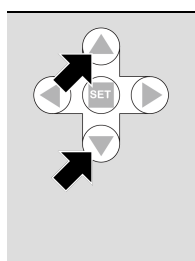
The number of bits per recorded image pixel can be changed. As the number of bits increase, the gradient (amount of change in the brightness) of the image gets finer, so the gradient representation is one of high image quality. As the number of bits decrease, the gradient of the image gets coarser which saves recording memory and extends the amount of recording time available.

■ Set the Recording Bit Length

Select the bit length from the three choices of 12bit, 10bit or 8bit.

1 Access the VIEW MENU (▶▶ 3-12)

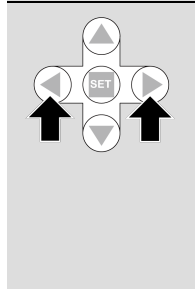
- Access the VIEW MENU from the VIEW mode.



2 Select the DEPTH with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select DEPTH.

```
<VIEW MENU>
GAMMA       : [NORMAL]
CHROMA      : [00 150 >]
KNEE        : [ON]
RGB COR.    : [OFF ON]
LUMINANC    : [NORMAL L]
[DEPTH]     : [12]
```



3 Select the recording bit length with the left/right arrows

- Select the recording bit length with the left/right arrows.
 - 8: 8bit (long time frame)
 - 10: 10bit (normal)
 - 12: 12bit (high image quality)

```
<VIEW MENU>
GAMMA       : [NORMAL]
CHROMA      : [00 150 >]
KNEE        : [ON]
RGB COR.    : [OFF ON]
LUMINANC    : [NORMAL L]
[DEPTH]     : [10]
```

If recording at 8bit, the recording time is about 1.5x that when recording at 12bit.

Set the Recorded Scene Number

The scene number can be simultaneously recorded as data to control the recorded video.

Recorded Scene Number

The recorded scene number is saved in the recorded video. This number is displayed as on screen display during playback and saved in the MCFF data. The recorded scene number remains even if the HX-3 power is cut, and multiple photographs or videos can be managed by the recorded scene number.

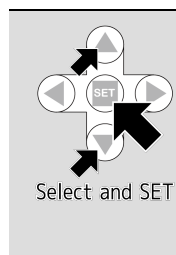
The recorded scene number adds +1 each time recording is completed (switch from the REC mode to the STOP mode or switch recording segments after REC), and counts from 0~65535.

■ Set the Initial Value for the Recorded Scene Number

Sets the initial value for the recorded scene number. You can start the scene numbers from any number, such as when correcting the scene number for a new recording or when setting a continuation number from a different recording.

1 Access the VIEW MENU (▶▶ 3-12)

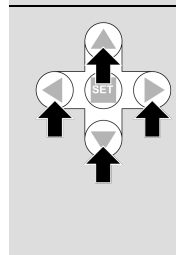
- Access the VIEW MENU from the VIEW mode.



2 Select the SCENE with the up/down arrows and press the SET button

- Use the up/down arrows to move to the selected item (reverse display) and select SCENE, and then press the SET button.

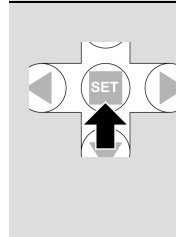
```
<VIEW MENU>
BLK BAL : [REDACTED] SET
SCENE : 00000
TRIGGER : [REDACTED] E>
FRM RATE : 1000 2000
FRM SIZE : 1920x1080
CUSTOM F : >
```



3 Input the value for the recorded scene number

- Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.

```
<VIEW MENU>
BLK BAL : [REDACTED] SET
SCENE : 00002
TRIGGER : [REDACTED] E>
FRM RATE : 1000 2000
FRM SIZE : 1920x1080
CUSTOM F : >
```



4 Press the SET button

- Press the SET button to set the initial value for the recorded scene number.
- The factory setting for the recorded scene number is 0.

```
<VIEW MENU>
BLK BAL : [REDACTED] SET
SCENE : 00002
TRIGGER : [REDACTED] E>
FRM RATE : 1000 2000
FRM SIZE : 1920x1080
CUSTOM F : >
```

Partitioning the memory

The scene number can be simultaneously recorded as data to control the recorded video.

Memory Segments

The recording memory can be divided into a maximum of 64 “segments”. The recording time for a single memory segment shortens according to the number of segments, and each of these segments is an independent recording range.

Loaded Memory Capacity	Segment Size and Number of Segments that can be Selected
8GB model	256MB×32, 512MB×16, 1GB×8, 2GB×4, 4GB×2, 8GB×1
16GB model	256MB×64, 512MB×32, 1GB×16, 2GB×8, 4GB×4, 8GB×2, 16GB×1
32GB model	512MB×64, 1GB×32, 2GB×16, 4GB×8, 8GB×4, 16GB×2, 32GB×1
64GB model	1GB×64, 2GB×32, 4GB×16, 8GB×8, 16GB×4, 32GB×2, 64GB×1

Recording

The following photography is possible if dividing the memory into segments and recording.

- Immediately start recording after recording without waiting the time for saving.
- Batch download with HXLink after recording multiple scenes.
- Save only the necessary scenes to a USB after recording multiple scenes.
- Can set and get the black balance in each segment.

Read the HXLink users guide for the method of setting custom segments.



- Attention • Videos recorded to the memory are all erased when setting the memory segments. Make sure that it is acceptable to erase the video before setting the segments.
- Saving Videos (▶ 3-37)

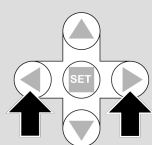


- Can use the custom segment ability to set the segment size by using the HXLink. Please read the "HXLink User's Manual" for information on how to operate.
- You can use the ability to protect each segment by using the HXLink. Please read the "HXLink User's Manual" for information on how to operate.

■ Partition the Memory

1 Display SYS SET (▶▶ 3-11)

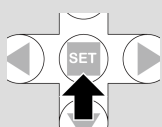
- Access TOP MENU > SYS MENU > SYS SET from the STOP mode.



2 Select SEG SIZE with the up/down arrows and select the number of partitioned segments with the left/right arrows

- Use the up/down arrows to move to the selected item (reverse display) and select SEG SIZE. Then use the left/right arrows to select the number of segments.

```
> SYS MENU > SYS
SEG SIZE: [REVERSE] 8>
REBOOT :
```

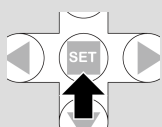


3 Press the SET button

- Press the SET button to display a confirmation message asking if it is acceptable to erase the video made with the memory partition settings.

```
> SYS MENU > SYS
SEG SIZE: [REVERSE] 8>
REBOOT :
```

```
Are you sure?
Image will be lost
```



4 Press the SET button again

- If there are no problems with erasing the saved video, press the SET button again and the memory will be partitioned into segments.
- If the segments are set, the video saved in the memory is erased and the image on the monitor or in the viewfinder will be erased and the display will turn black.

■ Select the Recording Segments

Select the memory recording segments from the partitioned memory segments. For this description, a segment has been selected from four partitioned segments.

1 Display MEM SEG (▶▶ 3-11)

- Access TOP MENU > MEM SEG from the STOP mode.



2 Select the segment with the up/down arrows and press the SET button

- Use the up/down arrows to select the memory segments to play back.
- Press the SET button to set the segment selection.
- Segments where recording has been completed will show the scene number and recorded date/time in the four columns on the right side.
- Segments that haven't been recorded will show **** */**/* **.*.*** on the right side.

TOP MENU > MEM SEG			
SEG NO.1:	0	12/0	
SEG NO.2:	1	12/0	
SEG NO.3:	****	**/*	
SEG NO.4:	****	**/*	

Select the Recording Method

In addition to normal recording, other recording methods include burst recording, multi trigger recording and event recording.

If recording in recorded areas partitioned into segments, continuous recording is possible by auto switching segments after recording.



Attention • The J-PAD3 REC MODE is displayed as REC METH on some J-PAD3 versions.

Recording Method

In addition to the recording method with the normal trigger input, the MEMRECAM HX-3 enables selection of the following recording method.

- Normal Recording Method: Method of recording images to the corresponding memory segment for a single trigger input
- Event Recording Method: Recording method where the first trigger input operates the recording trigger in the same manner as the normal recording method, but the external input/output trigger signals for the second and subsequent times are considered an event
- Burst Recording Method: Method of recording only the frames for the time frame enabled by the external input/output trigger to the memory.
- Multi Trigger Recording: Method:Method of recording multiple events by partitioning a single segment into a maximum of 16 equally sized blocks
- Multi MANUALRecording : Method designating the number of frames per block and successively photographing images repeatedly generated
- LINEAR Recording Method Photographic method controlling the number of frames to the segment for the recorded time with “Pause” and “Play” using the J-PAD3 button input



- Attention • External input/output trigger input is required for using the burst or event recording methods. (With the event recording method, only the first recording trigger, the trigger can be input from the J-PAD3)
- External input/output trigger input (▶▶ 4-60)

Auto Segment Switching, Auto Block Switching

When selecting any of the recording methods, segments (or blocks) automatically switch at the same time and the next recording functions are combined for selection.

See (▶▶ 4-52) for partitioning memory into segments for recording

Auto Segment Switching

- **AUTO:** Automatically switches segments when recording is done. Once the segment is switched, it automatically switches to the ARM mode. Segments where recording has been completed are protected and cannot be overwritten.
- **LOOP:** Segments and modes are automatically switched, just as with AUTO. Segments where recording has been completed are not protected. Once recording of all segments is complete, it returns to the top segment and continues recording in the ARM mode. Press the STOP button to finish recording.

Auto Block Switching (Only for the multi trigger recording method)

- **ALL BLOCKS:** Automatically switches blocks when recording is done. Once the block is switched, it automatically switches to the ARM mode. Segments are not automatically switched. Recording ends when all of the blocks have finished recording.
- **CONTINUOUS:** Automatically switches blocks when recording is done. Once the block is switched, it automatically switches to the ARM mode. Once all of the blocks have finished recording, it returns to the top block and continues recording in the ARM mode. Press the STOP button to finish recording

Recording Method Selection using the J-PAD3

When selecting the recording method from the J-PAD3, the recording method and the switching of auto segments (or blocks) are combined for selection.

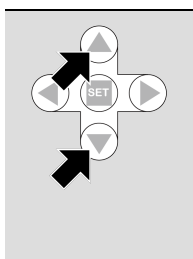
J-PAD3 Settings	Recording Method	Switching of Auto Segments (or Blocks)
NORMAL	Normal	No
NORMAL(A)	Normal	AUTO
NORMAL(L)	Normal	LOOP
EVENT	Event	No
EVENT(A)	Event	AUTO
EVENT(L)	Event	LOOP
BURST	Burst	No
BURST(A)	Burst	AUTO
BURST(L)	Burst	LOOP
MULTI(A)	Multi trigger	ALL BLOCKS
MULTI(C)	Multi trigger	CONTINUOUS
MULTIS(A)	Multi trigger	AUTO
MULTIS(L)	Multi trigger	LOOP
MULTI1(A)	Multi manual	ALL BLOCKS
MULTI1(C)	Multi manual	CONTINUOUS
MULTI2(A)	Multi manual	ALL BLOCKS
MULTI2(C)	Multi manual	CONTINUOUS
MULTI3(A)	Multi manual	ALL BLOCKS
MULTI3(C)	Multi manual	CONTINUOUS
LINEAR	LINEAR	No

■ Select the Recording Method

Combines the recording method and auto segment switching for selection.

1 Display TRIG SET (▶▶ 3-11)

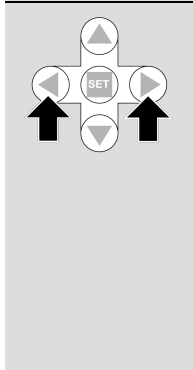
- Access TOP MENU > SYS MENU > TRIG SET from the STOP mode.



2 Select REC MODE with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select REC MODE.

```
> SYS MENU > TRIG
TRIG SFI : TRIG TR>
REC MODE : NORMAL N>
BLOCKS : 02
BEFORFRM : -----
AFTERFRM : -----
```



3 Select the recording method with the left/right arrows

- Use the left/right arrows to select the recording method to use.
- | | | |
|-------------|-------------|-------------|
| • NORMAL | • NORMAL(A) | • NORMAL(L) |
| • EVENT | • EVENT(A) | • EVENT(L) |
| • BURST | • BURST(A) | • BURST(L) |
| • MULTI(A) | • MULTI(C) | • MULTIS(A) |
| • MULTIS(L) | • MULTI1(A) | • MULTI1(C) |
| • MULTI2(A) | • MULTI2(C) | • MULTI3(A) |
| • MULTI3(C) | • LINEAR | |



- Read "Details on the Recording Method" (▶▶ 9-14) for details on the recording method and screen display for the recording method.

■ Set the Number of Partitions for the Multi Trigger Blocks

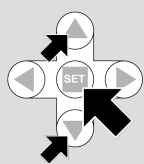
If using the multi trigger recording method, the number of blocks can be designated.



Attention • It can not be used in a multi manual recording mode (▶▶ 9-33)

1 Display TRIG SET (▶▶ 3-11)

- Access TOP MENU > SYS MENU > TRIG SET from the STOP mode.

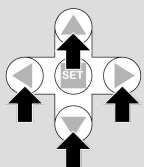


Select and SET

2 Select BLOCKS with the up/down arrows and press the SET button

- Use the up/down arrows to move to the selected item (reverse display) and select REC MODE.

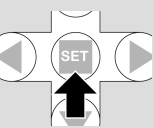
```
> SYS MENU > TRIG
TRIG SEL: [TRIG] TR>
REC MODE: [NORMAL]
BLOCKS: 02
BEFORFRM: -----
AFTERFRM: -----
```



3 Input the number of blocks

- Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.
- The minimum value is 2 and the maximum is 16.

```
> SYS MENU > TRIG
TRIG SEL: [TRIG] TR>
REC MODE: [NORMAL]
BLOCKS: 03
BEFORFRM: -----
AFTERFRM: -----
```



4 Press the SET button

- Press the SET button to set the number of blocks.

```
> SYS MENU > TRIG
TRIG SEL: [TRIG] TR>
REC MODE: [NORMAL]
BLOCKS: 03
BEFORFRM: -----
AFTERFRM: -----
```



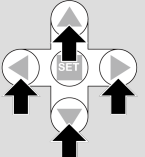
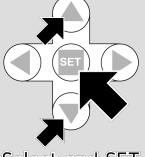
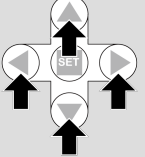
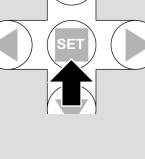
- Read "Details on the Recording Method" (▶▶ 9-14) for details on the recording method and screen display for the recording method.

■ The number of frames of a block of a Multi Manual is set up.

- If using the multi manual (▶▶ 9-33), the number of frames of a block is set.

1 Display TRIG SET (▶▶ 3-11)

- Access TOP MENU > SYS MENU > TRIG SET from the STOP mode.

	2 Select REC MODE with the up/down arrows and press the SET button the multi manual to be used is selected. <ul style="list-style-type: none"> • Select REC MODE with the up/down arrows • "MULTI2 (A)" is selected as an example. 	<pre> > SYS MENU > TRIG TRIG SEL: TRIG TR> REC MODE: MULTI2(A) BLOCKS : 02 BEFORFRM: 0 AFTERFRM: 1 </pre>
 Select and SET	3 Select BEFORFRM with the up/down arrows and press the SET button <ul style="list-style-type: none"> • Use the up/down arrows to move to the selected item (reverse display) and select BEFORFRM • Press the SET button. 	<pre> > SYS MENU > TRIG TRIG SEL: TRIG TR> REC MODE: MULTI2(A) BLOCKS : 02 BEFORFRM: 0000000000 AFTERFRM: 1 </pre>
	4 Input the number of blocks <ul style="list-style-type: none"> • Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows. 	<pre> > SYS MENU > TRIG TRIG SEL: TRIG TR> REC MODE: MULTI2(A) BLOCKS : 02 BEFORFRM: 0000000002 AFTERFRM: 1 </pre>
	4 Press the SET button <ul style="list-style-type: none"> • Press the SET button to set the number of blocks. 	<pre> > SYS MENU > TRIG TRIG SEL: TRIG TR> REC MODE: MULTI2(A) BLOCKS : 02 BEFORFRM: 2 AFTERFRM: 1 </pre>
	5 "AFTERFRM" is set up similarly. <ul style="list-style-type: none"> • The setting method is the same as "BEFORFRM." 	<pre> > SYS MENU > TRIG TRIG SEL: TRIG TR> REC MODE: MULTI2(A) BLOCKS : 02 BEFORFRM: 2 AFTERFRM: 5 </pre>

Trigger Input from an External Trigger

The HX-3 has two external triggers called TRIG1 and TRIG2 for trigger input with signals from other devices or the switch.

■ Connect the External Trigger

Connect to TRIG1

External trigger signal specifications from the TRIG1 connector require TTL level contact input at an isolated input.

These signals can be easily managed and connected for contact input with one switch and two power cords. Use in a clean environment without any exterior noise is recommended.

TRIG1 signal specifications: (▶▶ 9-47), TRIG1 connector specifications: (▶▶ 10-80)



Attention • The voltage tolerance is -0.5~5.5Vdc.



1 Connect the BNC cable to the TRIG1 connector

- Connect the BNC cable to the TRIG1 connector on the rear panel.
- Connect the other end of the BNC cable to the trigger signal output device.

Connect to TRIG2

The specifications for the external trigger signals from the TRIG2 connector are current loop input with a photo capacitor.

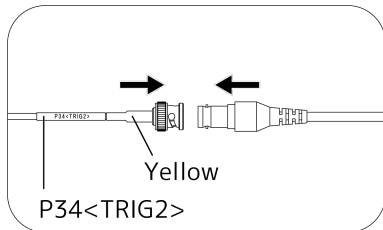
The trigger is enabled at an applied voltage of 5V or greater. These signals have a high level of noise resistance and are suitable for a long cable. We recommend using this input in environments where there is frequent noise generated such things as static electricity. An external power source is required for this input.

TRIG2 signal specifications: (▶▶ 9-48), TRIG2 input (REMOTE connector) specifications: (▶▶ 10-77)



1 Connect the J3 split cable to the REMOTE connector

- Connect the J3 split cable (sold separately) to the REMOTE connector.



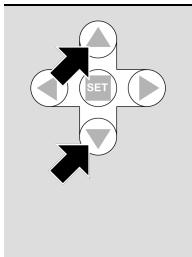
2 Connect the BNC cable (male) to the J3 split cable TRIG2 input

- Connect the BNC cable to the J3 split cable TRIG2 input.
- Connect the other end of the BNC cable to the trigger signal output device.

Select the External Trigger Signals

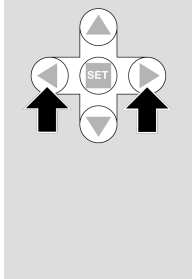
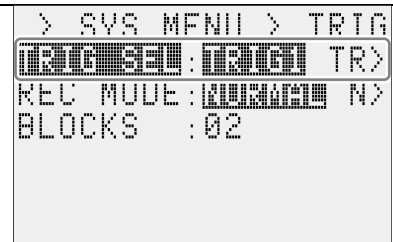
1 Display TRIG SET (▶▶ 3-11)

- Access TOP MENU > SYS MENU > TRIG SET from the STOP mode.



2 Select TRIG SEL with the up/down arrows

- Use the up/down arrows to select TRIG SEL.



3 Select the external trigger signals with the left/right arrows

- Select the external trigger signals with the left/right arrows.
- TRIG1: External trigger signals from TRIG1 connector enabled
- TRIG2: External trigger signals from TRIG2 connector enabled
- ANY: First external signal from either TRIG1 or TRIG2 connectors enabled
- BOTH: External signals from both TRIG1 and TRIG2 connectors enabled

■ Trigger Input from an External Trigger



- 1 Access the ARM mode
 - Select the ARM mode and start recording. (▶▶ 3-19)
- 2 Input the trigger signals from the selected external input/output
 - Input the trigger signals (enabled if L) to input the trigger and select the REC mode.



- Read “Set Trigger Filter” (▶▶ 4-83) for external trigger filter settings.



- Attention • With the initial settings, the trigger input polarity is NEGA (L) for TRIG1 and CRNT ON (Current ON) for TRIG2. The polarity settings can be changed.
- Select the external input/output signal polarity (▶▶ 4-80)
 - If there is trigger input polarity when switching to the VIEW or ARM modes, there will be a warning message indicating “Warning Trigger signal is asserted.” on the screen. Check the trigger polarity settings and input signals.
 - Press the STOP key to delete the warning message display and J-PAD3 status display.

Synchronized Recording to the External Synchronization Signals (EST)

The HX-3 has two external synchronization inputs of EST1, EST2 for synchronized recording with other devices or the camera and exposure timing.

External and Internal Synchronization

The MEMRECAM HX-3 records with the sensor exposure start timing as the standard. This exposure start timing is synchronized with the synchronization signals in the camera or the exposure start signals externally input .

Internal synchronization signals (INT): Synchronizes with synchronization signals (VD signals) created in the HX-3 camera.

External synchronization signals (EST1, EST2): Synchronizes with exposure start signals (EST: External Shutter Trigger, Exposure Start) input from the EST1 or the EST2 connector.

If recording using EST, when the input signal shifts from H to L in the ARM or REC mode, exposure starts and a single image is recorded. The minimum EST signal frequency is 0Hz (=recording temporary stop) and so can handle very slow speed recording. Additionally, if exposure signals from another camera are input to EST, simple synchronized recording can be performed. (▶▶ 9-59)



Attention • A “J3 split cable (sold separately) is required for EST2 input.

Restrictions on the Timing for External Synchronization Signals

The external synchronization signals (EST signals) must satisfy the following two timing conditions.

- EST signal cycle (Hz) \leq maximum frame rate for the frame size in the settings(frames/sec)
- EST signal cycle (Hz) $\leq 1 / \text{shutter speed(sec)}$

If the following timing conditions are relevant, a shutter line may be shown on the image (horizontal line) or the image luminance may not be normal.

- EST signal synchronization (Hz) \geq maximum frame rate for the frame size in the settings (frames/sec) / 2

(Example of an incorrect image: EST signal input of 75,000 at a frame size of 384 × 288)



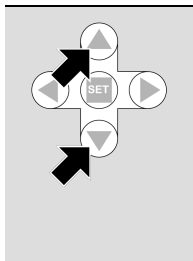
- Attention
- For the frame rate setting, select a speed close to the frequency of the input EST signal. Also, if there is nothing present that is a close value, custom set a frame rate.
 - Custom settings for frame rate and frame size (▶▶ 4-23)

■ Select Synchronization Signals

Select the synchronization signals (internal synchronization, external synchronization) to be used.

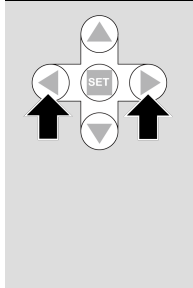
1 Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



2 Select SYNC SEL with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select SYNC SEL.



3 Select the synchronization signals with the left/right arrows

- Select the synchronization signals with the left/right arrows.
 - INT : Synchronize the synchronization signals generated by the camera
 - EST1: Synchronize the external synchronization signals input from the EST1 connector
 - EST2: Synchronize the external synchronization signals input from the REMOTE connector EST2.



- The filter setting of an external synchronization signal should read "an EST filter is set up" (▶▶ 4-84)



- When selecting external synchronization signals, the black balance can be set to internal synchronization even when EST is selected (HXLink ver1.50a ESTBB setting) . If external synchronization is not input, the black balance is not updated.

■ Select the EST synchronization accuracy

Two synchronous modes, the normal EST synchronization (EST) and the high precision synchronization (A-EST) which enabled the highly precise synchronization, can be selected as an EST synchronization.

EST : Exposure time is set up per line. For this reason, Gitta of one-line width exists to an EST signal. Time to read the image data (frame size (width) x4 pixel (length)) of one line from a sensor with a line unit.

A-EST : Exposure time is set up per clock. For this reason, Gitta to an EST signal becomes one clock, and enables highly precise synchronous photography.

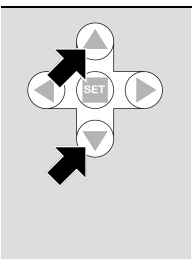


Attention

- When the cycle of an EST signal is twice less than the reciprocal of a recording rate, a horizontal reinforcement-like noise may appear.
- The exposure timing at the time of A-EST selecting (EXP TME) operates as GXnative.
- If a frame straddling function is used, even if it has selected EST MODE as EST, it will become A-EST setting. (▶▶ 4-77)

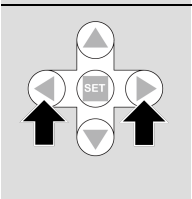
1 Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU >SYS MENU from the STOP mode.



2 Select EST MODE with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select EST MODE.



3 Select the EST synchronization accuracy with the left/right arrows

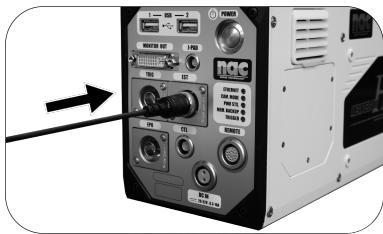
- select the EST synchronization accuracy with the left/right arrows
 - EST : Normal synchronization
 - A-EST : High precision synchronization

■ Connect EST (External Synchronization Signals)

Connect to EST1

EST1 Signals

- TTL level, 5V pull up, insulation, allowable voltage: -0.5~5.5Vdc
- EST1 signal specifications: (▶▶ 9-49), EST1 connector specifications: (▶▶ 10-79)



1 Connect the BNC cable to the EST1 connector

- Connect the BNC cable to the EST1 connector on the rear panel.
- Connect the other end of the BNC cable to the exposure start signal output device.

Connect to EST2

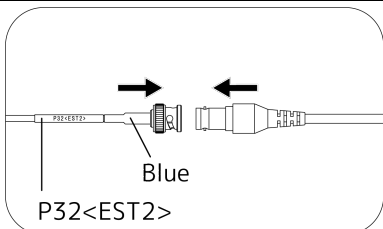
EST2 Signals

- TTL level, 5V pull up, insulation, allowable voltage: -0.5~5.5Vdc
- EST2 signal specifications: (▶▶ 9-49), EST2 input (REMOTE connector) specifications: (▶▶ 10-77)



1 Connect the J3 split cable to the REMOTE connector

- Connect the J3 split cable (sold separately) to the REMOTE connector.



2 Connect the BNC cable (male) to the J3 split cable EST2/EVENT input

- Connect the BNC cable to the J3 split cable EST2 / EVENT input.
- Connect the other end of the BNC cable to the exposure start signal output device.

- EST1 and EST2 are handled the same but cannot be used at the same time.

EST2/EVENT Event Signal Recording

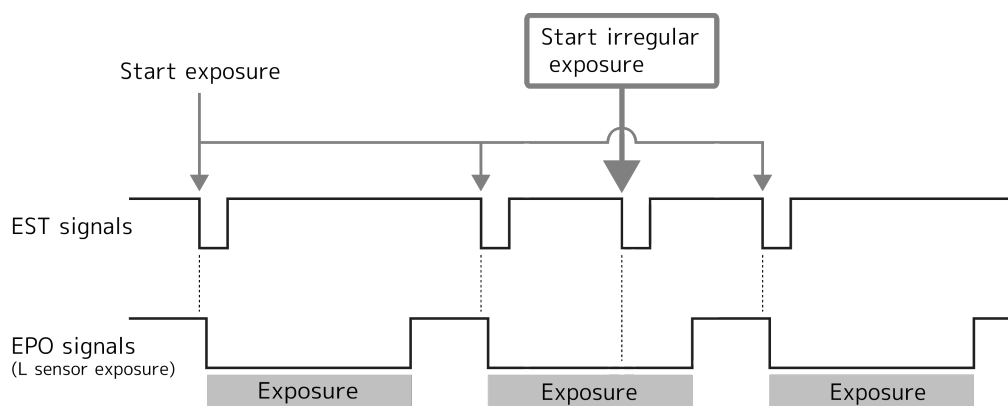
EST2 input can be used as input for event signal recording. If EST2 has polarity during frame standard time, an event signal is recorded to the frame and “Event input mark” is displayed during playback.



Event signal recording is performed automatically and the settings cannot be switched to enable/disable the function. Operation is not related to the synchronization settings. The event signal polarity utilizes EST2 polarity settings. Select the polarity for the external input/output signals. (▶ 4-80)

External Synchronization Signals with Irregular Timing

According to (M 4-64) external synchronization timing limitations, if the exposure start signal is input during exposure (the sensor electronic shutter is OPEN) it will not record properly. If the exposure start signal (H → L) is input to EST with this irregular timing, the image photographed may be corrupt.

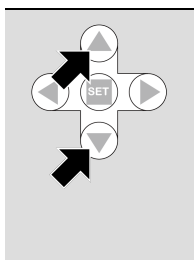


The exposure start signal for this irregular timing can be disabled.

■ Disable the Synchronization Signals with Irregular Timing

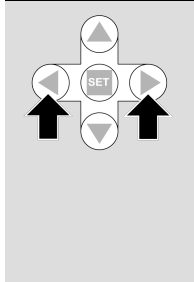
1 Access the SYS MENU (▶▶ M 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



2 Select EST SAFE with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select EST SAFE.

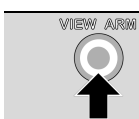


3 Turn ON with the left/right arrows

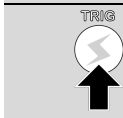
- Use the left/right arrows to select enable/disable synchronization signals with irregular timing.
 - OFF: Enable synchronization of synchronization signals with irregular timing (the photographed image may be corrupt.)
 - ON: Disable synchronization of synchronization signals with irregular timing.

■ Synchronize Recording to the EST Signals

- 1 After the selected external EST input, input the EST signals
 - Input from the connector selected for the EST signals for synchronized exposure to EST signals.



- 2 Access the ARM mode (▶▶ 3-19)
 - Switch to the VIEW mode from the STOP mode and then switch to the ARM mode to start recording.
 - With external synchronization settings (EST1 and EST2), the background of the on screen display in the VIEW or ARM mode will be blue.
 - The notation of the frame rate will be EST1 or EST2. (①)



- 3 Input the trigger to finish recording
 - Input the trigger button or external trigger and switch to the REC mode to finish recording.



- The initial setting for the polarity when the exposure starts with EST (the shutter will be OPEN) is L. The polarity setting can be changed.
- Select the external input/output signal polarity (▶▶ 4-80)
- If the exposure start (H → L) is not input from the selected external synchronization signals, the image displayed will not be updated. Check the input signals.

■ Import Images Synchronized to the EST Signals in the VIEW Mode

If recording with external synchronization signals (EST signals), select either “Import the image with synchronized signals in the EST signals and display” or “Import the image with synchronized signals in the camera and display” while in the VIEW mode. (EST VIEW)

EST VIEW

OFF : VIEW mode displays the image in internal synchronization signals.

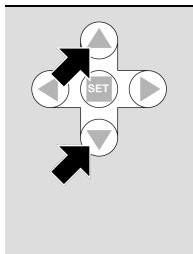
ON: Displays the EST synchronized image signals in the same manner, in either the VIEW or ARM modes.

The EST VIEW settings are settings only for the VIEW mode. If recording with external synchronization signals (EST1, EST2), set to either ON or OFF in the ARM mode to perform synchronized recording to the EST signals.

Also, if recording with internal synchronization signals (INT), display and recording can be conducted for all of the internal synchronization signals regardless of the settings in EST VIEW.

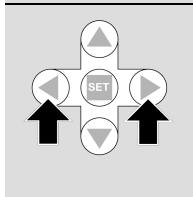
1 Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



2 Select EST VIEW with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select EST VIEW.



3 Use the left/right arrows to select synchronization in the VIEW mode.

- Use the left/right arrows to select synchronization in the VIEW mode.
 - OFF: Internal synchronization in the VIEW mode
 - ON: EST signal synchronization in the VIEW mode

Synchronized Record Timing

Recording can be synchronized to the timing of a device connected to the MEMRECAM HX-3.

The HX-3 uses internal camera time and recording is synchronized to that time. Recording can be done by synchronizing the time and frame with another device by synchronizing with the device that outputs the IRIG-B time code for this time or the GX-HUB sold separately.

Camera time synchronization: Time synchronized with the camera timer. Select if operating with just a camera or if precise time synchronization is not necessary. (If connected to a control PC, time synchronization is done with the PC timing)

GX-HUB time synchronization: Time synchronized with the GX-HUB timer. Select if operating with a multi camera connection using the GX-HUB. If connected to a control PC, time synchronization is done with the PC timing. If not connected to a control PC, recording with multiple cameras is synchronized but the exact time (day/hour/minute/second) is not available.

IRIG time synchronization: Time synchronized with the IRIG-B timer code. Select if the following occurs.

- If using only the MEMRECAM HX-3 and inputting the IRIG-B timer code from the J3 common cable (sold separately) IRIG-B input connected to a REMOTE connector.
- If inputting the IRIG-B timer code to the GX-HUB with multiple cameras connected using GX-HUB (a combination of the HX series and the GX series is possible).

IRIG-B Signals	
Standard	IRIG Standard 200-98
Recommended voltage	3Vpp
Allowable input voltage	1~10Vpp
Other	High impedance, isolation transformer input

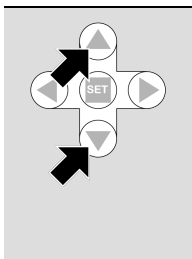
Trigger RESET: Resynchronization with trigger input signals. Select if using trigger signals to synchronize with an external device. The HX-3 recording time precision will be $\pm 0.01\%$ or less. If synchronizing time with trigger RESET, there may be significant discrepancies with the time from the trigger input signal timing.

■ Select the Time Synchronization

Select the time synchronization from internal synchronization or IRIG-B.

1 Access the SYS MENU (▶▶ 3-11)

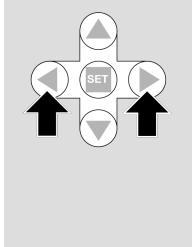
- Access TOP MENU > SYS MENU from the STOP mode.



2 Select SYNC TIME with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select SYNC TIME.

```
TOP MENU > SYS MEN
REL TIME: FRAME TR>
FXP TIME: GX-HUB>
SYNC TIME: ASYNC>
SYNC SEL: INT EST>
EST VIEW: ON
EST SAFE: OFF ON
```



3 Use the left/right arrows to select the time synchronization

- Use the left/right arrows to select the time synchronization to use.
 - ASYNC: Camera time synchronization
 - GX-HUB: GX-HUB time synchronization
 - IRIG: IRIG time synchronization
 - RESET: Trigger RESET



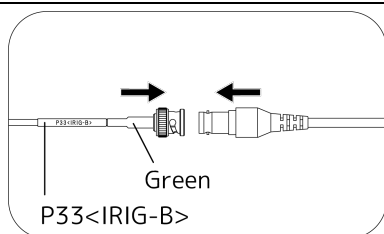
- If using a multi camera connection with GX-HUB, read the GX-HUB users guide.

■ Synchronize IRIG-B Signals with the Time

- IRIG-B signal specifications: (▶▶ 9-64), IRIG-B input (REMOTE connector) specifications: (▶▶ 10-77)



- 1 Connect the J3 split cable to the REMOTE connector
 - Connect the J3 split cable (sold separately) to the REMOTE connector.



- 2 Connect the BNC cable (male) to the J3 split cable IRIG input
 - Connect the BNC cable to the J3 split cable IRIG-B input.
 - Connect the other end of the BNC cable to the IRIG-B signal output device to output IRIG-B signals.

- 3 Select IRIG with the time synchronization selection
 - Select IRIB time synchronization from the J-PAD3. (▶▶ 4-73)

IRIG Time Synchronization Display

Check the VIEW screen to check if the IRIG-B timer codes and time synchronization were obtained.

If synchronized with the IRIG-B timer code

- An "I" is displayed in black letters with a green background in the superimposed frame counter.



If not synchronized with the IRIG-B timer code

- An "I" is displayed in black letters with a red background in the superimposed frame counter



If an "I" is not shown on the frame counter, IRIG is not selected for time synchronization.

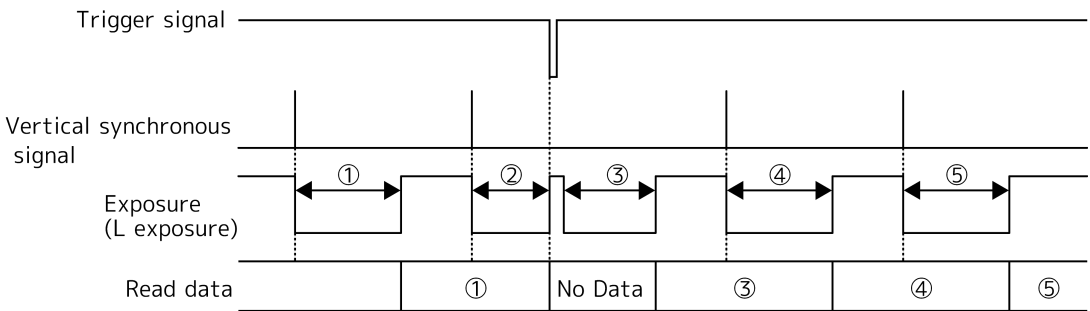
■ Synchronize the Trigger with the Time

Input the trigger using the trigger input signals (TRIG1,TRIG2) for trigger RESET.

- 1 Connect the external trigger
 - Input the trigger from external input/output(▶▶ 4-60)
- 2 Select RESET in the time synchronization selection
 - Select trigger reset from the J-PAD3.(▶▶ 4-73)

Trigger RESET

Input the trigger input signals to re-synchronize and start the new exposure.



In the figure, the trigger is input during the exposure time (②), and a new exposure starts from there (③). Input of the trigger while importing (①) displays the null data since there is no data after the trigger so the image is only saved as a normal image for part of the time. Additionally, the image during the time of exposure (②) does not exist (①) and becomes the data for the next image (③).

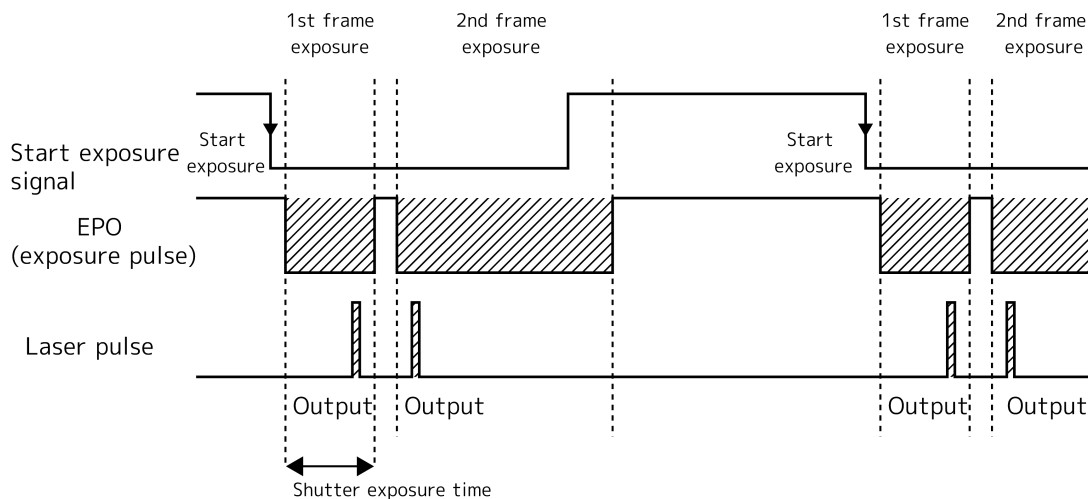
PIV (Particle Image Velocimetry)

recording

The frame straddling function enables recording two images with a very short time separation that is used with PIV (Particle Image Velocimetry).

PIV (Particle Image Velocimetry) is the technology to quantitatively measure the velocity distribution of a flow from the movement of the particles based on the premise of following the flow of particles that are mixed in a flow of liquid or gases.

Frame straddling is a method utilized for PIV, where a laser is employed to record two images with a very short time separating the frames. With HX-3 frame straddling photography, one exposure start signal can record two frames (1st frame and 2nd frame).



The timing to switch from the 1st frame to the 2nd frame is adjusted by changing the exposure time of the 1st frame using the shutter speed settings. The exposure time of the 2nd frame is automatically determined by the frame size and cannot be changed.

The exposure pulse signal (EPO) output can be checked for the time of exposure.

Select either internal synchronization or EST synchronization for the camera.

- If synchronizing the laser pulse timing using the camera EPO output signals as the standard, the GX camera synchronization is set to "internal synchronization". The frame rate is set with the camera.
- If there are standard signals separate from the camera, set the synchronization signals to EST1 or EST2, and the timing for both the camera and laser pulses are synchronized to the standard signals. The frame rate becomes the frequency of the standard signals.

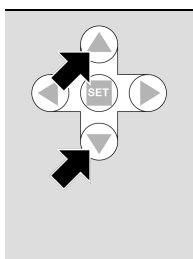
Synchronizing recording with external signals (EST) (▶ 4-63)

■ Frame Straddling Recording

Enables frame straddling recording.

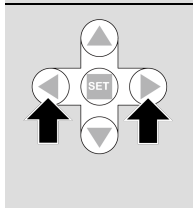
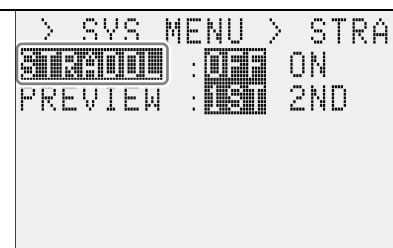
1 Display STRADDL (▶▶ 3-11)

- Access TOP MENU > SYS MENU > STRADDL from the STOP mode.



2 Select STRADDL with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select STRADDL.



3 Use the left/right arrows to select enable/disable

- Use the left/right arrows to select ON (enable) / OFF (disable) for frame straddling recording.
- OFF: Record normally
- ON: Frame straddling recording



Attention The following limitations apply when using the frame straddling function.

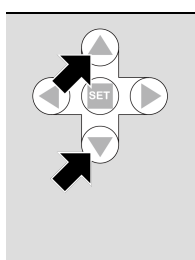
- The restrictions regarding relationship between the frame rate and the frame size, and the restrictions of exposure time are different from the normal mode (frame straddling is OFF).
- With external synchronization, the EST signal (exposure start signal) cycle > 3 / frame rate
- The frame rate is the speed of "magnitudes of 20 greater than 100 (with internal synchronization).
- The 1st frame minimum shutter speed is approximately 0.5μs.
- When the synchronization selection setting (SYNC SEL) is RESET, and when the frame rate setting (DUALRATE) is ON, frame straddling recording is not possible.
- If recording partitioned segments, there can be up to 8 segments.

■ Select the Video Display during Frame Straddling Recording

Either the 1st or 2nd frame can be shown on the live display in the VIEW or ARM modes during frame straddling recording to start checking the laser pulse timing.

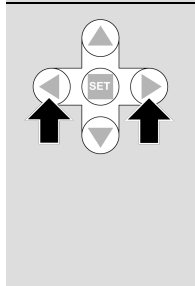
1 Access STRADDL (▶▶ 3-11)

- Access TOP MENU > SYS MENU > STRADDL from the STOP mode.



2 Select PREVIEW with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select PREVIEW.



3 Use the left/right arrows to select the display frame

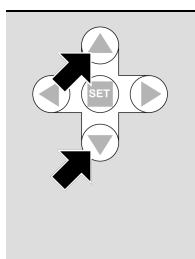
- Use the left/right arrows to select the live display frame when frame straddling recording.
- ANY: Live display of the newest image regardless of the distinction between 1st and 2nd frames
- 1st: Live display of the newest image for the 1st frame
- 2nd: Live display of the newest image for the 2nd frame

■ Select the Exposure Timing Compatible to K4 and K3

The sensor exposure timing for exposure start signals varies between the MEMRECAM HX and GX series and the previous MEMRECAM series (fx, ci series). If performing synchronized recording between cameras from the MEMRECAM HX, GX series and the previous MEMRECAM series, all of the camera exposure times must match.

1 Access the SYS MENU (▶▶ 3-11)

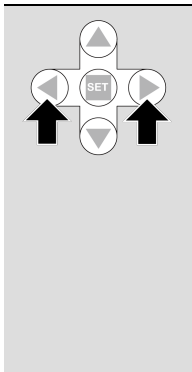
- Access TOP MENU > SYS MENU from the STOP mode.



2 Select EXP TIME with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select EXP TIME.





3 Use the left/right arrows to select the exposure timing

- Use the left/right arrows to select the exposure timing.
- GXnative: Start exposure when the exposure start signals begin
- K3compat: Exposure ends when the recording synchronization signals start
(if synchronized recording with cameras other than fx-K4 or K5)
- K4compat: Exposure ends when the recording synchronization signals start
(if synchronized recording with fx-K4 or K5)



- Attention • In the following cases, the exposure timing automatically switches to GXnative.
- If the time synchronization setting (SYNC TIME) is "trigger RESET".
 - If the frame straddling setting (STRADDL) is ON.



- CHECK • Read the HXLink users guide for synchronized recording with multiple camera connections between the MEMRECAM HX series and other MEMRECAM series.

Select the External Input/Output Signal Polarity

The external input/output signals can be selected according to the polarity of the connected device

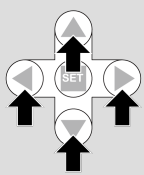
■ Select the External Input/Output Signal Polarity

The polarity of the following external input/output signals can be set to the H level (leading edge) or the L level (trailing edge).

- External trigger input(TRIG1, TRIG2)
- External synchronization signal input(EST1, EST2)
- Exposure pulse output(EPO)
- ARM Command input (ARM CMD)
- ARM status output(ARM STS)
- FAULT status output(FAULT)

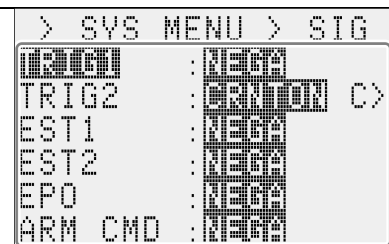
1 Access SIG SET (▶▶ 3-11)

- Access TOP MENU > SYS MENU > SIG SET from the STOP mode.



2 Select the external input/output to be set with the up/down arrows and select the polarity with the left/right arrows

- Use the up/down arrows to move to the selected item (reverse display) and select the external input/output to be set.
- Select the polarity with the left/right arrows.
- Select POSI or NEGA for TRIG1, EST1, EST2, EPO, ARM CMD, ARM STS and FAULT.
- Select CRNTON or CRNTOFF for TRIG2.



External Input/Output Signals	Polarity	Details
TRIG1	POSI	Detects the external trigger signals from the TRIG1 connector at the H level (isolation)
	NEGA ※	Detects the external trigger signals from the TRIG1 connector at the L level (short circuit)
TRIG2	CRNTON ※	Detects the external trigger signals from the TRIG2 input (REMOTE connector) at the H level
	CRNTOFF	Detects the external trigger signals from the TRIG2 input (REMOTE connector) at the L level
EST1	POSI	Detects the external trigger signals from the EST1 connector at the leading edge
	NEGA ※	Detects the external trigger signals from the EST1 connector at the trailing edge
EST2	POSI	Detects the EST signals from the EST2 input (REMOTE connector) at the leading edge
	NEGA ※	Detects the EST signals from the EST2 input (REMOTE connector) at the trailing edge
EPO (EPO /REMOTE Connector)	POSI	Outputs H level signals during exposure
	NEGA ※	Outputs L level signals during exposure
ARM CMD	POSI	Detects ARM command signals at the leading edge
	NEGA ※	Detects ARM command signals at the trailing edge
ARM STS	POSI	Isolated during the ARM mode (open collector output)
	NEGA ※	Short circuit during the ARM mode (open collector output)
FAULT	POSI	Isolated during FAULT status (open collector output)
	NEGA ※	Short circuit during FAULT status (open collector output)

TRIG1FLT		TRIG1 filter setting (20.0μs ※)
TRIG2FLT		TRIG2 filter setting (SAME ※)
EST1 FLT		EST1 filter setting (0.0μs ※)
EST2 FLT		EST2 filter setting (SAME ※)
TRIGEDGE		Trigger signal detection method (OFF ※)

「※」 refer to the factory settings

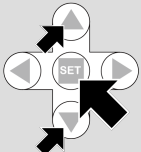
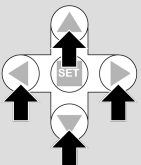
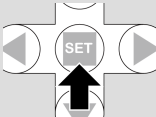
■ Set the Trigger Filter

A digital noise filter is embedded in the HX-3 trigger input. If there is noise in the trigger signals, set the filter value higher to enable the filter.

The filter value is the delay when clean pulses without chattering are input.

A range of 0.0~6553.5μsec can be set, in units of 0.1μsec.

- 1
- Access SIG SET (▶▶ 3-11)
 - Access TOP MENU >SYS MENU > SIG SET from the STOP mode.

 <p>Select and SET</p>	<div>2</div> <div>Select TRIG1FLT or TRIG2FLT with the up/down arrows and press the SET button<ul style="list-style-type: none">Use the up/down arrows to move to the selected item (reverse display) and select TRIG1FLT (TRIG1 input filter value) or TRIG2FLT (TRIG2 input filter value).If using TRIG2FLT, select SAME to set the same value as TRIG1FLT. Press the right arrow to select the number to input and then press the SET button to input.</div>	<pre>> SYS MENU > SIG ARM STS : NEGA FAULT : NEGA TRIG1FLT: 0020.00us TRIG2FLT: SAME 000> EST1 FLT: 0000.00us EST2 FLT: SAME 000></pre>
	<div>3</div> <div>Input the trigger filter value<ul style="list-style-type: none">Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.The values are in 0.1μsec units.</div>	<pre>> SYS MENU > SIG ARM STS : NEGA FAULT : NEGA TRIG1FLT: 0000.00us TRIG2FLT: SAME 000> EST1 FLT: 0000.00us EST2 FLT: SAME 000></pre>
	<div>4</div> <div>Press the SET button<ul style="list-style-type: none">Press the SET button to set the TRIG filter value.</div>	<pre>> SYS MENU > SIG ARM STS : NEGA FAULT : NEGA TRIG1FLT: 0040.00us TRIG2FLT: SAME 000> EST1 FLT: 0000.00us EST2 FLT: SAME 000></pre>

■ Set the EST Filter

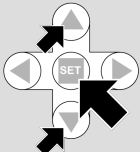
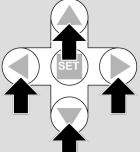
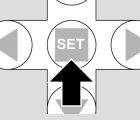
A digital noise filter is embedded in the HX-3 EST input. If there is noise in the EST signals, set the filter value higher to enable the filter.

The filter value is the delay when clean pulses without chattering are input.

A range of 0.0~6553.5μsec can be set, in units of 0.1μsec.

1 Access SIG SET (▶▶ 3-11)

- Access TOP MENU > SYS MENU > SIG SET from the STOP mode.

 <p>Select and SET</p>	<h3>2 Select EST1 FLT or EST2 FLT with the up/down arrows and press the SET button</h3> <ul style="list-style-type: none">• Use the up/down arrows to move to the selected item (reverse display) and select EST1 FLT (EST1 input filter value) or EST2 FLT (EST2 input filter value).• If using EST2 FLT, select SAME to set the same value as EST1 FLT. Press the right arrow to select the number to input and then press the SET button to input.	<pre>> SYS MENU > SIG ARM STS : NEGA FAULT : NEGA TRIG1FLT: 0020.0us TRIG2FLT: SAME 000> EST1 FLT: 0000.0us EST2 FLT: SAME 000></pre>
	<h3>3 Input the EST filter value</h3> <ul style="list-style-type: none">• Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.• The values are in 0.1μsec units.	<pre>> SYS MENU > SIG ARM STS : NEGA FAULT : NEGA TRIG1FLT: 0020.0us TRIG2FLT: SAME 000> EST1 FLT: 0020.0us EST2 FLT: SAME 000></pre>
	<h3>4 Press the SET button</h3> <ul style="list-style-type: none">• Press the SET button to set the EST filter value.	<pre>> SYS MENU > SIG ARM STS : NEGA FAULT : NEGA TRIG1FLT: 0020.0us TRIG2FLT: SAME 000> EST1 FLT: 0020.0us EST2 FLT: SAME 000></pre>

- The trigger signal detection method is selected.

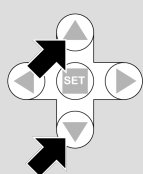


Attention

- When using external trigger signals with HX camera multi trigger or multi manual recording, and the level is “Trigger Signal Detection Method”, if moved to the next block with the trigger still input, the trigger is input at the next block but there may be times when you do not get the expected result.
- In that case, set the “Trigger Signal Detection Method” to edge.

1 Access SIG SET (▶ 3-11)

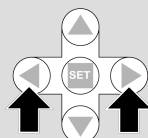
- Access TOP MENU > SYS MENU > SIG SET from the STOP mode.



2 Select TRIGEDGE with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select TRIGEDGE.

```
> SYS MENU > SIG
FAULT      : None
TRIG1FLT   : 0020 .0us
TRIG2FLT   : SAFE 000>
EST1 FLT   : 0000 .0us
EST2 FLT   : SAFE 000>
TRIGMODE : OFF ON
```



3 Use the left/right arrows to select the exposure timing for selecting the trigger signal detection method

- ```

24 Use the left/right arrows to select the trigger signal detection method
25 OFF : LEVEL
26 ON :EDGE

```

# A cooling fan is stopped

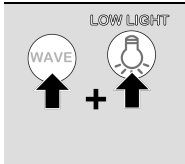
In order to prevent the rise in heat of the camera which can prevent the shake of the image by vibration of a camera by stopping a cooling fan with a built-in camera, the cooling fan's stop period is limited in 1 minute. Please stop a cooling fan according to the timing to recording.

If a cooling fan is stopped once, in order to cool a camera, a fan cannot be stopped for 9 minutes.

When taking recording continuously, a cooling fan can be stopped in the cycle of 10 minutes.

## ■ A cooling fan is stopped

---



When the status screen is displayed in each mode of J-PAD3, the LOW LIGHT key is pressed, continuing pressing the WAVE key.

A cooling fan's operation stops for 1 minute.



# 5

## Live Image Settings

Live  
Display

|                                                  |      |
|--------------------------------------------------|------|
| Items that Can be Set for the Live Display ..... | 5-2  |
| Zoom the Live Image .....                        | 5-4  |
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# Items that Can be Set for the Live Display

Live display zoom, scroll and image quality adjustment can be performed in the VIEW mode.

Press the J-PAD3 MENU button in the VIEW mode to switch to the VIEW MENU display. Settings for the image quality or zoom can be made from the VIEW MENU in the VIEW or ARM modes.

## ■ Items that can be Set from the VIEW MENU

```
<VIEW MENU>
BLK BAL : [REDA] SET
SCENE : 00000
TRIGGER : [CENTER] E>
FRM RATE : 1000 2000
FRM SIZE : 1920x1080
CUSTOM F : >
SHUTTER : [OPEN] 2k >
DUALRATE : >
AOI : [FULL] CEN>
IMG TRIG : [OFF] LOW >
IMGTRULE : [NORMAL] S>
AEC : [OFF] LOW >
DRES : [OFF] LOW >
LOWLIGHT : 1000 010>
GXC : [OFF] ON
S-GAIN : [LOW] MID >
D-GAIN : [NORMAL] H>
WHT BAL : [AUTO] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : 100 150 >
KNEE : [ON]
RGB COR. : [OFF] ON
LUMINANC : [NORMAL] L>
DEPTH : 10 12
ZOOM : [FIT] FIT2
SCROLL : 0 0
```

Items to Set	Details	Refer to »
BLK BAL	Black balance settings	4-35
SCENE	Scene number settings	4-50
TRIGGER	Trigger timing settings	4-29
FRM RATE	Frame rate settings	4-7
FRM SIZE	Frame size settings	4-10
CUSTOM F	Custom frame rate, frame size settings	4-23
SHUTTER	Shutter speed settings	4-26
DUALRATE	Variable frame rate settings	4-38
AOI	Photometry area settings	4-44
IMG TRIG	Image trigger settings	4-41
IMGTRULE	Image trigger standard luminance settings	4-43
AEC	Auto exposure function settings	4-46
DRES	DRES settings	4-48
LOWLIGHT	Low light function settings	5-13
GXC	Sensitivity extension function settings	4-37
S-GAIN	Sensor gain settings (Not use)	-
D-GAIN	Digital gain settings	5-7
WHT BAL	White balance settings	5-8
ENHANCE	Enhance settings	5-9
GAMMA	Gamma settings	5-10

Items in the table with dark backgrounds are items not described in “Live Display Settings”

Items to Set	Details	Refer to »
CHROMA	Chroma settings	5-10
KNEE	Knee settings	5-11
RGB COR.	RGB matrix settings	5-11
LUMINANC	Luminance settings	5-12
DEPTH	Recording bit length settings	4-49
ZOOM	Video display zoom settings	5-4
SCROLL	Video display scroll	5-6

Items in the table with dark backgrounds are items not described in “Live Display Settings”.

Press the STOP or MENU buttons to return to the status screen from the VIEW MENU.



- Attention
- D-GAIN, WHT BAL, ENHANCE, GAMMA, CHROMA, KNEE, RGB COR. and LUMINANC are settings relating to image quality and are reflected on the recorded video after recording or on the saved video.
  - Settings for LOWLIGHT, ZOOM and SCROLL are reflected only on the monitor.

# Zoom the Live Image

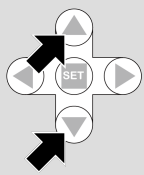
The live image displayed can be enlarged or reduced.

The live image displayed on the monitor or viewfinder can be zoomed in the VIEW or ARM modes.

## ■ Zoom Images in the VIEW Mode

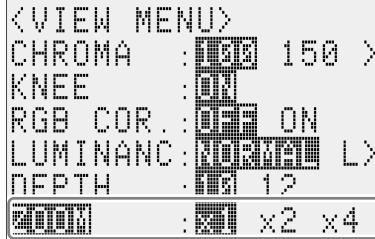
### 1 Access the VIEW MENU (▶▶ 3-12)

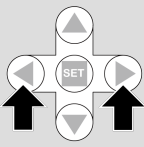
- Access the VIEW MENU from the VIEW mode.



### 2 Select ZOOM with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select ZOOM.

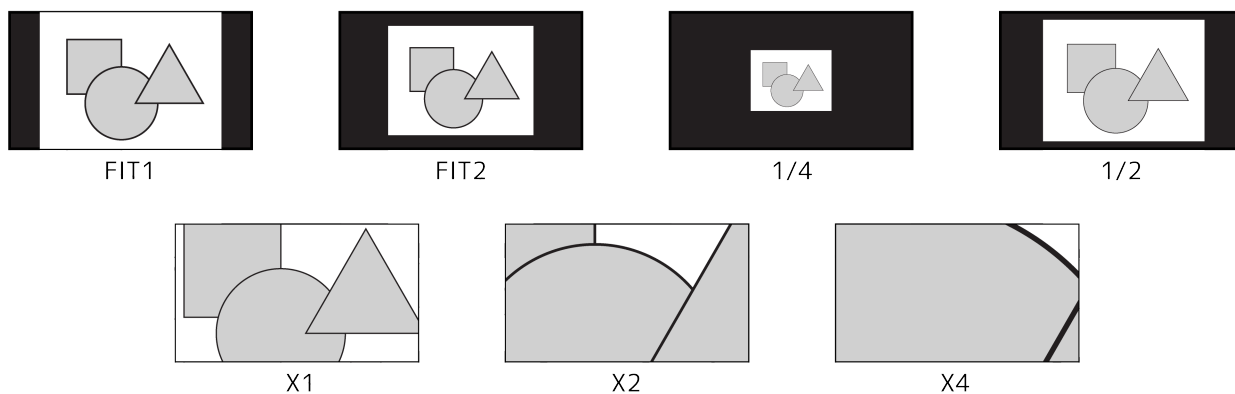




### 3 Select the zoom with the left/right arrows

- Select the zoom magnification to be set with the left/right arrows.
- FIT1 : Display the entire screen in the display area
- FIT2 : Reduce and display the entire screen in about 80% of the display area  
(if displaying the entire image on a standard NTSC monitor)
- 1/4 : Reduce the image to 1/4 for display
- 1/2 : Reduce the image to 1/2 for display
- X1 : Display the image actual size
- X2 : Double the image size for display
- X4 : Quadruple the image size for display

When 2560 x 1920 (full frame size) is zoomed on a 1920 x 1080 monitor





- The zoom can be changed after recording, during playback . (▶▶ 6-5)
- The size of the display area changes according to the settings for the connected monitor and monitor display resolution.  
Change the display resolution on the monitor (▶▶ 8-5)
- If the display size is larger than the display area, the part off the screen can be displayed by scrolling. (▶▶ 5-6)
- Even if the image extends past the display area on the monitor when zoomed, the part not displayed can be recorded.

# Scroll the Live Image

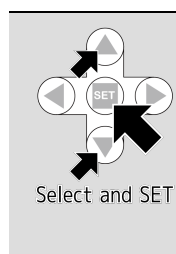
Areas outside the display area zoomed can be scrolled for display.

If using the enlarged or reduced display in the VIEW mode and the entire image does not fit in the display area, the display range can be scrolled for display. Using the center of the image as 0 (horizontal) and 0 (vertical), movement occurs in single pixel units.

## ■ Scroll the Image in the VIEW Mode

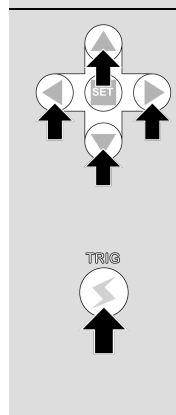
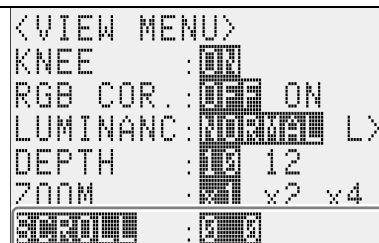
### 1 Access the VIEW MENU (▶ 3-12)

- Access the VIEW MENU from the VIEW mode.



### 2 Select SCROLL with the up/down arrows and press SET

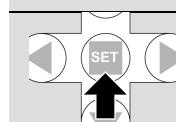
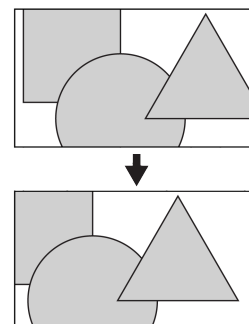
- Use the up/down arrows to move to the selected item (reverse display), select SCROLL and press the SET button.



### 3 Use the up/down and left/right arrows to scroll

- Use the left/right arrows to shift the display position in the horizontal direction. The numbers to the left will increase or decrease.
- Use the up/down arrows to shift the display position in the vertical direction. The numbers to the right will increase or decrease.
- Press the TRIG button to return to the center.

In case of scroll the image to + wise in horizontal



### 4 Press the SET button after scrolling

- Press the SET button to set the scrolling.



- The number of pixels scrolled is that of the frame size. For example, if the zoom setting is X4 and SCROLL is +1, it moves the equivalent of 4 pixels on the display.
- Scroll and display can be performed during playback after recording. (▶ 6-6)

# Adjust the Image Quality of the Live Image

The image quality of the live image displayed during recording can be adjusted.

The image quality of the live image can be adjusted in the VIEW or ARM modes. The image quality on the display is adjusted without changing the data from the sensor. The image quality can be adjusted again during playback after recording. (▶▶ 6-7)

To save the video as an AVI or MCFF file, save the video after adjusting the image quality settings.

The image quality can be adjusted for the following items. (Identical to image quality adjustment in the STOP mode after recording.)

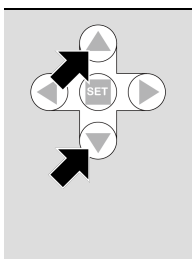
- Digital gain :                Sensitivity adjustment. Changes the brightness of the entire image.
- White balance :             Corrects the color to reflect the white properly according to various light sources.
- Enhance :                    Adjust the emphasis of the contour
- Gamma :                      Adjusts the gradation properties (darkness and brightness of the display).
- Chroma :                    Adjusts the saturation (color concentration).
- Knee :                        Lowers the gain in bright areas and expands the dynamic range.
- RGB Matrix :                Improves the color reproduction.
- Luminance Properties :    Sets the input/output properties for the luminance.

Live Display

## ■ Set the Digital Gain

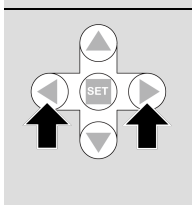
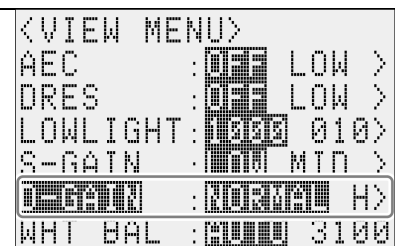
### 1 Access the VIEW MENU (▶▶ 3-12)

- Access the VIEW MENU from the VIEW mode.



### 2 Select D-GAIN with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select D-GAIN.



### 3 Select the digital gain with the left/right arrows

- Select the digital gain to be set with the left/right arrows.
  - LOW :            Sensitivity one step less than NORMAL (darker)
  - NORMAL :      Normal sensitivity setting
  - HIGH :          Sensitivity one step higher than NORMAL (lighter)

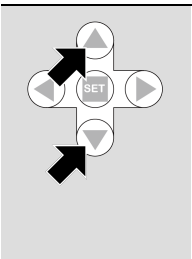
## ■ Set the White Balance

The following settings are available for the white balance.

Auto White Balance :	Automatically distinguishes the color temperature from the image recorded and adjusts to the optimal white balance.
Preset White Balance :	Use when the color temperature of the light source is known. The three settings are 3100K, 5000K and 9000K.
SET/REG White Balance :	Precisely sets the white balance value by recording white objects (such as paper) .

**1** Access the VIEW MENU (▶▶ 3-12)

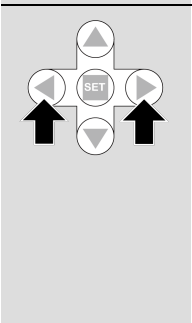
- Access the VIEW MENU from the VIEW mode.



**2** Select WHT BAL with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select WHT BAL.

<VIEW MENU>	
DRES	: OFF LOW >
LOWLIGHT	: 000 010 >
S-GAIN	: 000 MID >
N-GAIN	: 000000 H>
WHT BAL	: AUTO 3100
ENHANCE	: 000000 H>



**3** Select the white balance with the left/right arrows

- Select the white balance to be set with the left/right arrows
  - AUTO : Auto white balance
  - 3100K : When the color temperature of the light source is 3100K
  - 5000K : When the color temperature of the light source is 5000K
  - 9000K : When the color temperature of the light source is 9000K
  - REG : Use the data obtained from SET
  - SET : Obtain data for the white balance



## SET/REG White Balance Settings

Determines the white balance when recording white objects. Photograph an entire image using a large white paper or white wall to obtain the white balance photographed.

### 1 Photograph "white" as the entire angle of view

- In the VIEW mode, adjusts the white objects of the entire video to the subject to be displayed (works best if the ZOOM is set to FIT1 or FIT2.)
- Normal white balance cannot be obtained where the edges are bright white or dim white. Adjust the aperture or light source to an appropriate level of brightness.

### 2 Record the white objects and select the white balance settings in SET.

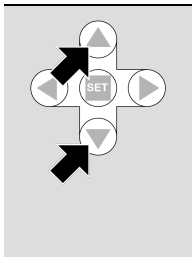
- Photograph white objects to calculate the white balance data.
- Once the white balance calculations are finished, they will automatically be set as REG.

Live Display

## ■ Set Enhance

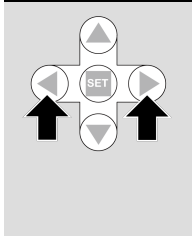
### 1 Access the VIEW MENU (▶▶ 3-12)

- Access the VIEW MENU from the VIEW mode.



### 2 Select ENHANCE with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select ENHANCE.



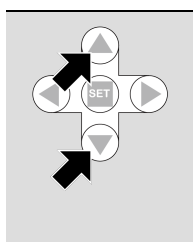
### 3 Select the enhance with the left/right arrows

- Select the enhance to be set with the left/right arrows.
  - OFF : Do not emphasize contours
  - LOW : Low contour emphasis
  - NORMAL : Normal contour emphasis
  - HIGH : High contour emphasis

## ■ Set the Gamma

### 1 Access the VIEW MENU (▶▶ 3-12)

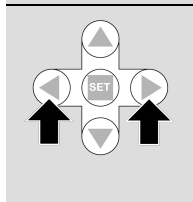
- Access the VIEW MENU from the VIEW mode.



### 2 Select GAMMA with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select GAMMA.

```
<VIEW MENU>
S-GAIN : [MID] MID >
D-GAIN : [NORMAL] H>
WHT BAL : [3100] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [150] 150 >
```



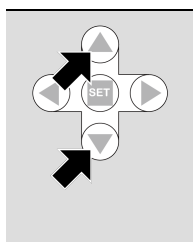
### 3 Select GAMMA with the left/right arrows

- Select the gamma to set with the left/right arrows.
  - OFF : No gamma correction
  - LOW : Low gamma correction
  - NORMAL : Normal gamma correction

## ■ Set the Chroma (Saturation)

### 1 Access the VIEW MENU (▶▶ 3-12)

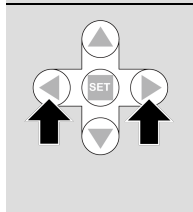
- Access the VIEW MENU from the VIEW mode.



### 2 Select CHROMA with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select CHROMA.

```
<VIEW MENU>
D-GAIN : [NORMAL] H>
WHT BAL : [3100] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [150] 150 >
KNEE : [LOW]
```

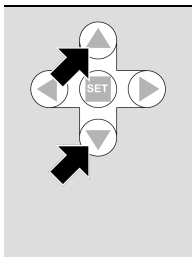


### 3 Select the chroma with the left/right arrows

- Select the chroma to be set with the left/right arrows.
  - 0 : 0% saturation (B/W image)
  - 50 : 50% saturation
  - 100 : 100% saturation (normal)
  - 150 : 150% saturation
  - 200 : 200% saturation

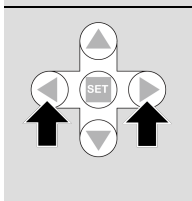
## ■ Set the KNEE

- 1 Access the VIEW MENU (▶▶ 3-12)
  - Access the VIEW MENU from the VIEW mode.



- 2 Select KNEE with the up/down arrows
  - Use the up/down arrows to move to the selected item (reverse display) and select KNEE.

```
<VIEW MENU>
WHT BAL : [AUTO] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [100] 150 >
KNEE : [ON]
RGB COR. : [OFF] ON
```

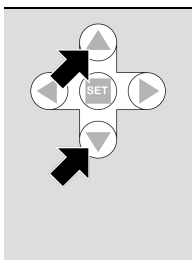


- 3 Select the knee with the left/right arrows
  - Select enable/disable with the left/right arrows.
    - OFF : No knee correction
    - ON : Knee correction

Live Display

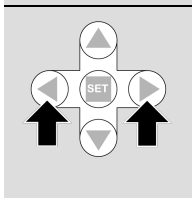
## ■ Set the RGB Matrix

- 1 Access the VIEW MENU (▶▶ 3-12)
  - Access the VIEW MENU from the VIEW mode.



- 2 Select RGB COR. with the up/down arrows
  - Use the up/down arrows to move to the selected item (reverse display) and select RGB COR.

```
<VIEW MENU>
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [100] 150 >
KNFF : [ON]
RGB COR. : [OFF] ON
LUMINANC : [NORMAL] L>
```

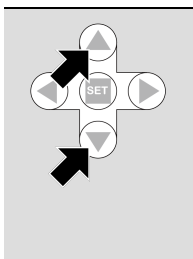


- 3 Select the RGB matrix with the left/right arrows
  - Select enable/disable the RGB matrix with the left/right arrows.
    - OFF : No RGB matrix correction
    - ON : RGB matrix correction

## ■ Set the Luminance Properties

### 1 Access the VIEW MENU (▶▶ 3-12)

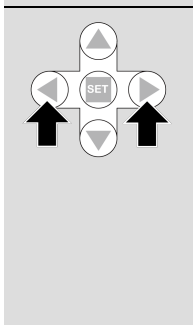
- Access the VIEW MENU from the VIEW mode.



### 2 Select LUMINANC with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select LUMINANC.

```
<VIEW MENU>
GAMMA : 0.45 150 >
CHROMA : 0.00 150 >
KNEE : 0.00
RGA COR : OFF ON
LUMINANC : 0.00 150 L>
DEPTH : 0.00 12
```



### 3 Select the luminance properties with the left/right arrows

- Select the luminance properties to be set with the left/right arrows.
  - NORMAL : Display using gain, gamma and knee settings (normal settings)
  - LINEAR : Display without any image data correction (gain, gamma and knee correction not used)
  - TABLE : Applies the luminance properties file for individual users (Can be selected)
  - CUSTOM : Custom settings for luminance properties.



- Luminance properties for "TABLE" and "CUSTOM" can be selected from the J-PAD3 but property values cannot be set. Settings are performed from the HXLink for the control PC.

Read the HXLink user guide to set.

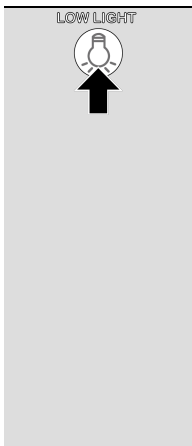
# Using the Low Light Function

Use when a bright live image cannot be obtained in the VIEW mode at the set frame rate.

If using the low light function, an image brighter than the photographed image at the set frame rate is displayed, and the angle of view and focus can be easily verified.

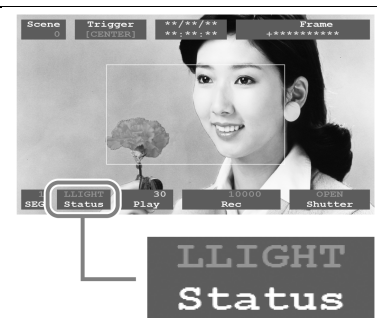
The low light function is enabled only on the image displayed in the VIEW mode. Images are not displayed in the ARM or REC modes, or when recording actual videos. Actual recordings take place with the set frame rate.

## Enable the Low Light Function



1 Press the LOW LIGHT button in the VIEW mode

- Press the LOW LIGHT button during a live display in the VIEW mode to enable the low light function.
- If the low light function is enabled, the camera mode display indicates LLIGHT.
- Press the LOW LIGHT button again to cancel the low light function and return to the normal display.



Live  
Display

## Segment Border Display

When the low light function is enabled, the live display is shown at full size (2560 × 1920), regardless of the frame size setting. The actual frame size recorded is shown with the white border (segment border).

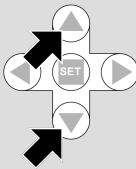

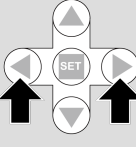
If the actual frame size recorded is small, adjust the image using the segment border displayed while verifying the surrounding image recorded. (If the entire image is larger than the range displayed on the monitor or viewfinder, the segment border is not displayed.)



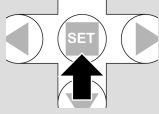

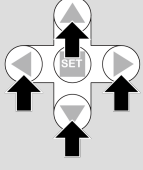

Segment border

## ■ Set the Brightness for Low Light

- 1 Access the VIEW MENU (► 3-12)
  - Access the VIEW MENU from the VIEW mode.

	<ol style="list-style-type: none"> <li>2 Select LOWLIGHT with the up/down arrows           <ul style="list-style-type: none"> <li>• Use the up/down arrows to move to the selected item (reverse display) and select LOWLIGHT.</li> </ul> </li> </ol>	
	<ol style="list-style-type: none"> <li>3 Use the left/right arrows to select the brightness (exposure time) when low light is enabled           <ul style="list-style-type: none"> <li>• Select the low light frame rate to be set with the left/right arrows.</li> <li>• 100 : Live image display during exposure time of 1/100 second (frame rate of 100 frames/second, corresponding to an OPEN shutter)</li> <li>• 250 : Live image display during exposure time of 1/250 second (frame rate of 250 frames/second, corresponding to an OPEN shutter)</li> <li>• 500 : Live image display during exposure time of 1/500 second (frame rate of 500 frames/second, corresponding to an OPEN shutter)</li> <li>• 1000 : Live image display during exposure time of 1/1000 second (frame rate of 1000 frames/second, corresponding to an OPEN shutter)</li> <li>• ****pps : custom exposure setting</li> </ul> </li> </ol>	

## ■ Set Low Light Exposure Time with Custom Setting

	<p><b>1</b> Under the low light brightness settings, select ****pps and press the SET button</p> <ul style="list-style-type: none"> <li>• Select ****pps with the left/right arrows and press the SET button to set a custom value.</li> </ul>	
	<p><b>2</b> Input the low light custom exposure time</p> <ul style="list-style-type: none"> <li>• Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.</li> <li>• The exposure time will correspond to the OPEN shutter at the input frame rate.</li> </ul>	
	<p><b>3</b> Press the SET button</p> <ul style="list-style-type: none"> <li>• The custom exposure time is enabled.</li> </ul>	

Live  
Display

---



# 6

## Playback Settings

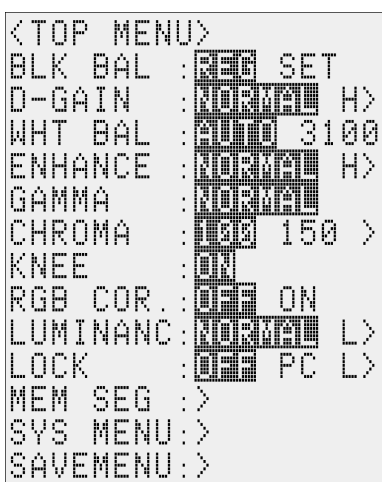
Items that Can be Set for Playback.....	6-2
Zoom the Playback Image.....	6-5
Scroll the Playback Image.....	6-6
Adjust the Image Quality of the Playback Image .....	6-7
Select the Memory Segment for Playback .....	6-13

# Items that Can be Set for Playback

Settings for image quality adjustment, zoom or scroll can be made from the MENU in the PLAY or LOOP mode .

Press the J-PAD3 MENU button while in the STOP mode to switch to the TOP MENU display. Playback image quality adjustment and memory segment switching can be performed with the TOP menu.


## ■ Items that can be set from the TOP MENU



Items to Set	Details	Refer to ▶▶
BLK BAL	Black balance settings	4-35
D-GAIN	Digital gain settings during playback	6-8
WHT BAL	White balance settings during playback	6-9
ENHANCE	Enhance settings during playback	6-10
GAMMA	Gamma settings during playback	6-10
CHROMA	Chroma settings during playback	6-11
KNEE	Knee settings during playback	6-11
RGB COR.	RGB matrix settings during playback	6-12
LUMINANC	Luminance settings during playback	6-12
LOCK	PC operation lock settings	8-7
MEM SEG	MEM SEG settings	4-53
SYS MENU	Jump to SYS MENU (System Menu)	—
SAVEMENU	Jump to SAVEMENU (Save Menu)	7-2

Items in the table with dark backgrounds are items not described in “Playback Settings”.

Press the STOP or MENU buttons to return to the status screen from the TOP MENU.

 Attention • D-GAIN, WHT BAL, ENHANCE, GAMMA, CHROMA, KNEE, RGB COR. and LUMINANC are settings relating to image quality and are reflected on the saved video.

Move to the SYS MENU from the TOP MENU to zoom or scroll.

■ Items that can be set from the SYS MENU

```
TOP MENU > SYS MEN
ID :000
DATETIME:12 10 18
OSD DISP:
OSD MODE:ALWAYS S>
OSD TIME:TRIG CRNT
CAFM DIS:OFF WHT >
FRM DISP:FRAME TI>
FRM TIME:TRIGGER >
TIMROUND:8 7
REL TIME:FRAME TR>
EXP TIME:EXTIME>
SYNCTIME:ASYNC GX>
SYNC SEL:EST1>
EST VIEW:ON
EST MODE:EST
EST SAFE:OFF ON
STRADDL :>
VIDEOOUT:ON
ZOOM :FIT2
SCROLL :0 0
BEEP :ON OFF
AUTOVIEW:OFF AUTO>
AUTO BB :ON OFF
SHLNC :OFF ON
WARNING :>
TRIG SET:>
SIG SET :>
SYS SET :>
DISPSET :>
INFO :>
```

Items to Set	Details	Refer to ▶▶
ID	ID number settings	8-8
DATETIME	Date and time settings	8-9
OSD DISP	On screen display settings	8-10
OSD MODE	On screen display settings for the camera mode	8-11
OSD TIME	Trigger timing display settings	8-12
CAFM DIS	Video image center mark settings	8-20
FRM DISP	Frame number display settings	8-13
FRM TIME	Frame time display settings	8-16
TIMROUND	Rounding settings	8-14
REL TIME	Relative time display settings	8-18
EXP TIME	Exposure timing settings	4-78
SYNC TIME	Synchronization time settings	4-72
SYNC SEL	Synchronization signal selection settings	4-65
EST VIEW	Synchronization settings for the VIEW mode during external synchronization	4-71
EST MODE	External synchronization accuracy setting	4-66
EST SAFE	Settings to ignore irregular EST signals	4-69
STRADDL	Frame straddling settings	4-76
VIDEOOUT	Video output settings	8-21

Items in the table with dark backgrounds are items not described in “Playback Settings”.

J

Items to Set	Details	Refer to »☰
ZOOM	Video display zoom display settings	6-5
SCROLL	Synchronization signal selection settings	6-6
BEEP	Remote control BEEP settings	8-22
AUTOVIEW	Auto view settings	8-23
AUTO BB	Auto black balance settings	8-25
SHLNC	Shutter line noise correction selecting settings	8-26
WARNING	Warning display settings	8-27
TRIG SET	Trigger settings	4-57 4-61
SIG SET	Input/output signal settings	4-80
SYS SET	System settings	4-52
DISP SET	Monitor settings	8-5
INFO	Information display	8-29

Items in the table with dark backgrounds are items not described in “Playback Settings”.

Press the STOP or MENU button to return to the status screen from the SYS MENU.

# Zoom the Playback Image

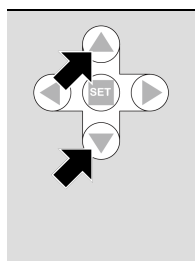
The image displayed can be enlarged or reduced.

The image displayed can be zoomed in the STOP mode.

## ■ Zoom Images in the STOP Mode

### 1 Access the SYS MENU(▶▶ 3-11)

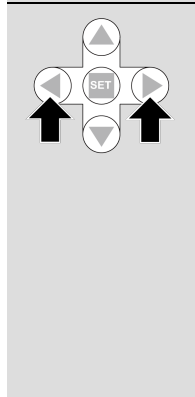
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select ZOOM with the up/down arrows

- Use the up/down arrows to move to the desired area of interest and select ZOOM.

```
TOP MENU > SYS MEN
EST VIEW: [M]
EST SAFE: [OFF] ON
STRADDL : >
VIDEOPNT : [M]
ZOOM : [FIT2] FIT2
SCROLL : 0 0
```



### 3 Select the zoom with the left/right arrows

- Select the zoom magnification to be set with the left/right arrows.
  - FIT1 : Display the entire screen in the display area
  - FIT2 : Reduce and display the entire screen in about 80% of the display area or if displaying the entire image on a standard NTSC monitor
  - 1/4 : Reduce the image to 1/4 for display
  - 1/2 : Reduce the image to 1/2 for display
  - X1 : Display the image actual size
  - X2 : Double the image size for display
  - X4 : Quadruple the image size for display



- The zoom can be changed even when displaying live in the VIEW mode. (▶▶ 5-4)
- The size of the display area changes according to the settings for the connected monitor and monitor display resolution.  
Change the display resolution on the monitor (▶▶ 8-5)
- If the display size is larger than the display area, the part off the screen can be displayed by scrolling. (▶▶ 6-6)

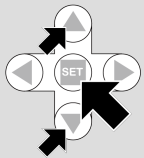

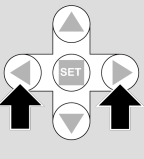
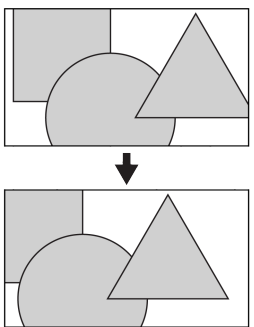

# Scroll the Playback Image

The entire image does not fit in the display area. The display range can be scrolled for display.

If viewing an enlarged or reduced display using the zoom function in the STOP mode and the entire image does not fit in the display area, the display range can be scrolled for viewing. Using the center of the image as 0 (horizontal) and 0 (vertical), movement occurs in single pixel units.

## ■ Scroll the Image in the STOP Mode

- 1 Access the SYS MENU (▶▶ 3-11)
  - Access TOP MENU > SYS MENU from the STOP mode.

 <p>Select and SET</p>	<ol style="list-style-type: none"> <li>2 Select SCROLL with the up/down arrows and press SET                             <ul style="list-style-type: none"> <li>• Use the up/down arrows to select SCROLL and press the SET button.</li> </ul> </li> </ol>	
	<ol style="list-style-type: none"> <li>3 Use the up/down and left/right arrows to scroll                             <ul style="list-style-type: none"> <li>• Use the left/right arrows to shift the display position in the horizontal direction. The numbers to the left will increase or decrease.</li> <li>• Use the up/down arrows to shift the display position in the vertically. The numbers to the right will increase or decrease.</li> <li>• Press the TRIG button to return to the center.</li> </ul> </li> </ol>	<p>In case of scroll the image to + wise in horizontal</p> 
	<ol style="list-style-type: none"> <li>4 Press the SET button after scrolling                             <ul style="list-style-type: none"> <li>• Press the SET button to set the scrolling.</li> </ul> </li> </ol>	



- The number of pixels scrolled is that of the frame size. For example, if the zoom setting is X4 and SCROLL is +1, it moves the equivalent of 4 pixels on the display.
- Scrolling and display are also available in the VIEW mode. (▶▶ 5-6)

# Adjust the Image Quality of the Playback Image

The image quality of the playback image can be adjusted while in the STOP mode.

The image quality can be adjusted in the VIEW mode before recording. (▶ 5-7)

The image quality can be adjusted for the following items. (Identical to the live image quality adjustment in the VIEW mode.)

- Digital gain :                Sensitivity adjustment. Changes the brightness of the entire image.
- White balance :             Corrects the color to reflect the white properly according to various light sources.
- Enhance :                    Adjust the emphasis of the contour
- Gamma :                     Adjusts the gradation properties (darkness and brightness of the display).
- Chroma :                    Adjusts the saturation (color concentration).
- Knee :                        Lowers the gain in bright areas and expands the dynamic range.
- RGB Matrix :                Improves the color reproduction.
- Luminance Properties :    Sets the input/output properties for the luminance.

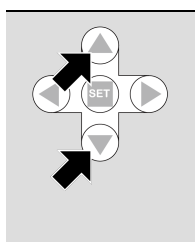


- The image quality settings for the playback images are reflected in videos saved and downloaded.
- If recording with the memory partitioned into segments, the image quality settings can be made for each segment.
- The live image settings in the VIEW and ARM modes cannot be changed even if the image quality settings in the playback image are changed.

## ■ Set the Digital Gain

### 1 Access the TOP MENU (▶▶ 3-11)

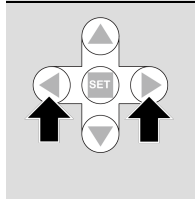
- Access the TOP MENU from the STOP mode.



### 2 Select D-GAIN with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select D-GAIN.

```
<TOP MENU>
AIK AAI .[REVERSE] SFT
D-GAIN : [NORMAL] H>
WHT BAL : [WHITE] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [100] 150 >
```



### 3 Select the digital gain with the left/right arrows

- Select the digital gain to be set with the left/right arrows.
  - LOW : Sensitivity one step less than NORMAL
  - NORMAL : Normal sensitivity setting
  - HIGH : Sensitivity one step higher than NORMAL

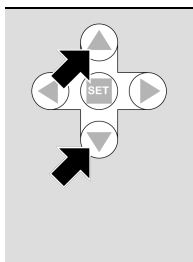


## ■ Set the White Balance

The following settings are available for the white balance.

Auto White Balance :	Automatically distinguishes the color temperature from the image recorded and adjusts to the optimal white balance.
Preset White Balance :	Use when the color temperature of the light source is known. The three settings are 3100K, 5000K and 9000K.
REG White Balance :	Sets the appropriate white balance value by photographing white objects (such as paper) before and after recording while in the VIEW mode.

- 1 Access the TOP MENU (▶▶ 3-11)
  - Access the TOP MENU from the STOP mode.

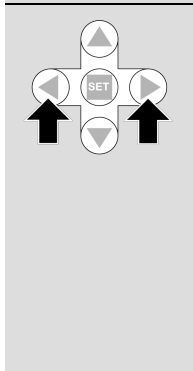


- 2 Select WHT BAL with the up/down arrows
  - Use the up/down arrows to move to the selected item (reverse display) and select WHT BAL.

```

<TOP MENU>
BLK BAL : [RED] SET
N-GAIN : [NORMAL] H>
[WHITE BAL] : [AUTO] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [100] 150 >

```



- 3 Select the white balance with the left/right arrows
  - Select the white balance to be set with the left/right arrows.
    - AUTO : Auto white balance
    - 3100K : When the color temperature of the light source is 3100K
    - 5000K : When the color temperature of the light source is 5000K
    - 9000K : When the color temperature of the light source is 9000K
    - REG : Use the white balance data obtained from the white balance settings SET in the VIEW mode

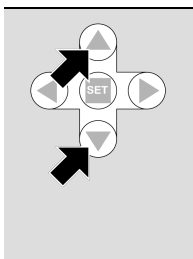
### REG White Balance Settings

Obtains the white balance data while in the VIEW mode.(▶▶ 5-9)

## ■ Set Enhance

### 1 Access the TOP MENU (▶▶ 3-11)

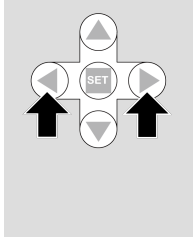
- Access the TOP MENU from the STOP mode.



### 2 Select ENHANCE with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select ENHANCE.

```
<TOP MENU>
BLK BAL : [000] SET
D-GAIN : [NORMAL] H>
WHT BAL : [0000] 3100
ENHANCE : [NORMAL] H>
GAMMA : [0000]
CHROMA : [000] 150 >
```



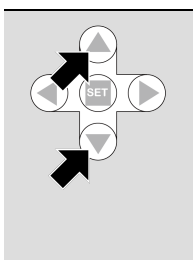
### 3 Select the enhance with the left/right arrows

- Select "enhance," and set with the left/right arrows.
  - OFF : Do not emphasize contours
  - LOW : Low contour emphasis
  - NORMAL : Normal contour emphasis
  - HIGH : High contour emphasis

## ■ Set the Gamma

### 1 Access the TOP MENU (▶▶ 3-11)

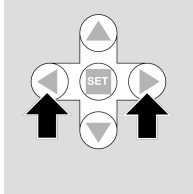
- Display TOP MENU from the STOP mode.



### 2 Select GAMMA with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select GAMMA.

```
<TOP MENU>
BLK BAL : [000] SET
D-GAIN : [NORMAL] H>
WHT BAL : [0000] 3100
ENHANCE : [NORMAL] H>
GAMMA : [0000]
CHROMA : [000] 150 >
```

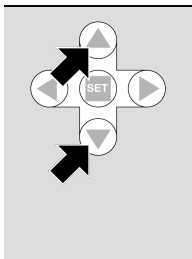


### 3 Select GAMMA with the left/right arrows

- Select the gamma to set with the left/right arrows.
  - OFF : No gamma correction
  - LOW : Low gamma correction
  - NORMAL : Normal gamma correction

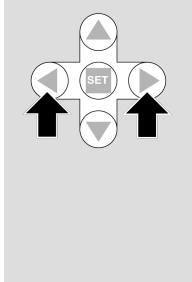
## ■ Set the Chroma (Saturation)

- 1 Access the TOP MENU (▶▶ 3-11)
  - Access the TOP MENU from the STOP mode.



- 2 Select CHROMA with the up/down arrows
  - Use the up/down arrows to move to the selected item (reverse display) and select CHROMA.

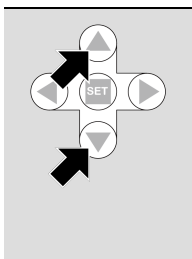
```
<TOP MENU>
D-GAIN : [NORMAL] H>
WHT BAL : [AUTO] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [100] 150 >
KNEE : [ON]
```



- 3 Select the chroma with the left/right arrows
  - Select the chroma to be set with the left/right arrows.
    - 0 : 0% saturation (B/W image)
    - 50 : 50% saturation
    - 100 : 100% saturation (normal)
    - 150 : 150% saturation
    - 200 : 200% saturation

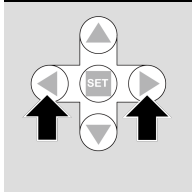
## ■ Set the Knee

- 1 Access the TOP MENU (▶▶ 3-11)
  - Access the TOP MENU from the STOP mode.



- 2 Select KNEE with the up/down arrows
  - Use the up/down arrows to move to the selected item (reverse display) and select KNEE.

```
<TOP MENU>
WHT BAL : [AUTO] 3100
ENHANCE : [NORMAL] H>
GAMMA : [NORMAL]
CHROMA : [100] 150 >
KNEE : [ON]
RGB CUR. : [OFF] ON
```

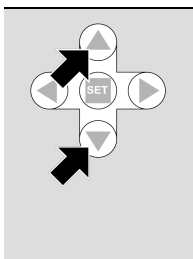


- 3 Select the KNEE with the left/right arrows
  - Select enable/disable with the left/right arrows.
    - OFF : No knee correction
    - ON : Knee correction

## ■ Set the RGB Matrix

### 1 Access the TOP MENU (▶▶ 3-11)

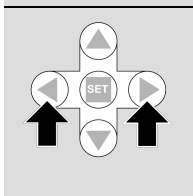
- Access the TOP MENU from the STOP mode.



### 2 Select RGB COR. with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select RGB COR.

```
<TOP MENU>
ENHANCE : NORMAL H>
GAMMA : NORMAL
CHROMA : 100 150 >
KNEE : 00
RGB COR : OFF ON
LUMINANC : NORMAL L>
```



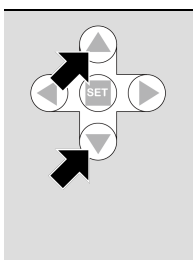
### 3 Select the RGB matrix with the left/right arrows

- Select enable/disable the RGB matrix with the left/right arrows.
  - OFF : No RGB matrix correction
  - ON : RGB matrix correction

## ■ Set the Luminance Properties

### 1 Access the TOP MENU (▶▶ 3-11)

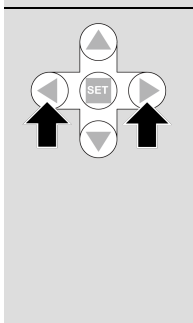
- Access the TOP MENU from the STOP mode.



### 2 Select LUMINANC with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select LUMINANC.

```
<TOP MENU>
ENHANCE : NORMAL H>
GAMMA : NORMAL
CHROMA : 100 150 >
KNEE : 00
RGB COR : OFF ON
LUMINANC : NORMAL L>
```



### 3 Select the luminance properties with the left/right arrows

- Select the luminance properties to be set with the left/right arrows.
  - NORMAL : Display using gain, gamma and knee settings (normal settings)
  - LINEAR : Display without any image data correction (gain, gamma and knee correction not used)
  - TABLE : Applies the luminance properties file for the individual user (can be selected)
  - CUSTOM : Custom settings for luminance properties.



- Luminance properties for "TABLE" and "CUSTOM" can be selected from the J-PAD3 but luminance values cannot be set. Set the custom values from HXLink on the control PC. Read the HXLink user guide for the setting method.

# Select the Memory Segment for Playback

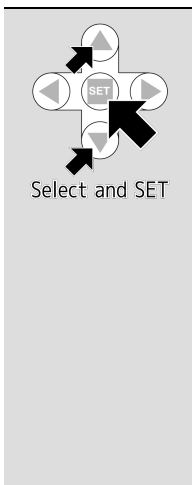
You can select a memory segment to be played in case of the memory segment reordering.

The playback segment can be selected for playback when recording by partitioning the memory into segments. Recording is conducted on the selected segments.

## ■ Select the Memory Segment

### 1 Access MEM SEG (▶▶ 3-11)


- Access TOP MENU > MEM SEG from the STOP mode.



### 2 Select the segment with the up/down arrows and press SET

- Select the memory segment for playback with the up/down arrows.
- Press the SET button to set the selected segment.
- The four digit scene number and recorded date/time is displayed on the right side for the segments for which recording has been completed.
- Segments not recorded will display \*\*\*\* \*\*/\*\*/\*\* \*\*:\*\*:\*\* on the right side.

TOP MENU > MEM SEG	
SEG NO.1:	0 12/0
SEG NO.2:	1 12/0
SEG NO.3:	**** **/**
SEG NO.4:	**** **/**

-  Attention
- Segments selected for playback are segments used for recording. Switch to the ARM mode to overwrite a new video on completed videos.
  - Select memory segments for recording (▶▶ 4-53)

---

# 7

## Save Settings


Items that can be Set for Saving .....	7-2
Saving Video Files .....	7-3
Saving Still Image Files .....	7-14
Selecting the USB Media for Storage .....	7-15
Formatting USB Media .....	7-16

# Items that can be Set for Saving

The images recorded can be saved as a video file or a still image file.

Saving and save settings can be performed from the SAVEMENU while in the TOP MENU. Press the J-PAD3 MENU button while in the STOP mode to display the TOP MENU display.

## ■ Items in the SAVE MENU

```
TOP MENU > SAVE ME
DOWNLOAD:
FREE FRM:7955
SAVE FRM:-6588 - +
REC FRM : -6588 - +
FILETYPE:  AVI>
AVI SET :>
YC TIFF :
SAVE SET:>
USB SEL :MY USB ME
USB INIT:>
```

Items to Set	Details	Refer to »
DOWNLOAD	Save to USB media	7-3
FREE FRM	Display the number of frames that can be recorded on the USB	7-5
SAVE FRM	Settings for the save range on the USB media	7-5
REC FRM	Display the recording frame range	7-5
FILETYPE	Settings for the file format on the USB media	7-8
AVI SET	AVI, MJPEG compression ratio and playback speed settings	7-6
YC TIFF	Save image display in the YC TIFF format	7-14
SAVE SET	Save settings menu	—
USB SEL	USB media selection	7-15
USB INIT	USB media format	7-16

Press the STOP or MENU button to return to the status screen from the SAVE MENU.



# Saving Video Files

Videos recorded can be saved as MCFF or AVI video files.



• Refer to (▶ 3-37) for the USB devices that can be used and for USB device connections.

The two methods to save recorded videos are shown below.

- USB storage : Save on USB media (USB connected HDD or flash drive)
- Download : Save to the control PC using the control software HXLink

USB storage does not require connection to a control PC, and you can save by simply operating the J-PAD3. Downloading requires connection to a control PC but videos can be downloaded faster than USB storage and multiple segments and videos can be batch downloaded from multiple cameras.

Saving to USB is described in this manual. Refer to the HXLink user guide for saving with the control software HXLink.

## File Formats for Saving Videos

With the HX-3, files can be saved in the MCFF, AVI or MJPEG formats.

- MCFF : Video format dedicated to the MEMRECAM series saves everything, including the image data obtained from the sensor, the time stamp (data recorded at the same time, such as the time), and image quality settings. After saving, this is optimal if making image quality adjustments with HXLink or if you need to set or record during recording. The file name is MCFF\*\*\*\* (sequential) and the file extension is MCF.
- AVI : With an uncompressed AVI (Windows standard video file format) file playback is possible with standard video playback software. Codec for uncompressed is not required and the image quality does not deteriorate. The file name is MCAV\*\*\*\* (sequential) and the file extension is AVI.
- MJPEG : Compressed AVI file in the Motion JPEG format. The file size can be smaller than an uncompressed AVI file but the image quality will deteriorate. Additionally, the time required for saving is more because of data compression. MotionJPEG codec or HXLink is required for playback. The file name is MCAV\*\*\*\* (sequential) and the file extension is AVI.

The video playback software used is not compatible with large AVI files with sizes of 2560 × 1920 or 1920 × 1920. In these instances, playback using HXLink.

## Required Settings for Saving

The following settings are required for saving recorded videos.

- Image quality adjustment (▶▶ 6-7)
- Save range settings
- Save file format selection
- Compression rate (with MJPEG) and playback speed (with AVI, MJPEG) settings

Image quality adjustment can be performed before recording or during playback after recording.

## Saving Images Larger than 4GB on USB

If saving to USB media using the HX-3, due to limitations to the FAT32 file system, files more than 4GB cannot be created. As a result, if the size of the MCFF to be saved on USB is greater than 4GB, the MCFF will be split into multiple files for saving. At this point, the second and subsequent files saved will have -V2, -V3 ... automatically added to the end of the standard file name.

- 1st file name : MCFF0000.MCF
- 2<sup>nd</sup> file name : MCFF0000-V2.MCF
- ...

If saving to USB media formatted with the exFAT or NTFS file system, they are not divided and are saved as a single file. As a result, use of the exFAT is recommended. (▶▶ 7-16)

If using the control software HXLink, multiple split and saved MCFF can be opened as a single scene for operation. Refer to the HXLink user guide for details.

## ■ Set Save Range

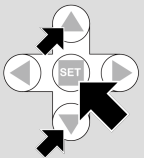
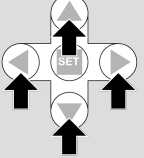
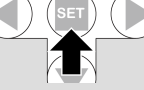
The following two methods are used to set the save range.

- Playback and save range settings in the STOP mode (▶▶ 3-33)
- Set the save frame range from the SAVE MENU

This describes the setting method from the SAVE MENU.

### 1 Access the SAVE MENU (▶▶ 3-11)

- Access TOP MENU > SAVE MENU from the STOP mode.

 <p>Select and SET</p>	<h3>2 Select SAVE FRM with the up/down arrows</h3> <p>and press the SET button</p> <ul style="list-style-type: none"> <li>• Press the SET button to input the save range.</li> </ul>	<pre>TOP MENU &gt; SAVE ME DOWNLOAD: FREE FRM : 7955 SAVE FRM : -6588 - + REC FRM : -6588 - + FILETYPE: [MPEG] AVI&gt; AVI SET :&gt;</pre>
	<h3>3 Input the save range</h3> <ul style="list-style-type: none"> <li>• Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.</li> <li>• The start frame is on the left side and the end frame is on the right side.</li> </ul>	<pre>TOP MENU &gt; SAVE ME DOWNLOAD: FREE FRM : 7955 SAVE FRM : -00000058 REC FRM : -6588 - + FILETYPE: [MPEG] AVI&gt; AVI SET :&gt;</pre>
	<h3>4 Press the SET button</h3> <ul style="list-style-type: none"> <li>• Sets the save range.</li> <li>• Displays the save range set.</li> </ul>	

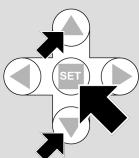
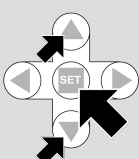
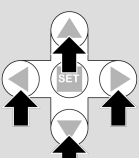
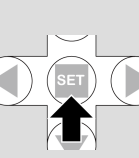
- FREE FRM : It is the number of frames which can be saved according to the empty domain of the USB media connected and selected.
- REC FRM : It is the range of a recording frame (scene whole).

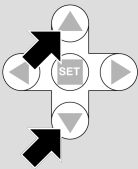
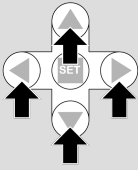
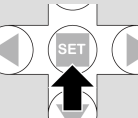
## ■ Set the Compression Quality and Playback Speed

The playback frame rate (frames per second) can be set if saving as AVI or MJPEG. Additionally, the compression quality can be set if saving as MJPEG. (These settings are not required if saving as MCFF)

### 1 Access the SAVEMENU (▶▶ 3-11)

- Access TOP MENU > SAVEMENU from the STOP mode.

 <p>Select and SET</p>	<h3>2 Select AVI SET with the up/down arrows and press the SET button</h3> <ul style="list-style-type: none"> <li>• Use the up/down arrows to move to the selected item (reverse display) and select AVI SET.</li> <li>• Press the SET button to display the AVI SET sub-menu.</li> </ul>	<pre>TOP MENU &gt; SAVE ME DOWNLOAD: FREE FRM:7955 SAVE FRM:-6588 - + REC FRM : -6588 - + FILETYPE: MJPEG AVI&gt; AVI SET :&gt;</pre>
 <p>Select and SET</p>	<h3>3 Frame rate : Select PLAYRATE with the up/down arrows and press the SET button</h3> <ul style="list-style-type: none"> <li>• Press the SET button to input the playback speed.</li> </ul>	<pre>TOP MENU &gt; AVI SET QUALITY :75 PLAYRATE: 30</pre>
	<h3>4 Input the playback speed.</h3> <ul style="list-style-type: none"> <li>• Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.</li> <li>• The minimum value is 1, the maximum is 60. (frames/sec)</li> </ul>	<pre>TOP MENU &gt; AVI SET QUALITY :75 PLAYRATE: 10</pre>
	<h3>5 Press the SET button</h3> <ul style="list-style-type: none"> <li>• Sets the playback speed.</li> <li>• Displays the playback speed set.</li> </ul>	<pre>TOP MENU &gt; AVI SET QUALITY :75 PLAYRATE: 10</pre>

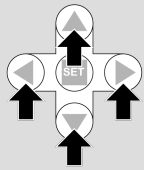
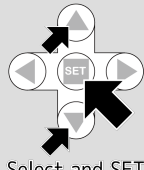
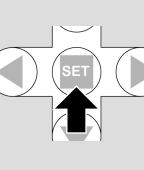
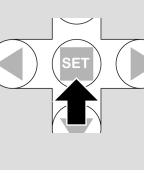
	<p><b>6</b> Compression Quality : Select QUALITY with the up/down arrows and press the SET button</p> <ul style="list-style-type: none"> <li>Press the SET button to input the compression quality.</li> </ul>	<pre>TOP MENU &gt; AVI SET QUALITY : 75 PLAYRATE : 10</pre>
	<p><b>7</b> Input the compression quality</p> <ul style="list-style-type: none"> <li>Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.</li> <li>The minimum value is 1 and the maximum is 100.</li> <li>Image quality improves as the value increases but the file size also increases.</li> <li>The file size decreases as the value decreases but the image quality deteriorates.</li> </ul>	<pre>TOP MENU &gt; AVI SET QUALITY : 095 PLAYRATE : 10</pre>
	<p><b>8</b> Press the SET button</p> <ul style="list-style-type: none"> <li>Sets the compression quality.</li> <li>Displays the compression quality set.</li> </ul>	<pre>TOP MENU &gt; AVI SET QUALITY : 095 PLAYRATE : 10</pre>

## ■ Save as MCFF File

### 1 Access the SAVEMENU (▶▶ 3-11)

- Access TOP MENU > SAVEMENU from the STOP mode.

### 2 Set the save range (▶▶ 7-5)

	<h3>3 Select FILETYPE with the up/down arrows and select MCFF with the left/right arrows</h3> <ul style="list-style-type: none"> <li>• Use the up/down arrows to move to the selected item (reverse display) and select FILETYPE.</li> <li>• Use the left/right arrows to select MCFF.</li> </ul>	<pre>TOP MENU &gt; SAVE ME DOWNLOAD: FREE FRM:7955 SAVE FRM:-100 - +1 REC FRM : -6588 - + FILETYPE: MCFF AVI&gt; AVI SET :&gt;</pre>
 <p>Select and SET</p>	<h3>4 Select DOWNLOAD with the up/down arrows and press the SET button</h3> <ul style="list-style-type: none"> <li>• After selecting DOWNLOAD, press the SET button to display the USB save screen.</li> <li>• The save range is displayed on the USB save screen and SET in the 4<sup>th</sup> row to the right of SAVE?: flashes.</li> </ul>	<pre>TOP MENU &gt; SAVE ME DOWNLOAD: FREE FRM:7955 SAVE FRM:-100 - +1 REC FRM : -6588 - + FILETYPE: MCFF AVI&gt; AVI SET :&gt;</pre>
	<h3>5 Press the SET button</h3> <ul style="list-style-type: none"> <li>• Press the SET button to start saving to the USB media.</li> <li>• After starting to save, the file name is displayed in FILE.</li> <li>• The progress bar for the status of the save is displayed at the bottom of the screen.</li> </ul>	<pre>MODE : DOWNLOAD START : -100 END : +100 SAVE? : SET FILE :</pre>
	<h3>6 Press the SET button once saving is complete</h3> <ul style="list-style-type: none"> <li>• Once saved, the display on the 4<sup>th</sup> row SAVE? switches to COMPLETE.</li> <li>• Press the SET button to end saving and return to the SAVE MENU.</li> </ul>	<pre>MODE : DOWNLOAD START : -100 END : +100 COMPLETE: SET FILE : MCFF0000.</pre>

Press the STOP button to stop saving. The save will be interrupted and it will return to the SAVE MENU.

## MCFF Image Quality Settings

The MCFF image quality settings are the contents set to the file in the STOP mode (▶▶ 6-7). Open a file with HXLink to read the saved image quality settings.

The MCFF image quality settings can be changed without deterioration during playback using HXLink. Refer to the HXLink user guide for details.

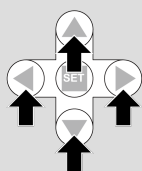


- MCFF files can be saved from the DOWNLOAD button. (▶▶ 3-37)

## ■ Save as Uncompressed AVI

- 1 Access the SAVE MENU (▶▶ 3-11)
  - Access TOP MENU > SAVE MENU from the STOP mode.

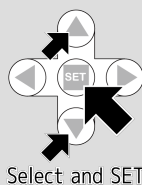
- 2 Set the range to be saved (▶▶ 7-5)



- 3 Select FILETYPE with the up/down arrows and select AVI with the left/right arrows
  - Use the up/down arrows to move to the selected item (reverse display) and select FILETYPE.
  - Use the left/right arrows to select AVI as the file format.

```
TOP MENU > SAVE ME
DOWNLOAD:
FREE FRM: 7955
SAVE FRM: -100 - +1
REC FRM : -6588 - +
FILETYPE: MCFF AVI>
AVI SET :>
```

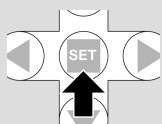
- 4 Set the frame rate (▶▶ 7-6)



Select and SET

- 5 Select DOWNLOAD with the up/down arrows and press the SET button
  - After selecting DOWNLOAD, press the SET button to display the USB save screen.
  - The save range is displayed on the USB save screen and SET in the 4<sup>th</sup> row to the right of SAVE?: flashes.

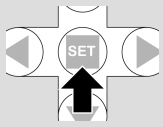
```
TOP MENU > SAVE ME
DOWNLOAD:
FREE FRM: 7955
SAVE FRM: -100 - +1
REC FRM : -6588 - +
FILETYPE: MCFF AVI>
AVI SET :>
```



- 6 Press the SET button
  - Press the SET button to start saving to the USB media.
  - After starting to save, the file name is displayed in FILE.
  - The progress bar for the status of the save is displayed at the bottom of the screen.


```
MODE : DOWNLOAD
START : -100
END : +100
SAVE? : SET
FILE :
```





**7** Press the SET button once saving is complete

- Once saving is complete, the display on the 4<sup>th</sup> row SAVE? switches to COMPLETE.
- Press the SET button to end saving and return to the SAVE MENU.



Press the STOP button to stop saving. The save will be interrupted and it will return to the SAVE MENU.

## AVI Image Quality Settings

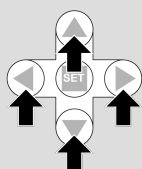
The MCFF image quality settings are the contents saved in the video file adjusted in the STOP mode (▶▶ 6-7). The image quality settings cannot be changed after saving.

## ■ Save as MJPEG

### 1 Access the SAVE MENU (▶▶ 3-11)

- Access TOP MENU > SAVE MENU from the STOP mode.

### 2 Set the range to be saved (▶▶ 7-5)

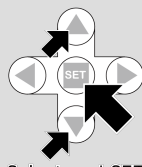


### 3 Select FILETYPE with the up/down arrows and select MJPEG with the left/right arrows

- Use the up/down arrows to move to the selected item (reverse display) and select FILETYPE.
- Use the left/right arrows to select MJPEG as the file format.

```
TOP MENU > SAVE ME
DOWNLOAD:
FREE FRM: 7955
SAVE FRM: -100 - +1
REC FRM : -6588 - +
FILETYPE: AVI MJPEG
AVI SET :>
```

### 4 Set the frame rate and the compression quality (▶▶ 7-6)

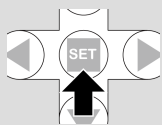


Select and SET

### 5 Select DOWNLOAD with the up/down arrows and press the SET button

- After selecting DOWNLOAD, press the SET button to display the USB save screen.
- The save range is displayed on the USB save screen and SET in the 4<sup>th</sup> row to the right of SAVE?: flashes.

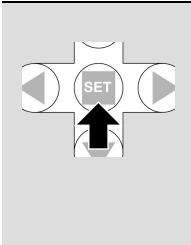
```
TOP MENU > SAVE ME
DOWNLOAD:
FREE FRM: 7955
SAVE FRM: -100 - +1
REC FRM : -6588 - +
FILETYPE: AVI MJPEG
AVI SET :>
```



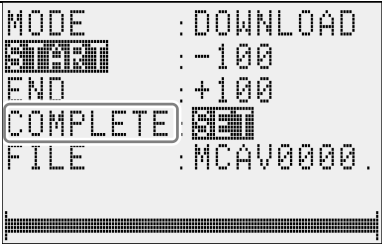
### 6 Press the SET button

- Press the SET button to start saving to the USB media.
- After starting to save, the file name is displayed in FILE.
- The progress bar for the status of the save is displayed at the bottom of the screen.

```
MODE : DOWNLOAD
START : -100
END : +100
SAVE? : SET
FILE :
```



- 7 Press the SET button once saving is complete
- Once saving is complete, the display on the 4<sup>th</sup> row SAVE? switches to COMPLETE.
  - Press the SET button to end saving and return to the SAVE MENU.



Press the STOP button to stop saving. The save will be interrupted and it will return to the SAVE MENU.

MJPEG Image Quality Settings

The AVI image quality settings are the details saved in the video file adjusted in the STOP mode (▶▶ 6-7) .  
The image quality settings cannot be changed after saving.

# Saving Still Image Files

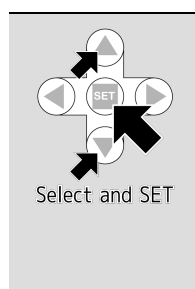
Images displayed can be saved as YC TIFF files.

## ■ Save Images Being Displayed

Images displayed in the STOP mode can be saved as still YC TIFF files.

### 1 Access the SAVE MENU (▶▶ 3-11)

Access TOP MENU > SAVE MENU from the STOP mode.



### 2 Select YC TIFF with the up/down arrows and press the SET button

- Use the up/down arrows to move to the selected item (reverse display) and select YC TIFF.
- Press the SET button to display the file name and save the YC TIFF file.

```
TOP MENU > SAVE ME
SAVE FRM: -6588 - +
REC FRM : -6588 - +
FILETYPE: TIFF AVI>
AUT SFT : >
YC TIFF :
SAVE SET: >
```

## YC TIFF File Pixel Size and Image Quality

Saving as YC TIFF saves the same image displayed on the monitor or viewfinder. In addition to the image quality settings from the STOP mode (▶▶ 6-7), it is saved as displayed with zoom (▶▶ 6-5) or scroll (▶▶ 6-6). However, information on the on screen display is not saved.

The pixel size of the YC TIFF file is the size displayed on the monitor or viewfinder.



- Attention • YC TIFF files are image data files with the format of YUV4:2:2, and involve software that cannot be opened with standard image display software. In these instances, use HXLink to open the files. For details, see the HXLink user's guide.

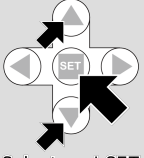
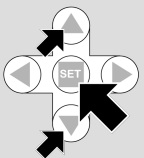
# Selecting the USB Media for Storage

If multiple USB media are connected, select the USB media to be used for storage.

## Select the USB Media

There are 3 USB ports on the HX-3 multiple USB devices can be simultaneously connected. If connecting two or more media, select the USB media to use.

- 1
- Access the SAVE MENU (▶▶ 3-11)
  - Access TOP MENU > SAVE MENU from the STOP mode.

 <p>Select and SET</p>	<div>2</div> <div>Select USB SEL with the up/down arrows and press the SET button<ul style="list-style-type: none"><li>• Use the up/down arrows to move to the selected item (reverse display) and select USB SEL.</li><li>• Press the SET button to display the USB SEL sub-menu.</li></ul></div>	<pre>TOP MENU &gt; SAVE ME FILETYPE: [MPEG] AVI&gt; AVI SET :&gt; VC TIFF : SAVE SET:&gt; [USB SEL] : MY USB ME USB INIT:&gt;</pre>
 <p>Select and SET</p>	<div>3</div> <div>Select the USB media to use with the up/down arrows and press the SET button<ul style="list-style-type: none"><li>• The volume and the total capacity for the USB media connected will be displayed.</li><li>• After selecting the USB media to use with the up/down arrows, press the SET button.</li></ul></div>	<pre>&gt; SAVE MENU &gt; USB [USB #1] : MY USB ME [USB #2] : YOUR USB</pre>

Video and still files saved to the selected USB media can be formatted.

# Formatting USB Media

Enable to initialize the USB media for data storage.



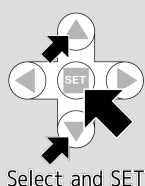
• When formatting, all of the data will be erased, including the video saved with HX-3. Format only after checking to make sure any required data is not included.

## ■ Format the Selected USB Media

Initializes the currently selected USB media. If connecting multiple USB media, select the media to be formatted. (▶▶ 7-15)

### 1 Access the SAVE MENU (▶▶ 3-11)

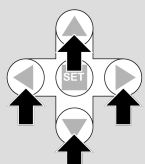
- Access TOP MENU > SAVE MENU from the STOP mode.



### 2 Select USB INIT with the up/down arrows and press the SET button

- Use the up/down arrows to move to the selected item (reverse display) and select USB INIT.
- Press the SET button to display the USB INIT sub-menu.

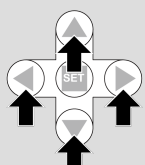
```
TOP MENU > SAVE ME
FILETYPE: [OFF] AVI>
AVI SET :>
VC TIFF :
SAVE SET:>
USB SFI : MY USB ME
[USB INIT]:>
```



### 3 Select LABELSET with the up/down arrows and select the volume with the left/right arrows

- Use the up/down arrows to select LABELSET and select whether or not to override the volume.
  - ON : Set the volume from the date/time
  - OFF : Do not change the volume

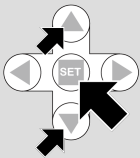
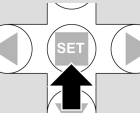
```
> SAVE MENU > USB
LABEL : MY USB ME
[LABELSET]: [OFF] ON
FILE SYS: [FAT32] ex>
FORMAT :
```



### 5 Select FILE SYS with the up/down arrows and select the file system with the left/right arrows

- Use the up/down arrows to select FILE SYS and select the file system. ※NTFS format is not selectable.
  - FAT32
  - exFAT

```
> SAVE MENU > USB
LABEL : MY USB ME
LABEL SET: [OFF] ON
[FILE SYS]: [exFAT]
FORMAT :
```

 <p>Select and SET</p>	<p><b>6</b> Select FORMAT with the up/down arrows and press the SET button</p> <ul style="list-style-type: none"><li>• Use the up/down arrows to select FORMAT.</li><li>• Press the SET button to display the format screen.</li></ul>	<pre>&gt; SAVE MENU &gt; USB LABEL      :MY USB ME LABELSET: OFF ON FILE SYS: FAT FORMAT :</pre>
 <p>Select and SET</p>	<p><b>7</b> Press the SET button to start formatting</p> <ul style="list-style-type: none"><li>• A verification message is displayed to confirm formatting.</li><li>• Press the SET button to start formatting.</li></ul>	<pre>&gt; SAVE MENU &gt; USB LABEL      :MY USB ME LABELSET: OFF ON FILE SYS: FAT Are you sure? Push SET key to Start.</pre>
	<p><b>8</b> Finish formatting</p> <ul style="list-style-type: none"><li>• A message is displayed upon completion of formatting.</li><li>• Press the SET button to switch from the format screen to the SAVE MENU or the status display.</li></ul>	<pre>&gt; SAVE MENU &gt; USB LABEL      :MY USB ME LABELSET: OFF ON FILE SYS: FAT Format Complete PUSH ANY KEY</pre>

---



# 8

## System Settings

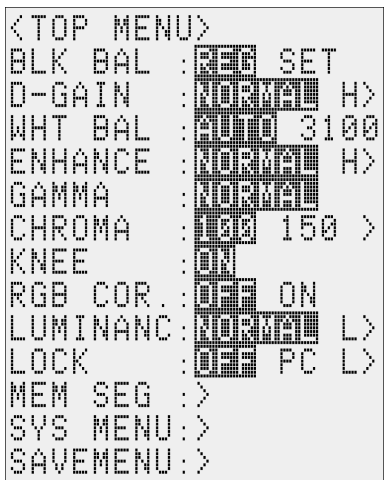
System Setting Items .....	8-2
Changing the Monitor Resolution .....	8-5
Settings to Allow/Lock Operations from the Control PC .....	8-7
ID Number Settings .....	8-8
Date and Time Settings.....	8-9
Set the On-Screen Display Information to Show/Hide ..	8-10
Set the Contents of the Trigger Time Display .....	8-12
Set the Contents of the Frame Counter Display .....	8-13
Select the Standard Frame Time .....	8-16
Set the Image Center Mark to Show/Hide .....	8-20
Set the Image to Show/Hide on the Monitor .....	8-21
Sound/Mute the Remote Control Operation .....	8-22
Auto View Function Settings .....	8-23
Auto Black Balance Settings .....	8-25
Set the Warning Messages to Show/Hide .....	8-27
Display System Information .....	8-29
Network Settings .....	8-30
Restore Settings .....	8-32

# System Setting Items

Make the settings relating to the system or screen display from the MENU.

Press the J-PAD3 MENU button while in the STOP mode to switch to the TOP MENU display.

## ■ Items that can be set from the TOP MENU



Items to Set	Details	Refer to »☰
BLK BAL	Black balance settings	4-35
D-GAIN	Digital gain settings during playback	6-8
WHT BAL	White balance settings during playback	6-9
ENHANCE	Enhance settings during playback	6-10
GAMMA	Gamma settings during playback	6-10
CHROMA	Chroma settings during playback	6-11
KNEE	Knee settings during playback	6-11
RGB COR.	RGB matrix settings during playback	6-12
LUMINANC	Luminance settings during playback	6-12
LOCK	PC operation lock settings	8-7
MEM SEG	Segment selection	4-53
SYS MENU	Jump to SYS MENU (System Menu)	—
SAVEMENU	Jump to SAVEMENU (Save Menu)	7-2

Items in the table with dark backgrounds are items not described in “System Settings”

Press the STOP or MENU buttons to return to the status screen from the TOP MENU.

## ■ Items that can be set from the SYS MENU

```

TOP MENU > SYS MEN
ID :000
DATETIME:12 10 18
OSD DISP: [ON]
OSD MODE: [1] [0] [0] [0] S>
OSD TIME: [1] [0] [0] [0] CRNT
CAFM DIS: [OFF] WHT >
FRM DISP: [FRAME TI] >
FRM TIME: [1] [0] [0] [0] >
TIMROUND: [8] [7]
REL TIME: [FRAME TR] >
EXP TIME: [EXPOSURE] >
SYNCTIME: [SYNCH] GX>
SYNC SEL: [V] EST1>
EST VIEW: [ON]
EST MODE: [1] [0] [0] [0]
EST SAFE: [OFF] ON
STRADDL : >
VIDEOOUT: [ON]
ZOOM : [1] [0] [0] FIT2
SCROLL : [0] [0]
BEEP : [ON] OFF
AUTOVIEW: [OFF] AUTO>
AUTO BB : [ON] OFF
SHLNC : [OFF] ON
WARNING : >
TRIG SET: >
SIG SET : >
SYS SET : >
DISPSET : >
INFO : >

```

Items to Set	Details	Refer to »
ID	ID number settings	8-8
DATETIME	Date and time settings	8-9
OSD DISP	On-screen display information settings	8-10
OSD MODE	On-screen display information settings for the camera mode	8-11
OSD TIME	Trigger timing display settings	8-12
CAFM DIS	Video image center mark settings	8-20
FRM DISP	Frame number display settings	8-13
FRM TIME	Frame time display settings	8-16
TIMROUND	Rounding settings	8-14
REL TIME	Relative time display settings	8-18
EXP TIME	Exposure timing settings	4-78
SYNC TIME	Synchronization time settings	4-72
SYNC SEL	Synchronization signal selection settings	4-65
EST VIEW	Synchronization settings for the VIEW mode during external synchronization	4-71
EST MODE	External synchronization accuracy setting	4-66
EST SAFE	Settings to ignore irregular EST signals	4-69
STRADDL	Frame straddling settings	4-76
VIDEOOUT	Video output settings	8-21
ZOOM	Video display zoom display settings	6-5
SCROLL	Video display scroll settings	6-6

Items in the table with dark backgrounds are items not described in “System Settings”.

Items to Set	Details	Refer to »☰
BEEP	Remote control BEEP settings	8-22
AUTOVIEW	Auto view settings	8-23
AUTO BB	Auto black balance settings	8-25
SHLNC	Shutter line noise correction selecting settings	8-26
WARNING	Warning display settings	8-27
TRIG SET	Trigger settings	4-57 4-61
SIG SET	Input/output signal settings	4-80
SYS SET	System settings	4-52
DISP SET	Monitor resolution settings	8-5
INFO	System information display	8-29


Items in the table with dark backgrounds are items not described in “System Settings”.

Press the STOP or MENU buttons to return to the status screen from the SYS MENU.

# Changing the Monitor Resolution

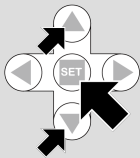
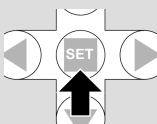
Change the display resolution to fit the monitor connected.

If the HX-3 is started up while connected to the monitor, the optimal display resolution and refresh rate will be automatically selected but the resolution settings can be changed if part of the monitor is not optimal or if you wish to display with a different resolution.

 **Attention** • Reboot the HX-3 when changing the monitor resolution.

## Select the Display Resolution

- 1 Access DISP SET(▶▶ 3-11)
  - Access TOP MENU > SYS MENU > DISP SET from the STOP mode.

 <p>Select and SET</p>	<ol style="list-style-type: none"> <li>2 Select the display resolution with the up/down arrows and press the SET button                             <ul style="list-style-type: none"> <li>• Use the up/down arrows to move to the selected item (reverse display) and select the display resolution and refresh rate.</li> <li>• Information not shown can be displayed by moving the left/right arrows.</li> <li>• The reverse display on the right side is the current setting.</li> <li>• * is the current display resolution and refresh rate.</li> <li>• Press the SET button to change to the selected resolution and a message asking if it is ok to reboot will be displayed.</li> </ul> </li> </ol>	<pre>&gt; SYS MENU &gt; DISP DISP #1: AUTO DISP #2: * 1920x10 DISP #3: 640x480 6 DISP #4: 640x480 7 DISP #5: 640x480 7 DISP #6: 640x480 7</pre>
	<ol style="list-style-type: none"> <li>3 Press the SET button again                             <ul style="list-style-type: none"> <li>• Press the SET button to set the screen resolution, and it will automatically reboot.</li> </ul> </li> </ol>	<pre>&gt; SYS MENU &gt; DISP DISP #1: AUTO DISP #2: * 1920x10 DISP #3: 640x480 6  ----- Set and Reboot Are you sure?</pre>

---

**4** After rebooting, the screen display resolution will switch

- After rebooting, the monitor display will switch to the display resolution set.

The display resolutions and refresh rates shown in the list vary according to the monitor connected.

# Settings to Allow/Lock Operations from the Control PC

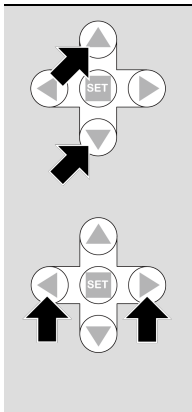
Allow/lock operations when connected to the PC via the Ethernet for the REMOTE connector.

In addition to operations from the J-PAD3, the HX-3 can be operated from the control software HXLink connected to a PC. To prevent accidental operations from HXLink while operating from the J-PAD3, it is possible to lock operations from the PC.

## ■ Allow/Lock Operations from the Control PC

### 1 Access the TOP MENU (▶▶ 3-11)

- Access the TOP MENU from the STOP mode.



### 2 Select LOCK with the up/down arrows and select allow/lock with the left/right arrows

- Use the up/down arrows to move to the selected item (reverse display) and select LOCK.
- Use the left/right arrows to select allow/lock operations from the PC.
  - OFF Allow operations from the PC
  - PC LOCK Lock operations from the PC

```
<TOP MENU>
LUMINANC: [NORMAL] L>
GXC : OFF ON
[LOCK] : PC LOCK
MEM SEG :>
SYS MENU:>
SAVEMENU:>
```

# ID Number Settings

ID numbers can be assigned to multiple cameras used to identify which camera is recording the data.

If using multiple MEMRECAM HX-3 or if simultaneously using other MEMRECAM series cameras, it is possible to assign ID numbers from 0~127 for each camera to understand which is the data from what camera. The ID numbers are saved on USB media or as MCFF data downloaded from HXLink, and can be confirmed in HXLink.

This ID is a different number from the CID : camera ID (▶▶ 8-29).

## ■ Set the ID Number

### 1 Access the SYS MENU (▶▶ 3-11)

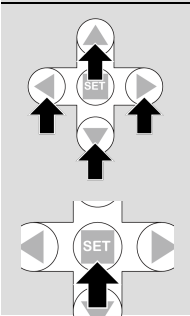
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select ID with the up/down arrows and press the SET button

- Use the up/down arrows to move to the selected item (reverse display), select the ID and press the SET button.
- Press the SET button to input the ID.

```
TOP MENU > SYS MEN
[Icon] : 000
DATETIME: 12 01 01
OSD DISP: [Icon]
OSD MODE: ALWAYS S>
OSD TIME: 12:00 CRNT
CAFM DIS: 000 WHT >
```



### 3 Input the ID number and press the SET button

- Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.
- The minimum value is 000, the maximum is 127.
- Press the SET button to set the ID number.

```
TOP MENU > SYS MEN
[Icon] : 000
DATETIME: 12 01 01
OSD DISP: [Icon]
OSD MODE: ALWAYS S>
OSD TIME: 12:00 CRNT
CAFM DIS: 000 WHT >
```

Refer to the HXLink user guide for the method of checking the ID of the downloaded video and saved USB.



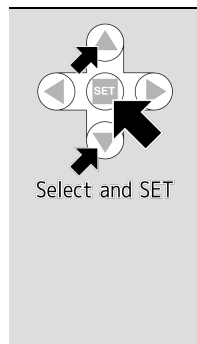
# Date and Time Settings

Sets the date and time. The date and time can be saved as data for the recorded video.

## ■ Set the Date and Time

### 1 Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.

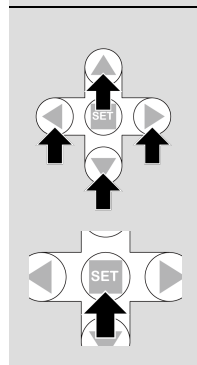


### 2 Select DATETIME with the up/down arrows

and press the SET button

- Use the up/down arrows to move to the selected item (reverse display), select DATETIME and press the SET button.
- Press the SET button to input the date and time.

```
TOP MENU > SYS MEN
ID : 000
DATETIME: 12 01 01
USD DISP: ALL
OSD MODE: ALWAYS S>
OSD TIME: 12:16 CRNT
CAFM DIS: OFF WHT >
```



### 3 Input the date/time and press the SET button

- Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.
- Two columns can be input for the year, month, day, hour, minute and second.
- The time uses a 24 hour clock.
- Press the SET button to set the date and time.

```
TOP MENU > SYS MEN
ID : AAA
DATETIME: 12 02 01
USD DISP: ALL
OSD MODE: ALWAYS S>
OSD TIME: 12:16 CRNT
CAFM DIS: OFF WHT >
```

# Set the on-screen display information to show/hide

Set the on screen display (OSD) for the image to show/hide.

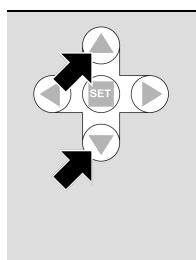
## ■ Set the On-screen Display Items

Frame rate and status information is displayed on the monitor or viewfinder during recording or playback.

This on-screen display can be set to show/hide from the MENU.

### 1 Access the SYS MENU (▶▶ 3-11)

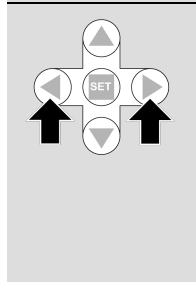
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select OSD DISP with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select OSD DISP.

```
TOP MENU > SYS MEN
ID : 000
DATETIME : 12 01 01
OSD DISP : []
OSD MODE : ALWAYS S>
OSD TIME : 1316 CRNT
CAFM DIS : OFF WHT >
```



### 3 Select the on-screen display items with the left/right arrows

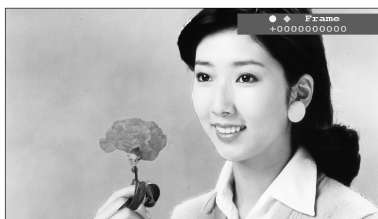
- Use the left/right arrows to select the on-screen display items.
  - NONE Hide
  - FRAME Show only the frame counter
  - ALL Display all

```
TOP MENU > SYS MEN
ID : 000
DATETIME : 12 01 01
OSD DISP : []
OSD MODE : ALWAYS S>
OSD TIME : 1316 CRNT
CAFM DIS : OFF WHT >
```

NONE



FRAME



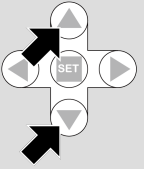
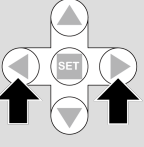
ALL



## ■ Set the Display of On-screen Display according to the Camera Mode

Select to either display on-screen display only in the STOP mode or in all of the operating modes.

- 1 Access the SYS MENU (▶▶ 3-11)
- Access TOP MENU > SYS MENU from the STOP mode.

	<p>2 Select OSD MODE with the up/down arrows</p> <ul style="list-style-type: none"><li>• Use the up/down arrows to move to the selected item (reverse display) and select OSD MODE.</li></ul>	<pre>TOP MENU &gt; SYS MEN ID          :000 DATETIME   :12 01 01 OSD DISP   :ALL OSD MODE   :ALWAYS S&gt; OSD TIME   :1215 CRNT CAFM DIS   :OFF WHT &gt;</pre>
	<p>3 Select the on-screen display mode with the left/right arrows</p> <ul style="list-style-type: none"><li>• Use the left/right arrows to select the on-screen display mode.</li><li>• ALWAYS    Display in all modes</li><li>• STOP       Display only in the STOP mode</li></ul>	<pre>TOP MENU &gt; SYS MEN ID          :000 DATETIME   :12 02 01 OSD DISP   :ALL OSD MODE   :STOP OSD TIME   :1215 CRNT CAFM DIS   :OFF WHT &gt;</pre>

# Set the Contents of the Trigger Time Display

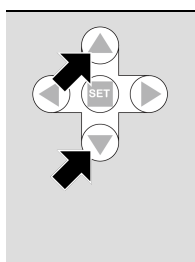
Select the contents displayed for the on screen information trigger time as either trigger time or current time.

## ■ Set the Trigger Time Display

The trigger time for the on-screen display is the trigger information for the VIEW, ARM and REC mode, and the current time can be set to display. (The trigger time is displayed in the STOP, PLAY and LOOP modes.)

### 1 Access the SYS MENU (▶▶ 3-11)

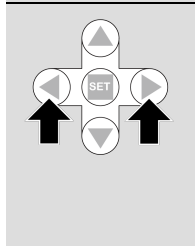
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select OSD TIME with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select OSD TIME.

```
TOP MENU > SYS MEN
ID : 000
DATETIME: 12 01 01
OSD DISP: [REVERSE]
OSD MODE: [ALWAYS] S>
OSD TIME: [TRIG] CRNT
CAM DIS: [OFF] WHT >
```



### 3 Select the display contents for the trigger time with the left/right arrows

- Select the display contents with the left/right arrows.
  - TRIG Display the trigger time in all modes
  - CRNT Display current time in the VIEW, ARM and REC modes  
(Display trigger time in STOP, PLAY and LOOP)

If selecting CRNT, "Date Time" is displayed when the current time is shown in the VIEW, ARM and REC modes.

(①)

If the image trigger function is used, "Image Trigger" is displayed regardless of the trigger time display setting (②)

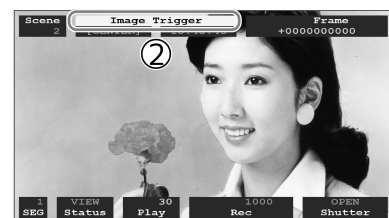
TRIG



CRNT



Image Trigger



# Set the Contents of the Frame Counter Display

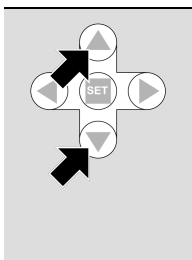
Change the units or number of columns for the on screen information frame counter.

## ■ Set the Units for the Frame Counter

In addition to the frame number, the frame counter can be set to display the time and percentage (%).

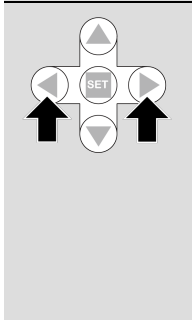
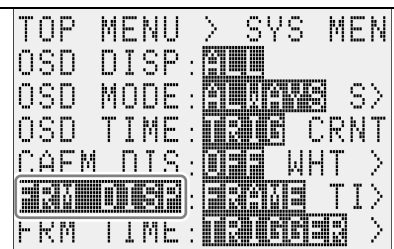
### 1 Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select FRM DISP with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select FRM DISP.



### 3 Select frame counter display units with the left/right arrows

- Use the left/right arrows to select the frame counter display units.
  - FRAME Display the current frame number
  - TIME Display the current frame time as a relative time from the trigger frame
  - ABS.TIME Display the absolute time for the current frame
  - MEMORY% Display the current frame position as a percentage (%) of the number of recordable frames



- Absolute time standard ▶▶ 8-16
- Relative time standard ▶▶ 8-18

## Number of Decimal Places Displayed for the Frame Time

The HX-3 performs high speed photograph at 100000~1300000 frames/sec and can handle precision time display by showing the frame time rounded to the 7<sup>th</sup> decimal place (0.1μs units).

Since rounding to the 6<sup>th</sup> decimal place is sufficiently precise when performing the high speed recording (less than 100000 frames per second) for the majority of instances, the factory setting rounds to the 6<sup>th</sup> decimal place. (Displayed to the 6<sup>th</sup> decimal place (1μs units) with the MEMRECAM GX series.)

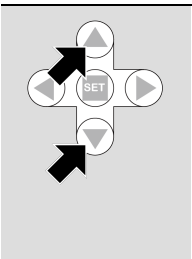
The settings for the display units for the frame time displayed on the frame counter are “TIME” and “ABS.TIME”.

## ■ Set to Round Decimal Places in the Frame Counter Display

Decimals for the frame time shown on the frame counter can be set to round to 6 or 7 places.

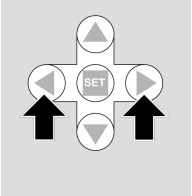
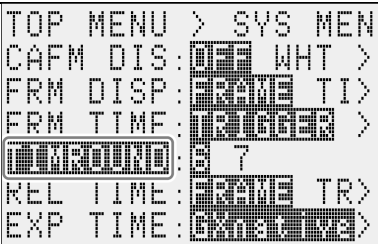
**1** Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



**2** Select TIMROUND with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select TIMROUND.



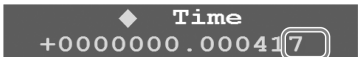
**3** Select the frame counter display units with the left/right arrows

- Use the left/right arrows to select the frame counter display units.
  - 6 Display rounded to the 6<sup>th</sup> decimal place
  - 7 Display rounded to the 7<sup>th</sup> decimal place

Round to 6 or 7 Decimal Places on the Frame Counter (On-screen Display)

Display TIME rounded to the 6<sup>th</sup> decimal place

- The relative time shown is rounded to the 6<sup>th</sup> decimal place.



Display TIME rounded to the 7<sup>th</sup> decimal place

- The relative time from the trigger frame is rounded to the 7<sup>th</sup> decimal place.



Display ABS.TIME rounded to the 6<sup>th</sup> decimal place

- The absolute time shown is rounded to the 6<sup>th</sup> decimal place.



Display ABS.TIME rounded to the 7<sup>th</sup> decimal place

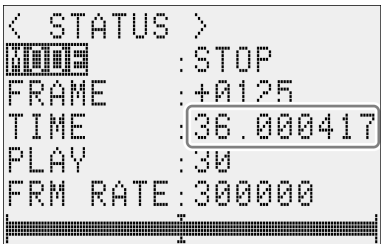
- The absolute time shown is rounded to the 7<sup>th</sup> decimal place.



J-PAD3 Frame Time Display

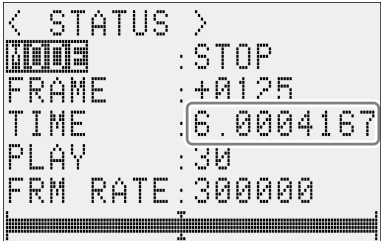
Display rounded to the 6<sup>th</sup> decimal place

- The frame time (TIME) shown is rounded to the 6<sup>th</sup> decimal place.



Display rounded to the 7<sup>th</sup> decimal place

- The frame time (TIME) is shown rounded to the 7<sup>th</sup> decimal place.



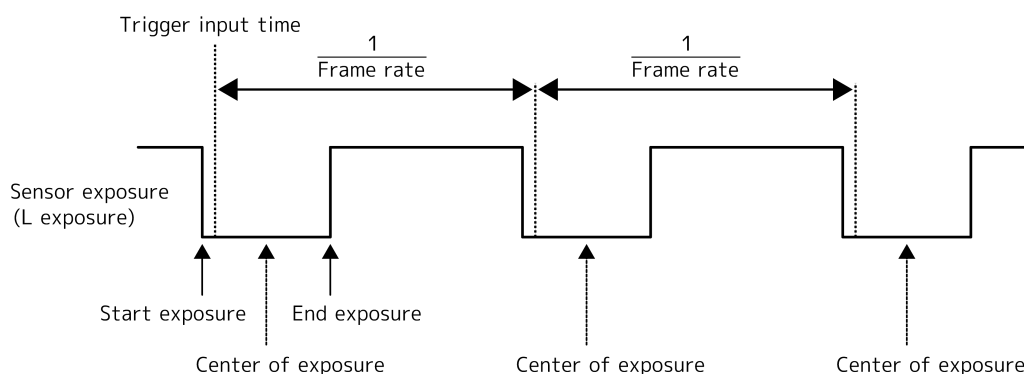
# Select the Standard Frame Time

If the frame counter display is set to either relative time or absolute time, the standard time can be selected.

## Frame Time Standards

The following two choices are available for the time standards when displaying the frame time.

- **Trigger Input Time :** The trigger input time during recording is used as the standard, with 1/frame speed added to the next frame time. With this setting, the time between each frame is uniform and has the benefit of being easy to understand.
  - ※ If recording with external signal synchronization (EST) (▶▶ 4-70), the frame time cannot be displayed.
- **Exposure Time Center Point :** The center point between the sensor exposure time and end time becomes the frame time. Since the image and time information is saved in the memory as the time stamp, the frame time is displayed even with external signal synchronization (EST) recording.
  - ※ The time between frames is not uniform with the automatic exposure function (AE) settings (▶▶ 4-46).

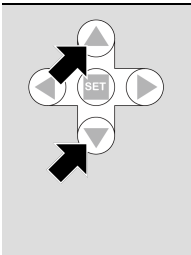




## ■ Set the Time Standard for the Frame Counter

### 1 Access the SYS MENU (▶▶ 3-11)

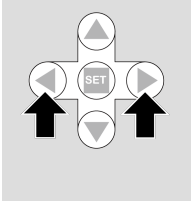
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select FRM TIME with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select FRM TIME.

```
TOP MENU > SYS MEN
OSD MODE: ALWAYS S>
OSD TIME: 1/100 CRNT
CAFM DIS: OFF WHT >
FRM DISP: FRAME TI>
FRM TIME: 1/100000 >
TIMKOUND: 8 7
```



### 3 Select the time standard for the frame counter with the left/right arrows

- Use the left/right arrows to select the standard time for the frame counter.
  - TRIGGER Use the trigger signal input time as the standard
  - EXPOSURE Use the center point of the exposure time as the standard

## Relative Time Standard

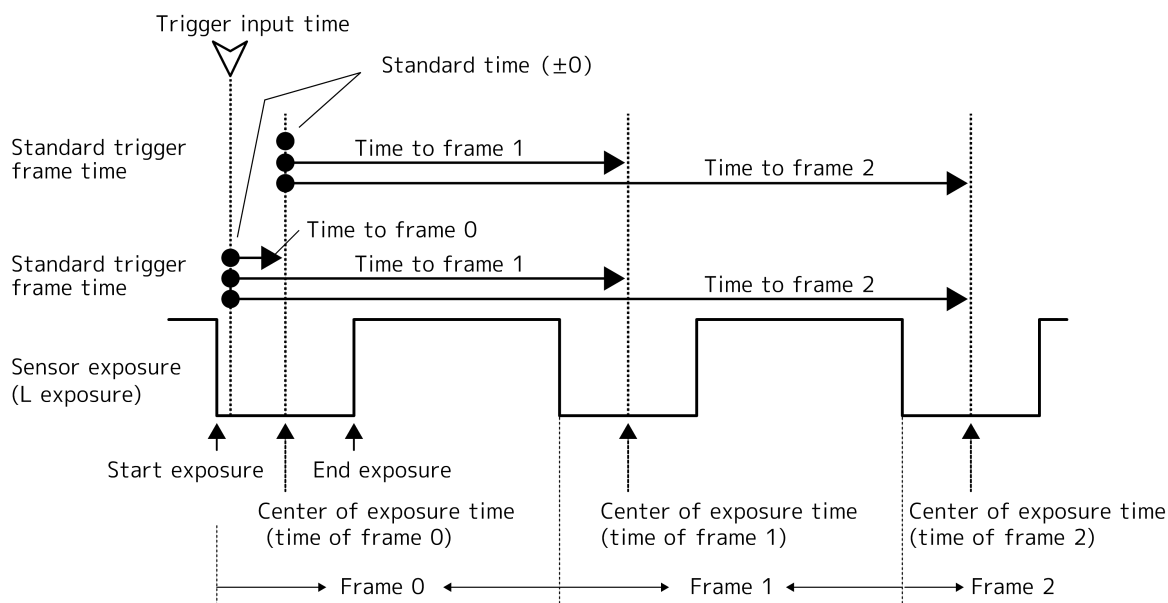
When the current frame time is set to display the relative time from the trigger frame (TIME) on the frame counter display FRM DISP) and the frame time display setting (FRM TIME) is set to the center exposure time (EXPOSURE), select one of the two choices below as the time standard (0 timing).

- Trigger frame time standard

The relative frame time standard is the trigger frame time. The relative frame time is the time when the trigger frame time is subtracted from the relative frame time. (Make sure the trigger frame (frame 0) time is 0.0000000.)

- Trigger input time standard

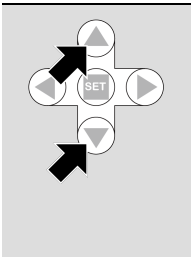
The relative frame time standard is the trigger input time. The relative frame time is the time when the trigger signal input time is subtracted from the frame time.



## ■ Select the Relative Time as the Standard

### 1 Access the SYS MENU (▶▶ 3-11)

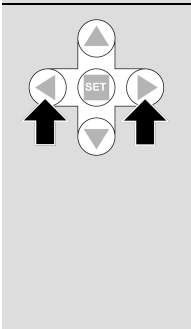
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select REL TIME with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select REL TIME.

```
TOP MENU > SYS MEN
CAFM DIS: OFF WHT >
FRM DISP: FRAME TI>
FRM TIME: TRIGGER >
TIMROUND: 8 7
REL TIME: FRAME TR>
EXP TIME: EXACTLY>
```



### 3 Select the relative time as the standard using the left/right arrows

- Use the left/right arrows to select the relative time as the standard.
  - FRAME Trigger frame time as the standard
  - TRIG Trigger input time as the standard

```
TOP MENU > SYS MEN
CAFM DIS: OFF WHT >
FRM DISP: FRAME TI>
FRM TIME: TRIGGER >
TIMROUND: 8 7
REL TIME: FRAME
EXP TIME: EXACTLY>
```

# Set the Image Center Mark to Show/Hide

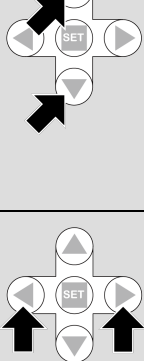
A mark (CAFM : Camera Alignment Fiducially Mark) can be displayed to show the center of the image.

## ■ Set Show/Hide for the Image Center Mark

Displays a mark at the center of the image, and can be used as a guide for recording and playback. Select from hide (OFF), white mark (WHT) or black mark (BLK) for the image center mark settings.

### 1 Access the SYS MENU (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



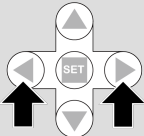
### 2 Select CAFM DIS with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select CAFM DIS.

```

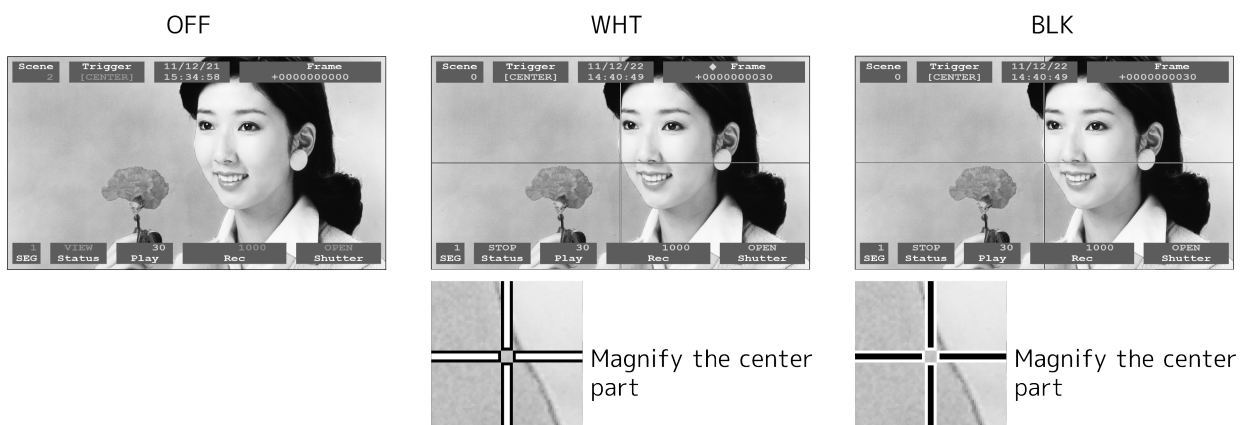
TOP MENU > SYS MEN
ID : 000
DATETIME: 12 01 01
OSD DISP: [OFF]
OSD MODE: [ALWAYS] S>
OSD TIME: [BIG] CRNT
CAFM DIS: [OFF] WHT >

```



### 3 Select the display for the image center mark with the left/right arrows

- Use the left/right arrows to select the image center mark.
  - OFF Not displayed
  - WHT White mark shown at the center of the image
  - BLK Black mark shown at the center of the image

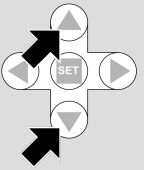

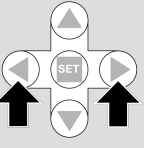



# Set the Image to Show/Hide on the Monitor

The image output to the monitor or viewfinder can be shown/hidden. Useful when using video signal switcher.

## ■ Set the Image to Show/Hide on the Monitor

- 1
- Access the SYS MENU (▶▶ 3-11)
  - Access TOP MENU > SYS MENU from the STOP mode.

	<div>2</div> <div>Select VIDEOOUT with the up/down arrows<ul style="list-style-type: none"><li>• Use the up/down arrows to move to the selected item (reverse display) and select VIDEOOUT.</li></ul></div>	
	<div>3</div> <div>Select show/hide the image with the left/right arrows<ul style="list-style-type: none"><li>• Use the left/right arrows to select ON or OFF.<ul style="list-style-type: none"><li>• OFF No video signals output</li><li>• ON Video signals output</li></ul></li></ul></div>	

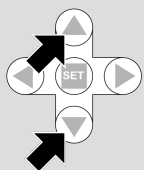
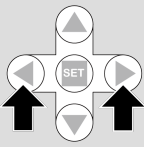
How to use the monitor (▶▶ 2-10)

# Sound/Mute the Remote Control Operation

Turns the J-PAD3 sound ON/OFF.

## ■ Set the Operating Sounds for the Remote Control

- 1 Access the SYS MENU (▶▶ 3-11)
  - Access TOP MENU > SYS MENU from the STOP mode.

	<ol style="list-style-type: none"><li>2 Select BEEP with the up/down arrows<ul style="list-style-type: none"><li>• Use the up/down arrows to move to the selected item (reverse display) and select BEEP.</li></ul></li></ol>	<pre>TOP MENU &gt; SYS MEN STRADDL :&gt; VIDEOOUT: [ON] ZOOM : [000] FIT2 SCROLL : 0 0 [BEEP] : [ON] OFF AUTOVIEW: [OFF] AUTO&gt;</pre>
	<ol style="list-style-type: none"><li>3 Select the relative time standard with the left/right arrows<ul style="list-style-type: none"><li>• Use the left/right arrows to select the relative time standard.<ul style="list-style-type: none"><li>• ON Operating sounds</li><li>• OFF No operating sounds</li></ul></li></ul></li></ol>	<pre>TOP MENU &gt; SYS MEN STRADDL :&gt; VIDEOOUT: [ON] ZOOM : [000] FIT2 SCROLL : 0 0 [BEEP] : [ON] [OFF] AUTOVIEW: [OFF] AUTO&gt;</pre>

# Auto View Function Settings

Function to set to automatically switch to the VIEW mode when the recording is finished.

If the video input with the trigger uses the auto view function, it automatically switches to the VIEW mode. If split into multiple segments in the memory (▶▶ 4-51), it switches to the next segment when switching to the ARM mode, and the subsequent video can be made.

## Auto View Function Settings

The two settings in the auto view function include AUTO and LOOP.

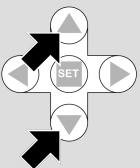
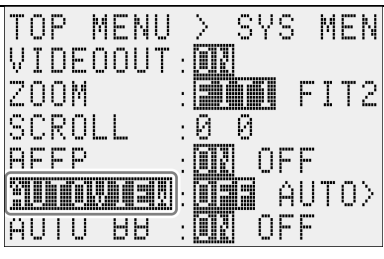
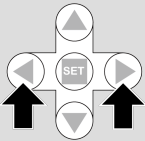
- **AUTO** Auto view repeats until a segment is not recorded. Overwriting to recorded memory segments is prohibited and switching to recorded segments is not allowed. If switched to the ARM mode when the subsequent segment has been recorded or overwriting has been completed up to the last segment, a warning message will be displayed (①) and switching is not allowed.



- **LOOP** Auto view repeats until stopped with the STOP button. Recorded segments are also overwritten. After recording the final memory segment, it returns to the first memory segment and continues recording.

## ■ Use the Auto View Function

- 1 Access the SYS MENU (▶▶ 3-11)
  - Access TOP MENU > SYS MENU from the STOP mode.

	<ol style="list-style-type: none"><li>2 Select AUTOVIEW with the up/down arrows<ul style="list-style-type: none"><li>• Use the up/down arrows to move to the selected item (reverse display) and select AUTOVIEW.</li></ul></li></ol>	
	<ol style="list-style-type: none"><li>3 Select the auto view function settings with the left/right arrows<ul style="list-style-type: none"><li>• Use the left/right arrows to select the auto view settings.</li><li>• If auto view is enabled, the background of the on-screen display information turns blue.<ul style="list-style-type: none"><li>• OFF          Disable the auto view function</li><li>• AUTO        Repeat auto view until the final memory segment</li><li>• LOOP        Repeat auto view until the STOP button is pressed</li></ul></li></ul></li></ol>	



# Auto Black Balance Settings

HX-3 sets the auto black balance ON/OFF.

About black balance (▶▶ 3-20)

The black balance function should be the correction which unites the black level for every pixel of the sensor of HX-3, and after it changes a shutter and frame size, please carry it out.

If automatic black balance is turned ON, black balance will be automatically maintained at "the time of a VIEW start, an ARM start, and the end of REC". Setting of automatic black balance is set to ON in the factory setting of HX-3.

Although this function can also be turned OFF for shortening of the time concerning a mode change, etc., a shutter and frame size are changed, and if it records without maintaining black balance, white or a black horizontal line noise may go into an image.

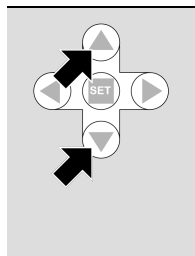
It recommends turning ON automatic black balance and employing it.

The noise of the horizontal line which turns ON shutter line noise correction can be prevented.

## Set the Auto Black Balance

### 1 Access the SYS MENU (▶▶ 3-11)

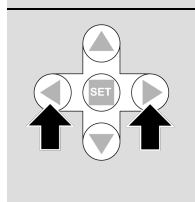
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select AUTO BB with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select AUTO BB.

```
TOP MENU > SYS MEN
ZOOM : [FIT] FIT2
SCROLL : 0 0
BEEP : [ON] OFF
AUTOVIEW : [OFF] AUTO>
[AUTO BB] : [ON] OFF
WARNING : >
```



### 3 Select the auto black balance with the left/right arrows

- Use the left/right arrows to select the auto black balance.
  - ON Enable auto black balance
  - OFF Disable auto black balance

However, if shutter line noise correction is turned ON, a horizontal line noise can be prevented, but recording rate performance falls.

Example: The recording rate at the time of the HX-3 frame size 1920x1080

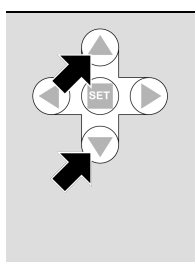
Shutter line noise correction    ON        A maximum of 4430 tops / second  
(preset 4000 top / second)

Shutter line noise correction    OFF        A maximum of 4670 tops / second  
(preset 4500 a top/second)

## ■ Set the Shutter line noise correction

### 1 Access the SYS MENU (▶▶ 3-11)

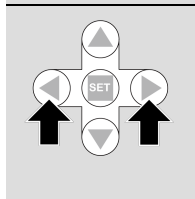
- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select SHLNC with the up/down arrows

- Use the up/down arrows to move to the selected item (reverse display) and select SHLNC.

```
TOP MENU > SYS MEN
ZOOM : [REVERSE] FIT2
SCROLL : 0 0
BEEP : [ON] OFF
AUTOVIEW : [OFF] AUTO>
AUTO BB : [ON] OFF
SHLNC : [OFF] ON
```



### 3 Select the shutter line noise correction with the left/right arrows

- Select the shutter line noise correction with the left/right arrows
  - ON            Enable shutter line noise correction
  - OFF          Disable shutter line noise correction

# Set the Warning Messages to Show/Hide

Some of the warning messages can be set to show/hide.

Display of the following warning messages can be set to ON or OFF.

- Battery warning (BATTERY) : Warning when the memory backup battery charge or camera input power voltage drops or experiences something abnormal.
- RTC battery warning (RTC BATT) : Warning when the battery voltage for the internal timer drops.
- Abnormal frame rate warning (FRM RATE) : Warning when the difference between the frame rate settings and the actual cycle is outside of the acceptable range.
- Camera display interrupt warning (IRQ) : Warning when the image display interrupt signal is lost.
- Mismatched black balance warning (BLK BAL) : Warning when the black balance settings don't match.

## Mismatched Black Balance

The HX-3 requires black balance before recording to correct the fixed pattern noise of the image sensor. With black balance, the same settings must be made for the frame size, frame rate, shutter speed, sensor gain and GXC during recording.

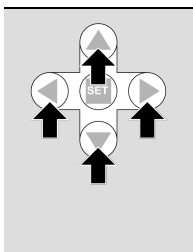
Warnings can be set to be shown when changing the frame size, frame rate and shutter after capturing the black balance. When the warning is displayed, the black balance is immediately corrected. However, since the HX-3 has an auto black balance function when switching modes, it isn't necessary to show the warnings. In this case, the mismatched black balance data warning can be set to OFF.

## ■ Set the Warning Messages to Show/Hide

---

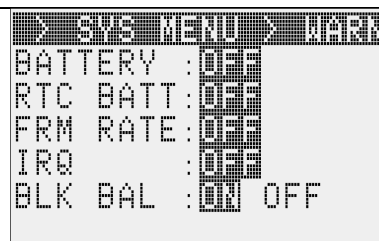
### 1 Display WARNING (▶▶ 3-11)

- Access TOP MENU > SYS MENU from the STOP mode.



### 2 Select the items to set with the up/down arrows and set them with the left/right arrows

- Select the warnings to set with the up/down arrows and select ON or OFF with the left/right arrows.



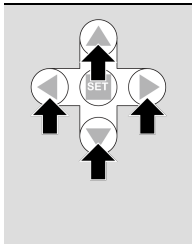
# Display System Information

Displays the system information. Settings cannot be changed.

## ■ Set the System Information

### 1 Display INFO (▶▶ 3-11)

- Access TOP MENU > SYS MENU > INFO from the STOP mode.



### 2 Check the system information with the up/down and left/right arrows

- Select the item with the up/down arrows.
- Scroll through the display with the left/right arrows and check the contents.

```
> SYS MENU > INFO
MODEL : ECAM HX-3
VERSION : 1.50
CID : 7777
MEM SIZE : 34155
REVISION : 1:07-2:06
NETWORK : ETHERNET
```

## System Information Details

List of system information displayed in the INFO sub-menu.

Name of J-PAD3 Display	Contents
MODEL	Camera model number
VERSION	Firmware version
CID	Individual camera identification number
MEM SIZE	Memory size
REVISION	Hardware revision
NETWORK	Network method(HX-3 has only ETHERNET)
DHCP	Network DHCP client setting
IP ADDR	IP address, sub net mask
MAC ADDR	MAC address
ELAPSED	Time elapsed

- Information shown on the INFO sub menu is for display only and the settings cannot be changed.
- Settings other than DHCP and IP ADDR cannot be changed from the J-PAD3.

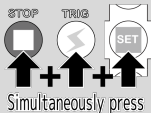
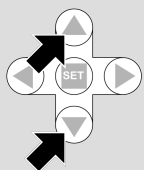
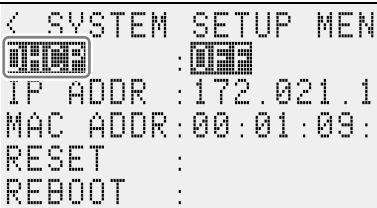
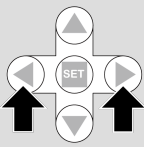
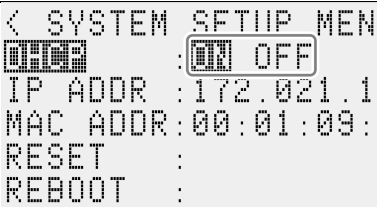
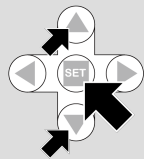
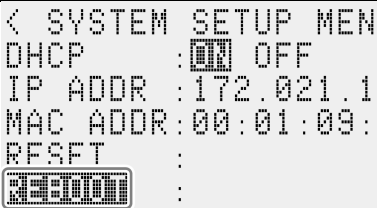
# Network Settings

Network settings can be made to control the PC control software HXLink.

Other than operation with the J-PAD3, the HX-3 can operate and set while connected to a PC via a gigabit Ethernet and can download videos. This sets the network for connecting PC with a network. Refer to the PC or network device user guide for the PC connection and the network settings.

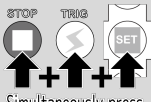
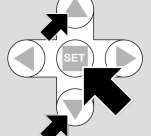
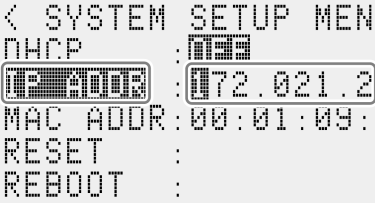
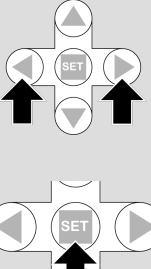
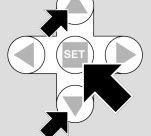

## ■ Set the DHCP

The HX-3 can automatically set the IP address and sub net mask with a router and DHCP server.

 Simultaneously press	<b>1 Access the SYSTEM SETUP MENU (▶▶ 3-12)</b> <ul style="list-style-type: none"><li>Simultaneously press the STOP, MENU and TRIG buttons from the STOP mode to access the SYSTEM SETUP MENU.</li></ul>	
	<b>2 Select DHCP with the up/down arrows</b> <ul style="list-style-type: none"><li>Use the up/down arrows to move to the selected item (reverse display) and select DHCP.</li></ul>	
	<b>3 Select enable/disable DHCP with the left/right arrows</b> <ul style="list-style-type: none"><li>Use the left/right arrows to select ON or OFF.<ul style="list-style-type: none"><li>ON Enable DHCP</li><li>OFF Disable DHCP (fixed IP address)</li></ul></li></ul>	
 Select and SET	<b>4 Select REBOOT with the up/down arrows and press the SET button</b> <ul style="list-style-type: none"><li>Use the up/down arrows to move to the selected item (reverse display), select REBOOT and press the SET button.</li><li>Press the SET button to reboot the camera.</li><li>After rebooting, the DHCP settings are complete.</li></ul>	

## ■ Set the IP Address and Sub-net Mask

If DHCP is set to disabled, you can set the IP address and sub-net mask yourself. Check with your network administrator for the IP address and sub-net mask settings or read the user guide for the devices such as routers.


 <p>Simultaneously press</p>	<p><b>1</b> Access the SYSTEM SETUP MENU (▶▶ 3-12)</p> <ul style="list-style-type: none"> <li>Simultaneously press the STOP, MENU and TRIG buttons from the STOP mode to access the SYSTEM SETUP MENU.</li> </ul>	
 <p>Select and SET</p>	<p><b>2</b> Select IP ADDR with the up/down arrows and press the SET button</p> <ul style="list-style-type: none"> <li>Use the up/down arrows to move to the selected item (reverse display), select IP ADDR and press the SET button.</li> </ul>	
	<p><b>3</b> Input the IP address and sub-net mask and then press the SET button.</p> <ul style="list-style-type: none"> <li>Use the left/right arrows to move columns and increase or decrease the value with the up/down arrows.</li> <li>Input in the order of ***.***.***.***(IP address) /***.***.***.***(sub-net mask).</li> <li>Each value can be set from 000 ~ 255.</li> </ul>	
 <p>Select and SET</p>	<p><b>4</b> Select REBOOT with the up/down arrows and press the SET button</p> <ol style="list-style-type: none"> <li>Use the up/down arrows to move to the selected item (reverse display), select REBOOT and press the SET button.</li> <li>Press the SET button to reboot the camera.</li> <li>After rebooting, the DHCP settings are complete.</li> </ol>	


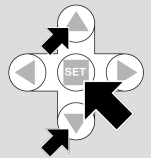

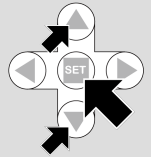

# Restore Settings

Restores all of the settings to the factory settings.

## ■ Restore Factory Settings

Restores the default settings.

 **Attention** • Even the recorded videos are erased. Make sure to save the videos you need.

 Simultaneously press	<div>1 Access the SYSTEM SETUP MENU (▶▶ 3-12)</div> <div>• Simultaneously press the STOP, MENU and TRIG buttons from the STOP mode to access the SYSTEM SETUP MENU.</div>	
 Select and SET	<div>2 Select RESET with the up/down arrows and press the SET button</div> <div>• Use the up/down arrows to move to the selected item (reverse display), select RESET and press the SET button.</div>	
 Select and SET	<div>3 Select REBOOT with the up/down arrows and press the SET button</div> <div>• Use the up/down arrows to move to the selected item (reverse display), select REBOOT and press the SET button.</div> <div>• Press the SET button to reboot the camera.</div> <div>• After rebooting, the settings are restored.</div>	



# 9

## Other

List of MENU Items.....	9-2
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Input of Individual Control Signals.....	9-42
Output of Exposure Pulse Signals .....	9-45
External Input/Output Signal Circuits.....	9-47
Troubleshooting .....	9-66

# List of MENU Items

A list of the times that can be set from the J-PAD3 MENU. Items in **bold** are factory settings.

## ■ TOP MENU

BLK BAL	OFF, REG, SET Black balance settings	▶▶ 4-35
D-GAIN	LOW, NORMAL, HIGH Digital gain settings during playback	▶▶ 6-8
WHT BAL	AUTO, 3100, 5000, 9000, REG White balance settings during playback	▶▶ 6-9
ENHANCE	OFF, LOW, NORMAL, HIGH Enhance settings during playback	▶▶ 6-10
GAMMA	OFF, LOW, NORMAL Gamma settings during playback	▶▶ 6-10
CHROMA	0, 50, 100, 150, 200 Chroma settings during playback	▶▶ 6-11
KNEE	OFF, ON Knee settings during playback	▶▶ 6-11
RGB COR.	OFF, ON RGB matrix settings during playback	▶▶ 6-12
LUMINANC	NORMAL, LINEAR, CUSTOM Luminance properties settings during playback	▶▶ 6-12
LOCK	OFF, PC LOCK PC operation lock settings	▶▶ 8-7
MEM SEG	Memory segment menu	▶▶ 4-53
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CID	Show camera identification number	» 8-29
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SAVE?		
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## FILE

Show file name

» 7-3

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## ■ SAVE SET (TOP MENU &gt; SAVE MENU &gt; SAVE SET)

## RETRY

OFF, ON

Retry when there is a variance in data comparison

—

## ERASE

OFF, ON

Erase

—

## ERROR

ABORT, CONTINUE

Operating setting when error detected

—

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» 7-15

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Show USB drive 2 volume · capacity

» 7-15

## ■ USB INIT (TOP MENU &gt; SAVE MENU &gt; USB INIT)

## LABEL

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» 7-16

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OFF, ON

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## FILE SYS

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Format file system selection

» 7-16

## FORMAT

Format

» 7-16

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	Restore factory settings	▶▶ 8-32
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FRM SIZE	Custom frame size settings	▶▶ 4-23

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# Details of the Recording Method

Describes the screens for the normal, burst, event and multi trigger recording method as well as their operation.

Select the recording method (▶▶ 4-54)

## ■ On-screen Display for the Recording Method

Shows the current settings on-screen for the video when set to the normal, burst, event, multi-trigger, multi-manual, and linear recording method.

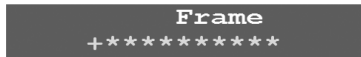
### Frame Counter Display

The current recording method is shown on the frame counter.

(However, the display changes when switching to the VIEW or ARM modes immediately after switching recording methods.)

#### Normal Recording Method

- Recording method not shown.
- Shown when set to NORMAL, NORMAL (A), or NORMAL (L).



#### Event Recording Method

- The letter E is displayed in the frame counter when the current method is the event recording method.
- Shown when set to EVENT, EVENT (A), or EVENT (L).



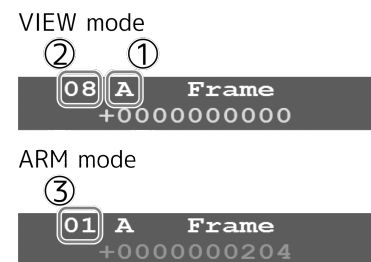
#### Burst Recording Method

- The letter B (①) is displayed in the frame counter when the current method is the burst recording method.
- Also, BURST (②) is shown in trigger timing.
- Shown when set to BURST, BURST (A), or BURST (L).



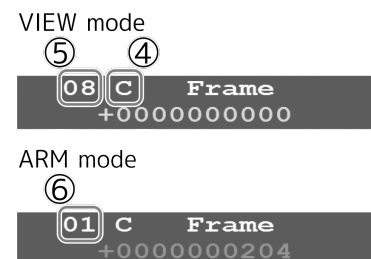
## Multi Trigger Recording Method MULTI(A), MULTIS(A), MULTIS(L)

- The letter A (①) is displayed in the frame counter when the current method is the multi-trigger recording method (excluding CONTINUOUS).
- During the VIEW mode, the number of partitioned blocks is shown (②), and during the ARM mode, the block number currently being written is shown (③).
- During the PLAY mode, the block number played back is shown.
- Shown when set to MULTI(A), MULTIS(A), or MULTIS(L).



## MULTI(C)

- The letter C (④) is displayed for the CONTINUOUS multi-trigger recording method.
- During the VIEW mode, the number of partitioned blocks appears (⑤), and during the ARM mode, the block number currently being written is shown (⑥). However, if the counter reaches the recorded block partition set, the value does not increase further.
- During the PLAY mode, the block number played back appears.
- Shown when set to MULTI(C).

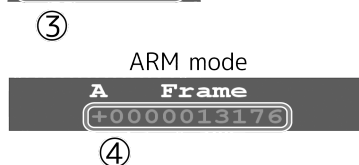


## Multi Manual Recording Method

### MULTI 1(A)、MULTI1(C)、MULTI3(A)、MULTI3(C)

- The character (①) of "A" (or "C") showing the present recording system being ALLBLOCKS (or CONTINUOUS) of an automatic block change is displayed.
- t is displayed on trigger timing as "Multi1 ((②))" (or Multi3).
- The set-up number of frames (▶▶ 4-38) is displayed on (③).
- Block No. is not displayed.
- The number in which a frame counter (④) is equivalent to all the blocks instead of 1 block is displayed at the time of ARM mode.
- A frame counter is displayed considering all the blocks as one scene by making the head frame of a head block into a standard (0) at the time of PLAY mode.

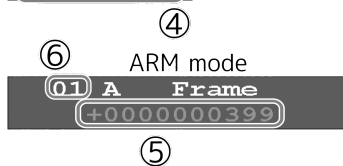
VIEW mode



### MULTI2 (A) 、MULTI2 (C)

- The character (①) of "A" (or "C") showing the present recording system being ALLBLOCKS (or CONTINUOUS) of an automatic block change is displayed.
- It is displayed on trigger timing as "Multi2 (②)."
- "BEREFOFRM" and "AFTERFRM" which were set up are displayed (④).
- The number of division blocks (②) is displayed at the time of VIEW mode, and the block (⑥) during writing is displayed now at the time of ARM mode.
- As for a frame counter (⑤), AFTERFRM is displayed at the time of ARM mode.

VIEW mode





## LINEAR Recording Method

- The character (①) of "L" which displays that the present system is a linear recording method with a frame counter is displayed.
- It is displayed on trigger timing as "LINEAR ((2))."
- It becomes this display when it is set as "LINEAR."



## Memory Segment Number Display

The letter shows the setting for the auto segment switch to the memory segment number.

---

### No auto segment switch



- A letter is not shown for an auto segment switch.
- Shown when set to NORMAL, EVENT, BURST, MULTI (A), MULTI(C), MULTI1/2/3(A/C), LINEAR .

---

### AUTO segment switch



- The letter A is shown for an auto segment switch.
- Appears when set to NORMAL (A), EVENT(A), BURST(A), MULTIS(A).

---

### LOOP auto segment switch



- The letter L is shown for a LOOP auto segment switch
- Shown when set to NORMAL (L), EVENT(L), BURST(L), MULTIS(L).

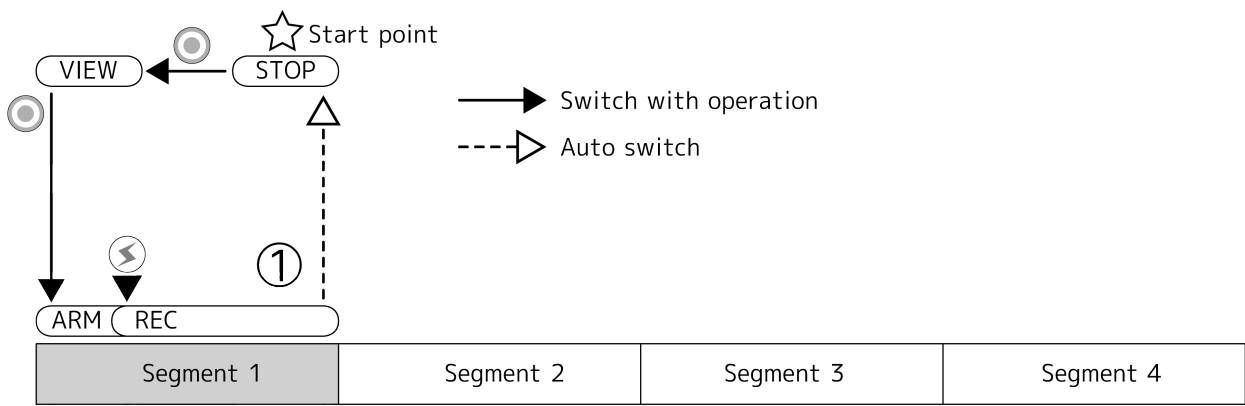
## ■ Normal Recording Method Operation

The normal recording method is the recording method for videos input with a single trigger for the selected segment. The three settings of NORMAL, NORMAL (A), and NORMAL (L) match the auto segment switch settings.

### NORMAL

Normal recording method, no auto segment switch

Example partitioned into 4 segments, recording on segment 1.

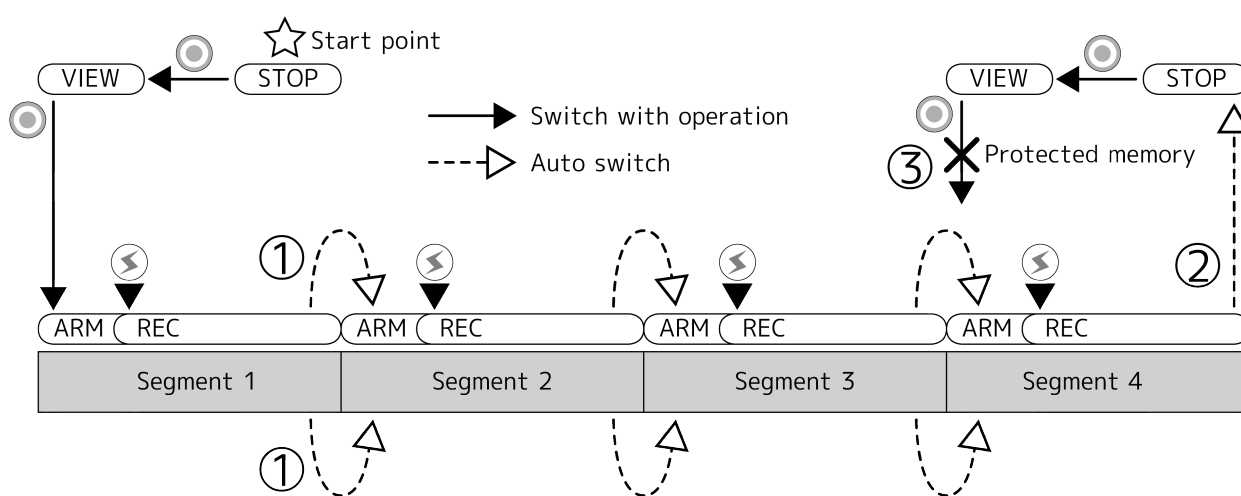


- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. After completing recording according to the trigger timing, it switches to the STOP mode.

## NORMAL (A)

Normal recording method, auto segment switch: AUTO

Example partitioned into 4 segments auto segment switch with AUTO.



- ① After switching to the ARM mode, it switches to the REC mode upon trigger input and completes recording with the trigger timing. Then it automatically moves to the next segment and switches to the ARM mode.
- ② Once all of the segments have been recorded, it switches to the STOP mode.
- ③ When switching to the ARM mode again, the previously recorded memory segments are protected and it doesn't switch to the ARM mode.

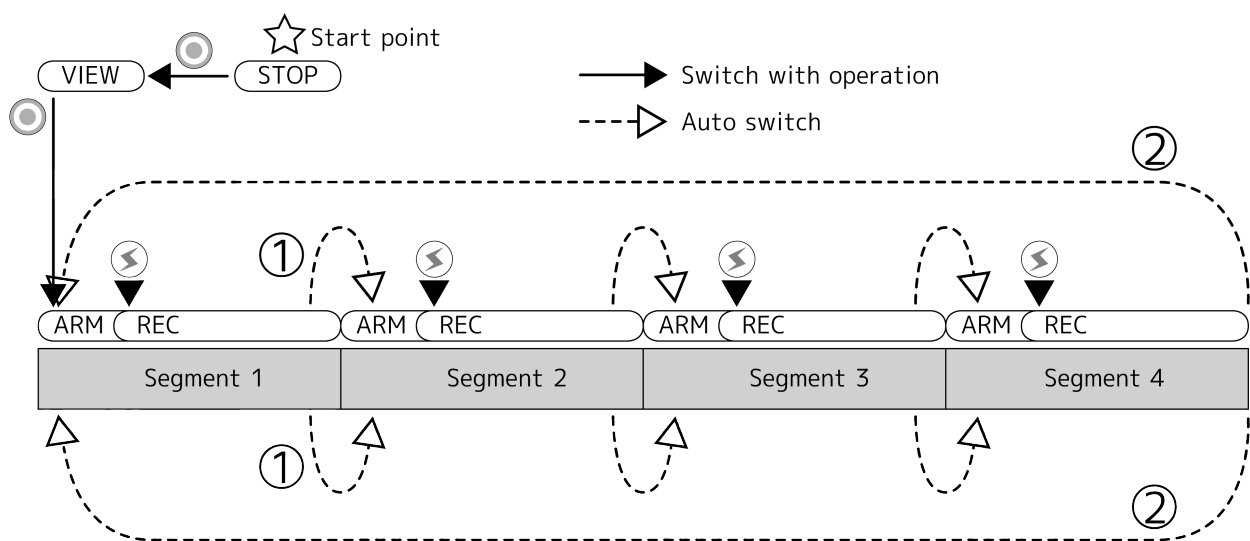
※ If switching to the ARM mode while the memory is protected, the following warning message appears.



## NORMAL (L)

Normal recording method, auto segment switch: LOOP

Example partitioned into 4 segments, auto segment switch with LOOP.



- ① After switching to the ARM mode, it switches to the REC mode upon trigger input and completes recording with the trigger timing. Then it automatically moves to the next segment and switches to the ARM mode.
- ② Once all of the segments have been recorded, it moves to the top segment and again switches to the ARM mode. (the top memory segment is overwritten.)

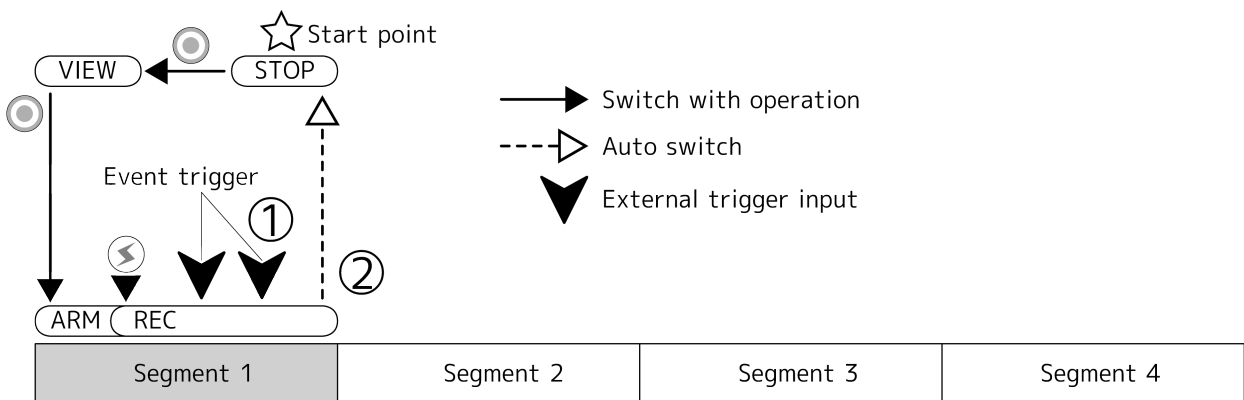
If recording has been completed, press the STOP button. The video segments recorded are recorded until the STOP button is pressed.

## ■ Event Recording Method Operation

The event recording method is the recording method for videos and events input from the first trigger for the selected segment and then input from external input/output for the second and subsequent triggers (event triggers) until the recording has been completed. During playback, an event mark (yellow ●) is displayed on the frame counter for the recorded frame (event frame). The three settings of EVENT, EVENT (A), and EVENT (L) match the auto segment switch settings.

### EVENT

Event recording method, no auto segment switch  
Example partitioned into 4 segments, recording on segment 1.

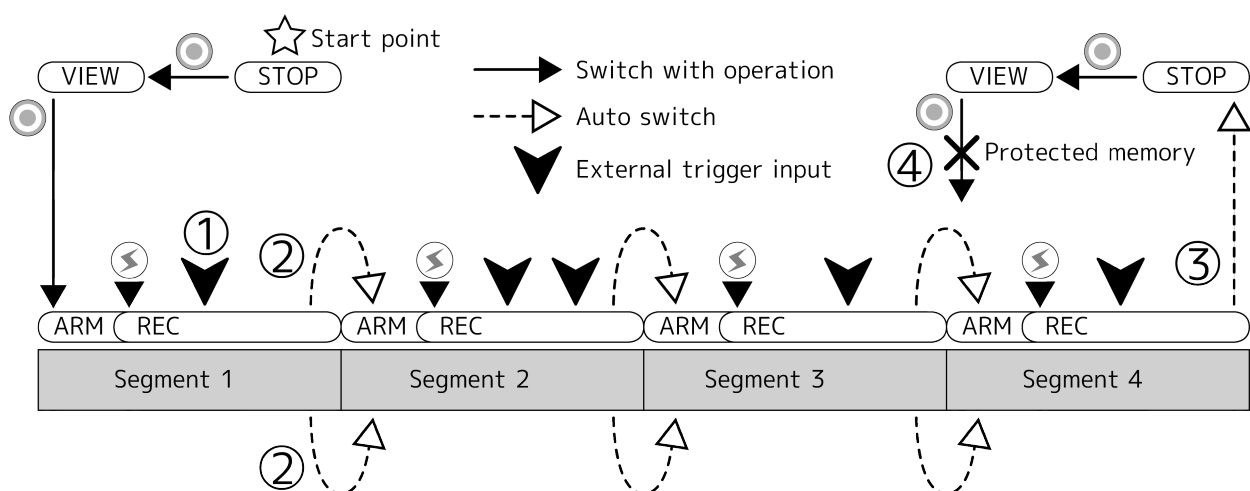


- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. The external trigger input is treated as an event trigger and records until recording is completed.
- ② After completing recording according to the trigger timing, it switches to the STOP mode.

## EVENT (A)

Event recording method, auto segment switch: AUTO

Example partitioned into 4 segments auto segment switch with AUTO.



- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. The external trigger input is treated as an event trigger and records until recording is completed.
- ② Recording ends according to the trigger timing. It automatically moves to the next segment and then switches to the ARM mode. Event triggers can be recorded for all segments.
- ③ Once all of the segments have been recorded, it switches to the STOP mode.
- ④ When switching to the ARM mode again, the previously recorded memory segments are protected and it doesn't switch to the ARM mode.

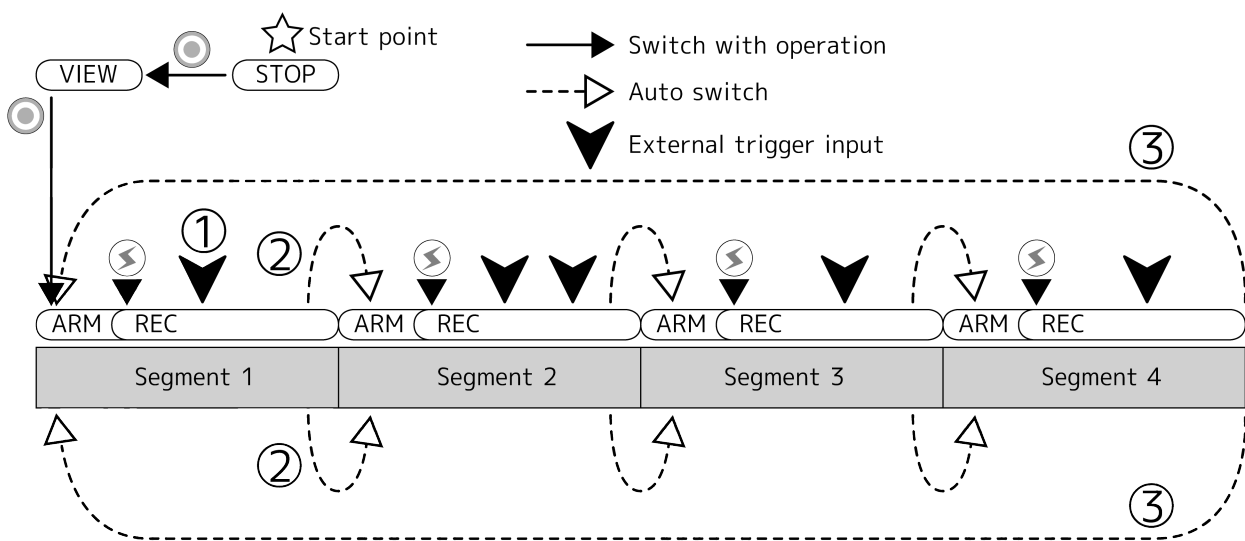
※If switching to the ARM mode while the memory is protected, the following warning message appears.



## EVENT (L)

Event recording method, auto segment switch: LOOP

Example partitioned into 4 segments, auto segment switch with LOOP.



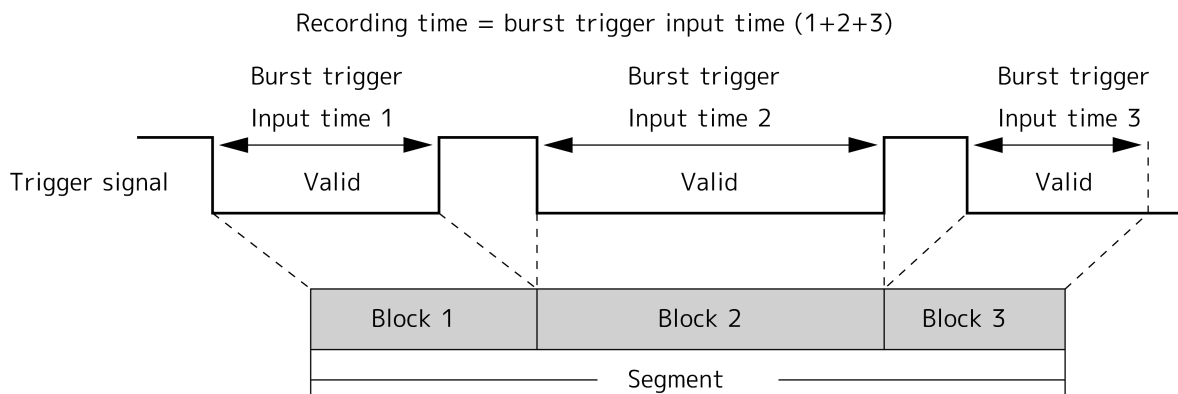
- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. The external trigger input is treated as an event trigger and records until recording is completed.
- ② Recording ends according to the trigger timing. It automatically moves to the next segment and then switches to the ARM mode. Event triggers can be recorded for all segments.
- ③ Once all of the segments have been recorded, it moves to the top segment and again switches to the ARM mode. (the top memory segment is overwritten.)

If recording has been completed, press the STOP button. The video segments recorded are recorded until the STOP button is pressed.



## Burst Recording Method Operation

The burst recording method is the recording method for videos where the frames for the recording time to the segments are controlled by trigger (burst trigger) input from external input/output. In the next figure, recording occurs for a single segment with three burst signals. Segments are automatically partitioned into blocks at the burst trigger enabled input times.



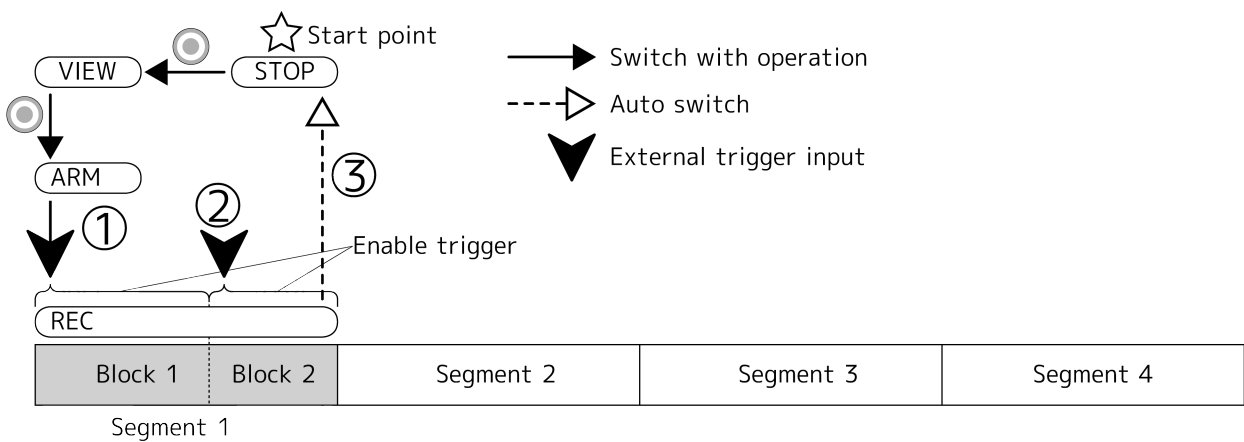
The three settings of BURST, BURST (A), BURST (L) match the auto segment switch settings.



- Attention**
- Trigger input from the J-PAD3 is not possible with the burst recording method. Input with TRIG1 input or TRIG2 input.
  - While the number of burst trigger inputs is not limited, only 64 blocks can be partitioned (top frame recorded, can jump during playback).

BURST

Burst recording method, no auto segment switch  
Example partitioned into 4 segments, recording on segment 1.

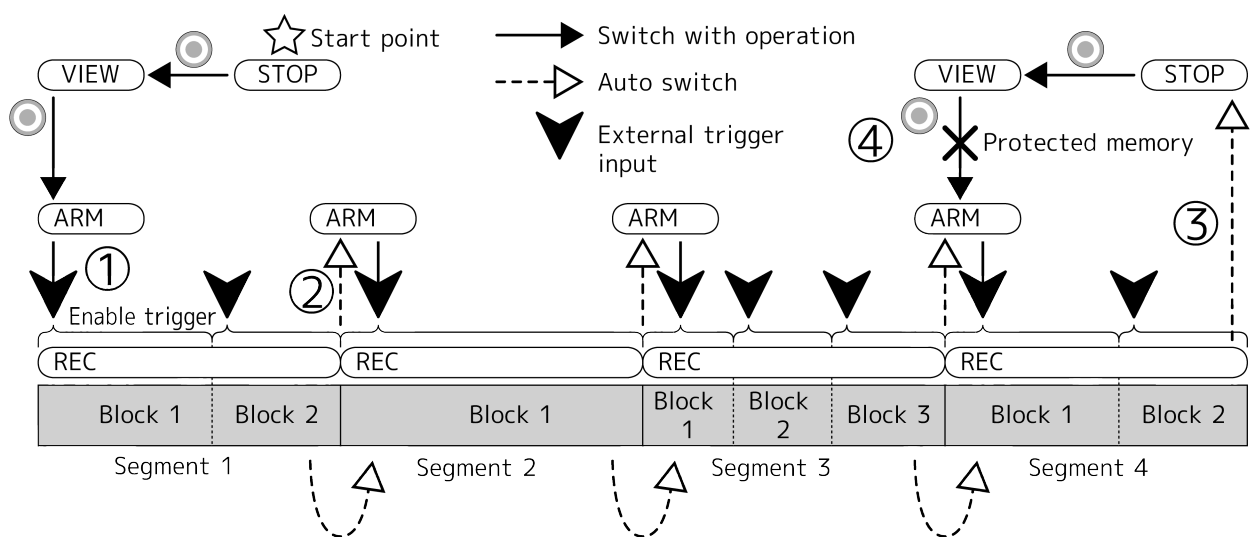


- ① After switching to the ARM mode, it switches to the REC mode upon trigger input.
- ② Blocks are partitioned when the trigger input is disabled and the REC mode is paused. Recording restarts when the trigger input is enabled.
- ③ Recording stops when the end of the segment is reached, and it switches to the STOP mode.

## BURST (A)

Burst recording method, auto segment switch: AUTO

Example partitioned into 4 segments auto segment switch with AUTO.



- ① After switching to the ARM mode, it switches to the REC mode upon enabling trigger input.
- ② Recording ends when the end of the segment is reached, and it automatically moves to the next segment and switches to the ARM mode.
- ③ Once all of the segments have been recorded, it switches to the STOP mode.
- ④ When switching to the ARM mode again, the previously recorded memory segments are protected and it doesn't switch to the ARM mode.

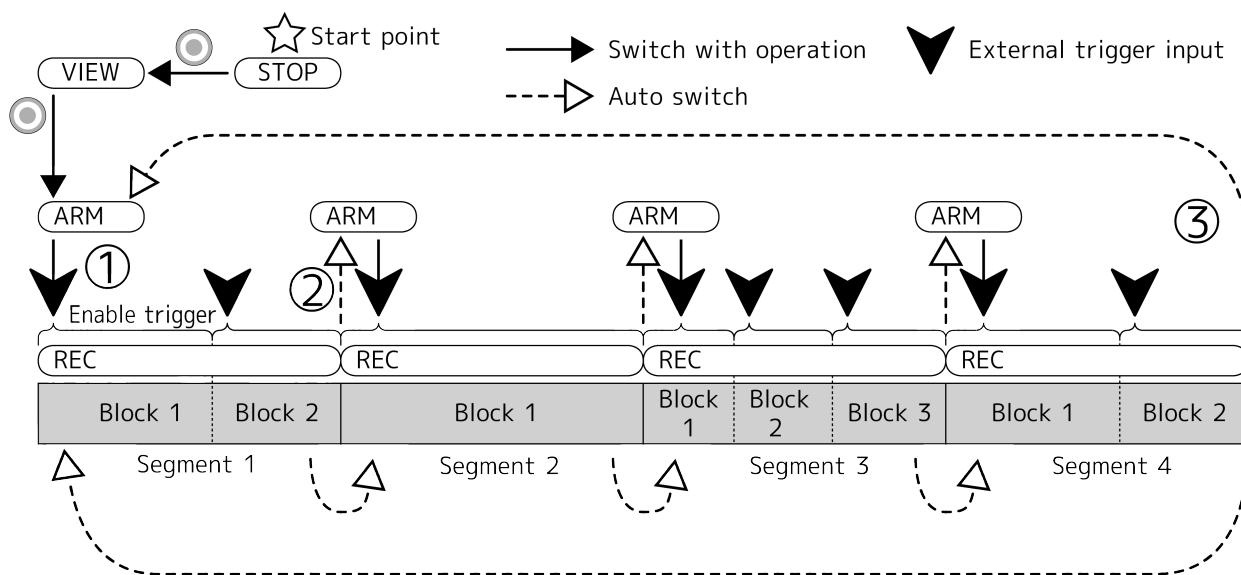
※If switching to the ARM mode while the memory is protected, the following warning message appears.



## BURST (L)

Burst recording method, auto segment switch: LOOP

Example partitioned into 4 segments, auto segment switch with LOOP.



- ① After switching to the ARM mode, it switches to the REC mode upon valid trigger input.
- ② Recording ends when the end of the segment is reached, and it automatically moves to the next segment and switches to the ARM mode.
- ③ Once all of the segments have been recorded, it moves to the top segment and again switches to the ARM mode. (The top memory segment is overwritten.)

To stop recording, press STOP. The recorded image segments are saved up to the time that STOP was pressed.

## Multi-Trigger Recording Method Operation

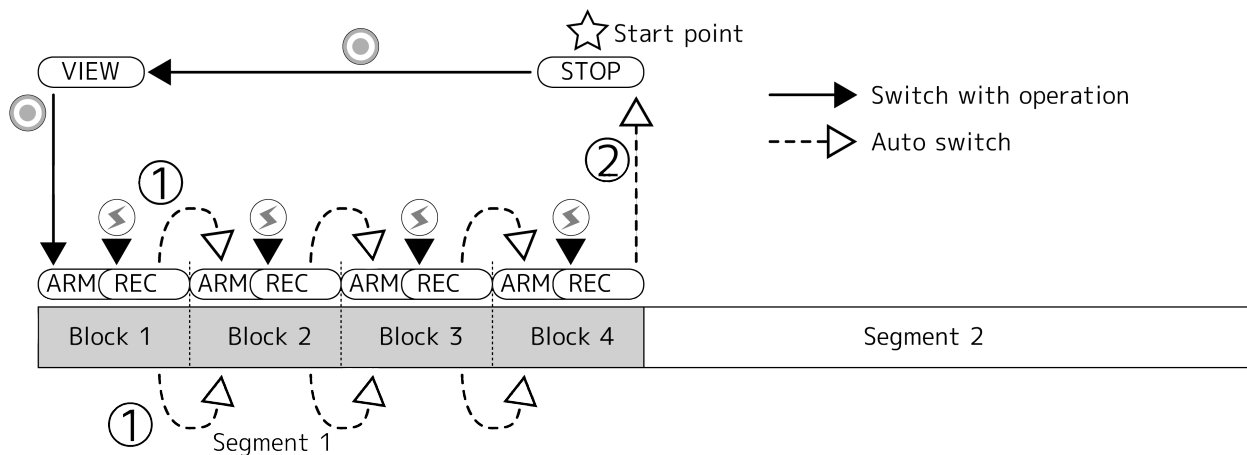
The multi-trigger recording method can successively record multiple effects individually by previously partitioning segments into a maximum of 16 uniform blocks. After recording to a block, it automatically moves to the next block.

The four settings of MULTI(A), MULTI(C), MULTIS(A), MULTIS(L) match the auto segment switching and block switching settings.

### MULTI(A)

Multi-trigger recording method, auto segment (block) switch: ALL BLOCKS

Example partitioned into two segments of four blocks, recording on segment 1.

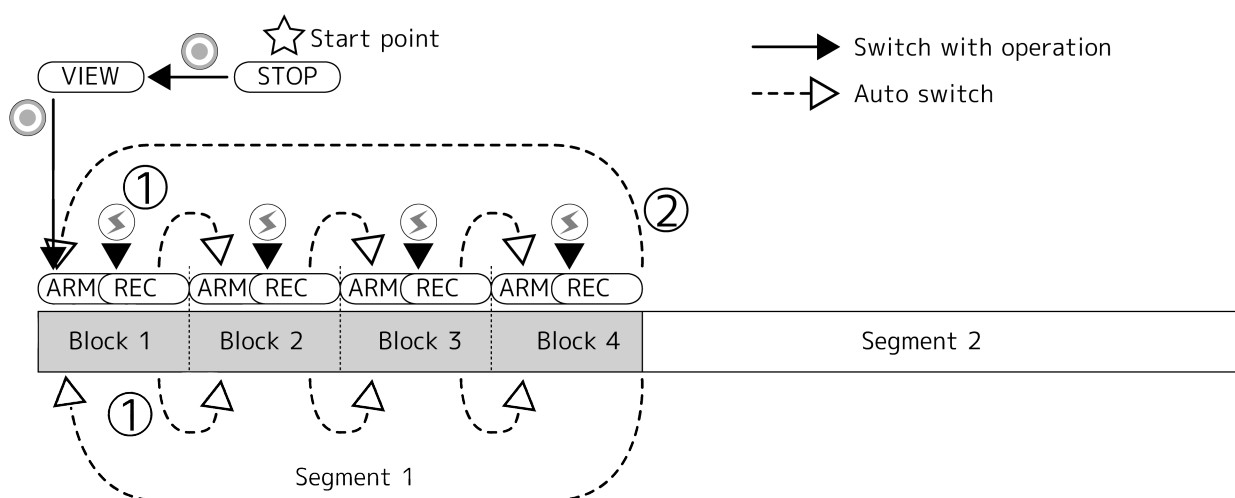


- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. Recording stops according to the trigger timing and it automatically moves to the next block and switches to the ARM mode.
- ② Once all of the blocks have been recorded, it switches to the STOP mode.

## MULTI(C)

Multi-trigger recording method, auto segment (block) switch: CONTINUOUS

Example partitioned into two segments of four blocks, recording on segment 1.



- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. Recording stops according to the trigger timing and it automatically moves to the next block and switches to the ARM mode.
- ② Once all of the segments have been recorded, it moves to the top block and switches to the ARM mode again. (The top block is overwritten.) The frame counter showing the block recorded doesn't change, and stays at 01.

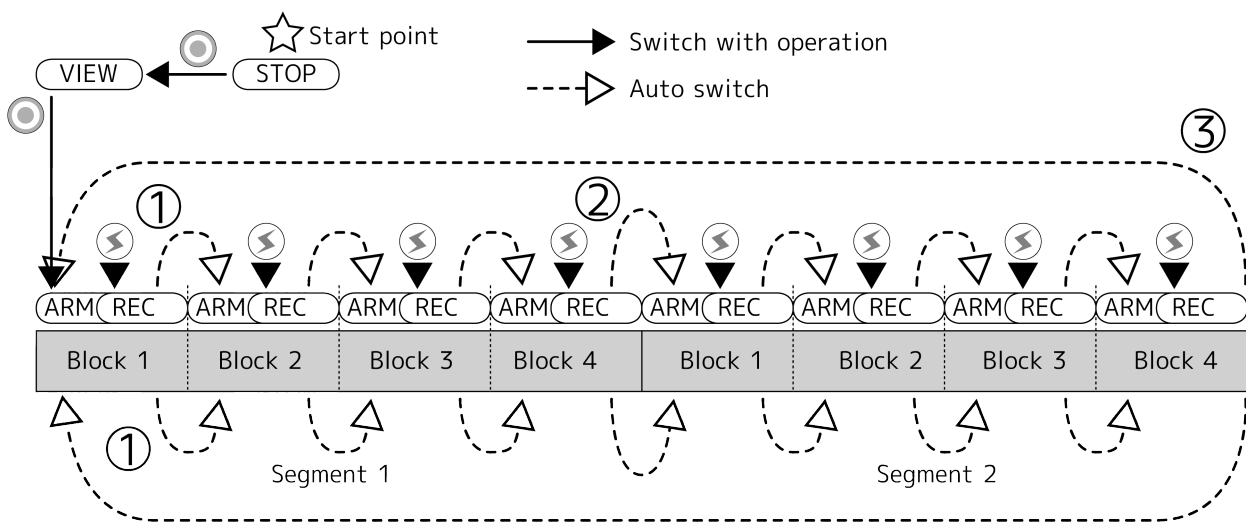
If recording has been completed, press the STOP button. The video blocks recorded are recorded until the STOP button is pressed.



## MULTIS(L)

Multi-trigger recording method, auto segment (block) switch: LOOP

Example partitioned into two segments of four blocks, auto segment switch with LOOP.



- ① After switching to the ARM mode, it switches to the REC mode upon trigger input. Recording stops according to the trigger timing and it automatically moves to the next block and switches to the ARM mode.
- ② Once all of the blocks have been recorded, it automatically moves to the next segment and switches to the ARM mode.
- ③ Once all of the segments and blocks have been recorded, it moves to the top segment and again switches to the ARM mode. (The top memory segment is overwritten.)

If recording has been completed, press the STOP button. The video blocks recorded are recorded until the STOP button is pressed.



## ■ Multi-Munual Recording Method

The multi manual recording method designates the number of frames per single block and successively records the images repeatedly generated.

After the block is recorded, it automatically moves to the next block.

The six settings of “MULTI1(A)”, “MULTI1(C)”, “MULTI2(A)”, “MULTI2(C)”, “MULTI3(A)”, “MULTI3(C)” are matched with the settings of block switching.



Attention

- There are no settings for automatically switching segments.
- When using external trigger signals with HX camera multi trigger/multi manual recording, if the “Trigger Signal Detection Method” is level and you jump to the next block with the trigger still in the input state, the trigger is input at the next block, and the expected result may not be achieved.

In this case, set the “Trigger Signal Detection Method” to edge.

Switching the trigger signal detection method to edge (▶▶ 4-84)

### MULTI1

It synchronizes with the timing trigger signal of an exposure start of a trigger frame, and is a method recorded at the set-up recording rate after a trigger frame. According to the number of frames per block, the number of blocks (number of times which can be trigger inputted) is determined.

For example, it can be used in recording of injection, etc. to synchronize with the start of spraying.



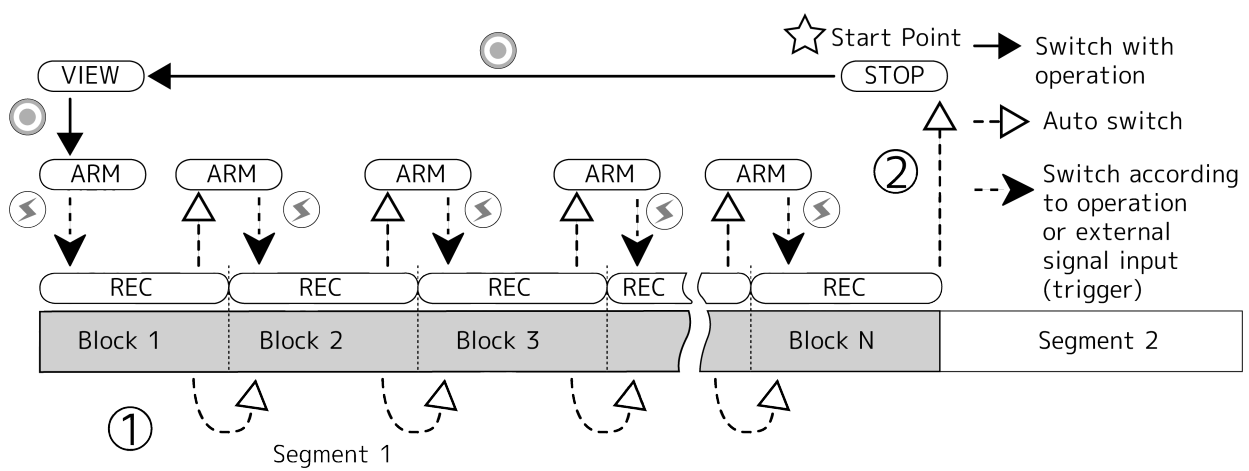
Attention

- Recording is not possible prior to the trigger frame for each block.
- The video monitor image cannot be updated while not recording.

## MULTI1(A)

Multi trigger recording method, auto segment (block) switching: ALL BLOCKS

Example split into two segments with recording in segment 1.

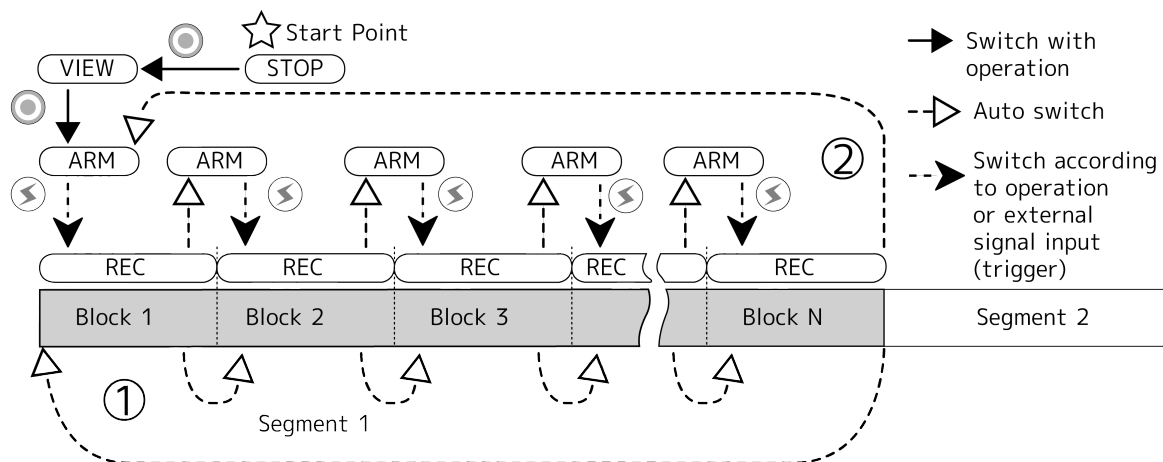


- ① After switching to the ARM mode, input the trigger to switch to the REC mode. After completing recording according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
- ② Once recording to all of the blocks is finished, it switches to the STOP mode.

## MULTI1(C)

Multi trigger recording method, auto segment (block) switching: CONTINUOUS

Example split into two segments with recording in segment 1.



- ① After switching to the ARM mode, input the trigger to switch to the REC mode. After completing recording according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
- ③ After the recording of all the blocks finishes, it moves to a top block and changes to ARM mode again. (Overwrite recording of the top block is carried out.)

Please press the STOP key, when you end recording. The image of the block during recording is recorded to the timing which pressed the STOP key.

## MULTI2

A method of synchronized recording for internal synchronization/IRIG signals/EST signals with input of trigger signals.

Additionally, this can be combined with the frame straddling function.

For example, for engine combustion photography, this can be used when synchronizing the angle of the crank rotation or photographing a rotating body and a fluid.

In each block, recording before and after the trigger frame is possible.



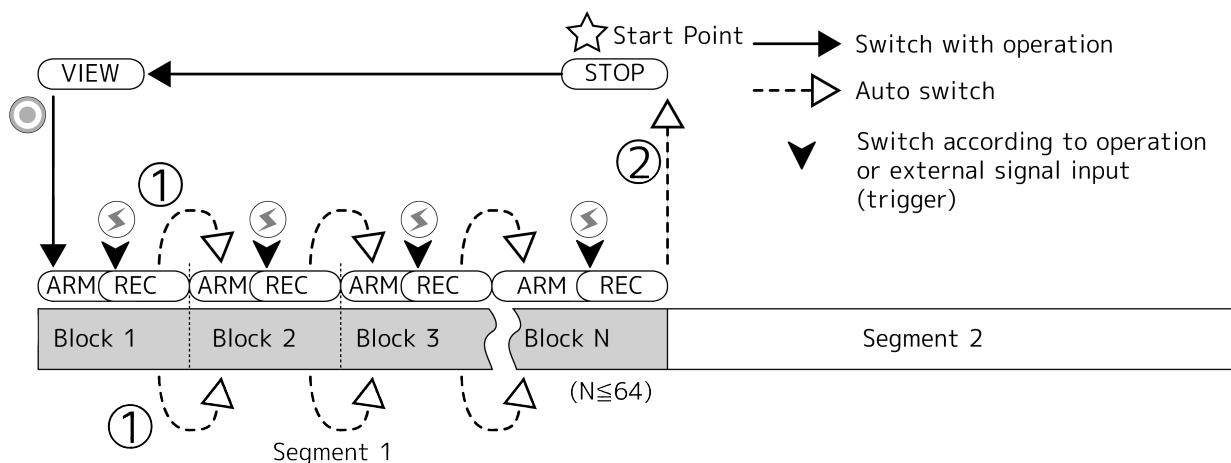
 Attention

- The maximum number of blocks (number of possible trigger inputs) is 64.  
As a result, if the number of frames per block is small, the entire range of the segment cannot be recorded.

## MULTI2(A)

Multi trigger recording method, auto segment (block) switching: ALL BLOCKS

Example split into two segments with recording in segment 1.



- ① After switching to the ARM mode, input the trigger to switch to the REC mode. After completing recording according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
- ② Once recording to all of the blocks is finished, it switches to the STOP mode.



## MULTI3

A recording method identical to MULTI2 except there are no limits to the number of trigger inputs.

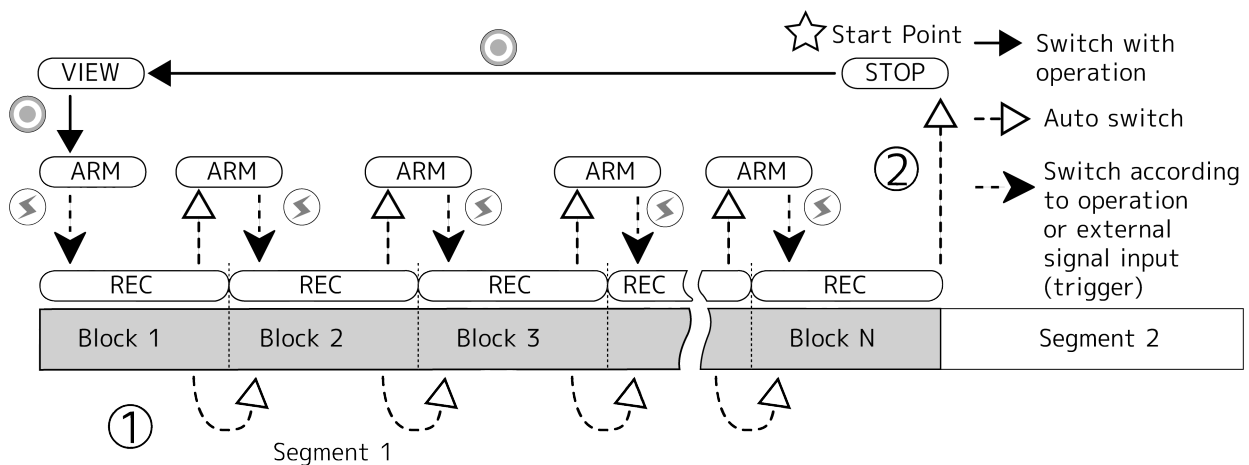
The number of blocks (number of possible trigger inputs) are determined according to the number of frames per block.

However, recording prior to the trigger frame is not possible.

## MULTI3(A)

Multi trigger recording method, auto segment (block) switching: ALL BLOCKS

Example split into two segments with recording in segment 1.

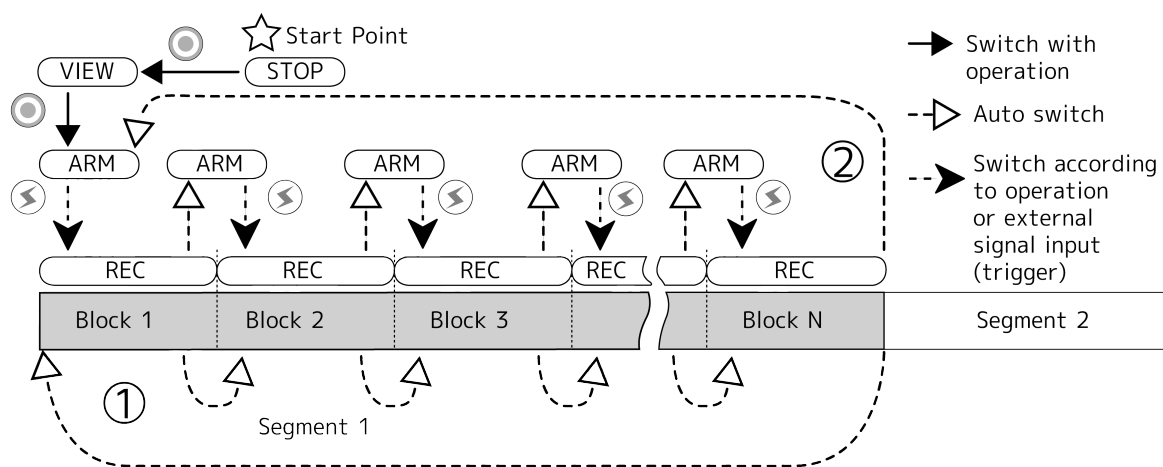


① After switching to the ARM mode, input the trigger to switch to the REC mode. After completing recording according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.

② Once recording to all of the blocks is finished, it switches to the STOP mode.

## MULTI3(C)

Multi trigger recording method, auto segment (block) switching: CONTINUOUS  
Example split into two segments with recording in segment 1.



- ① After switching to the ARM mode, input the trigger to switch to the REC mode. After completing recording according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
- ④ After the recording of all the blocks finishes, it moves to a top block and changes to ARM mode again. (Overwrite recording of the top block is carried out.) The display of the frame counter in which a recording block is shown returns to 01.

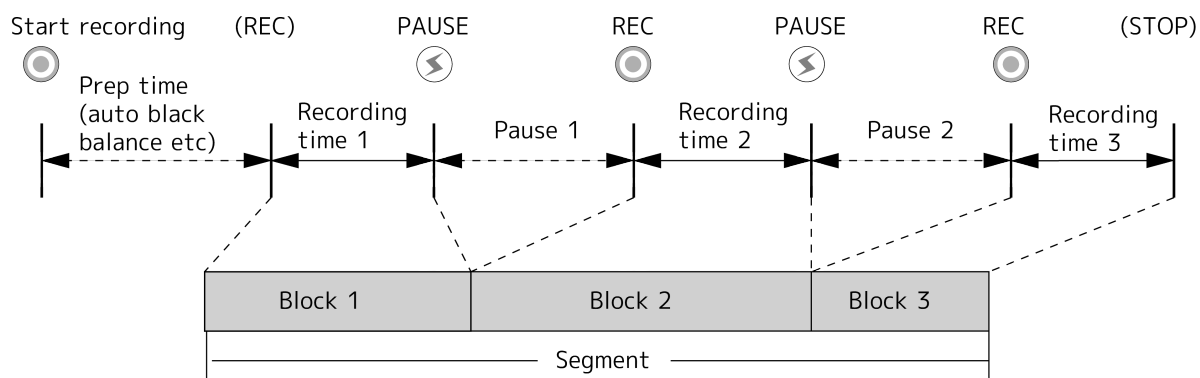
Please press the STOP key, when you end recording. The image of the block during recording is recorded to the timing which pressed the STOP key.

## ■ Linear recording method

The linear recording method is a method of recording images by controlling the number of frames to the segment for the recorded time with “Pause” and “Play” using the J-PAD3 button input.

In the following figure, recording is conducted with two pauses.

The segments are automatically divided into blocks for each recording time.



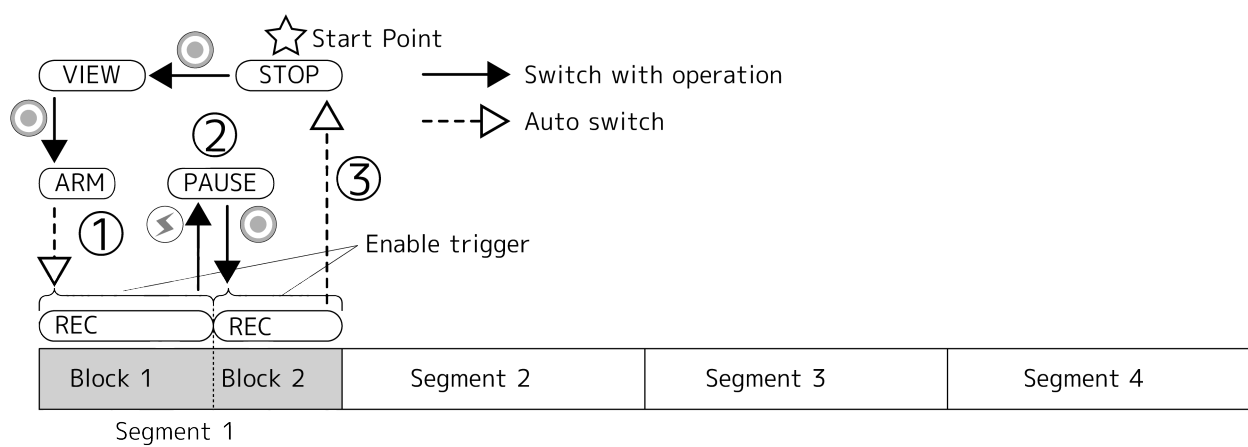
Attention

- There are no settings for auto segment switching.
- There is no external trigger input for the linear recording method.
- While there are no limits to the number of pauses, it can only be divided into 64 blocks (recording the top frame, jump during playback).



## LINEAR

Example split into four segments with recording in segment 1.



- ① After switching to the ARM mode, it automatically switches to the REC mode.
- ② The block is split upon input of the trigger button and stands by in the PAUSE mode. Press the ARM button again to restart recording in the REC mode.
- ③ Recording is finished once the end of the segment is reached, and then it switches to the STOP mode.


# Individual control signal input/output

This describes the ARM command, ARM status, FAULT status external input/output.

Independent input/output control is available on the HX-3 using the CTL cable (sold separately).

- ARM command input : Input of valid signals switches to the ARM mode from the STOP or VIEW modes.
- ARM status output : Outputs the enabled polarity when in the ARM mode, otherwise outputs disabled polarity.
- FAULT status output : Outputs the enabled polarity when a warning message appears or when HX-3 is starting up, otherwise outputs disabled polarity.

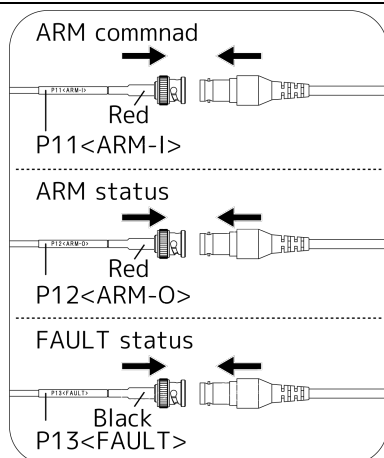
Using trigger input, ARM command input and ARM status output, it is possible to proceed to the next recording with only the control system signals affiliated with the external input/output.

 Attention • A CTL cable (sold separately) is required to use the ARM command, ARM status and FAULT status.

## ■ Independent Control Signal Input/Output Connection



- 1 Connect the CTL cable to the CTL connector.
  - Connect the CTL cable (sold separately) to the CTL connector.



- 2 Connect the BNC cable to the input/output on the CTL cable
  - Connect the BNC cable (male) to the ARM command connector, ARM status connector and FAULT status connector of the CTL cable.
  - Connect the other end of the BNC cable to the control system device used.

ARM Command (ARM CMD)

ARM Command Signals


- TTL level, 5V pull-up, isolation, allowable voltage range : -0.5~5.5VDC
- ARM command input circuit specifications(▶▶ 9-62), ARM command connector specifications(▶▶ 10-75)
- Settings for first enabled signals : Trailing edge detection of ARM command signals(▶▶ 4-80)

■ Switch to the ARM Mode with ARM Command

- 1 Input enabled signals (trailing) for the ARM command
- Switch to the ARM mode from the STOP and VIEW modes.
  - Even in an ARM command is input in the PLAY, LOOP, SAVE (USB save), or DOWNLOAD (downloaded and saved with HXLink) modes, it doesn't switch to the ARM mode.

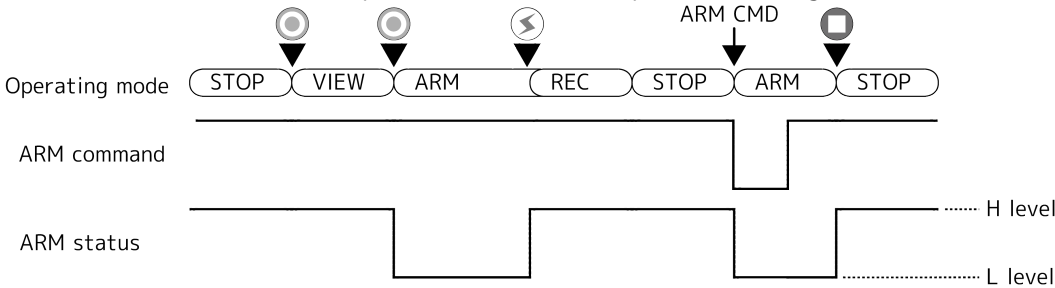
ARM Status (ARM STS)

ARM Status Signals

-  Attention • The ARM status provides open collector output so waveforms cannot be observed if voltage is not applied from an external power source.
- Open collector output, isolation, maximum applied voltage : 50VDC
  - ARM status output circuit specifications (▶▶ 9-60), ARM status connector specifications (▶▶ 10-75)
  - Output signals are signals indicating the ARM mode, and it is possible to select either L(NEGA) / H (POSI) of the polarity settings as the output level during ARM.

Example of ARM command input · ARM status output

The polarities of the ARM command input and ARM status output are both negative (▶▶ 4-80)



Other

## FAULT Status (FAULT STS)

### FAULT Status Signals

- Open collector output, isolation, maximum applied voltage : 50VDC
- FAULT status output circuit specifications (▶▶ 9-61), FAULT status connector specifications (▶▶ 10-75)

The FAULT status outputs the enabled polarity (initial value: NEGA) for the next states (fail state).

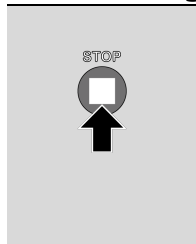
- Warning message displayed (abnormal setting alert, malfunction alert, abnormal voltage alert, increasing sensor temperature alert, abnormal trigger alert)
- Camera startup

The polarity cannot be changed while operating (▶▶ 4-80)



Attention • The FAULT status provides open collector output so waveforms cannot be verified if voltage is not applied from an external power source

## ■ Turning Off the Warning Message Displayed on the Monitor



- 1 Press the STOP button during the status display on the J-PAD3
  - Press the STOP button during the status display to turn the warning message off. At this point, the STOP button does not change the operating mode.
  - If the STOP button is pressed during MENU display, the warning will not go out and it will switch to the status display. Then, press the STOP button again to turn off the warning display.

In addition to turning off the warning message on the monitor or viewfinder screen, it changes to the FAULT status and disabled polarity output.

# Exposure pulse signal output

This describes the EPO (Exposure Pulse Output) output.

The HX-3 outputs exposure pulse signals to photograph synchronously with cameras and devices from other manufacturers.

**Attention** • The same signals are output from the EPO connector and the REMOTE connector EPO. Reverse and the output of both is reversed.

## EPO Connection EPO connector



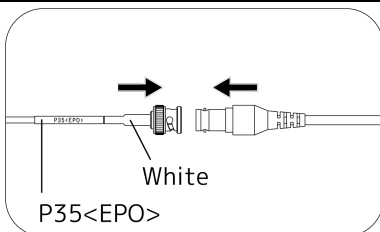
- 1 Connect the BNC cable to the EPO connector
  - Connect the BNC cable to the EPO connector on the rear panel.
  - Connect the other end of the BNC cable to the synchronization and measurement equipment.

## Connect the EPO

**Attention** • A split cable (sold separately) is required for EPO use.



- 1 Connect the J3 split cable to the REMOTE connector.
  - Connect the J3 split cable (sold separately) to the REMOTE connector.



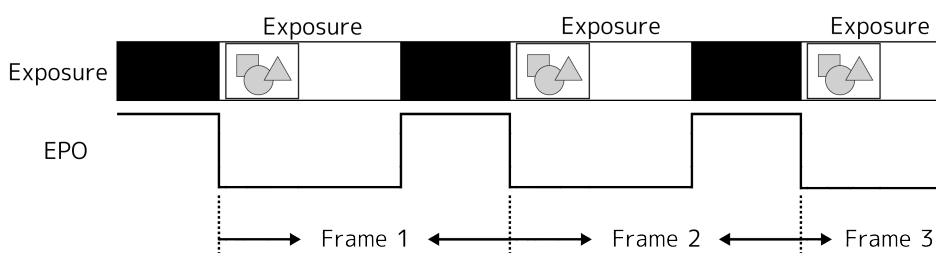
- 2 Connect the BNC cable to the J3 split cable EPO connector
  - Connect the BNC cable to the J3 split cable EPO connector.
  - Connect the other end of the BNC cable to the device for synchronization and viewing.

## EPO

### EPO signals

- 5V CMOS level, isolation, input/output current  $\pm 4\text{mA}$  or less
- EPO output circuit specifications (▶▶ 9-58), EPO connector specifications (▶▶ 10-77)

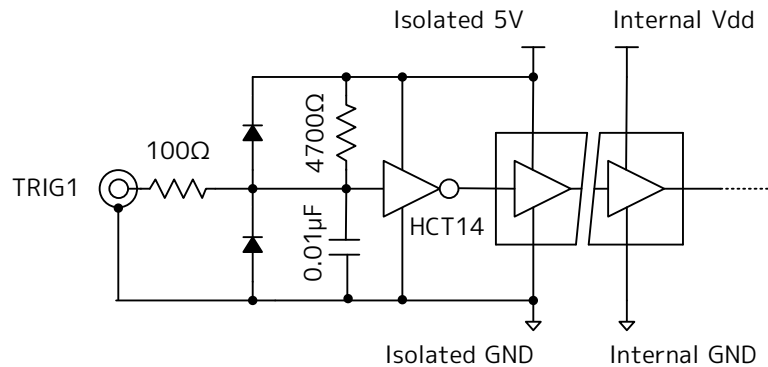
During exposure, the L level is output but at all other times the H level is output. The polarity can be changed with the setting. (▶▶ 4-80)



# External input/output signal circuit

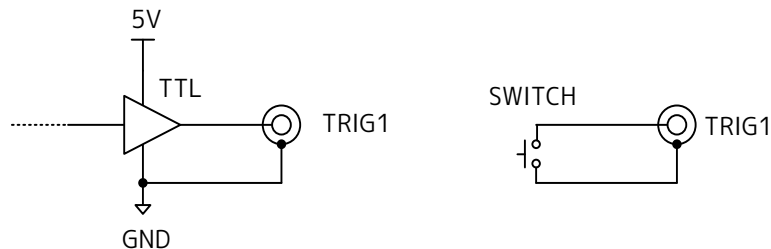
## ■ TRIG1

Input Equivalence Circuit Diagram



Isolation, TTL level, 5V pull-up resistance 4700Ω, L level :  $-0.5\text{V}$  (minimum applied voltage)  $\sim 0.8\text{V}$ , H level :  $2\text{V} \sim 5.5\text{V}$  (maximum applied voltage), trigger enabled for  $H \rightarrow L$ , contact point input possible, polarity reverse function

Recommended Interface Circuit



### Trigger Filter

There is a noise filter circuit included in the digital method which is used to enhance the effect of the filter by setting the filter value higher when there is significant external noise.

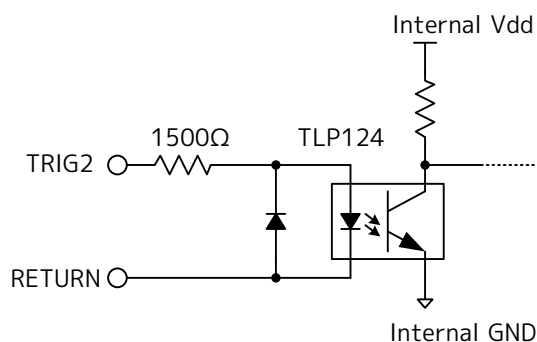
The filter value units are  $\mu\text{s}$ , and indicate the delay when good pulses without chattering are input. The minimum setting unit is  $0.1\mu\text{s}$ . The factory setting is  $20.0\mu\text{s}$  and the range of possible settings is  $0.0 \sim 6553.5\mu\text{s}$ .

This filter value can be set independently to two trigger inputs.

However, with TRIG1 input, there is a delay of about  $1.4\mu\text{s}$  added due to the analog filter on the input part. It is operated by a contact point or open collector, and if the trigger polarity is straight, the delay of about  $1.4\mu\text{s}$  increases to about  $30\mu\text{s}$ .

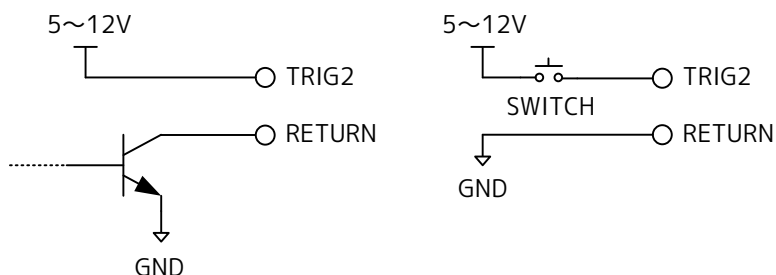
## ■ TRIG2

### Input Equivalence Circuit Diagram



Isolation, photo coupler current loop, current limiting resistance 1500Ω, trigger enabled at 5V or higher, maximum applied voltage  $\pm 32\text{V}$ , CRNTOFF(current OFF) level : 0.1mA or less, CRNTON (current ON) level : 2.4mA or more, photo coupler TLP124, polarity reverse function

### Recommended Interface Circuit



### Trigger Filter

There is a noise filter circuit included in the digital method which is used to enhance the effect of the filter by setting the filter value higher when there is significant external noise.

The filter value units are  $\mu\text{s}$ , and indicate the delay when good pulses without chattering are input. The minimum setting unit is 0.1 $\mu\text{s}$ . The factory setting is 20.0 $\mu\text{s}$  and the range of possible settings is 0.0~6553.5 $\mu\text{s}$ .

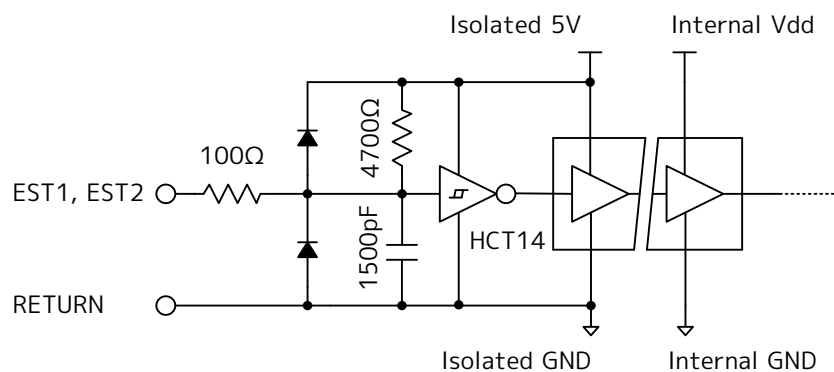
This filter value can be set independently to two trigger inputs.

The TRIG2 delay is about 5 $\mu\text{s}$  with the trigger turned to CRNT ON, and about 150 $\mu\text{s}$  with the trigger turned to CRNT OFF.



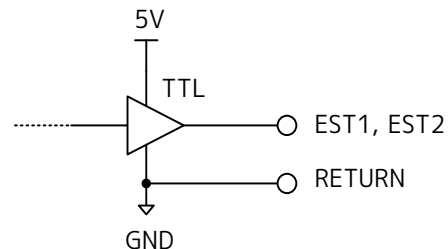
## EST1, EST2 / EVENT

Input Equivalence Circuit Diagram



Isolation, TTL level, 5V pull-up resistance 4700Ω, L level :  $-0.5\text{VDC}$  (minimum applied voltage)~ $0.8\text{VDC}$ ,  
H level :  $2\text{VDC}$ ~ $5.5\text{VDC}$  (maximum applied voltage), exposure starts at  $H \rightarrow L$ , photographs one image

Recommended Interface Circuit



### EST Filter

There is a noise filter circuit included in the digital method which is used to enhance the effect of the filter by setting the filter value higher when there is significant external noise.

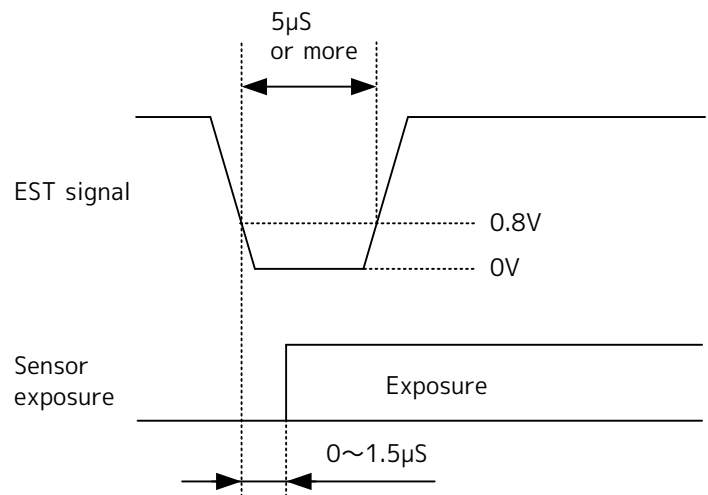
The filter value units are  $\mu\text{s}$ , and indicate the delay when good pulses without chattering are input. The minimum setting unit is  $0.1\mu\text{s}$ . The factory setting is  $20.0\mu\text{s}$  and the range of possible settings is  $0.0 \sim 6553.5\mu\text{s}$ .

This filter value can be set independently to two EST inputs.

However, if the EST polarity is straight, a delay of about  $0.2\mu\text{s}$  is added because of the analog filter on the input part and if the EST polarity is negative, the delay increases by about  $0.5\mu\text{s}$ .

Also, it is operated by a contact point or open collector, and if the EST polarity is straight, the delay of about  $0.2\mu\text{s}$  increases to about  $3.5\mu\text{s}$ .

Timing HX-3, HX-3L, HX-3E



Timing diagram when the noise filter setting is 0μ S.

Exposure delay (T) =		Indefinite delay	+	delay from EST filter
		↓		↓
A-E S T	:	Synchronous accuracy 37~62ns		1.5μ S
E S T	:	Synchronous accuracy 2H~3H		1.5μ S

$H \text{ (One-line read-out time)} = (\text{Horizontal resolution} / 32 + 3) \times 12.5\text{ns}$

---

#### Timing Constraints HX-3, HX-3L, HX-3E

EST signal cycle  $> 1 / \text{maximum recording speed}$

A-EST signal cycle  $> 1 / \text{maximum recording speed}$

If this is not met, recording will not be performed correctly. However, if the external synchronization save function is ON, ignore the disabled EST.

Additionally, there are constraints for the shutter time.

A-EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s}$

EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s} + 3 \times H$

must be satisfied. If this is not met, recording will not be performed correctly.

If the EST function is enabled, it becomes the GX native exposure timing.

In A-EST, a horizontal reinforcement-like shutter noise may appear the interval of an EST signal narrowly.

The conditions in which a shutter noise does not appear are as follows.

A-EST signal cycle  $> \text{shutter speed} + \text{read-out time} + 0.4\mu\text{s}$

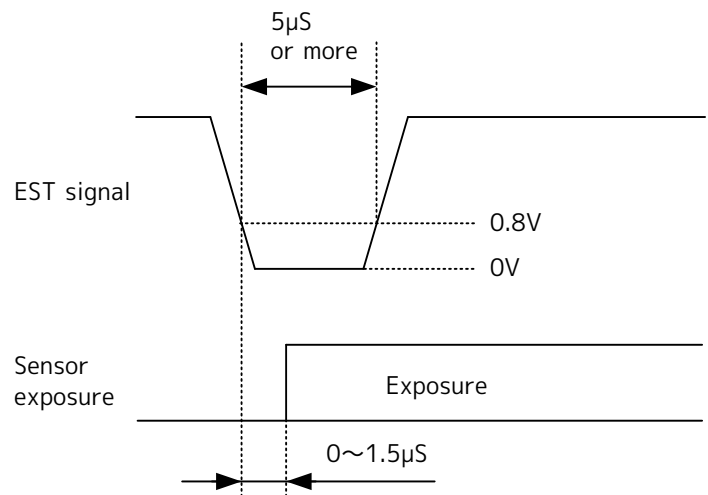
Read-out time  $= (\text{vertical resolution} / 4 + 1) \times H$

---

#### Event Signals

The input signal level (whether or not the REMOTE connector contact pin is at a valid level) is recorded together with the image. The enabled/disabled polarity of the event signals can be checked with the video output or on the HXLink screen. There is no limit to the number of inputs for event signals. There is no jump function. Can be used together with the event trigger function.

Timing HX-4, HX-4E



Timing diagram when the noise filter setting is 0μ S.

Exposure delay (T) =	Indefinite delay	+	delay from EST filter
	↓		↓
A-E S T :	Synchronous accuracy 46~50ns		1.5μ S
E S T :	Synchronous accuracy 2H~3H		1.5μ S

$H \text{ (One-line read-out time)} = (\text{Horizontal resolution} / 32 + 3) \times 15.31\text{ns}$

---

#### Timing Constraints HX-4, HX-4E

EST signal cycle  $> 1 / \text{maximum recording speed}$

A-EST signal cycle  $> 1 / \text{maximum recording speed}$

If this is not met, recording will not be performed correctly. However, if the external synchronization save function is ON, ignore the disabled EST.

Additionally, there are constraints for the shutter time.

A-EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s}$

EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s} + 3 \times H$

must be satisfied. If this is not met, recording will not be performed correctly.

If the EST function is enabled, it becomes the GX native exposure timing.

In A-EST, a horizontal reinforcement-like shutter noise may appear the interval of an EST signal narrowly.

The conditions in which a shutter noise does not appear are as follows.

A-EST signal cycle  $> \text{shutter speed} + \text{read-out time} + 0.47\mu\text{s}$

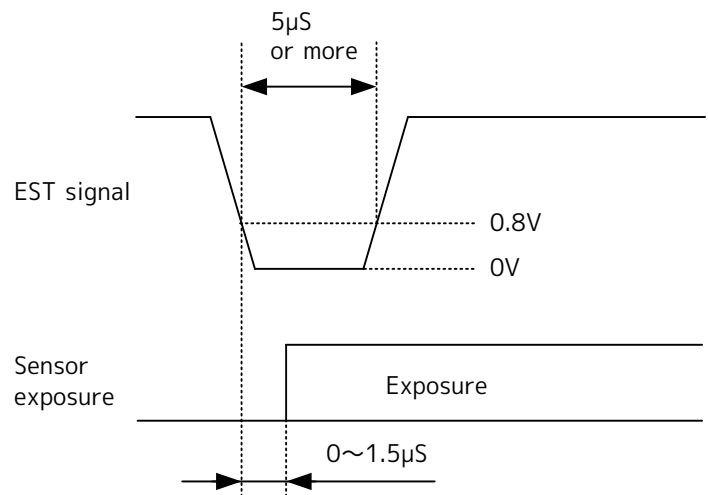
Read-out time  $= (\text{vertical resolution} / 4 + 1) \times H$

---

#### Event Signals

The input signal level (whether or not the REMOTE connector contact pin is at a valid level) is recorded together with the image. The enabled/disabled polarity of the event signals can be checked with the video output or on the HXLink screen. There is no limit to the number of inputs for event signals. There is no jump function. Can be used together with the event trigger function.

Timing HX-5, HX-5E



Timing diagram when the noise filter setting is 0μ S.

Exposure delay (T) =	Indefinite delay	+	delay from EST filter
	↓		↓
A-E S T :	Synchronous accuracy 54~73ns		1.5μ S
E S T :	Synchronous accuracy 2H~3H		1.5μ S

$H \text{ (One-line read-out time)} = (\text{Horizontal resolution} / 32 + 3) \times 18.1\text{ns}$

---

#### Timing Constraints HX-5, HX-5E

EST signal cycle  $> 1 / \text{maximum recording speed}$

A-EST signal cycle  $> 1 / \text{maximum recording speed}$

If this is not met, recording will not be performed correctly. However, if the external synchronization save function is ON, ignore the disabled EST.

Additionally, there are constraints for the shutter time.

A-EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s}$

EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s} + 3 \times H$

must be satisfied. If this is not met, recording will not be performed correctly.

If the EST function is enabled, it becomes the GX native exposure timing.

In A-EST, a horizontal reinforcement-like shutter noise may appear the interval of an EST signal narrowly.

The conditions in which a shutter noise does not appear are as follows.

A-EST signal cycle  $> \text{shutter speed} + \text{read-out time} + 0.54\mu\text{s}$

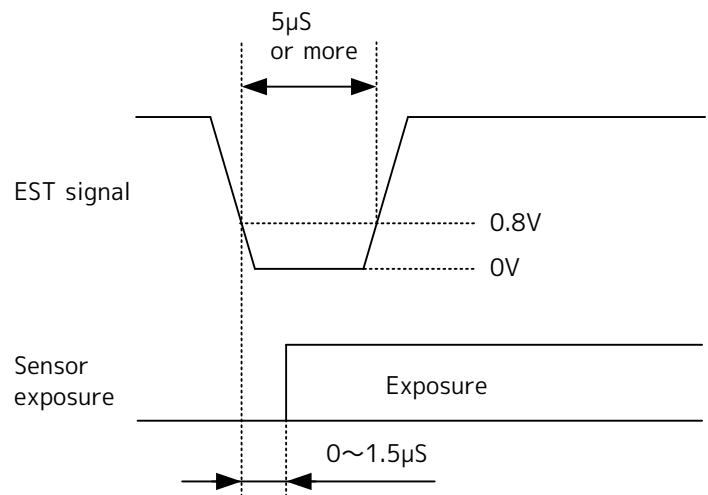
Read-out time  $= (\text{vertical resolution} / 4 + 1) \times H$

---

#### Event Signals

The input signal level (whether or not the REMOTE connector contact pin is at a valid level) is recorded together with the image. The enabled/disabled polarity of the event signals can be checked with the video output or on the HXLink screen. There is no limit to the number of inputs for event signals. There is no jump function. Can be used together with the event trigger function.

Timing HX-6, HX-6E



Timing diagram when the noise filter setting is0μ S.

Exposure delay (T) =	Indefinite delay	+	delay from EST filter
	↓		↓
A-E S T :	Synchronous accuracy 37~62ns		1.5μ S
E S T :	Synchronous accuracy 2H~3H		1.5μ S

$H \text{ (One-line read-out time)} = (\text{Horizontal resolution} / 16 + 3) \times 12.5\text{ns}$



---

### Timing Constraints HX-6, HX-6E

EST signal cycle  $> 1 / \text{maximum recording speed}$

A-EST signal cycle  $> 1 / \text{maximum recording speed}$

If this is not met, recording will not be performed correctly. However, if the external synchronization save function is ON, ignore the disabled EST.

Additionally, there are constraints for the shutter time.

A-EST signal cycle  $> \text{shutter speed} + 0.6\mu\text{s}$

EST signal cycle  $> \text{shutter speed} + 1.6\mu\text{s} + 3 \times H$

must be satisfied. If this is not met, recording will not be performed correctly.

If the EST function is enabled, it becomes the GX native exposure timing.

In A-EST, a horizontal reinforcement-like shutter noise may appear the interval of an EST signal narrowly.

The conditions in which a shutter noise does not appear are as follows.

A-EST signal cycle  $> \text{shutter speed} + \text{read-out time} + 0.4\mu\text{s}$

Read-out time  $= (\text{vertical resolution} / 4 + 1) \times H$

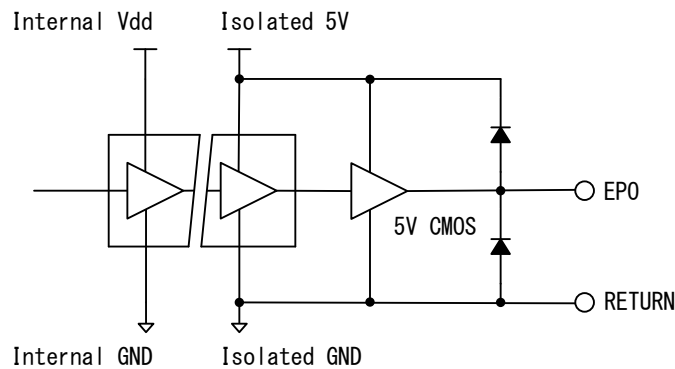
---

### Event Signals

The input signal level (whether or not the REMOTE connector contact pin is at a valid level) is recorded together with the image. The enabled/disabled polarity of the event signals can be checked with the video output or on the HXLink screen. There is no limit to the number of inputs for event signals. There is no jump function. Can be used together with the event trigger function.

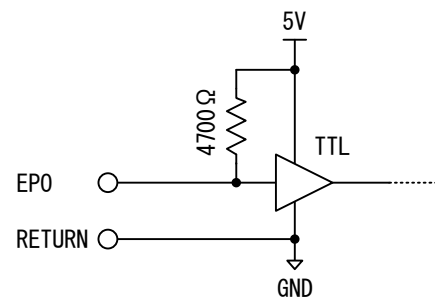
EPO

Input Equivalence Circuit Diagram

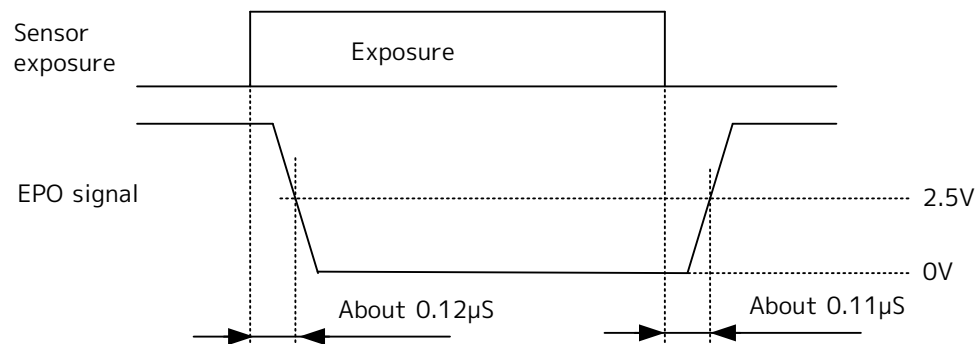


Isolation, 5V CMOS level, L level:0.4VDC or less, H level:4.0VDC or more, input/out current  $\pm 4\text{mA}$  or less, L exposure. Polarity reverse function

Recommended Interface Circuit



Timing



Exposure timing · Jitter (time change for adjacent exposure timing) within  $\pm 20\text{nS}$

---

### Simple Synchronized Recording

Synchronized recording can be easily performed because the multiple HX/GX series cameras or the fx series cameras with the exposure start signal (EST) input function use exposure pulse output (EPO).

Additionally, synchronized recording is also possible with other cameras that have equivalent functions. Since there is a possibility that the time precision cannot be guaranteed due to signal delays or time changes, the limitation is that all of the cameras must have the same frame rate.

For simple synchronized recording, the system is comprised of cameras that are deemed master or slave. One of the cameras in use can be the master camera, and the others are all slave cameras. If a HX · GX series camera is the master camera, the exposure pulse output (EPO) signals for this camera are connected to the exposure start signals (EST) input for all of the other cameras.

If combining both the HX · GX series and the fx series, the fx series EST input has the specification of starting exposure only at H → L edge signals, while with HX · GX series master camera, the output polarity is set to reverse and the L level is output during exposure. Also, the EST input setting for the slave HX · GX series cameras are H → L edge signals.

If combining with other cameras, refer to the manuals to match the signal polarity.

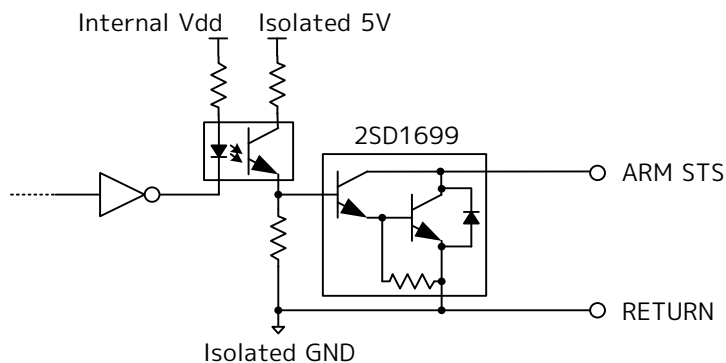
---



- Attention • Since the exposure pulse output (EPO) signals are equivalent to the exposure time (shutter time), if set to a short exposure time, the pulse width will also shorten. Be sure to take adequate caution of conversion to a suitable interface and cable properties for signal transmission. With an inappropriate method of use, error pulses may be detected or pulses may be lost, preventing transmission.

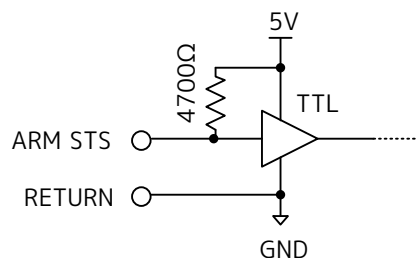
## ■ ARM Status

Input Equivalence Circuit Diagram



Isolation, open collector output, maximum applied voltage 50VDC, maximum current 100mA, short circuit in the ARM mode, polarity reverse function

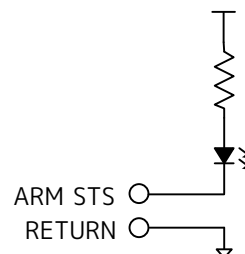
Recommended Interface Circuit 1



Circuit where the ARM status is detected as logic signals

To detect that multiple cameras are all in ARM, connect the ARM status output for all of the cameras (wired AND) and set ARM to the H level. If even one of the cameras is not in ARM, it will switch to the L level. If the camera power is OFF, the output will be H, so use caution.

Recommended Interface Circuit 2

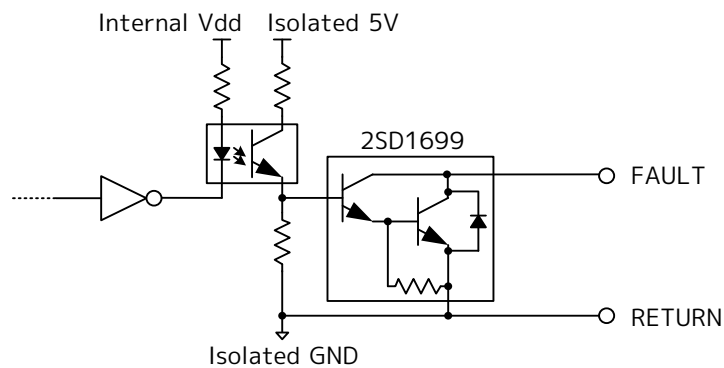


Circuit where the ARM status is visually confirmed by the LED display

To light up in ARM, set the ARM to output at the L level.

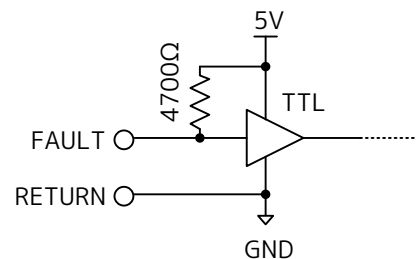
## ■ FAULT Status

Input Equivalence Circuit Diagram



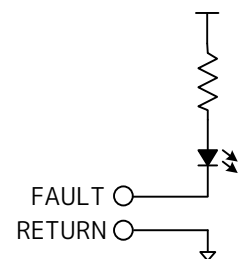
Isolation, open collector output, maximum applied voltage 50VDC, maximum current 100mA, short circuit in the FAULT state, polarity reverse function

Recommended Interface Circuit 1



To detect that multiple cameras are all in FAULT, use circuit 1, connect the FAULT status output for all of the cameras (wired NOR) and set FAULT to the L level. If all of the cameras are not in FAULT, it will switch to the H level. If the camera power is OFF, the output will be H, so use caution.

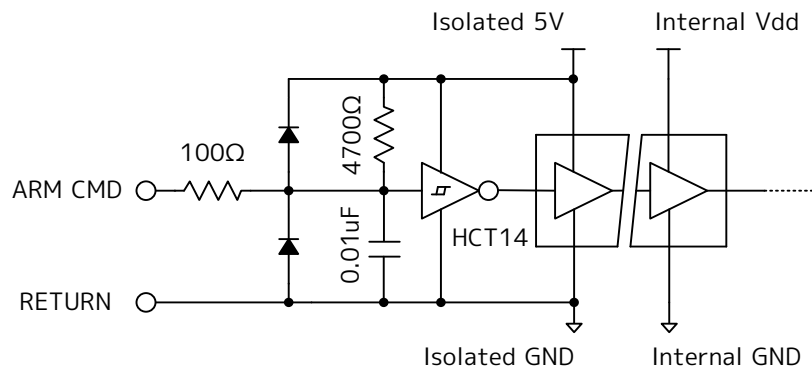
Recommended Interface Circuit 2



Circuit where the FAULT status is visually confirmed by the LED display  
To light up in ARM, set the FAULT to output at the L level.

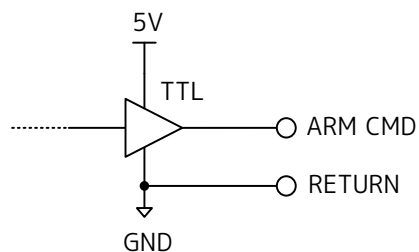
## ■ ARM Command

Input Equivalence Circuit Diagram



Isolation, TTL level, 5V pull-up resistance 4700Ω, L level :  $-0.5\text{V}$ (minimum applied voltage) $\sim 0.8\text{V}$ , H level :  $2\text{V}\sim 5.5\text{V}$ (maximum applied voltage), jump to the ARM mode with L, contact input possible, polarity reverse function

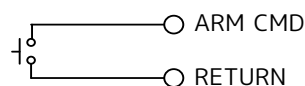
Recommended Interface Circuit 1



Circuit where the ARM command is input with logic signals

Logic level can be set to H/L. If multiple cameras are all in the ARM mode and they are all connected, the ARM command becomes a single signal. Use caution, because it switches to the H level if the ARM command signals are not connected (open state).

Recommended Interface Circuit 2

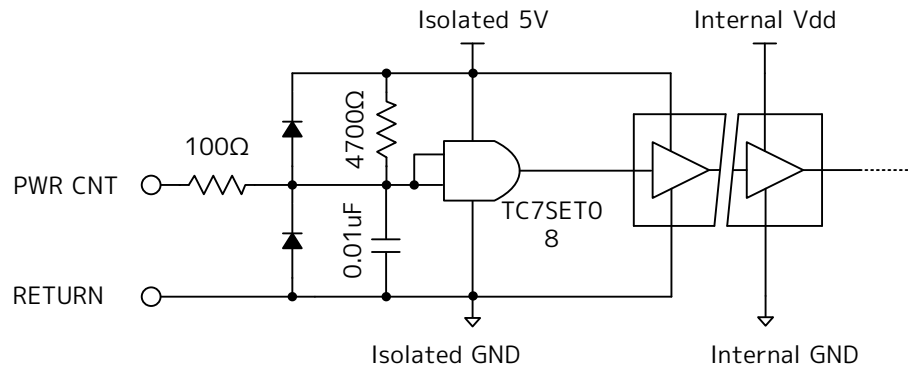


Circuit where commands are input with contact signals

Enabled polarity is set to enable commands at the L level.

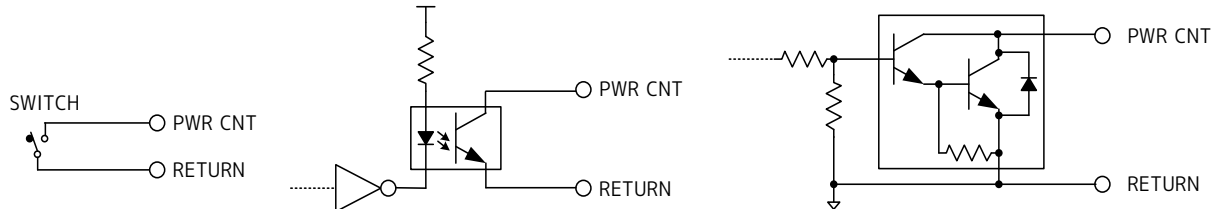
## ■ Power Control Input (PWRCNT)

Input Equivalence Circuit Diagram



Isolation, TTL level, 5V pull-up resistance 4700Ω, L level :  $-0.5\text{V}$ (minimum applied voltage) $\sim 0.8\text{V}$ , H level :  $2\text{V}\sim 5.5\text{V}$ (maximum applied voltage), power ON with H, power OFF with L, contact input possible, polarity reverse function

Recommended Interface Circuits 1 ~ 3

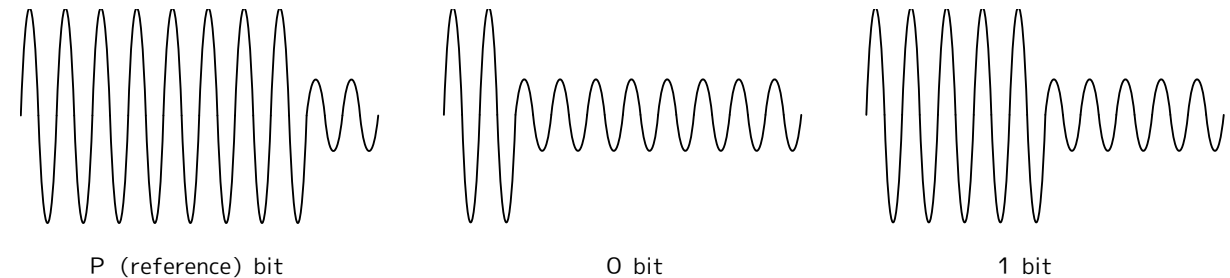


The power is ON when open or at the H level, and the power is OFF when there is a short between two pins or at the L level. The GX-HUB uses these signals for the multi-camera system, with batch power control the primary objective.

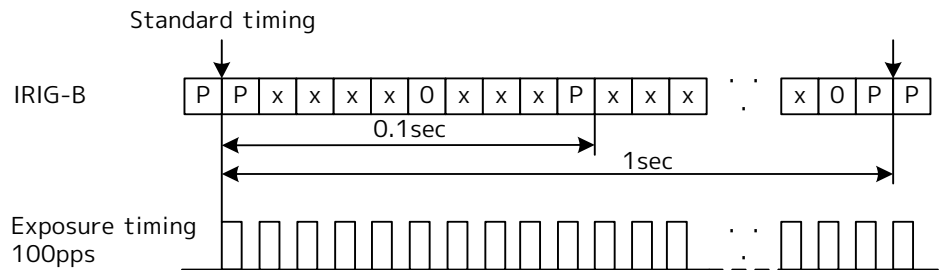
IRIG-B

Standards	IRIG Standard 200-98, IEEE1344
	Compatible with 1 kHz carrier modulated IRIG-B (B120, B122, B123 format). Not compatible with carrier signals used, BCD codes, some CF (IEEE1344 の TMOF) un-modulated IRIG-B (B000, B003 format).

Modulated IRIG-B waveform and exposure timing



Modulated on P bit, O bit, and 1 bit. Standard timing is the top portion. 100 bits per second, 10 carrier per bit. P bit for every 0.1 second. 1 carrier is 1ms.



The example in the figure above shows the IRIG-B and exposure timing for 100 frames/second. In the figure, x indicates 1 or 0 bits.

The IRIG-B and exposure start are consistent with the standard timing at any record speed. (exposure phase shift set to 0°)



---

### Exposure Phase Shift Function

Used as a method of realizing the high resolution and high recording speeds while using multiple cameras.

Used for remote recording to ignore the parallax from camera placement.

The setting is the phase angle (1 degree units, 0~359).

The exposure phase shift settings can only be made from the camera control software HXLink.

For example, with each camera set to 2000 frames/second at  $2560 \times 1920$  pixels, four cameras with IRIG synchronization and phase shift settings for each camera of  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$ , recording can take place at the equivalent of  $2000 \times 4 = 8000$  frames/second.

Since 2000 frames/second have a frame interval of  $500\mu\text{s}$ , this corresponds to a shift of only  $0\mu\text{s}$ ,  $125\mu\text{s}$ ,  $250\mu\text{s}$ ,  $375\mu\text{s}$  from IRIG-B standard timing for each camera.

With a normal multiple camera synchronization system (such as the GX-HUB system), the exposure timing on all of the cameras is synchronized for use and the phase shift is set to  $0^\circ$ .

---

# Troubleshooting

## ■ Power

Problem	Solution	📖
No power	<ul style="list-style-type: none"> <li>• Check the power cable connection</li> <li>• Turn the power switch on the AC adapter ON</li> <li>• If power is supplied from someplace other than the AC adapter, check the voltage and the rated output</li> </ul>	2-8 2-12
Can't charge the battery	<ul style="list-style-type: none"> <li>• It's time to replace the battery. Please contact a NAC's authorized distributor/sales rep in your region.</li> </ul>	—

## ■ Startup and Preparation

Problem	Solution	📖
I want to check to see if the camera starts up normally	<ul style="list-style-type: none"> <li>• Check the following <ul style="list-style-type: none"> <li>• Is CAM MODE on the status LED lit up in blue?</li> <li>• Is it in the STOP mode with an image properly displayed on the monitor?</li> <li>• Is the status displayed on the J-PAD3 LCD?</li> </ul> </li> </ul>	1-8 3-13 3-4
No video on the monitor connected to MONITOR OUT	<ul style="list-style-type: none"> <li>• Depending on the monitor, it may not be able to differentiate signals during HX-3 startup, so restart the power to the monitor.</li> <li>• A monitor is returned on.</li> <li>• A signal output setup (VIDEO OUT) on a monitor is checked.</li> </ul>	2-10 2-12 8-21
No connection from HXLink	<ul style="list-style-type: none"> <li>• Check the network settings</li> <li>• Check and make sure the status LED for ETHERMET is lit or flashing</li> <li>• Check to see if the LED on the PC network card (or switching hub or router) is flashing</li> <li>• Check to see if a ping command response was received from the PC</li> </ul>	—
I want to initialize the settings	<ul style="list-style-type: none"> <li>• Revert to the factory settings</li> </ul>	8-32

## ■ Recording

Problem	Solution	📖
Unable to access the ARM mode	<ul style="list-style-type: none"> <li>If the auto segment switch (recording method) is set to AUTO, or if the auto view function is used, recorded segments are protected and it won't switch to the ARM mode → <ul style="list-style-type: none"> <li>Reset the segments and erase the recorded video</li> <li>Set the auto segment switch to something other than AUTO</li> <li>Turn the auto view function OFF</li> </ul> </li> </ul>	4-52 4-57 8-23
Video won't update	<ul style="list-style-type: none"> <li>If set to EST(external signal synchronization) and the EST signals aren't input → Check the EST connection and input signals</li> <li>If the synchronization signal selection is incorrect → Select the synchronization signal to use</li> </ul>	4-67 9-49 4-65
No synchronization with EST signals	<ul style="list-style-type: none"> <li>If the EST signal polarity is incorrect → Set the EST enabled polarity</li> <li>If the synchronization signal selection is incorrect → Select the synchronization signal to use</li> </ul>	4-80 4-65
No external trigger input	<ul style="list-style-type: none"> <li>If the external trigger selection is incorrect → Select the external trigger to use</li> <li>Check whether or not the external trigger signals are enabled signals</li> <li>Set the external trigger signal enabled polarity</li> </ul>	4-61 9-47 4-80
Lens won't open or shut	<ul style="list-style-type: none"> <li>After turning the aperture to CLOSE, adjust the aperture of the lens.</li> <li>If the subject is too bright → Adjust the brightness of the lighting or adjust to match the record speed or shutter speed such as the lens filter</li> </ul>	2-3
Immediately after switching to the ARM mode, it changes to the REC mode	<ul style="list-style-type: none"> <li>If the external trigger input is enabled → Set the enabled polarity for the external trigger signals and check the trigger signals</li> <li>The recording method is LINEAR → It changes NORMAL</li> </ul>	4-80 4-54
Gets hot when used for long periods of time	<ul style="list-style-type: none"> <li>If slightly hot to the touch but there is no warning and the cooling fan is turning → It is within the normal operating range</li> <li>If the abnormal temperature warning is given → Turn off the power and contact the store where purchased</li> </ul>	—

## ■ Images

Problem	Solution	🔖
The video is completely black	<ul style="list-style-type: none"> <li>Remove the lens cap</li> <li>Set the record speed and shutter speed and prepare the necessary lighting</li> </ul>	3-17
Too much noise	<ul style="list-style-type: none"> <li>Gain too high → Set the sensor gain and digital gain</li> <li>Recalibrate the black balance</li> </ul>	5-7 6-8 4-35
Horizontal lines on the image	<ul style="list-style-type: none"> <li>If the EST synchronization recording conditions are not met → Set to match EST</li> <li>AEC is ON. → Turn AEC off.</li> </ul>	4-64 4-46
Image is horizontally or vertically broken (incorrect aspect ratio)	<ul style="list-style-type: none"> <li>Set the monitor display resolution to the optimal resolution</li> <li>If there are cases where there are settings relating to scaling (enlarge/reduce) on the monitor side, read the user's guide for the monitor in use</li> </ul>	8-5

## ■ Saving

Problem	Solution	🔖
Video not saved on the USB media	<ul style="list-style-type: none"> <li>Initialize the USB media during the first use</li> <li>If there is not enough free space on the USB media, use a different USB media or delete unneeded video or data</li> </ul>	7-16
Saving doesn't progress	<ul style="list-style-type: none"> <li>It takes time to save lots of data on USB Rule of thumb (It takes 1~2 hours to save 32GB as MCFF, and several hours for MJPEG)</li> <li>If you want to save it quicker, save by downloading with HXLink</li> </ul>	—

## ■ J-PAD3

Problem	Solution	🔖
J-PAD3 buttons don't respond	<ul style="list-style-type: none"> <li>Redirect the J-PAD3 (with the power on to the main unit)</li> </ul>	2-9
No operating sounds from the J-PAD3	<ul style="list-style-type: none"> <li>Set the operating sounds on the J-PAD3</li> </ul>	8-22
Trigger doesn't work from the J-PAD3	<ul style="list-style-type: none"> <li>Trigger input doesn't work if the recording method is burst</li> </ul>	4-57


## List of Warning Displays

Warning Message	Details	Response	Icon
Auto pilot init failed!	<ul style="list-style-type: none"> <li>The auto pilot sequence file cannot be read</li> </ul>	<ul style="list-style-type: none"> <li>Read the auto pilot section in the HXLink user's guide</li> </ul>	—
Auto pilot sequence error! LINE=*****	<ul style="list-style-type: none"> <li>The auto pilot sequence file description is wrong</li> </ul>	<ul style="list-style-type: none"> <li>Read the auto pilot section in the HXLink user's guide</li> </ul>	—
Black Balance does not suit. Recording setting differs from a recorded image.	<ul style="list-style-type: none"> <li>Black balance at a recording setting that does not match the recorded image</li> </ul>	<ul style="list-style-type: none"> <li>Black balance used the same settings as the recorded image (recording speed, shutter speed, frame size, sensor gain, GXC). (However, now with the same black balance correction as the recording time)</li> </ul>	4-35
	<ul style="list-style-type: none"> <li>Black balance does not match the recording settings</li> </ul>	<ul style="list-style-type: none"> <li>After recording finished, black balance immediately done without changing the settings.</li> </ul>	4-35
DCIN. High Voltage! ( Over 33V )	<ul style="list-style-type: none"> <li>The input voltage is too high</li> </ul>	<ul style="list-style-type: none"> <li>If AC POWER SYSTEM used → Turn off the power to the camera and AC adapter and contact us.</li> <li>If using other power supply → Check the voltage, current and waveform of the connected power supply</li> </ul>	—
DCIN. Low Voltage! ( Under 19V )	<ul style="list-style-type: none"> <li>Input voltage too low, unstable</li> </ul>	<ul style="list-style-type: none"> <li>If AC POWER SYSTEM used → Turn off the power to the camera and AC adapter and contact us.</li> <li>If using other power supply → Check the voltage, current and waveform of the connected power supply</li> </ul>	
DRP temperature is outside the range	<ul style="list-style-type: none"> <li>Abnormal camera temperature</li> </ul>	<ul style="list-style-type: none"> <li>If the ambient temperature is high → Use within the guaranteed operating temperature range. Do not place unit near strong light or heat.</li> <li>If the vents are blocked → Check the position of the vents and make sure they aren't blocked</li> </ul>	2-2  1-5 1-6

Other

Warning Message	Details	Response	📖
Memory protected. AUTOVIEW=AUTO	<ul style="list-style-type: none"> <li>Memory protected with the auto view function</li> </ul>	<ul style="list-style-type: none"> <li>Erase the recorded video</li> <li>Turn OFF the auto view function</li> </ul>	4-52 8-23
Memory protected. REC MODE=****	<ul style="list-style-type: none"> <li>Memory protected with the auto segment switch AUTO setting</li> </ul>	<ul style="list-style-type: none"> <li>Erase the recorded video</li> <li>Change the settings for the recording method</li> </ul>	4-52 4-57
No Battery.	<ul style="list-style-type: none"> <li>The memory backup battery is not installed</li> </ul>	<ul style="list-style-type: none"> <li>The camera may be malfunctioned. Please contact a NAC's authorized distributor/sales rep in your region.</li> </ul>	—
Power Drop Detected. *****	<ul style="list-style-type: none"> <li>Input power source is unstable (intermittent outages)</li> </ul>	<ul style="list-style-type: none"> <li>If AC POWER SYSTEM used → Turn off the power to the camera and AC adapter and contact us.</li> </ul>	—
RTC battery is low power!	<ul style="list-style-type: none"> <li>RTC battery dead</li> </ul>	<ul style="list-style-type: none"> <li>Contact us for RTC battery replacement</li> </ul>	—
	<ul style="list-style-type: none"> <li>Old date setting</li> </ul>	<ul style="list-style-type: none"> <li>If set to date before 2003 → Set to the current date</li> <li>If connected to PC set to date before 2003 using HXLink → Set the date on the PC (read the HXLink user's guide for details)</li> </ul>	8-9
Saving failure!	<ul style="list-style-type: none"> <li>Can't save on USB media</li> </ul>	<ul style="list-style-type: none"> <li>USB device is not operating properly (compatibility issue) → Use a different media</li> </ul>	—
Sensor temperature is outside the range.	<ul style="list-style-type: none"> <li>Abnormal sensor temperature</li> </ul>	<ul style="list-style-type: none"> <li>If the ambient temperature is high → Use within the guaranteed operating temperature range. Do not place unit near strong light or heat.</li> </ul>	2-2
		<ul style="list-style-type: none"> <li>If the vents are blocked → Check the position of the vents and make sure they aren't blocked</li> </ul>	1-5 1-6

Warning Message	Details	Response	🔔
Trigger signal is asserted. Trigger signal is asserted. [ARM]	<ul style="list-style-type: none"> <li>External trigger is input during startup and when switching to the VIEW/ARM mode</li> </ul>	<ul style="list-style-type: none"> <li>The external input/output enabled polarity is not set properly</li> </ul>	4-80
		<ul style="list-style-type: none"> <li>Error in external input/output connection (Ex. : EST1 signals connected to TRIG1) → Properly connect</li> <li>If the external input/output is incorrect or if there is noise → Input the correct signals</li> </ul>	4-60
Update Black Balance Data!	<ul style="list-style-type: none"> <li>The black balance must be updated</li> </ul>	<ul style="list-style-type: none"> <li>Update the black balance</li> </ul>	4-35

 **Attention** • If a warning message appears that is not on this list, verify the message details and contact us.

## Contact Us

When contacting us for troubleshooting, maintenance or repair, in addition a description of the symptoms, have the following information available to expedite the process.

If it can be turned on and started up

- |                                        |                                                                                          |
|----------------------------------------|------------------------------------------------------------------------------------------|
| • CID (camera identification number) : | CID verification method (▶▶ 8-29)                                                        |
| • Memory :                             | Memory verification method (▶▶ 8-29)                                                     |
| • Serial number (production number) :  | The four digit number written on the label affixed to the base of the main unit (▶▶ 1-6) |

If it cannot be powered on

- |                                       |                                                                       |
|---------------------------------------|-----------------------------------------------------------------------|
| • Serial number (production number) : | Four digit number written on the label affixed to the bottom (▶▶ 1-6) |
|---------------------------------------|-----------------------------------------------------------------------|

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# 10

## Specifications

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# Image Sensor

## ■ Photographic Element

Format	Approx. 2.2 inch CMOS sensor(color/black and white)
Number of Pixels	2560 × 1920 pixels(4,910,000 pixels)
Size of Area	28.16 × 21.12 mm
Precision at Center Optical Axis	±0.5 mm

## ■ Frame Rates MEMRECAM HX-3

Preset Frame Rates	50, 60, 100, 250, 500, 1,000, 2,000, 2,500, 3,000, 4,000, 4,500, 5,000, 6,000, 7,000, 7,500, 8,000, 10,000, 20,000, 25,000, 30,000, 40,000, 50,000, 75,000, 100,000, 200,000, 300,000, 400,000, 600,000, 700,000, 900,000, 1,300,000 frames/sec
Custom Frame Rates	50~1,300,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~1,210,000 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-3

Preset(GXC OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
2,000 or less	2560	1920	Full 4:3	28.16	21.12
2,000	2432	1824	Split 4:3	26.75	20.06
2,500 or less	2560	1440	Split 16:9	28.16	15.84
2,500	2176	1632	Split 4:3	23.94	17.95
2,500	1920	1920	Split 1:1	21.12	21.12
3,000	2048	1536	QXGA 4:3	22.53	16.90
3,000	1792	1792	Split 1:1	19.71	19.71
3,000	2304	1296	Split	25.34	14.26
3,000	1920	1440	Split 16:9	21.12	15.84
4,000	1792	1344	Split 4:3	19.71	14.78
4,000	1536	1536	Split 1:1	16.90	16.90
4,000	1920	1200	WUXGA	21.12	13.2
4,500 or less	1920	1080	Full HD 16:9	21.12	11.88
5,000	1536	1152	Split 4:3	16.90	12.67
5,000	1280	1280	Split 1:1	14.08	14.08
6,000	1408	1056	Split 4:3	15.49	11.62
7,000	1280	1024	SXGA 5:4	14.08	11.26
7,000	1280	992	Split	14.08	10.91

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
7,500 or less	1280	960	Split 4:3	28.16/14.08	21.12/10.56
8,000	1408	784	Split	———/15.49	———/8.62
8,000	1152	864	Split 4:3	25.34/12.67	19.01/9.50
10,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
10,000	1152	752	Split	25.34/12.67	16.54/8.27
10,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
10,000	960	960	Split 1:1	21.12/10.56	21.12/10.56
20,000	768	576	Split 4:3	16.90/8.45	12.67/6.34
20,000	768	512	Split	16.90/8.45	11.26/5.63
20,000	640	640	Split 1:1	14.08/7.04	14.08/7.04
25,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
30,000	640	384	Split	14.08/7.04	8.45/4.22
30,000	512	512	Split 1:1	11.26/5.63	11.26/5.63
40,000	640	272	Split	14.08/7.04	5.98/2.99
40,000	512	384	Split 4:3	11.26/5.63	8.45/4.22
50,000	512	264	Split	11.26/5.63	5.81/2.90
50,000	384	384	Split 1:1	8.45/4.22	8.45/4.22
75,000	384	272	Split 4:3	8.45/4.22	5.98/2.99
75,000	384	208	Split	8.45/4.22	4.58/2.29
100,000	384	200	Split	8.45/4.22	4.40/2.20
100,000	320	232	QVGA 4:3	7.04/3.52	5.10/2.55
100,000	320	168	Split	7.04/3.52	3.70/1.85
200,000	320	104	Split	7.04/3.52	2.29/1.14
200,000	320	40	Split	7.04/3.52	0.88/0.44
300,000	320	64	Split	7.04/3.52	1.41/0.70
300,000	320	8	Split	7.04/3.52	0.18/0.09
400,000	320	40	Split	7.04/3.52	0.88/0.44
600,000	320	24	Split	7.04/3.52	0.53/0.26
700,000	320	16	Split	7.04/3.52	0.35/0.18
900,000	320	8	Split	7.04/3.52	0.18/0.09

1,300,000	320	8	Split	7.04/3.52	0.18/0.09
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Custom Frame Size	Horizontal 64 Pixels, Vertical 8 Pixel units
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## ■ Frame Rates MEMRECAM HX-3L

Preset Frame Rates	50, 60, 100, 250, 500, 750, 1,000, 2,000, 2,500, 3,000, 4,000, 4,500, 5,000, 6,000, 7,000, 7,500, 8,000, 10,000, 20,000, 25,000, 30,000, 40,000, 50,000, 75,000, 100,000, 200,000, 300,000, 400,000, 600,000, 640,000, 909,090 (preset only) frames/sec
Custom Frame Rates	50~640,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~640,000 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-3L

Preset(GXC OFF)	Maximum Frame Rate and Valid Pixels(Area)				
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
2,000 or less	2560	1920	Full 4:3	28.16	21.12
2,000	2432	1824	Split 4:3	26.75	20.06
2,500 or less	2560	1440	Split 16:9	28.16	15.84
2,500	2176	1632	Split 4:3	23.94	17.95
2,500	1920	1920	Split 1:1	21.12	21.12
3,000	2048	1536	QXGA 4:3	22.53	16.90
3,000	1792	1792	Split 1:1	19.71	19.71
3,000	2304	1296	Split	25.34	14.26
3,000	1920	1440	Split 16:9	21.12	15.84
4,000	1792	1344	Split 4:3	19.71	14.78
4,000	1536	1536	Split 1:1	16.90	16.90
4,000	1920	1200	WUXGA	21.12	13.2
4,500 or less	1920	1080	Full HD 16:9	21.12	11.88
5,000	1536	1152	Split 4:3	16.90	12.67
5,000	1280	1280	Split 1:1	14.08	14.08
6,000	1408	1056	Split 4:3	15.49	11.62
7,000	1280	1024	SXGA 5:4	14.08	11.26
7,000	1280	992	Split	14.08	10.91

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
7,500 or less	1280	960	Split 4:3	28.16/14.08	21.12/10.56
8,000	1408	784	Split	——/15.49	——/8.62
8,000	1152	864	Split 4:3	25.34/12.67	19.01/9.50
10,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
10,000	1152	752	Split	25.34/12.67	16.54/8.27
10,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
10,000	960	960	Split 1:1	21.12/10.56	21.12/10.56
20,000	768	576	Split 4:3	16.90/8.45	12.67/6.34
20,000	768	512	Split	16.90/8.45	11.26/5.63
20,000	640	640	Split 1:1	14.08/7.04	14.08/7.04
25,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
30,000	640	384	Split	14.08/7.04	8.45/4.22
30,000	512	512	Split 1:1	11.26/5.63	11.26/5.63
40,000	640	272	Split	14.08/7.04	5.98/2.99
40,000	512	384	Split 4:3	11.26/5.63	8.45/4.22
50,000	512	264	Split	11.26/5.63	5.81/2.90
50,000	384	384	Split 1:1	8.45/4.22	8.45/4.22
75,000	384	272	Split 4:3	8.45/4.22	5.98/2.99
75,000	384	208	Split	8.45/4.22	4.58/2.29
100,000	384	200	Split	8.45/4.22	4.40/2.20
100,000	320	232	Split	7.04/3.52	5.10/2.55
100,000	320	168	Split	7.04/3.52	4.22/2.11
200,000	384	88	Split	8.45/4.22	1.94/0.97
200,000	320	40	Split	7.04/3.52	0.88/0.44
300,000	320	64	Split	7.04/3.52	1.41/0.70
400,000	320	40	Split	7.04/3.52	0.88/0.44
600,000	320	24	Split	7.04/3.52	0.53/0.26
640,000	320	24	Split	7.04/3.52	0.53/0.26
909,090	320	16	Split	7.04/3.52	0.35/0.18

Custom Frame Size	Horizontal 64 Pixels, Vertical 24 Pixel units
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## ■ Frame Rates MEMRECAM HX-3E

Preset Frame Rates	50, 60, 100, 250, 500, 750, 1,000, 2,000, 2,500, 3,000, 4,000, 4,500, 5,000, 6,000, 7,000, 7,500, 8,000, 10,000, 20,000, 25,000, 30,000, 40,000, 50,000, 75,000, 100,000, 200,000, 220,000 frames/sec
Custom Frame Rates	50~220,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~220,000 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-3E

Preset(GXC OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
2,000 or less	2560	1920	Full 4:3	28.16	21.12
2,000	2432	1824	Split 4:3	26.75	20.06
2,500 or less	2560	1440	Split 16:9	28.16	15.84
2,500	2176	1632	Split 4:3	23.94	17.95
2,500	1920	1920	Split 1:1	21.12	21.12
3,000	2048	1536	QXGA 4:3	22.53	16.90
3,000	1792	1792	Split 1:1	19.71	19.71
3,000	2304	1296	Split	25.34	14.26
3,000	1920	1440	Split 16:9	21.12	15.84
4,000	1792	1344	Split 4:3	19.71	14.78
4,000	1536	1536	Split 1:1	16.90	16.90
4,000	1920	1200	WUXGA	21.12	13.2
4,500 or less	1920	1080	Full HD 16:9	21.12	11.88
5,000	1536	1152	Split 4:3	16.90	12.67
5,000	1280	1280	Split 1:1	14.08	14.08
6,000	1408	1056	Split 4:3	15.49	11.62
7,000	1280	1024	SXGA 5:4	14.08	11.26
7,000	1280	992	Split	14.08	10.91

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
7,500 or less	1280	960	Split 4:3	28.16/14.08	21.12/10.56
8,000	1408	784	Split	——/15.49	——/8.62
8,000	1152	864	Split 4:3	25.34/12.67	19.01/9.50
10,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
10,000	1152	752	Split	25.34/12.67	16.54/8.27
10,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
10,000	960	960	Split 1:1	21.12/10.56	21.12/10.56
20,000	768	576	Split 4:3	16.90/8.45	12.67/6.34
20,000	768	512	Split	16.90/8.45	11.26/5.63
20,000	640	640	Split 1:1	14.08/7.04	14.08/7.04
25,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
30,000	640	384	Split	14.08/7.04	8.45/4.22
30,000	512	512	Split 1:1	11.26/5.63	11.26/5.63
40,000	640	272	Split	14.08/7.04	5.98/2.99
40,000	512	384	Split 4:3	11.26/5.63	8.45/4.22
50,000	512	264	Split	11.26/5.63	5.81/2.90
50,000	384	384	Split 1:1	8.45/4.22	8.45/4.22
75,000	384	272	Split 4:3	8.45/4.22	5.98/2.99
75,000	384	208	Split	8.45/4.22	4.58/2.29
100,000	384	200	Split	8.45/4.22	4.40/2.20
100,000	320	232	Split	7.04/3.52	5.10/2.55
100,000	320	168	Split	7.04/3.52	4.22/2.11
200,000	320	104	Split	7.04/3.52	2.29/1.14
220,000	320	96	Split	7.04/3.52	2.11/1.05

Custom Frame Size

Horizontal 64 Pixels, Vertical 96 Pixel units

## ■ Frame Rates MEMRECAM HX-4

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、5,000、6,000、7,500、8,000、10,000、15,000、20,000、25,000、30,000、40,000、60,000、80,000、100,000、200,000、300,000、400,000、600,000、750,000、1,000,000、1,080,000 frames/sec
Custom Frame Rates	50~1,080,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~1,083,330 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-4

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
6,000 or less	1280	960	Full 4:3	28.16/14.08	21.12/10.56
6,000	1280	928	Split	28.16/14.08	20.42/10.21
7,500	1152	864	Split4:3	25.34/12.67	19.01/9.50
8,000	1280	736	Split	28.16/14.08	16.19/8.10
8,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
8,000	1280	688	Split	28.16/14.08	15.14/7.67
8,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
8,000	960	960	Split1:1	21.12/10.56	21.12/10.56
10,000	1152	656	Split	25.34/12.67	14.43/7.22
10,000	1024	720	Split	22.53/11.26	15.84/7.92
10,000	960	720	Split 4:3	21.12/10.56	15.84/7.92
10,000	896	768	Split	19.71/9.86	16.90/8.45
15,000	896	544	Split	19.71/9.86	11.97/5.98
15,000	768	576	Split4:3	16.90/8.45	12.67/6.34
15,000	640	640	Split1:1	14.08/7.04	14.08/7.04
20,000	768	464	Split	16.90/8.45	10.21/5.10
20,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
25,000	640	432	Split	14.08/7.04	9.50/4.75
25,000	512	512	Split1:1	11.26/5.63	11.26/5.63
25,000	512	472	Split	11.26/5.63	10.38/5.19
30,000	512	440	Split	11.26/5.63	9.68/4.84

Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
30,000	512	384	Split4:3	11.26/5.63	8.45/4.22
40,000	640	264	Split	14.08/7.04	5.81/2.90
40,000	512	264	Split 16:9	11.26/5.63	5.81/2.90
40,000	384	384	Split1:1	8.45/4.22	8.45/4.22
60,000	384	272	Split4:3	8.45/4.22	5.98/2.99
60,000	384	208	Split	8.45/4.22	4.58/2.29
80,000	384	200	Split 16:9	8.45/4.22	4.40/2.20
80,000	320	232	QVGA 4:3	7.04/3.52	5.10/2.55
80,000	320	168	Split	7.04/3.52	3.70/1.85
100,000	384	160	Split	8.45/4.22	3.52/1.76
100,000	320	120	Split	7.04/3.52	2.64/1.32
200,000	320	80	Split	7.04/3.52	1.76/0.88
200,000	320	16	Split	7.04/3.52	0.35/0.18
300,000	384	40	Split	8.45/4.22	0.88/0.44
300,000	320	48	Split	7.04/3.52	1.06/0.53
400,000	320	32	Split	7.04/3.52	0.70/0.35
600,000	320	16	Split	7.04/3.52	0.35/0.18
750,000	320	8	Split	7.04/3.52	0.18/0.09
1,000,000	320	8	Split	7.04/3.52	0.18/0.09
1,080,000	320	8	Split	7.04/3.52	0.18/0.09

Custom Frame Size

Horizontal 64 Pixels, Vertical 8 Pixel units

## ■ Frame Rates MEMRECAM HX-4E

Preset Frame Rates	50、60、100、250、500、1,000、2,000、2,500、3,000、4,000、5,000、6,000、7,500、8,000、10,000、15,000、20,000、25,000、30,000、40,000、60,000、80,000、100,000、200,000、210,000 frames/sec
Custom Frame Rates	50~210,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~210,000 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-4E

Preset(GXC ON/OFF)	Maximum Frame Rate and Valid Pixels(Area)				
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
6,000 or less	1280	960	Full 4:3	28.16/14.08	21.12/10.56
6,000	1280	928	Split	28.16/14.08	20.42/10.21
7,500	1152	864	Split4:3	25.34/12.67	19.01/9.50
8,000	1280	736	Split	28.16/14.08	16.19/8.10
8,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
8,000	1280	688	Split	28.16/14.08	15.14/7.67
8,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
8,000	960	960	Split1:1	21.12/10.56	21.12/10.56
10,000	1152	656	Split	25.34/12.67	14.43/7.22
10,000	1024	720	Split	22.53/11.26	15.84/7.92
10,000	960	720	Split 4:3	21.12/10.56	15.84/7.92
10,000	896	768	Split	19.71/9.86	16.90/8.45
15,000	896	544	Split	19.71/9.86	11.97/5.98
15,000	768	576	Split4:3	16.90/8.45	12.67/6.34
15,000	640	640	Split1:1	14.08/7.04	14.08/7.04
20,000	768	464	Split	16.90/8.45	10.21/5.10
20,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
25,000	640	432	Split	14.08/7.04	9.50/4.75
25,000	512	512	Split1:1	11.26/5.63	11.26/5.63
25,000	512	472	Split	11.26/5.63	10.38/5.19
30,000	512	440	Split	11.26/5.63	9.68/4.84

Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
30,000	512	384	Split4:3	11.26/5.63	8.45/4.22
40,000	640	264	Split	14.08/7.04	5.81/2.90
40,000	512	264	Split 16:9	11.26/5.63	5.81/2.90
40,000	384	384	Split1:1	8.45/4.22	8.45/4.22
60,000	384	272	Split4:3	8.45/4.22	5.98/2.99
60,000	384	208	Split	8.45/4.22	4.58/2.29
80,000	384	200	Split 16:9	8.45/4.22	4.40/2.20
80,000	320	232	QVGA 4:3	7.04/3.52	5.10/2.55
80,000	320	168	Split	7.04/3.52	3.70/1.85
100,000	384	160	Split	8.45/4.22	3.52/1.76
100,000	320	120	Split	7.04/3.52	2.64/1.32
200,000	320	80	Split	7.04/3.52	1.76/0.88
210,000	320	80	Split	7.04/3.52	1.76/0.88

Custom Frame Size

Horizontal 64 Pixels, Vertical 80 Pixel units

## ■ Frame Rates MEMRECAM HX-5E

Preset Frame Rates	50、60、100、250、500、1,000、1,250、1,500、2,000、2,500、3,000、3,500、4,000、4,500、5,000、6,000、7,000、8,000、10,000、15,000、20,000、25,000、30,000、40,000、50,000、70,000、100,000、200,000、210,000 frames/sec
Custom Frame Rates	50~210,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~210,000 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-5

Preset(GXC OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
1,250 or less	2560	1920	Full 4:3	28.16	21.12
1,500 or less	2560	1440	WQHD 16:9	28.16	15.84
1,500	2176	1632	Split4:3	23.94	17.95
1,500	1920	1920	Split1:1	21.12	21.12
2,000	2432	1368	Split 16:9	26.75	15.05
2,000	2048	1536	QXGA 4:3	22.53	16.90
2,000	1792	1792	Split1:1	19.71	19.71
2,500	1792	1344	Split4:3	19.71	14.78
2,500	1664	1584	Split	18.30	17.42
2,500	1536	1536	Split1:1	16.90	16.90
3,000 or less	1920	1080	Full HD 16:9	21.12	11.88
3,000	1664	1248	Split 4:3	18.30	14.08
3,000	1408	1408	Split 1:1	15.49	15.49
3,500	1792	1008	Split 16:9	19.71	11.09
3,500	1536	1152	Split4:3	16.90	12.67
3,500	1280	1280	Split1:1	14.08	14.08
4,000	1536	1056	Split	16.70	11.62
4,000	1408	1056	Split 4:3	15.49	11.62
4,000	1280	1264	Split	14.08	13.90
4,500	1280	1024	SXGA 5:4	14.08	11.26

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical			Horizontal
5,000 or less	1280	960	Split4:3	28.16/14.08	21.12/10.56
6,000	1152	864	Split4:3	25.34/12.67	19.01/9.50
6,000	1024	1024	Split 1:1	——/11.26	——/11.26
7,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
7,000	1024	816	Split	22.53/11.26	17.95/8.97
8,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
8,000	896	816	Split	19.71/9.86	17.95/8.98
10,000	1024	608	Split	22.53/11.26	13.38/6.69
10,000	896	688	Split	19.71/9.86	15.14/7.57
10,000	896	672	Split4:3	19.71/9.86	14.78/7.39
10,000	768	768	Split1:1	16.90/8.45	16.90/8.45
10,000	896	632	Split	19.71/9.86	13.90/6.95
15,000	768	528	Split	16.90/8.45	11.62/5.81
15,000	640	624	Split	14.08/7.04	13.73/6.86
15,000	768	464	Split	16.90/8.49	10.21/5.10
15,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
20,000	640	464	Split	14.08/7.04	10.21/5.10
20,000	768	384	Split	16.90/8.45	8.45/4.22
20,000	512	560	Split	11.26/5.63	12.32/6.16
20,000	512	512	Split1:1	11.26/5.63	11.26/5.63
20,000	640	400	Split	14.08/7.04	8.8/4.4
25,000	640	368	Split	14.08/7.04	8.10/4.05
25,000	512	448	Split	11.26/5.63	9.86/4.93
25,000	512	384	Split4:3	11.26/5.63	8.45/4.22
30,000	768	256	Split	16.90/8.45	5.93/2.82
30,000	640	304	Split	14.08/7.04	6.69/3.34
30,000	512	368	Split	11.26/5.63	8.10/4.05
30,000	512	312	Split	11.26/5.63	6.86/3.43
30,000	384	384	Split1:1	8.45/4.22	8.45/4.22



Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical			Horizontal
40,000	384	288	Split	8.45/4.22	6.34/3.17
50,000	512	216	Split	11.26/5.63	4.75/2.38
50,000	384	280	Split4:3	8.45/4.22	6.16/3.08
50,000	384	216	Split	8.45/4.22	4.75/2.38
70,000	384	162	Split	8.45/4.22	4.22/2.11
70,000	320	224	Split	7.04/3.52	4.93/2.46
70,000	320	160	Split	7.04/3.52	3.52/1.76
100,000	384	128	Split	8.45/4.22	2.82/1.41
100,000	320	152	Split	7.04/3.52	3.34/1.67
100,000	320	88	Split	7.04/3.52	1.94/0.97
200,000	384	56	Split	8.45/4.22	1.23/0.62
200,000	320	64	Split	7.04/3.52	1.41/0.70
210,000	320	64	Split	7.04/3.52	1.41/0.70

Custom Frame Size

Horizontal 64 Pixels, Vertical 64 Pixel units

## ■ Frame Rates MEMRECAM HX-6

Preset Frame Rates	50、60、100、250、500、1,000、1,250、1,500、2,000、2,500、3,000、3,500、4,00、5,000、6,000、8,000、10,000、15,000、20,000、25,000、30,000、50,000、70,000、100,000、150,000、200,000、300,000、350,000、450,000、650,000 frames/sec
Custom Frame Rates	50~650,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~677,960 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-6

Preset(GXC OFF) Maximum Frame Rate and Valid Pixels(Area)					
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
1,000 or less	2560	1920	Full フル 4:3	28.16	21.12
1,250 or less	2560	1440	WQHD 16:9	28.16	15.84
1,250	2176	1632	Split 4:3	23.94	17.95
1,250	1920	1920	Split1:1	21.12	21.12
1,500	2048	1536	QXGA 4:3	22.53	16.90
1,500	2048	1520	Split	22.53	16.72
1,500	1792	1792	Split1:1	19.71	19.71
2,000 or less	1920	1080	Full HD 16:9	21.12	11.88
2,000	1792	1344	Split4:3	19.71	14.78
2,000	1536	1536	Split1:1	16.90	16.90
2,000	1792	1280	Split	19.71	14.08
2,500	1536	1152	Split4:3	16.90	12.67
2,500	1280	1280	Split1:1	14.08	14.08
3,000	1408	1056	Split4:3	15.49	11.62
3,500	1280	1024	SXGA 5:4	14.08	11.26

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
3,500 or less	1280	960	Split4:3	28.16/14.08	21.12/10.56
4,500	1152	864	Split4:3	25.34/12.67	19.01/9.50
4,500	1024	944	Split	22.53/11.26	20.77/10.38
5,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
5,000	1024	896	Split	22.53/11.26	19.71/9.86
5,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
6,000	1152	672	Split	25.34/12.67	14.78/7.40
6,000	1024	752	Split	22.53/11.26	16.54/8.27
6,000	896	848	Split	19.71/9.86	18.66/9.33
6,000	1024	688	Split	22.53/11.26	15.14/7.57
8,000	1024	560	Split	22.53/11.26	12.32/6.16
8,000	896	624	Split	19.71/9.86	13.73/6.86
8,000	896	576	Split	19.71/9.86	12.67/6.34
8,000	768	720	Split	16.90/8.45	15.84/7.92
10,000	896	504	Split 16:9	19.71/9.86	11.09/5.54
10,000	768	576	Split 4:3	16.90/8.45	12.67/6.34
10,000	768	512	Split	16.90/8.45	11.26/5.63
10,000	640	640	Split1:1	14.08/7.04	14.08/7.04
10,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
15,000	768	384	Split	16.90/8.45	8.45/4.22
15,000	640	448	Split	14.08/7.04	9.86/4.93
15,000	640	384	Split	14.08/7.04	8.45/4.22
15,000	512	512	Split1:1	11.26/5.63	11.26/5.63
20,000	640	336	Split	14.08/7.04	7.39/3.70
20,000	640	272	Split	14.08/7.04	5.98/2.99
20,000	512	400	Split	11.26/5.63	8.8/4.4
20,000	512	384	Split4:3	11.26/5.63	8.45/4.22
25,000	512	328	Split4:3	11.26/5.63	7.22/3.61
25,000	512	264	Split	11.26/5.63	5.81/2.90
25,000	384	384	Split1:1	8.45/4.22	8.45/4.22

Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
30,000	512	272	Split 16:9	11.26/5.63	5.98/2.99
30,000	448	304	Split	9.86/4.93	6.69/3.34
30,000	384	280	Split	8.45/4.22	6.16/3.08
50,000	512	160	Split	11.26/5.63	3.52/1.76
50,000	384	200	Split 16:9	8.45/4.22	4.40/2.20
50,000	320	232	QVGA 4:3	7.04/3.52	5.10/2.55
50,000	320	168	Split	7.04/3.52	3.70/1.85
70,000	512	112	Split	11.26/5.63	2.46/1.23
70,000	384	136	Split	8.45/4.22	2.99/1.50
70,000	320	160	Split	7.04/3.52	3.52/1.76
70,000	320	96	Split	7.04/3.52	2.11/1.06
100,000	512	72	Split	11.26/5.63	1.58/0.92
100,000	384	96	Split	8.45/4.22	2.11/1.06
100,000	320	112	Split	7.04/3.52	2.46/1.23
100,000	320	48	Split	7.04/3.52	1.06/0.53
150,000	384	56	Split	8.45/4.22	1.23/0.62
150,000	320	64	Split	7.04/3.52	1.41/0.70
150,000	320	8	Split	7.04/3.52	0.18/0.09
200,000	448	32	Split	9.86/4.93	0.70/0.35
200,000	384	40	Split	8.45/4.22	0.88/0.44
200,000	320	48	Split	7.04/3.52	1.06/0.53
300,000	320	24	Split	7.04/3.52	0.53/0.26
350,000	320	24	Split	7.04/3.52	0.53/0.26
450,000	320	16	Split	7.04/3.52	0.35/0.18
650,000	320	8	Split	7.04/3.52	0.18/0.09

Custom Frame Size

Horizontal 64 Pixels, Vertical 8 Pixel units

## ■ Frame Rates MEMRECAM HX-6

Preset Frame Rates	50、60、100、250、500、1,000、1,250、1,500、2,000、2,500、3,000、3,500、4,00、5,000、6,000、8,000、10,000、15,000、20,000、25,000、30,000、50,000、70,000、100,000、150,000、200,000、300,000、350,000、450,000、650,000 frames/sec
Custom Frame Rates	50~650,000 frames/sec (increment of 10 frames/sec)
EST and Custom Frame Rates	0~677,960 frames/sec

## ■ Frame Rate and Valid Pixels MEMRECAM HX-6

Preset(GXC OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
1,000 or less	2560	1920	Full フル 4:3	28.16	21.12
1,250 or less	2560	1440	WQHD 16:9	28.16	15.84
1,250	2176	1632	Split 4:3	23.94	17.95
1,250	1920	1920	Split1:1	21.12	21.12
1,500	2048	1536	QXGA 4:3	22.53	16.90
1,500	2048	1520	Split	22.53	16.72
1,500	1792	1792	Split1:1	19.71	19.71
2,000 or less	1920	1080	Full HD 16:9	21.12	11.88
2,000	1792	1344	Split4:3	19.71	14.78
2,000	1536	1536	Split1:1	16.90	16.90
2,000	1792	1280	Split	19.71	14.08
2,500	1536	1152	Split4:3	16.90	12.67
2,500	1280	1280	Split1:1	14.08	14.08
3,000	1408	1056	Split4:3	15.49	11.62
3,500	1280	1024	SXGA 5:4	14.08	11.26

Preset(GXC ON/OFF)		Maximum Frame Rate and Valid Pixels(Area)			
Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
3,500 or less	1280	960	Split4:3	28.16/14.08	21.12/10.56
4,500	1152	864	Split4:3	25.34/12.67	19.01/9.50
4,500	1024	944	Split	22.53/11.26	20.77/10.38
5,000 or less	1280	720	HDTV720 16:9	28.16/14.08	15.84/7.92
5,000	1024	896	Split	22.53/11.26	19.71/9.86
5,000	1024	768	XGA 4:3	22.53/11.26	16.90/8.45
6,000	1152	672	Split	25.34/12.67	14.78/7.40
6,000	1024	752	Split	22.53/11.26	16.54/8.27
6,000	896	848	Split	19.71/9.86	18.66/9.33
6,000	1024	688	Split	22.53/11.26	15.14/7.57
8,000	1024	560	Split	22.53/11.26	12.32/6.16
8,000	896	624	Split	19.71/9.86	13.73/6.86
8,000	896	576	Split	19.71/9.86	12.67/6.34
8,000	768	720	Split	16.90/8.45	15.84/7.92
10,000	896	504	Split 16:9	19.71/9.86	11.09/5.54
10,000	768	576	Split 4:3	16.90/8.45	12.67/6.34
10,000	768	512	Split	16.90/8.45	11.26/5.63
10,000	640	640	Split1:1	14.08/7.04	14.08/7.04
10,000	640	480	VGA 4:3	14.08/7.04	10.56/5.28
15,000	768	384	Split	16.90/8.45	8.45/4.22
15,000	640	448	Split	14.08/7.04	9.86/4.93
15,000	640	384	Split	14.08/7.04	8.45/4.22
15,000	512	512	Split1:1	11.26/5.63	11.26/5.63
20,000	640	336	Split	14.08/7.04	7.39/3.70
20,000	640	272	Split	14.08/7.04	5.98/2.99
20,000	512	400	Split	11.26/5.63	8.8/4.4
20,000	512	384	Split4:3	11.26/5.63	8.45/4.22
25,000	512	328	Split4:3	11.26/5.63	7.22/3.61
25,000	512	264	Split	11.26/5.63	5.81/2.90
25,000	384	384	Split1:1	8.45/4.22	8.45/4.22

Maximum Frame Rate (frames/sec)	Valid Pixels		Horizontal/Vertical Ratio (Name)	Size of Valid Photographic Area (mm)	
	Horizontal	Vertical		Horizontal	Vertical
30,000	512	272	Split 16:9	11.26/5.63	5.98/2.99
30,000	448	304	Split	9.86/4.93	6.69/3.34
30,000	384	280	Split	8.45/4.22	6.16/3.08
50,000	512	160	Split	11.26/5.63	3.52/1.76
50,000	384	200	Split 16:9	8.45/4.22	4.40/2.20
50,000	320	232	QVGA 4:3	7.04/3.52	5.10/2.55
50,000	320	168	Split	7.04/3.52	3.70/1.85
70,000	512	112	Split	11.26/5.63	2.46/1.23
70,000	384	136	Split	8.45/4.22	2.99/1.50
70,000	320	160	Split	7.04/3.52	3.52/1.76
70,000	320	96	Split	7.04/3.52	2.11/1.06
100,000	512	72	Split	11.26/5.63	1.58/0.92
100,000	384	96	Split	8.45/4.22	2.11/1.06
100,000	320	112	Split	7.04/3.52	2.46/1.23
100,000	320	48	Split	7.04/3.52	1.06/0.53
150,000	384	56	Split	8.45/4.22	1.23/0.62
150,000	320	64	Split	7.04/3.52	1.41/0.70
150,000	320	48	Split	7.04/3.52	1.06/0.53

Custom Frame Size

Horizontal 64 Pixels, Vertical 48 Pixel units

## ■ Sensitivity MEMRECAM HX-3, HX-3L, HX-3E, HX-5, HX-5E, HX-6, HX-6E

Color	ISO2,000 (with 2400lx, F4, 1000 frames/sec , Shutter 1/1000s, GXC : OFF digital gain : NORMAL)
B/W	ISO10,000 (with 600lx, F4, 1000 frames/sec , Shutter 1/1000s, GXC : OFF digital gain : NORMAL)

※ Illumination when the subject output signals for a reflection rate of 89% reach 100%, lens adjusted for the aperture.

## MEMRECAM HX-4, HX-4E

Color	ISO8,000 (with 600lx, F4, 1000 frames/sec , Shutter 1/1000s, GXC : ON digital gain : NORMAL)
B/W	ISO40,000 (with 150lx, F4, 1000 frames/sec , Shutter 1/1000s, GXC : ON digital gain : NORMAL)

※ Illumination when the subject output signals for a reflection rate of 89% reach 100%, lens adjusted for the aperture.

## ■ Shutter MEMRECAM HX-3

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>50~400,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not) , 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> <li>600,000 frames/sec Shutter OPEN 1.6μs</li> <li>1,300,000 frames/sec Shutter OPEN 0.6μs</li> </ul>
Custom Settings	0.2~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed



## ■ Shutter MEMRECAM HX-3L

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~400,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> <li>· 600,000 frames/sec Shutter OPEN 1.6μs</li> <li>· 909,090 frames/sec Shutter OPEN 1.26μs</li> </ul>
Custom Settings	1.0~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-3E

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~220,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> </ul>
Custom Settings	1.1~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-4

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~400,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> <li>· 1,080,000 frames/sec Shutter OPEN 0.82μs</li> </ul>
Custom Settings	0.3~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-4E

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~210,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> </ul>
Custom Settings	1.1~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-5

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~400,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> <li>· 900,000 frames/sec Shutter OPEN 0.97μs</li> </ul>
Custom Settings	0.3~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-5E

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~210,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> </ul>
Custom Settings	1.1~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-6

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~400,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> <li>· 650,000 frames/sec Shutter OPEN 1.34μs</li> </ul>
Custom Settings	0.4~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Shutter MEMRECAM HX-6E

Shutter Method	Electronic shutter
Shutter Time Setting Method	Select from present / custom set
Preset	<ul style="list-style-type: none"> <li>· 50~200,000 frames/sec</li> <li>OPEN (50 and 60 frame/sec not), 1/100, 1/250, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000</li> </ul>
Custom Settings	1.1~10000μs(= 10ms = 1/100s) 1 / can be set to a longer exposure time than the Frame Rate
Auto Exposure	Setting : ON / OFF Function : 10μs~Auto adjustment of exposure time at set shutter speed

## ■ Lens Mount

Type of Mount	F Mount, C Mount, NM Mount, EF Mount(select at purchase)
F Mount	NIKON F Mount, compatible with lens without a diaphragm
C Mount	Vignetting from the image resolution
NM Mount	Compatible with Leica M Mount
EF Mount	CANON EF Mount
	Focus and diaphragm remote control, auto control function(HXLink)

## ■ Timing Compatibility with Conventional Products

HX-3 standard timing	Shutter exposure start timing (GX native)
fx compatible timing	Shutter exposure end timing(K3 compat , K4 compat)

# Recorder

## ■ Recording Memory

Installed Memory	16GB / 32GB / 64GB	MEMRECAM HX-3、HX-3L、HX-3E、HX-4、HX-4E、HX-5、HX-5E、
	8GB / 16GB / 32GB	MEMRECAM HX-6
Memory Segment Partitions	8GB model :	256MB×32, 512MB×16, 1GB×8, 2GB×4, 4GB×2, 8GB×1
	16GB model :	256MB×64, 512MB×32, 1GB×16, 2GB×8, 4GB×4, 8GB×2, 16GB×1
	32GB model :	512MB×64, 1GB×32, 2GB×16, 4GB×8, 8GB×4, 16GB×2, 32GB×1
	64GB model :	1GB×64, 2GB×32, 4GB×16, 8GB×8, 16GB×4, 32GB×2, 64GB×1

## ■ Recording Bit Length

Image Sensor Output	12 bit
Recording bits per pixel	Select from 8 / 10 / 12 bit
	12 bit : Record image sensor output 12 bit (high image quality)
	10 bit : Record image sensor output top 10 bit
	8 bit : Record image sensor output top 8 bit (long time period)

## ■ Recording Times      MEMRECAM H-3

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	1.15	1.38	1.72
2560	1440	2500	1.22	1.47	1.84
2176	1632	2500	1.27	1.52	1.91
1920	1920	2500	1.22	1.47	1.84
2048	1536	3000	1.19	1.43	1.79
1792	1792	3000	1.17	1.40	1.76
1792	1344	4000	1.17	1.40	1.76
1536	1536	4000	1.19	1.43	1.79
1920	1080	4500	1.21	1.45	1.81
1536	1152	5000	1.27	1.53	1.91
1280	1280	5000	1.38	1.65	2.07
1408	1056	6000	1.26	1.52	1.90
1280	1024	7000	1.23	1.48	1.85
1280	960	7500	1.22	1.47	1.84
1152	864	8000	1.42	1.70	2.13
1280	720	10000	1.22	1.47	1.84
1024	768	10000	1.43	1.72	2.15
960	960	10000	1.22	1.47	1.84
768	576	20000	1.27	1.53	1.91
640	640	20000	1.38	1.65	2.07
640	480	25000	1.47	1.76	2.21
512	512	30000	1.43	1.72	2.15
512	384	40000	1.43	1.72	2.15
384	384	50000	1.53	1.84	2.30
384	288	75000	1.36	1.63	2.04
384	208	100000	1.41	1.70	2.12
320	240	100000	1.47	1.76	2.21
384	96	200000	1.53	1.84	2.30
320	72	300000	1.63	1.96	2.45
320	48	400000	1.84	2.21	2.76
320	32	600000	1.84	2.21	2.76
320	24	700000	2.10	2.52	3.15

Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
320	16	900000	2.45	2.94	3.68
320	8	1300000	3.40	4.08	5.10

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32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	2.31	2.77	3.47
2560	1440	2500	2.47	2.96	3.70
2176	1632	2500	2.56	3.07	3.84
1920	1920	2500	2.47	2.96	3.70
2048	1536	3000	2.41	2.89	3.61
1792	1792	3000	2.36	2.83	3.54
1792	1344	4000	2.36	2.83	3.54
1536	1536	4000	2.41	2.89	3.61
1920	1080	4500	2.44	2.92	3.66
1536	1152	5000	2.57	3.08	3.86
1280	1280	5000	2.77	3.33	4.16
1408	1056	6000	2.55	3.06	3.82
1280	1024	7000	2.48	2.97	3.72
1280	960	7500	2.47	2.96	3.70
1152	864	8000	2.85	3.43	4.28
1280	720	10000	2.47	2.96	3.70
1024	768	10000	2.89	3.47	4.34
960	960	10000	2.47	2.96	3.70
768	576	20000	2.57	3.08	3.86
640	640	20000	2.77	3.33	4.16
640	480	25000	2.96	3.55	4.44
512	512	30000	2.89	3.47	4.34
512	384	40000	2.89	3.47	4.34
384	384	50000	3.08	3.70	4.63
384	288	75000	2.74	3.29	4.11
384	208	100000	2.85	3.42	4.27
320	240	100000	2.96	3.55	4.44
384	96	200000	3.08	3.70	4.63
320	72	300000	3.29	3.95	4.94
320	48	400000	3.70	4.44	5.55
320	32	600000	3.70	4.44	5.55
320	24	700000	4.23	5.08	6.35
320	16	900000	4.94	5.93	7.41

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		Horizontal	Vertical	
320	8	1300000	6.84	8.21	10.26

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64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	4.64	5.57	6.96
2560	1440	2500	4.95	5.94	7.43
2176	1632	2500	5.14	6.17	7.71
1920	1920	2500	4.95	5.94	7.43
2048	1536	3000	4.83	5.80	7.25
1792	1792	3000	4.74	5.68	7.11
1792	1344	4000	4.74	5.68	7.11
1536	1536	4000	4.83	5.80	7.25
1920	1080	4500	4.89	5.87	7.34
1536	1152	5000	5.16	6.19	7.74
1280	1280	5000	5.57	6.69	8.36
1408	1056	6000	5.11	6.14	7.67
1280	1024	7000	4.97	5.97	7.46
1280	960	7500	4.95	5.94	7.43
1152	864	8000	5.73	6.88	8.60
1280	720	10000	4.95	5.94	7.43
1024	768	10000	5.80	6.96	8.71
960	960	10000	4.95	5.94	7.43
768	576	20000	5.16	6.19	7.74
640	640	20000	5.57	6.69	8.36
640	480	25000	5.94	7.13	8.92
512	512	30000	5.80	6.96	8.71
512	384	40000	5.80	6.96	8.71
384	384	50000	6.19	7.43	9.29
384	288	75000	5.50	6.60	8.26
384	208	100000	5.71	6.86	8.57
320	240	100000	5.94	7.13	8.92
384	96	200000	6.19	7.43	9.29
320	72	300000	6.60	7.92	9.91
320	48	400000	7.43	8.92	11.15
320	32	600000	7.43	8.92	11.15
320	24	700000	8.49	10.19	12.74
320	16	900000	9.91	11.89	14.86

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		Horizontal	Vertical	
320	8	1300000	13.72	16.46	20.58

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## ■ Recording Times MEMRECAM H-3L

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	1.15	1.38	1.72
2560	1440	2500	1.22	1.47	1.84
2176	1632	2500	1.27	1.52	1.91
1920	1920	2500	1.22	1.47	1.84
2048	1536	3000	1.19	1.43	1.79
1792	1792	3000	1.17	1.40	1.76
1792	1344	4000	1.17	1.40	1.76
1536	1536	4000	1.19	1.43	1.79
1920	1080	4500	1.21	1.45	1.81
1536	1152	5000	1.27	1.53	1.91
1280	1280	5000	1.38	1.65	2.07
1408	1056	6000	1.26	1.52	1.90
1280	1024	7000	1.23	1.48	1.85
1280	960	7500	1.22	1.47	1.84
1152	864	8000	1.42	1.70	2.13
1280	720	10000	1.22	1.47	1.84
1024	768	10000	1.43	1.72	2.15
960	960	10000	1.22	1.47	1.84
768	576	20000	1.27	1.53	1.91
640	640	20000	1.38	1.65	2.07
640	480	25000	1.47	1.76	2.21
512	512	30000	1.43	1.72	2.15
512	384	40000	1.43	1.72	2.15
384	384	50000	1.53	1.84	2.30
384	272	75000	1.44	1.73	2.16
384	200	100000	1.47	1.76	2.21
320	232	100000	1.52	1.82	2.28
384	88	200000	1.67	2.00	2.51
320	64	300000	1.84	2.21	2.76
320	40	400000	2.21	2.65	3.31
320	24	600000	2.45	2.94	3.68
320	24	640000	2.30	2.76	3.45

Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
320	16	909090	2.43	2.91	3.64

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32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	2.31	2.77	3.47
2560	1440	2500	2.47	2.96	3.70
2176	1632	2500	2.56	3.07	3.84
1920	1920	2500	2.47	2.96	3.70
2048	1536	3000	2.41	2.89	3.61
1792	1792	3000	2.36	2.83	3.54
1792	1344	4000	2.36	2.83	3.54
1536	1536	4000	2.41	2.89	3.61
1920	1080	4500	2.44	2.92	3.66
1536	1152	5000	2.57	3.08	3.86
1280	1280	5000	2.77	3.33	4.16
1408	1056	6000	2.55	3.06	3.82
1280	1024	7000	2.48	2.97	3.72
1280	960	7500	2.47	2.96	3.70
1152	864	8000	2.85	3.43	4.28
1280	720	10000	2.47	2.96	3.70
1024	768	10000	2.89	3.47	4.34
960	960	10000	2.47	2.96	3.70
768	576	20000	2.57	3.08	3.86
640	640	20000	2.77	3.33	4.16
640	480	25000	2.96	3.55	4.44
512	512	30000	2.89	3.47	4.34
512	384	40000	2.89	3.47	4.34
384	384	50000	3.08	3.70	4.63
384	272	75000	2.90	3.48	4.36
384	200	100000	2.96	3.55	4.44
320	232	100000	3.06	3.68	4.61
384	88	200000	3.36	4.04	5.05
320	64	300000	3.70	4.44	5.55
320	40	400000	4.44	5.33	6.67
320	24	600000	4.94	5.93	7.41
320	24	640000	4.63	5.55	6.94

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		Horizontal	Vertical	
320	16	909090	4.89	5.87	7.33

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64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	4.64	5.57	6.96
2560	1440	2500	4.95	5.94	7.43
2176	1632	2500	5.14	6.17	7.71
1920	1920	2500	4.95	5.94	7.43
2048	1536	3000	4.83	5.80	7.25
1792	1792	3000	4.74	5.68	7.11
1792	1344	4000	4.74	5.68	7.11
1536	1536	4000	4.83	5.80	7.25
1920	1080	4500	4.89	5.87	7.34
1536	1152	5000	5.16	6.19	7.74
1280	1280	5000	5.57	6.69	8.36
1408	1056	6000	5.11	6.14	7.67
1280	1024	7000	4.97	5.97	7.46
1280	960	7500	4.95	5.94	7.43
1152	864	8000	5.73	6.88	8.60
1280	720	10000	4.95	5.94	7.43
1024	768	10000	5.80	6.96	8.71
960	960	10000	4.95	5.94	7.43
768	576	20000	5.16	6.19	7.74
640	640	20000	5.57	6.69	8.36
640	480	25000	5.94	7.13	8.92
512	512	30000	5.80	6.96	8.71
512	384	40000	5.80	6.96	8.71
384	384	50000	6.19	7.43	9.29
384	272	75000	5.83	6.99	8.74
384	200	100000	5.94	7.13	8.92
320	232	100000	6.15	7.38	9.22
384	88	200000	6.75	8.11	10.13
320	64	300000	7.43	8.92	11.15
320	40	400000	8.92	10.70	13.38
320	24	600000	9.91	11.89	14.86
320	24	640000	9.29	11.15	13.93

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
320	16	909090	9.81	11.77	14.72

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## ■ Recording Times      MEMRECAM H-3E

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	1.15	1.38	1.72
2560	1440	2500	1.22	1.47	1.84
2176	1632	2500	1.27	1.52	1.91
1920	1920	2500	1.22	1.47	1.84
2048	1536	3000	1.19	1.43	1.79
1792	1792	3000	1.17	1.40	1.76
1792	1344	4000	1.17	1.40	1.76
1536	1536	4000	1.19	1.43	1.79
1920	1080	4500	1.21	1.45	1.81
1536	1152	5000	1.27	1.53	1.91
1280	1280	5000	1.38	1.65	2.07
1408	1056	6000	1.26	1.52	1.90
1280	1024	7000	1.23	1.48	1.85
1280	960	7500	1.22	1.47	1.84
1152	864	8000	1.42	1.70	2.13
1280	720	10000	1.22	1.47	1.84
1024	768	10000	1.43	1.72	2.15
960	960	10000	1.22	1.47	1.84
768	576	20000	1.27	1.53	1.91
640	640	20000	1.38	1.65	2.07
640	480	25000	1.47	1.76	2.21
512	512	30000	1.43	1.72	2.15
512	384	40000	1.43	1.72	2.15
384	384	50000	1.53	1.84	2.30
384	272	75000	1.44	1.73	2.16
384	200	100000	1.47	1.76	2.21
320	232	100000	1.52	1.82	2.28
320	104	200000	1.70	2.04	2.55
320	96	220000			

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time (sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	2.31	2.77	3.47
2560	1440	2500	2.47	2.96	3.70
2176	1632	2500	2.56	3.07	3.84
1920	1920	2500	2.47	2.96	3.70
2048	1536	3000	2.41	2.89	3.61
1792	1792	3000	2.36	2.83	3.54
1792	1344	4000	2.36	2.83	3.54
1536	1536	4000	2.41	2.89	3.61
1920	1080	4500	2.44	2.92	3.66
1536	1152	5000	2.57	3.08	3.86
1280	1280	5000	2.77	3.33	4.16
1408	1056	6000	2.55	3.06	3.82
1280	1024	7000	2.48	2.97	3.72
1280	960	7500	2.47	2.96	3.70
1152	864	8000	2.85	3.43	4.28
1280	720	10000	2.47	2.96	3.70
1024	768	10000	2.89	3.47	4.34
960	960	10000	2.47	2.96	3.70
768	576	20000	2.57	3.08	3.86
640	640	20000	2.77	3.33	4.16
640	480	25000	2.96	3.55	4.44
512	512	30000	2.89	3.47	4.34
512	384	40000	2.89	3.47	4.34
384	384	50000	3.08	3.70	4.63
384	272	75000	2.90	3.48	4.36
384	200	100000	2.96	3.55	4.44
320	232	100000	3.06	3.68	4.61
320	104	200000	3.42	4.10	5.13
320	96	220000	3.70	4.44	5.55

64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	2000	4.64	5.57	6.96
2560	1440	2500	4.95	5.94	7.43
2176	1632	2500	5.14	6.17	7.71
1920	1920	2500	4.95	5.94	7.43
2048	1536	3000	4.83	5.80	7.25
1792	1792	3000	4.74	5.68	7.11
1792	1344	4000	4.74	5.68	7.11
1536	1536	4000	4.83	5.80	7.25
1920	1080	4500	4.89	5.87	7.34
1536	1152	5000	5.16	6.19	7.74
1280	1280	5000	5.57	6.69	8.36
1408	1056	6000	5.11	6.14	7.67
1280	1024	7000	4.97	5.97	7.46
1280	960	7500	4.95	5.94	7.43
1152	864	8000	5.73	6.88	8.60
1280	720	10000	4.95	5.94	7.43
1024	768	10000	5.80	6.96	8.71
960	960	10000	4.95	5.94	7.43
768	576	20000	5.16	6.19	7.74
640	640	20000	5.57	6.69	8.36
640	480	25000	5.94	7.13	8.92
512	512	30000	5.80	6.96	8.71
512	384	40000	5.80	6.96	8.71
384	384	50000	6.19	7.43	9.29
384	272	75000	5.83	6.99	8.74
384	200	100000	5.94	7.13	8.92
320	232	100000	6.15	7.38	9.22
384	104	200000	6.86	8.23	10.29
320	96	220000	7.43	8.92	11.15

## ■ Recording Times MEMRECAM HX-4

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
1280	960	6000	1.53	1.84	2.30
1152	864	7500	1.51	1.81	2.27
1280	720	8000	1.53	1.84	2.30
1024	768	8000	1.79	2.15	2.69
960	960	8000	1.53	1.84	2.30
960	720	10000	1.63	1.96	2.45
768	576	15000	1.70	2.04	2.55
640	640	15000	1.84	2.21	2.76
640	480	20000	1.84	2.21	2.76
512	512	25000	1.72	2.07	2.59
512	384	30000	1.91	2.30	2.87
384	384	40000	1.91	2.30	2.87
384	272	60000	1.80	2.16	2.70
384	200	80000	1.84	2.21	2.76
320	232	80000	1.90	2.28	2.85
384	160	100000	1.84	2.21	2.76
320	80	200000	2.21	2.65	3.31
320	40	300000	2.94	3.53	3.68
320	32	400000	2.76	3.31	4.14
320	8	1080000	4.09	4.91	6.14

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
1280	960	6000	3.08	3.70	4.63
1152	864	7500	3.05	3.66	4.57
1280	720	8000	3.08	3.70	4.63
1024	768	8000	3.61	4.34	5.42
960	960	8000	3.08	3.70	4.63
960	720	10000	3.29	3.95	4.94
768	576	15000	3.43	4.11	5.14
640	640	15000	3.70	4.44	5.55
640	480	20000	3.70	4.44	5.55
512	512	25000	3.47	4.16	5.21
512	384	30000	3.86	4.63	5.79
384	384	40000	3.86	4.63	5.79
384	272	60000	3.63	4.36	5.45
384	200	80000	3.70	4.44	5.55
320	232	80000	3.83	4.60	5.75
384	160	100000	3.70	4.44	5.55
320	80	200000	4.44	5.33	6.67
320	40	300000	5.92	7.11	8.89
320	32	400000	5.55	6.67	8.33
320	8	1080000	8.24	9.88	12.35

64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
1280	960	6000	6.19	7.43	9.29
1152	864	7500	6.11	7.34	9.17
1280	720	8000	6.19	7.43	9.29
1024	768	8000	7.26	8.71	10.89
960	960	8000	6.19	7.43	9.29
960	720	10000	6.60	7.93	9.91
768	576	15000	6.88	8.26	10.32
640	640	15000	7.43	8.92	11.15
640	480	20000	7.43	8.92	11.15
512	512	25000	6.97	8.36	10.45
512	384	30000	7.74	9.29	11.61
384	384	40000	7.74	9.29	11.61
384	272	60000	7.28	8.74	10.93
384	200	80000	7.43	8.92	11.15
320	232	80000	7.69	9.22	11.53
384	160	100000	7.43	8.92	11.15
320	80	200000	8.92	10.70	13.38
320	40	300000	11.89	14.27	17.84
320	32	400000	11.15	13.38	16.72
320	8	1080000	16.52	19.83	24.78



## ■ Recording Times MEMRECAM HX-4

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
1280	960	6000	1.53	1.84	2.30
1152	864	7500	1.51	1.81	2.27
1280	720	8000	1.53	1.84	2.30
1024	768	8000	1.79	2.15	2.69
960	960	8000	1.53	1.84	2.30
960	720	10000	1.63	1.96	2.45
768	576	15000	1.70	2.04	2.55
640	640	15000	1.84	2.21	2.76
640	480	20000	1.84	2.21	2.76
512	512	25000	1.72	2.07	2.59
512	384	30000	1.91	2.30	2.87
384	384	40000	1.91	2.30	2.87
384	272	60000	1.80	2.16	2.70
384	200	80000	1.84	2.21	2.76
320	232	80000	1.90	2.28	2.85
384	160	100000	1.84	2.21	2.76
320	80	200000	2.21	2.65	3.31
320	80	210000	2.10	2.52	3.15

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
1280	960	6000	3.08	3.70	4.63
1152	864	7500	3.05	3.66	4.57
1280	720	8000	3.08	3.70	4.63
1024	768	8000	3.61	4.34	5.42
960	960	8000	3.08	3.70	4.63
960	720	10000	3.29	3.95	4.94
768	576	15000	3.43	4.11	5.14
640	640	15000	3.70	4.44	5.55
640	480	20000	3.70	4.44	5.55
512	512	25000	3.47	4.16	5.21
512	384	30000	3.86	4.63	5.79
384	384	40000	3.86	4.63	5.79
384	272	60000	3.63	4.36	5.45
384	200	80000	3.70	4.44	5.55
320	232	80000	3.83	4.60	5.75
384	160	100000	3.70	4.44	5.55
320	80	200000	4.44	5.33	6.67
320	80	210000	4.23	5.08	6.35

64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
1280	960	6000	6.19	7.43	9.29
1152	864	7500	6.11	7.34	9.17
1280	720	8000	6.19	7.43	9.29
1024	768	8000	7.26	8.71	10.89
960	960	8000	6.19	7.43	9.29
960	720	10000	6.60	7.93	9.91
768	576	15000	6.88	8.26	10.32
640	640	15000	7.43	8.92	11.15
640	480	20000	7.43	8.92	11.15
512	512	25000	6.97	8.36	10.45
512	384	30000	7.74	9.29	11.61
384	384	40000	7.74	9.29	11.61
384	272	60000	7.28	8.74	10.93
384	200	80000	7.43	8.92	11.15
320	232	80000	7.69	9.22	11.53
384	160	100000	7.43	8.92	11.15
320	80	200000	8.92	10.70	13.38
320	80	210000	8.49	10.19	12.74

## ■ Recording Times MEMRECAM HX-5

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1250	1.84	2.20	2.76
2560	1440	1500	2.04	2.45	3.06
2176	1632	1500	2.12	2.54	3.18
1920	1920	1500	2.04	2.45	3.06
2048	1536	2000	1.79	2.15	2.69
1792	1792	2000	1.76	2.11	2.64
1792	1344	2500	1.87	2.25	2.81
1536	1536	2500	1.91	2.30	2.87
1920	1080	3000	1.81	2.18	2.72
1536	1152	3500	1.82	2.19	2.74
1280	1280	3500	1.97	2.36	2.96
1408	1056	4000	1.90	2.28	2.85
1280	1024	4500	1.91	2.30	2.87
1280	960	5000	1.84	2.21	2.76
1152	864	6000	1.89	2.27	2.84
1280	720	7000	1.75	2.10	2.63
1024	768	8000	1.79	2.15	2.69
768	768	10000	1.92	2.30	2.88
640	480	15000	2.45	2.94	3.68
512	512	20000	2.15	2.59	3.23
512	384	25000	2.30	2.76	3.45
384	384	30000	2.55	3.07	3.83
384	280	50000	2.10	2.52	3.15
384	128	100000	2.30	2.76	3.45
320	64	200000	2.76	3.31	4.14
320	40	300000	2.94	3.53	4.42
320	24	400000	3.68	4.42	5.52
320	8	900000	4.91	5.89	7.36

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1250	3.70	4.44	5.55
2560	1440	1500	4.11	4.94	6.17
2176	1632	1500	4.27	5.12	6.41
1920	1920	1500	4.11	4.94	6.17
2048	1536	2000	3.61	4.34	5.42
1792	1792	2000	3.54	4.25	5.31
1792	1344	2500	3.78	4.53	5.67
1536	1536	2500	3.86	4.63	5.79
1920	1080	3000	3.66	4.39	5.49
1536	1152	3500	3.67	4.41	5.51
1280	1280	3500	3.97	4.76	5.95
1408	1056	4000	3.82	4.59	5.74
1280	1024	4500	3.86	4.63	5.79
1280	960	5000	3.70	4.44	5.55
1152	864	6000	3.81	4.57	5.71
1280	720	7000	3.52	4.23	5.29
1024	768	8000	3.61	4.34	5.42
768	768	10000	3.86	4.63	5.79
640	480	15000	4.91	5.93	7.41
512	512	20000	4.34	5.21	6.51
512	384	25000	4.63	5.55	6.94
384	384	30000	5.14	6.17	7.72
384	280	50000	4.23	5.08	6.35
384	128	100000	4.63	5.55	6.94
320	64	200000	5.55	6.67	8.33
320	40	300000	5.92	7.11	8.89
320	24	400000	7.41	8.89	11.11
320	8	900000	9.88	11.85	14.82

64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1250	7.43	8.92	11.15
2560	1440	1500	8.25	9.91	12.38
2176	1632	1500	8.57	10.28	12.86
1920	1920	1500	8.25	9.91	12.38
2048	1536	2000	7.26	8.71	10.89
1792	1792	2000	7.11	8.53	10.66
1792	1344	2500	7.58	9.10	11.37
1536	1536	2500	7.74	9.29	11.61
1920	1080	3000	7.34	8.81	11.01
1536	1152	3500	7.37	8.85	11.06
1280	1280	3500	7.96	9.55	11.94
1408	1056	4000	7.68	9.21	11.52
1280	1024	4500	7.74	9.29	11.61
1280	960	5000	7.43	8.92	11.15
1152	864	6000	7.64	9.17	11.47
1280	720	7000	7.08	8.49	10.62
1024	768	8000	7.26	8.71	10.89
768	768	10000	7.74	9.29	11.62
640	480	15000	9.91	11.89	14.86
512	512	20000	8.71	10.45	13.06
512	384	25000	9.29	11.15	13.93
384	384	30000	10.32	12.39	15.48
384	280	50000	8.49	10.19	12.74
384	128	100000	9.29	11.15	13.93
320	64	200000	11.15	13.38	16.72
320	40	300000	11.89	14.27	17.84
320	24	400000	14.86	17.84	22.30
320	8	900000	19.82	23.79	29.73

## ■ Recording Times MEMRECAM HX-5E

16GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1250	1.84	2.20	2.76
2560	1440	1500	2.04	2.45	3.06
2176	1632	1500	2.12	2.54	3.18
1920	1920	1500	2.04	2.45	3.06
2048	1536	2000	1.79	2.15	2.69
1792	1792	2000	1.76	2.11	2.64
1792	1344	2500	1.87	2.25	2.81
1536	1536	2500	1.91	2.30	2.87
1920	1080	3000	1.81	2.18	2.72
1536	1152	3500	1.82	2.19	2.74
1280	1280	3500	1.97	2.36	2.96
1408	1056	4000	1.90	2.28	2.85
1280	1024	4500	1.91	2.30	2.87
1280	960	5000	1.84	2.21	2.76
1152	864	6000	1.89	2.27	2.84
1280	720	7000	1.75	2.10	2.63
1024	768	8000	1.79	2.15	2.69
768	768	10000	1.92	2.30	2.88
640	480	15000	2.45	2.94	3.68
512	512	20000	2.15	2.59	3.23
512	384	25000	2.30	2.76	3.45
384	384	30000	2.55	3.07	3.83
384	280	50000	2.10	2.52	3.15
384	128	100000	2.30	2.76	3.45
320	64	200000	2.76	3.31	4.14
320	64	210000	2.63	3.15	3.94

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1250	3.70	4.44	5.55
2560	1440	1500	4.11	4.94	6.17
2176	1632	1500	4.27	5.12	6.41
1920	1920	1500	4.11	4.94	6.17
2048	1536	2000	3.61	4.34	5.42
1792	1792	2000	3.54	4.25	5.31
1792	1344	2500	3.78	4.53	5.67
1536	1536	2500	3.86	4.63	5.79
1920	1080	3000	3.66	4.39	5.49
1536	1152	3500	3.67	4.41	5.51
1280	1280	3500	3.97	4.76	5.95
1408	1056	4000	3.82	4.59	5.74
1280	1024	4500	3.86	4.63	5.79
1280	960	5000	3.70	4.44	5.55
1152	864	6000	3.81	4.57	5.71
1280	720	7000	3.52	4.23	5.29
1024	768	8000	3.61	4.34	5.42
768	768	10000	3.86	4.63	5.79
640	480	15000	4.91	5.93	7.41
512	512	20000	4.34	5.21	6.51
512	384	25000	4.63	5.55	6.94
384	384	30000	5.14	6.17	7.72
384	280	50000	4.23	5.08	6.35
384	128	100000	4.63	5.55	6.94
320	64	200000	5.55	6.67	8.33
320	64	210000	5.29	6.35	7.94



64GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1250	7.43	8.92	11.15
2560	1440	1500	8.25	9.91	12.38
2176	1632	1500	8.57	10.28	12.86
1920	1920	1500	8.25	9.91	12.38
2048	1536	2000	7.26	8.71	10.89
1792	1792	2000	7.11	8.53	10.66
1792	1344	2500	7.58	9.10	11.37
1536	1536	2500	7.74	9.29	11.61
1920	1080	3000	7.34	8.81	11.01
1536	1152	3500	7.37	8.85	11.06
1280	1280	3500	7.96	9.55	11.94
1408	1056	4000	7.68	9.21	11.52
1280	1024	4500	7.74	9.29	11.61
1280	960	5000	7.43	8.92	11.15
1152	864	6000	7.64	9.17	11.47
1280	720	7000	7.08	8.49	10.62
1024	768	8000	7.26	8.71	10.89
768	768	10000	7.74	9.29	11.62
640	480	15000	9.91	11.89	14.86
512	512	20000	8.71	10.45	13.06
512	384	25000	9.29	11.15	13.93
384	384	30000	10.32	12.39	15.48
384	280	50000	8.49	10.19	12.74
384	128	100000	9.29	11.15	13.93
320	64	200000	11.15	13.38	16.72
320	64	300000	10.62	12.74	15.93

## ■ Recording Times MEMRECAM HX-6

8GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1000	1.13	1.36	1.70
2560	1440	1250	1.21	1.45	1.81
2176	1632	1250	1.25	1.51	1.88
1920	1920	1250	1.21	1.45	1.81
2048	1536	1500	1.18	1.42	1.77
1792	1792	1500	1.15	1.39	1.74
1792	1344	2000	1.16	1.39	1.74
1536	1536	2000	1.18	1.42	1.77
1920	1080	2000	1.34	1.61	2.02
1536	1152	2500	1.26	1.51	1.89
1280	1280	2500	1.36	1.63	2.04
1408	1056	3000	1.25	1.50	1.87
1280	1024	3500	1.21	1.46	1.82
1280	960	3500	1.29	1.55	1.94
1152	864	4500	1.24	1.49	1.87
1280	720	5000	1.21	1.45	1.81
1024	768	5000	1.42	1.70	2.13
768	720	8000	1.26	1.52	1.90
768	576	10000	1.26	1.51	1.89
640	640	10000	1.36	1.63	2.04
640	480	10000	1.82	2.18	2.73
512	512	15000	1.42	1.70	2.13
512	384	20000	1.42	1.70	2.13
384	384	25000	1.51	1.82	2.27
384	280	30000	1.73	2.07	2.59
384	200	50000	1.45	1.74	2.18
320	232	50000	1.50	1.80	2.25
384	96	100000	1.51	1.81	2.27
320	48	100000	3.63	4.36	5.45
320	48	200000	1.82	2.18	2.73
320	24	300000	2.42	2.91	3.63
320	8	650000	3.36	4.03	5.03

16GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1000	2.30	2.76	3.45
2560	1440	1250	2.45	2.95	3.68
2176	1632	1250	2.55	3.06	3.82
1920	1920	1250	2.45	2.95	3.68
2048	1536	1500	2.40	2.88	3.60
1792	1792	1500	2.35	2.82	3.52
1792	1344	2000	2.35	2.82	3.52
1536	1536	2000	2.40	2.88	3.60
1920	1080	2000	2.73	3.27	4.09
1536	1152	2500	2.56	3.07	3.84
1280	1280	1250	2.76	3.31	4.14
1408	1056	3000	2.54	3.04	3.81
1280	1024	3500	2.47	2.96	3.70
1280	960	3500	2.63	3.16	3.95
1152	864	4500	2.53	3.03	3.79
1280	720	5000	2.46	2.95	3.68
1024	768	5000	2.88	3.45	4.32
768	720	8000	2.56	3.07	3.84
768	576	10000	2.56	3.07	3.84
640	640	10000	2.76	3.32	4.14
640	480	10000	3.68	4.42	5.53
512	512	15000	2.88	3.45	4.32
512	384	20000	2.88	3.45	4.32
384	384	25000	3.07	3.68	4.60
384	280	30000	3.50	4.21	5.26
384	200	50000	2.94	3.53	4.42
320	232	50000	3.04	3.65	4.57
384	96	100000	3.06	3.68	4.60
320	48	100000	7.36	8.84	11.05
320	48	200000	3.68	4.42	5.53
320	24	300000	4.91	5.89	7.36
320	8	650000	6.80	8.16	10.20

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1000	4.63	5.56	6.95
2560	1440	1250	4.94	5.93	7.41
2176	1632	1250	5.13	6.15	7.69
1920	1920	1250	4.94	5.93	7.41
2048	1536	1500	4.82	5.79	7.24
1792	1792	1500	4.73	5.67	7.09
1792	1344	2000	4.73	5.67	7.09
1536	1536	2000	4.83	5.79	7.24
1920	1080	2000	5.49	6.59	8.24
1536	1152	2500	5.15	6.18	7.72
1280	1280	1250	5.56	6.67	8.34
1408	1056	3000	5.10	6.13	7.66
1280	1024	3500	4.96	5.96	7.44
1280	960	3500	5.29	6.35	7.94
1152	864	4500	5.08	6.10	7.63
1280	720	5000	4.94	5.93	7.41
1024	768	5000	5.79	6.95	8.69
768	720	8000	5.15	6.18	7.72
768	576	10000	5.15	6.18	7.72
640	640	10000	5.56	6.67	8.34
640	480	10000	7.41	8.89	11.12
512	512	15000	5.79	6.95	8.69
512	384	20000	5.79	6.95	8.69
384	384	25000	6.18	7.41	9.27
384	280	30000	7.05	8.47	10.58
384	200	50000	5.92	7.11	8.89
320	232	50000	6.13	7.36	9.20
384	96	100000	6.17	7.41	9.26
320	48	100000	14.82	17.78	22.23
320	48	200000	7.41	8.89	11.12
320	24	300000	9.88	11.85	14.82
320	8	650000	13.68	16.42	20.53

## ■ Recording Times MEMRECAM HX-6E

8GB model

Preset settings. Recording time is when the Frame Rate is at the maximum value.

Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1000	1.13	1.36	1.70
2560	1440	1250	1.21	1.45	1.81
2176	1632	1250	1.25	1.51	1.88
1920	1920	1250	1.21	1.45	1.81
2048	1536	1500	1.18	1.42	1.77
1792	1792	1500	1.15	1.39	1.74
1792	1344	2000	1.16	1.39	1.74
1536	1536	2000	1.18	1.42	1.77
1920	1080	2000	1.34	1.61	2.02
1536	1152	2500	1.26	1.51	1.89
1280	1280	2500	1.36	1.63	2.04
1408	1056	3000	1.25	1.50	1.87
1280	1024	3500	1.21	1.46	1.82
1280	960	3500	1.29	1.55	1.94
1152	864	4500	1.24	1.49	1.87
1280	720	5000	1.21	1.45	1.81
1024	768	5000	1.42	1.70	2.13
768	720	8000	1.26	1.52	1.90
768	576	10000	1.26	1.51	1.89
640	640	10000	1.36	1.63	2.04
640	480	10000	1.82	2.18	2.73
512	512	15000	1.42	1.70	2.13
512	384	20000	1.42	1.70	2.13
384	384	25000	1.51	1.82	2.27
384	280	30000	1.73	2.07	2.59
384	200	50000	1.45	1.74	2.18
320	232	50000	1.50	1.80	2.25
384	96	100000	1.51	1.81	2.27
320	48	100000	3.63	4.36	5.45
384	56	150000	1.73	2.08	2.60
320	64	150000	1.82	2.18	2.73
320	48	200000	1.82	2.18	2.73

16GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1000	2.30	2.76	3.45
2560	1440	1250	2.45	2.95	3.68
2176	1632	1250	2.55	3.06	3.82
1920	1920	1250	2.45	2.95	3.68
2048	1536	1500	2.40	2.88	3.60
1792	1792	1500	2.35	2.82	3.52
1792	1344	2000	2.35	2.82	3.52
1536	1536	2000	2.40	2.88	3.60
1920	1080	2000	2.73	3.27	4.09
1536	1152	2500	2.56	3.07	3.84
1280	1280	1250	2.76	3.31	4.14
1408	1056	3000	2.54	3.04	3.81
1280	1024	3500	2.47	2.96	3.70
1280	960	3500	2.63	3.16	3.95
1152	864	4500	2.53	3.03	3.79
1280	720	5000	2.46	2.95	3.68
1024	768	5000	2.88	3.45	4.32
768	720	8000	2.56	3.07	3.84
768	576	10000	2.56	3.07	3.84
640	640	10000	2.76	3.32	4.14
640	480	10000	3.68	4.42	5.53
512	512	15000	2.88	3.45	4.32
512	384	20000	2.88	3.45	4.32
384	384	25000	3.07	3.68	4.60
384	280	30000	3.50	4.21	5.26
384	200	50000	2.94	3.53	4.42
320	232	50000	3.04	3.65	4.57
384	96	100000	3.06	3.68	4.60
320	48	100000	7.36	8.84	11.05
384	56	150000	3.50	4.21	5.26
320	64	150000	3.68	4.42	5.52
320	48	200000	3.68	4.42	5.52

32GB model		Preset settings. Recording time is when the Frame Rate is at the maximum value.			
Valid Pixels		Frame Rate ( frames/sec )	Recording Time(sec)		
Horizontal	Vertical		12bit	10bit	8bit
2560	1920	1000	4.63	5.56	6.95
2560	1440	1250	4.94	5.93	7.41
2176	1632	1250	5.13	6.15	7.69
1920	1920	1250	4.94	5.93	7.41
2048	1536	1500	4.82	5.79	7.24
1792	1792	1500	4.73	5.67	7.09
1792	1344	2000	4.73	5.67	7.09
1536	1536	2000	4.83	5.79	7.24
1920	1080	2000	5.49	6.59	8.24
1536	1152	2500	5.15	6.18	7.72
1280	1280	1250	5.56	6.67	8.34
1408	1056	3000	5.10	6.13	7.66
1280	1024	3500	4.96	5.96	7.44
1280	960	3500	5.29	6.35	7.94
1152	864	4500	5.08	6.10	7.63
1280	720	5000	4.94	5.93	7.41
1024	768	5000	5.79	6.95	8.69
768	720	8000	5.15	6.18	7.72
768	576	10000	5.15	6.18	7.72
640	640	10000	5.56	6.67	8.34
640	480	10000	7.41	8.89	11.12
512	512	15000	5.79	6.95	8.69
512	384	20000	5.79	6.95	8.69
384	384	25000	6.18	7.41	9.27
384	280	30000	7.05	8.47	10.58
384	200	50000	5.92	7.11	8.89
320	232	50000	6.13	7.36	9.20
384	96	100000	6.17	7.41	9.26
320	48	100000	14.82	17.78	22.23
384	56	150000	7.05	8.47	10.58
320	64	150000	7.41	8.89	11.11
320	48	200000	7.41	8.89	11.11

## ■ Live Image Display

Modes Displaying Live Images	VIEW mode, ARM mode, REC mode
Output Connector	MONITOR OUT connector(DVI-D)
Refresh Rate	approx.19~29fps (depends on the resolution) <ul style="list-style-type: none"> <li>• approx.19fps in display resolution of 1920x1080 and recording resolution of 2560x1920, ZOOM: FIT1</li> <li>• approx. 29fps in display resolution of 680x480, regardless of recording resolution and ZOOM settings</li> </ul>

## ■ Recording Conditions

Recording Start Conditions	ARM command (from J-PAD3, HXLink), ARM command input signal (CTL connector), Auto pilot ARM command, Segment and block recording end (if multi trigger or auto segment switch)
Recording End Conditions	Auto stop after trigger input according to the trigger timing, End recording for all areas in the memory segment (with burst trigger recording), Stop command(STOP from J-PAD3, HXLink), Auto pilot stop command
Temporary stop recording conditions during REC mode	During burst trigger mode operation, trigger signal disable level during REC mode
Recording restart conditions during REC mode	During burst trigger mode operation, trigger signal enable level during REC mode



## ■ Recording Trigger Mode

Normal Trigger	Normal recording trigger	
Event Trigger	First trigger signal :	Trigger
	2 <sup>nd</sup> and subsequent trigger signals :	Records external trigger signals as event
	Number of possible input pulses :	63
Burst trigger	Recording when external trigger signals ON	
Multi Trigger	Selected segments partitioned into 2 ~ 64 blocks, recording automatically switches blocks at each trigger signal	
Multi Manual	Specify the number of frames per block, records repeated phenomenon	
Linear	Controls the “Pause” and “Start” for recording the frames for the segment recording time with the J-PAD3 trigger input	

## ■ Trigger Timing

START	Trigger point about 5% from the top of the recording memory
CENTER	Trigger point at the center of the recording memory (about 50%)
END	Trigger point about 5% before the last of the recording memory
CUSTOM	Trigger point at a preset value(-100~100%), set in 1% increments
POST	Trigger point at a frame time preset from the top of the recording memory, set in 1 frame increments, maximum delay frame time : 600 sec

## ■ Synchronized Recording Data

Recording scene number	Closed caption method
Recording trigger mode settings	Closed caption method
Frame Rate	Closed caption method
Frame size	Closed caption method
Shutter speed	Closed caption method
Recording image quality settings	Closed caption method
Recording comments	Closed caption method
Trigger time	Closed caption method
Internal standard time (or IRIG-B time)	Synchronized recording method
Exposure start time	Synchronized recording method, min/sec, 0.1μsec units
Exposure end time	Synchronized recording method, time stamp, min/sec, 0.1μsec units
Frame count	Synchronized recording method, time stamp, memory address information
Trigger time	Synchronized recording method, time stamp, day/hour/ min/sec, nsec units
Sequence count	Synchronized recording method, time stamp, recording sequence information
Signal status	Synchronized recording method, time stamp, Trigger, EST, event, IRIG lock, sensor flag bit identification
Recording time	Synchronized recording method, time stamp, day/hour/ min/sec, nsec units
※Closed caption method :	Image and information recorded separately, synthetic display method, recorded to system controller at trigger input
※Synchronized recording method :	Image and information recorded together, saved in image memory
※Time stamp :	Synchronization recording data for each frame

# Video Converter

## ■ Video Output

Output signals	MONITOR OUT : DVI-D signals
Image refresh rate	approx.19~29fps (depends on the resolution) <ul style="list-style-type: none"> <li>• approx.19fps in display resolution of 1920x1080 and recording resolution of 2560x1920, ZOOM: FIT1</li> <li>• approx. 29fps in display resolution of 680x480, regardless of recording resolution and ZOOM settings</li> </ul>
Display resolution	DVI : 1920 × 1080 ~ 640 × 480 (depending on the monitor connected, select min ~ max)
Gradation	YUV each 8bit ((YUV422)(for final internal digital stage))

## ■ Image Quality Settings

Gain	LOW, NORMAL, HIGH
White balance	AUTO, 3100K, 5000K, 9000K, REG
Enhance	OFF, LOW, NORMAL, HIGH
Gamma	OFF, LOW, NORMAL
Chroma	0%, 50%, 100%, 150%, 200%
Knee	OFF, ON
RGB matrix	OFF, ON
Luminance properties	NORMAL, LINEAR, CUSTOM

## ■ Display Range

Zoom	FIT1 (Display 100% of screen) FIT2 (Display all screen reduced to about 80%, black margin) 1/4x, 1/2x, 1x, 2x, 4x
Scroll	Zoomed image is shown in the display area, display position can be set
Display segment frame border	Segment frame border can be shown in VIEW and low light modes, can be combined with zoom display
Display mark at screen center	CAFM (Camera Alignment Fiducial Mark = cross to mark center of the image) can be displayed, mark can be selected black or white

## ■ Playback Display

Playback speed	Frame advance, 1~1920 frames/sec , forward and reverse
Frame jump	Trigger point, recording start point, recording end point
Playback mode	Single playback, loop playback
Playback range setting	Set start and end points

# System Control

## ■ Main Unit Switch

Power switch	A Momentary Push Button SW (2 positions)
	<ul style="list-style-type: none"> <li>A way to turn on/off</li> </ul>
	Push the button for about 2 seconds.

## ■ Status LED

ETHERNET	Lit green : Network connection Flashing green : Communicating with network(Active) Lit orange : Linking with 1000BASE-T Off : Network not connected or power OFF ※If communicating by linking with 1000BASE-T, while the orange is lit, the green LED will flash but compared to the orange, the flashing green is darker so it is harder to recognize
CAMERA MODE	Lit blue : STOP mode, PLAY mode, LOOP mode, SAVE mode Lit white : VIEW mode (EST signal detection in EST mode when flashing) Lit red : ARM mode (EST signal detection in EST mode when flashing) Lit orange : REC mode (EST signal detection in EST mode when flashing) Off : Power OFF or starting up
PWR STS LED	Lit green: Power ON, normal state Lit red: Power ON, fail state(if camera startup, malfunction detected, abnormal power voltage detected, sensor rising temperature detected, abnormal trigger signal detected, or abnormal setting detected) Off : Power OFF

MEM BACKUP	Lit Green:	Memory backup is valid by AC adapter (Charge: High).
	Flashing Green:	Memory backup is valid by built-in battery only (Charge: High).
	Lit Orange:	Memory backup is valid by AC adapter (Charge: Medium)
	Flashing Orange:	Memory backup is valid by built-in battery only (Charge: Medium)
	Lit Red:	Memory backup is valid by AC adapter (Charge: Low).
	Flashing Red:	Memory backup is valid by built-in battery only (Charge: Low).
	No Light:	Memory backup is invalid.
TRIGGER	Lit:	Trigger input detected
	No Light:	Trigger input not detected or Power OFF
	Oburst recording	
	Lit:	Input signal
	Not lit:	Signal not input

## ■ On-screen Display (On Screen Display)

Scene number	0~65,535	
Shutter	Preset : 1/100, 1/250, 1/500, ... 1/500,000	
	Custom : $\mu$ s display	
Trigger mode	START, CENTER, END, -9999 ~ +100( % unit :CUSTOM)、 ( frame count : multi manual)	
Trigger time	Trigger input time,* when not yet recorded, 0 with ARM/REC	
Image trigger	OSD display when image trigger function enabled in VIEW, ARM, REC mode	
Frame count	Frame :	With the trigger frame at 0, the frame number of the currently displayed screen (integer)
	Time :	With the trigger frame time or the trigger detection time at 0, the relative time of the currently displayed screen (unit: microseconds)
	ATime :	Absolute time (unit: microseconds, 24 hour clock),

		trigger frame time for the currently displayed screen used as the trigger detection time, time displayed as “trigger standard” time or “exposure center” time added with the frame cycle
	Memory% :	Displayed in % of the recording range for the currently displayed screen, top 0%, last 100%
Memory segment number	1~64	
Mode	STOP, VIEW, ARM, REC, SAVE, EXPORT	
Playback speed	1~1920	
Frame rate	Preset: 50~1,300,000 (HX-3) (pps), EST	
Auto pilot comment	Step of processing displayed during auto pilot execution	

Warning	Abnormal frame rate (can be ON/OFF), abnormal camera interrupt (can be ON/OFF), outside of the valid sensor temperature range, camera head: not connected/abnormal communication/abnormal EEPROM, abnormal recording start/abnormal recording cancel, abnormal I2C device communication, ※ abnormal input voltage (low voltage : 1.9V or less), ※abnormal input voltage(high voltage : 3.3V or more), trigger signal assert during VIEW/ARM startup, startup error, RTC battery dead (can be ON/OFF), ※ black balance data mismatch, black balance data creation error, USB HDD format error/save error/read error, MCFF transfer error, USB driver deadlock or timeout, abnormal voltage: image memory power flicker or abnormal image memory initialization setting, image memory protect (not in ARM), internal USB memory not detected, auto pilot initialization error, sequence execution error ※ : can be set ON / OFF
Highlighting	AUTO VIEW, EST, image trigger



## ■ Memory Backup

Function	After finishing recording, if the power switch is OFF due to some unexpected operation or if the power cable is disconnected, protects the contents of the recorded images	
Battery	Battery :	Ni-Cd
	Type :	4 x AA size batteries
	Capacity :	600mAh
	Lifetime :	1 year
	(It depends on environment. We suggest to replace the battery with new one every year.)	
Backup time	About 40 minutes (32GB model)	
Backup start condition	Enabled with the start of recording	
Battery backup start condition	DC input voltage 19.0V or less to the MEMRECAM HX-3 after recording finished	
Charging time	Approx. 10 hours (from a fully discharged state to a full charged state)	
Charging condition	While the power is supplied to the MEMRECAM from an external power supply (ex. AC adapter)	
Battery status display	LED	indication at the rear panel
	Red:	Small charged state
	Orange:	Medium charged state
	Green:	Full charged state

# Input/output Connector

## ■ DC-IN Connector

Application	Power input			
Model	ODU G12L0C-P02LTQ0-0000			
Plug	ODU S12L0C-P02MTQ0-9200			
Power voltage	DC20 - 32V			
Power use	HX-3	16GB~64GB	about 105W	
	HX-4	16GB~64GB	about 105W	
	HX-5	16GB~64GB	about 105W	
	HX-6	8GB~32GB	about 70W	
	2000pps, ARM mode, when peripheral devices not connected			
Power protection	Reverse polarity : Internal circuit breaker(parts replaceable)			
	Excess current : Internal thermal circuit protector 28V, 15A(standard)( parts replaceable)			
	Excess voltage : 35VDC 1 minute			
Pin Position				
Pin No.	Name	Direction	Function · Input/output Level	Notes
1	DC24V IN	IN	DC +24V input	
2	DC24V RTN	IN	DC +24V return	
shell	FRAME GND	—	Frame ground	

## ■ CTL Connector

Application	Discreet control signal input/output	
Model	ODU G11LOC-P10LCC0-0000	
Plug	ODU S21LOC-P10MCC0-720S	
ARM command input	Signal level:	TTL level, 5V pullup, isolation L Level: -0.5VDC (minimum applied voltage) ~ 0.8VDC H Level : 2VDC ~ 5.5VDC (maximum applied voltage)
	Function:	Switch to ARM mode for H→L when shifting to the ARM mode contact point input, polarity reverse function
ARM status output	Signal level:	Open collector output, isolation Maximum applied voltage : 50VDC, Maximum current : 100mA
	Function:	short circuit during the ARM mode, polarity reverse function
FAULT status output	Signal level:	Open collector output, isolation Maximum applied voltage : 50VDC, Maximum current : 100mA
	Function:	Short circuit during FAULT status(POWER LED fail (red) state), polarity reverse function

## Input/output Connector

Pin position				
Pin No.	Name	Direction	Function · Input/output Level	Notes
1	ARM command IN	IN	TTL, contact	
2	ARM command IN RTN	IN	TTL, contact	Isolation ground
3	ARM status out	OUT	Open collector	
4	RM status out RTN	OUT	Open collector	Isolation ground
5	FAULT status out	OUT	Open collector	
6	FAULT status out RTN	OUT	Open collector	Isolation ground
7	NC	—		
8	NC	—		
9	NC	—		
10	NC	—		
shell	FRAME GND	—	Frame ground	

## ■ REMOTE Connector

Application	Remote operation(compatible with the GX series J3 connector)	
Model	LEMO EGG.2B.318	
Plug	LEMO FGG.2B.318	
Ethernet	1000BASE-T (IEEE802.3ab), 100BASE-TX (IEEE802.3u) DHCP compatible, isolation	
EST2/EVENT input	Signal level:	TTL level, 5V pullup, isolation L level : -0.5VDC(minimum applied voltage) ~ 0.8VDC H level: 2VDC ~ 5.5VDC(maximum applied voltage)
	Function:	Exposure start with H→L when ARM or REC mode set to EST mode. Record one image Synchronization precision 50nS or less Contact input, polarity reverse function During EVENT input, the signal level is recorded with the image
IRIG-B input	Signal level:	3Vpp (1~10Vpp), high impedance, isolation trans input
	Standard :	IRIG Standard 200-98
TRIG2 input	Signal level:	Current loop with photo coupler, isolation Maximum applied voltage : $\pm 32V$ Current limit resistance : 1500 $\Omega$
	Function:	Trigger enabled at 5V or more, polarity reverse function
EPO output	Signal level:	5VCMOS output, isolation
	Function:	Trailing(H → L) : exposure start Rising(L → H) : exposure end polarity reverse function

Power control (PWRCNT) input	Signal level:	TTL level, 5Vpullup , isolation L level : -0.5VDC(minimum applied voltage) ~ 0.8VDC H level: 2VDC ~ 5.5VDC(Maximum applied voltage)
	Function:	H : Power ON L : Power OFF contact input possible, no polarity reverse function

Pin Position				
Pin No.	Name	Direction	Function · Input/output Level	Notes
1	MDI 0+	I/O	10/100/1000BASE-T Interface	
2	MDI 0-	I/O	10/100/1000BASE-T Interface	
3	MDI 1+	I/O	10/100/1000BASE-T Interface	
4	MDI	I/O	10/100/1000BASE-T Interface	
5	MDI 2+	I/O	10/100/1000BASE-T Interface	
6	MDI	I/O	10/100/1000BASE-T Interface	
7	MDI 3+	I/O	10/100/1000BASE-T Interface	
8	MDI	I/O	10/100/1000BASE-T Interface	
9	EST2/EVENT IN	IN	TTL, contact	Isolation
10	EST2/EVENT IN RTN	IN	TTL, contact	Isolation ground
11	IRIG-B IN	IN	High impedance	Isolation trans
12	IRIG-B IN RTN	IN	High impedance	Isolation trans
13	TRIG2 IN A	IN	Current loop, anode	Isolation
14	TRIG2 IN C	IN	Current loop, cathode	Isolation
15	EPO	OUT	TTL	Isolation
16	EPO RTN	OUT	TTL	Isolation ground
17	PWRCNT IN	IN	TTL, contact	Isolation
18	PWRCNT IN RTN	IN	TTL, contact	Isolation ground
shell	FRAME GND	—	Frame ground	



Attention • Same signals are output from the EPO connector and the REMOTE connector EPO. Reverse and the output of both is reversed.

## ■ EST Connector

Application	EST1 exposure start signal input			
Model	BNC receptacle			
Plug	BNC plug			
EST1 input	Signal level:	TTL level, 5V pullup, isolation L Level: -0.5VDC (minimum applied voltage) ~ 0.8VDC H Level : 2VDC ~ 5.5VDC (maximum applied voltage)		
	Function:	Exposure start with H→L when ARM or REC mode set to EST mode. Record one image Synchronization precision 50nS or less Contact input, polarity reverse function		
Pin Position				
Pin No.	Name	Direction	Function · Input/output Level	Notes
1	EST1 IN	IN	TTL, contact	Isolation
shell	EST1 IN RTN	IN	TTL, contact	Isolation ground

## ■ TRIG Connector

Application	TRIG1 trigger signal input	
Model	BNC receptacle	
Plug	BNC plug	
TRIG1 input	Signal level:	TTL level, 5V pullup, isolation L Level: -0.5VDC (minimum applied voltage) ~ 0.8VDC H Level : 2VDC ~ 5.5VDC (maximum applied voltage)
	Function:	Enabled trigger with H→L, Contact input polarity reverse function

### Pin Position

Pin No.	Name	Direction	Function · Input/output Level	Notes
1	TRIG1 IN	IN	TTL, contact	Isolation
shell	TRIG1 IN RTN	IN	TTL, contact	Isolation ground



## ■ J-PAD3 Connector

Application	Dedicated remote controller J-PAD3 connection			
Model	LEMO EGG.0B.306			
Plug	LEMO FGG.0B.306			
DC24V output	Signal level:	Power input(DC-IN connector)through output Maximum output current : 1A, no protection circuit		
Data transmission	Standards :	RS-232C standards(only TXD and RXD), no isolation		
Pin position				
Pin No.	Name	Direction	Function · Input/output Level	Notes
1	NC	—		
2	DC24V OUT	OUT	DC+24V output	
3	DC24V OUT RTN	OUT	DC+24V return	
4	TXD OUT	OUT	Serial signal output, RS-232C	
5	RXD IN	IN	Serial signal input, RS-232C	
6	GND	I/O		Internal ground
shell	FRAME GND	—	Frame ground	

## ■ USB Connector

Application	USB device connection			
Model	USB Standard-A    receptacle			
Plug	USB Standard-A    plug			
Number of connectors	2(rear panel : 2)			
Standards	USB2.0 standards, USB HOST			
Pin position				
Pin No.	Name	Direction	Function    · Input/output Level	Notes
1	VBUS	OUT	USB power output, 5V · 0.5A	
2	D-	I/O	USB2.0 HS signals	
3	D+	I/O	USB2.0 HS signals	
4	GND	OUT	USB power output return	
shell	FRAME GND	—		

■ MONITOR OUT Connector

Application	DVI video output
Model	XM4-3932-1314 receptacle
Plug	DVI-D plug (single link)
Standards	Digital Visual Interface

Pin position				
Pin o.	Name	Direction	Function · Input/output Level	Notes
1	D_RED1-	OUT	TMDS Data 2-	Link 1
2	D_RED1+	OUT	TMDS Data 2+	Link 1
3	GND	OUT	TMDS Data 2 shield	Internal ground
4	NC	—		(Link 2)
5	NC	—		(Link 2)
6	DDC_CLK	OUT	DDC clock	
7	DDC_D	OUT	DDC data	
8	NC	—		
9	D_GRN1-	OUT	TMDS Data 1-	Link 1
10	D_GRN1+	OUT	TMDS Data+	Link 1
11	GND	OUT	TMDS Data 1 shield	Internal ground
12	NC			
13	NC			
14	+5V	OUT	Power for monitor when in standby	
15	GND	OUT	Return for pin 14	Internal ground
16	H_P_DET	OUT	Hot Plug Detect	
17	D_BLU1-	OUT	TMDS data 0-	Link 1
18	D_BLU1+	OUT	TMDS data 0+	Link 1
19	GND	OUT	TMDS data 0 shield	Internal ground
20	NC			(Link 2)
21	NC			(Link 2)
22	GND	OUT	TMDS clock shield	Internal ground
23	D_CLK+	OUT	Digital clock +	(Link 1 and 2)
24	D_CLK-	OUT	Digital clock —	(Link 1 and 2)
C1	NC			
C2	NC			
C3	NC			
C4	NC			
C5	NC			

## ■ LENS CTL Connector

Application	EF control lens mount control connection	
Model	ODU G10LOC-P09LCC0-0000	
Plug	ODU S20LOC-P09MCC0-520S	
DC12V output	Signal level:	DC12V, maximum output current : 1A, no protection circuit
VIDEO output	Standards :	RS-232C standards(only TXD and RXD), no isolation
	Function:	lens focus control · aperture control · focal length information acquisition

### Pin position

Pin o.	Name	Direction	Function · Input/output Level	Notes
1	DC12V OUT	OUT	EF lens mount power	
2	DC12V OUT RTN	OUT	EF lens mount power	Internal ground
3	TXD OUT	OUT	Serial signal output, RS-232C	
4	TXD OUT RTN	OUT	GND	Internal ground
5	RXD IN	IN	Serial signal input, RS-232C	
6	RXD IN RTN	IN	GND	Internal ground
7	NC	—		
8	NC	—		
9	NC	—		
shell	FRAME GND	—		

## ■ EPO Connector

Application	EPO signal output			
Model	BNC receptacle			
Plug	BNC plug			
EPO output	Signal level:	5VCMOS output, isolation		
	Function:	Trailing(H → L) : exposure start		
		Rising(L → H) : exposure end		
		polarity reverse function		
Pin position				
Pin o.	Name	Direction	Function · Input/output Level	Notes
1	EPO	OUT	TTL	Isolation
shell	EPO RTN	OUT	TTL	Isolation ground



- Attention • Same signals are output from the EPO connector and the REMOTE connector EPO. Reverse and the output of both is reversed.

# Configuration, Environment, Applicable Standards, Precision, Supplies

## ■ Configuration

Exterior dimensions(W×H×D)	W120×H140×D333mm(excluding connectors, protruding parts and mount)
Weight of unit	5.6kg (HX-3, HX-3L, HX-4, HX-5 , 32GB Model, excluding cable and option) 4.9kg (HX-6 , 32GB Model, excluding cable and option)
Tripod with screws	3/8-16UNC, Depth 11mm(large screws)×2

## ■ Environment

Operating temperature and humidity	0~40°C, 30~80%RH(no condensation)
Storage temperature and humidity	-10~60°C, 20~80%RH(no condensation)

## ■ Precision

Precision of recording time	±0.01%(or 4)or less Using the value above for the reciprocal of the Frame Rate (frequency) when temporarily stopped (1 sec or more) as the precision time
Inspection method for precision of recording time	Uses EPO signals output from the EPO connector and the REMOTE connector as the Frame Rate in a given time (1 sec or more) and measures the frequency with the frequency counter

## ■ Applicable Standards

Safety standards	EN60950
Electromagnetic conformity	EN55022, EN55024, FCC Part 15 Class A

## ■ Supplies

Clock battery	Battery life :	3 years or more
	Replacement method :	Replacement by our company

# Main Attachments, Products Sold Separately

## ■ F Mount Adapter

Exterior dimensions(W×H×D)	72 × 72 × 43 mm
Weight	0.25 kg
Lens	F mount lens (vignetting from image resolution with some F mount lenses)

## ■ C Mount Adapter

Exterior dimensions(W×H×D)	72 × 72 × 13 mm
Weight	0.07 kg
Lens	C mount lens (vignetting from image resolution with screw depth of 4mm or less)

## ■ NM Mount Adapter

Exterior dimensions(W×H×D)	72 × 72 × 25 mm
Weight	0.2 kg
Lens	NM mount lens

## ■ EF Mount Adapter

Exterior dimensions(W×H×D)	80 × 80 × 45 mm
Weight	0.3kg
Lens	EF mount lens (Can not be use EF-S mount lens)
Plug	ODU S20LOC-P09MCC0-520S
Control	Recognizes installation with HXLink, controls focus · aperture

## ■ Simple J3 cable

Length	0.5 m
Plug	Camera : LEMO FGG.2B.318 ETHER : RJ45 receptacle

## ■ HX KIT

CDROM	HXLink CD-ROM : HXLink CD-ROM Control software HX-3 User's guide : HX-3 User's guide electronic manual(this document) HXLink User's guide : HXLink detailed user's guide
Brochures	HXLink Quick start guide : HXLink simple user's guide HX-3 User's guide(basic) : HX-3 basic operating manual

## ■ HXLink Control Software

PC	IBM PC compatible(DOS/V)
OS	Microsoft Windows XP Professional + SP3 (32bit ) Windows Vista Ultimate/Business + SP1 (32/64bit ) Windows 7 Ultimate/Professional (32/64bit ) Windows 8 Pro (32/64bit )
CPU	Core2 Duo 2GHz or equivalent (the compression and display processing speed depends on the CPU properties.)
Memory	2GB or greater
Display	Full color, screen size of 1024×768 or greater (Recommend 1600×1200 or greater for color image sizes of 1280×1024)
HDD	600MB for program or log 60GB or greater for data (recommend 200GB or more) (depends on the number of cameras and the number of frames saved)
Network	1000BASE-T / 100BASE-TX
Optical drive	CD-ROM drive



## ■ AC Adapter (Sold separately)

Exterior dimensions(W×H×D)	120 × 49.3 × 250 mm(not including connectors)	
Weight	1.4 kg	
Operating temperature and humidity	0~60°C, 5~90%RH(no condensation)	
Storage temperature and humidity	-40~85°C, 10~90%RH(no condensation)	
Connectors	Camera :	NANABOSHI NTE-243-RF
	AC :	AC 3 pin connector
Input	AC100~264V, 47~63Hz	
Output	DC28V, 14.29A maximum	

## ■ AC Adapter DRP – DC Cable (Sold separately)

Length	3.0 m	
Plug	AC adapter :	NANABOSHI NET-243-PM
	Camera :	ODU S12LOC-P02MTQ0-9200

## ■ J-PAD3 (Sold separately)

Exterior dimensions (W×H×D)	65 × 140 × 18 mm	
Weight	0.2 kg	
Operating temperature and humidity	0~40°C, 20~80%RH(no condensation)	
Storage temperature and humidity	-10~60°C, 20~80%RH(no condensation)	
Plug	LEMO FGG.0B.306	
Cable length	2.0 m	
LCD display	128×64 dot, monochrome, backlight	

### ■ J3 Split Cable (Sold separately)

Length	0.5 m	
Plug	Camera :	LEMO FGG.2B.318
	ETHER :	RJ45 receptacle
	EST2 :	BNC Plug
	IRIG-B :	BNC Plug
	TRIG2 :	BNC Plug
	EPO :	BNC Plug
	PWRCNT :	BNC Plug

### ■ CTL Cable (Sold separately)

Length	0.5 m	
Plug	Camera :	ODU S21LOC-P10MCCO-720S
	ARM -I :	BNC Plug
	ARM-O :	BNC Plug
	FAULT :	BNC Plug

## ■ Viewfinder (Sold separately)

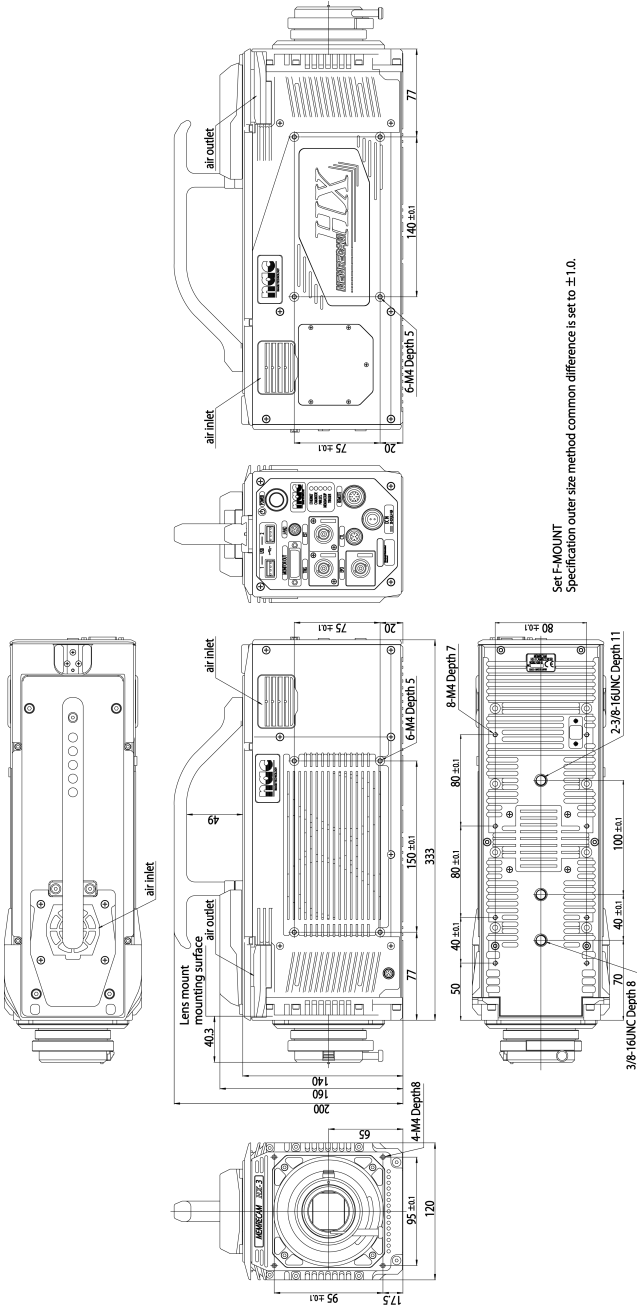
Exterior dimensions (W×H×D)	129 × 88.5 × 28 mm(excluding protruding parts)
Weight	Approximately 0.25kg
Operating temperature and humidity	0~+40°C, 30~80%RH(no condensation)
Storage temperature and humidity	-20~60°C, 30~80%RH(no condensation)
Power	DC7.2V Sony M series battery or AC Adapter
LCD	5 inch, TFT, 800x480, 400cd/m2
Battery run time	NP-FM500H : Approx. 3 hours (In new and full-charged state. Following is the same.) NP-QM71D : Approx. 5 hours NP-QM91D : Approx. 8 hours
Connector	HDMI (Type A)

## ■ HX Carrying Case (Sold separately)

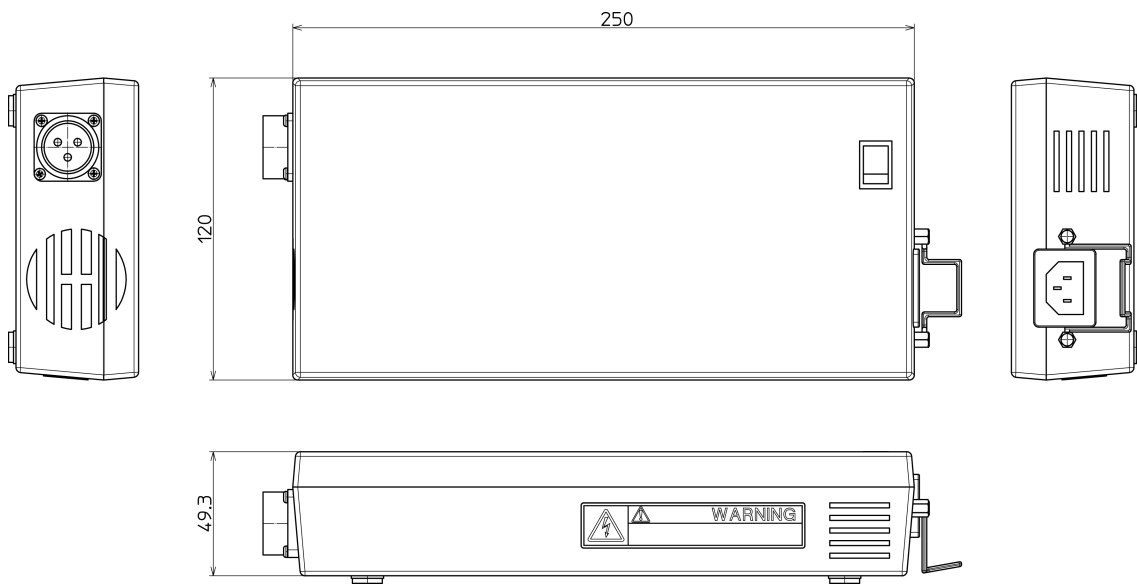
Exterior dimensions (W×H×D)	615 × 484 × 220 mm
Weight	About 6.4kg

# Figures

■ MEMRECAM HX-3 Camera Unit Dimensional Figure  
(Dimensions common to the HX-3, HX-3L, HX-3E, HX-4, HX-4E, HX-5, HX-5E and HX-6, HX-6E)



## ■ AC Adapter Dimensional Figure



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