

Panasonic®

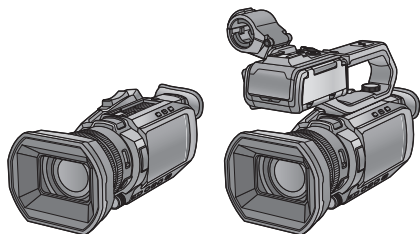
Basic Operating Instructions

4K Video Camera

Model No.

HC-X1500

HC-X2000



Please read these instructions carefully before using this product, and save this manual for future use.

More detailed operating instructions are available in “Operating Instructions (PDF format)”.

To read it, download it from the website.

<https://www.pavc.panasonic.co.jp/hdw/oi/X2000/>



Information for Your Safety

WARNING:

To reduce the risk of fire, electric shock or product damage,

- Do not expose this unit to rain, moisture, dripping or splashing.
- Do not place objects filled with liquids, such as vases, on this unit.
- Use the recommended accessories.
- Do not remove covers.
- Do not repair this unit by yourself. Refer servicing to qualified service personnel.

CAUTION!

To reduce the risk of fire, electric shock or product damage,

- Do not install or place this unit in a bookcase, built-in cabinet or in another confined space. Ensure this unit is well ventilated.
- Do not obstruct this unit's ventilation openings with newspapers, tablecloths, curtains, and similar items.
- Do not place sources of naked flames, such as lighted candles, on this unit.

The mains plug is the disconnecting device. Install this unit so that the mains plug can be unplugged from the socket outlet immediately.

This unit is intended for use in moderate and tropical climates.

■ Concerning the battery

Warning

Risk of fire, explosion and burns. Do not disassemble, heat above 60 °C or incinerate.

CAUTION

- Danger of explosion if battery is incorrectly replaced. Replace only with the type recommended by the manufacturer.
- When disposing of the batteries, please contact your local authorities or dealer and ask for the correct method of disposal.

■ Product identification marking

Product	Location
4K Video Camera	Bottom
AC adaptor	Bottom

For Singapore only

Complies with IMDA Standards DB01017
--

For Thailand only

This telecommunication equipment conforms to NTC/NBTC technical requirement.
--

AC Adaptor

Disconnect the AC mains plug from the AC mains socket when not in use.
--

■ Cautions for use

Keep this unit as far away as possible from electromagnetic equipment (such as microwave ovens, TVs, video games etc.).

- If you use this unit on top of or near a TV, the pictures and/or sound on this unit may be disrupted by electromagnetic wave radiation.
- Do not use this unit near cell phones because doing so may result in noise adversely affecting the pictures and/or sound.
- Recorded data may be damaged, or pictures may be distorted, by strong magnetic fields created by speakers or large motors.
- Electromagnetic wave radiation generated by microprocessors may adversely affect this unit, disturbing the pictures and/or sound.
- If this unit is adversely affected by electromagnetic equipment and stops functioning properly, turn this unit off and remove the battery or disconnect AC adaptor. Then reinsert the battery or reconnect AC adaptor and turn this unit on.

Do not use this unit near radio transmitters or high-voltage lines.

If you record near radio transmitters or high-voltage lines, the recorded pictures and/or sound may be adversely affected.

Do not lift up this unit by the handle with the tripod still attached

- When the tripod is attached, its weight will also affect the unit's handle, possibly causing the handle to break and hurting the user.
- To carry the unit while the tripod is attached, take hold of the tripod.

Do not swing the unit around, shake it by, or allow it hang from the handle

- Do not jar, swing, or shake the unit by its handle. Any strong jolt to the handle may damage the unit or result in personal injury.

Do not allow the cord to drag on the ground or pull a connected cord along the passage

- The cord will be damaged, causing fire or electrical shock, when the cord gets caught by the feet, excite will also cause personal injury.

When this unit is turned on, do not use it in direct contact with the skin for a long period of time.

- When using this unit for a long period of time, use a support such as a tripod. Low temperature burns may result if any high temperature part of this unit or hot air from the ventilation openings on the front side of the hand strap of this unit is in direct contact with the skin for a long period of time.

About connecting to a PC

- A USB2.0 cable is not supplied with this unit. Use a commercially-available generic USB cable conforming to USB2.0.

If possible, we recommend using a cable with a length of 1.5 m or less.

About connecting to a TV

- Use a commercially-available High Speed HDMI cable. If possible, we recommend using a cable with a length of 3 m or less.

About using a headphone

- Excessive sound pressure from earphones and headphones can cause hearing loss.
- Listening at full volume for long periods may damage the user's ears.

■ Caution regarding the lens and the viewfinder

Do not aim the lens or the viewfinder at the sun or strong light. Doing so may cause the unit to malfunction.

■ Batteries that may be used with this product (As of January 2020)

Panasonic AG-VBR59/VW-VBD58 batteries may be used with this product.

It has been found that counterfeit battery packs which look very similar to the genuine product are made available to purchase in some markets. Some of these battery packs are not adequately protected with internal protection to meet the requirements of appropriate safety standards. There is a possibility that these battery packs may lead to fire or explosion. Please be advised that we are not liable for any accident or failure occurring as a result of use of a counterfeit battery pack. To ensure that safe products are used we would recommend that a genuine Panasonic battery pack is used.

■ The symbols on this product (including the accessories) represent the following:

~ AC

== DC

| ON

⏻ Standby

□ Class II equipment (The construction of the product is double-insulated.)

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This product is licensed under the AVC Patent Portfolio License for the personal use of a consumer or other uses in which it does not receive remuneration to (i) encode video in compliance with the AVC Standard (“AVC Video”) and/or (ii) decode AVC Video that was encoded by a consumer engaged in a personal activity and/or was obtained from a video provider licensed to provide AVC Video. No license is granted or shall be implied for any other use. Additional information may be obtained from MPEG LA, L.L.C.

See <http://www.mpegla.com>

- Separate license contract with MPEG-LA is required to record in a memory card with this product and to distribute that card to end users for a profit. The end user mentioned here indicates a person or organization that handles contents for a personal use.

Software information about this product

This product incorporates the following software:

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- (4) the software licensed under the GNU LESSER General Public License, Version 2.1 (LGPL V2.1), and/or
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For details, refer to the terms of license that are displayed using the following method:

- 1) Select the [OTHERS] menu → [USB DEVICE] → [SERVICE MODE] → [YES].
Select "LICENSE.TXT" in the external drive recognized by the computer.

At least three (3) years from delivery of this product, Panasonic will give to any third party who contacts us at the contact information provided below, for a charge no more than our cost of physically performing source code distribution, a complete machine-readable copy of the corresponding source code covered under GPL V2.0 or LGPL V2.1, as well as the respective copyright notice thereof.

Contact Information: oss-cd-request@gg.jp.panasonic.com

The source code and the copyright notice are also available for free in our website below.
<https://panasonic.net/cns/oss/index.html>

How to read this document

■ Models described in these operating instructions

- This document describes the operation of models HC-X1500 and HC-X2000.
- The illustrations of the products, menu screens, etc., may differ from the actual items. Unless specifically stated otherwise, screen depictions and illustrations of the unit are of HC-X2000.
- The functionalities of the models differ. Be aware that the part numbers for the models that support the functions are shown.
- Not all models may be available depending on the region of purchase.
- Model numbers are abbreviated as follows in these operating instructions:

Model number	Abbreviation used in these operating instructions	
HC-X1500		[X1500]
HC-X2000		[X2000]

■ Conventions used in this manual

- Words and phrases in [] brackets indicate content displayed in the LCD monitor.
- Words and phrases in < > brackets indicate design text used on this unit, such as button names.

■ Reference pages

- Reference pages in this document are indicated by (→ 00).

■ Terminology

- The battery pack is described as “battery”.
- SDHC memory card, and SDXC memory card are referred to as “SD card” or “memory card” unless distinguished otherwise.
- Images created with one recording operation are referred to as a “clip”.

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Before using the unit

- **Before using the unit, always check if the built-in battery is not consumed, and then set the date/time.**

The date of the internal clock of the unit resets to January 1, 2020 if the built-in battery is exhausted. This may result in the meta data of the clip not being recorded correctly, and it may not display correctly in the thumbnail screen.

Connect the AC adaptor to the main unit or attach a battery when recharging the built-in battery.

The date/time set on the main unit is maintained for approximately 6 months when left in this state for approximately 24 hours.

(Recharged even when the power is on.)

For details about setting the time zone and date/time, refer to [TIME ZONE] (→ 17) and [CLOCK SETTING] (→ 17).

- **When using this product during rain or snow or when at the beach, be careful that water does not get inside the camera.**

Water causes damage to the camera and memory card. (Repair may be impossible)

- **Take care so sand and/or dust do not get inside the camera when using it at the beach, etc.**

Sand and dust may damage the camera and memory card. (Be careful when inserting or removing the memory card)

- **AC adaptor and battery**

- It may take more time to charge or may not be able to charge when the temperature of the battery is extremely high or extremely low.
- Noise may be generated in radio when the unit is used close to a radio (especially when receiving AM). Keep a distance of 1 m or more when using.
- Oscillating sound may generate inside the AC adaptor during the use, but this is not a malfunction.
- Always disconnect the power plug from the power outlet after the use. (Power of approximately 0.1 W is consumed by the AC power itself if kept connected)
- Do not get the terminal section of the AC adaptor, or the battery dirty. Install the device close to the power outlet so the disconnection device (power plug) can be easily reached.

- **Charging lamp during charging**

When the charging lamp is flashing, the following should be considered.

Flashing with approx. 4 second period (on for approx. 2 seconds, off for approx. 2 seconds):

- When the battery is over discharged or the temperature of the battery is too high or low. It can be charged, but it may take a few hours to complete the charging normally.

- Once normal charging starts, the charging lamp lights up green. However, depending on the conditions of use, even when normal charging is taking place, the charging lamp may keep flashing in approx. 4 second intervals until charging is completed.

Flashing with approx. 0.5 second period (on for approx. 0.25 second, off for approx. 0.25 second):

- The battery is not charged. Remove the battery from the unit, and try charging again.
- Check that the terminals of the unit or battery are not dirty or covered with a foreign object, and connect the battery correctly once again.

If a foreign object or dirt is present, turn off the unit before removing.

- The battery or environment is at an extremely high or low temperature. Wait until the temperature has returned to an appropriate level and try charging again. If you are still unable to charge, there may be a fault in the main unit, battery or AC adaptor.

Off:

- Charging has finished.
- If the status indicator stays off despite the charging being unfinished, there may be a fault in the unit, battery or AC adaptor.
- If the operating time is very short even after the battery has been recharged, the battery has worn out. Please purchase a new battery.

■ Memory cards

- The surface of this unit or the memory card may get slightly hot when used for a long period of time, but this is not a malfunction.
- The amount of memory included on the label of the memory card is the total amount of memory below.
 - Capacity to protect and manage copyright
 - Capacity usable as the normal memory on the unit or a PC.
- Do not give a strong impact to, bend, or drop the memory card.
- Memory card data may become destroyed or erased in the following cases.
 - Electrical noise or static electricity
 - Malfunction of the unit or the memory card
- Do not perform the following operations when accessing the memory card (the card 1 access lamp/card 2 access lamp is flashing in orange).
 - Removing the memory card
 - Disconnecting battery or the AC adaptor without turning off the main unit
 - Apply vibration or impact

■ Take care not to drop the main unit when carrying the camera.

- Strong impact will damage the main unit, and it may not operate properly.
- Hold the handle* or grip when carrying the camera, and handle it carefully.

* The handle can be used when the handle unit (**X2000** supplied, **X1500** optional) is attached.

■ Do not apply insecticide or volatile material to the camera.

- The main unit may deform or the paint may peel off when insecticide or volatile material is applied.

- **Do not allow the camera to remain in contact with a rubber or vinyl object for a long period of time.**
- **Disconnect the battery or disconnect the AC cable from the power outlet after the use.**

■ **Battery characteristics**

The battery is a rechargeable lithium-ion battery. It produces electrical energy via an internal chemical reaction. This chemical reaction is effected by the ambient temperature and humidity. The usable time of the battery becomes shorter when the temperature gets higher or lower. When used in an environment with extremely low temperature, it can only be used for approximately 5 minutes.

When the battery is in an extremely hot environment, its protective function will operate and the unit cannot be used temporarily.

■ **After using the unit, be sure to remove the battery.**

Securely remove the battery from the camera.

(Minute current is consumed even if the camera is turned off when the battery is left attached)

The battery will become over discharge and may become unusable even if it is recharged when the battery is left attached for long period of time.

Do not remove the battery when the power is turned on.

Turn off the power and remove the battery after the operation lamp goes completely out.

■ **Take proper care of the battery terminal.**

Do not allow dust or foreign objects on the battery terminal.

Confirm that the battery and its terminal section is not deformed when the battery is dropped by mistake.

Do not mount a deformed battery to the camera. This may damage the camera.

■ **Cautions when throwing memory cards away or transferring them to others**

Formatting memory cards or deleting data using the functions of the unit or a computer will merely change the file management information: it will not completely erase the data on the cards.

It is recommended to completely erase the data in following method when discarding/conveying.

- Physically destroy the memory card itself
- Completely erase the data in the memory card using a commercially available data erasing software for PC, etc.

Users are responsible for managing the data stored in their memory card.

■ LCD monitor and viewfinder

- Condensation sometimes forms on the LCD panel of the LCD monitor in locations subject to extreme temperature differences. If this happens, wipe with a soft, dry cloth.
- Do not touch the LCD monitor with your finger nails, or rub or press with strong force.
- The LCD monitor will be slightly darker than normal immediately after the power is turned on when the camera is very cold. It will return to its regular brightness when the internal temperature increases.
- The LCD monitor and viewfinder are managed with high precision so that at least 99.99% of the dots are effective pixels and 0.01% or less are invalid pixels and always lit. This is not a malfunction and it has no effect whatsoever on the recorded images.
- It may become difficult to see or difficult to recognize the touch when a LCD protection sheet is affixed.

■ About Condensation (When the lens, the viewfinder or LCD Monitor is fogged up)

Condensation occurs when there is a change in temperature or humidity, such as when the unit is taken from outside or a cold room to a warm room. Please be careful, as it may cause the lens, the viewfinder or LCD monitor to become soiled, moldy, or damaged.

When taking the unit to a place which has a different temperature, if the unit is accustomed to the room temperature of the destination for about 1 hour, condensation can be prevented. (When the difference in temperature is severe, place the unit in a plastic bag or the like, remove air from the bag, and seal the bag.)

When condensation has occurred, remove the battery and/or the AC adaptor and leave the unit like that for about 1 hour. When the unit becomes accustomed to the surrounding temperature, foginess will disappear naturally.

■ Caution regarding laser beams

The MOS sensor may be damaged if the MOS sensor is subjected to light from a laser beam. Take sufficient care to prevent laser beams from striking the lens when shooting in an environment where laser devices are used.

■ Treatment of clips

Clips recorded with devices other than this unit are not supported by this unit.

■ Regarding system frequencies

You can change the system frequency (59.94 Hz/50.00 Hz) for this unit by using the menu.

- When AVCHD clips are recorded, it is not possible to use the same memory card with different system frequencies. When the system frequency is changed, use a different memory card.

■ Note the following points.

- If you prepare to record important images, always shoot some advance test footage to verify that both pictures and sound are being recorded normally.
- Panasonic will not assume liability when video or audio recording fails due to a malfunction of the unit or the memory card during the use.
- Set the calendar (datetime of the internal clock) and the time zone, or check the setting before recording. This will have an effect on the management of the recorded contents.

■ Exemption of liability

Panasonic is not liable in any way regarding following.

- 1 **Incidental, special, or consequential damages caused directly or indirectly by the unit**
- 2 **Damages, breakage of the unit, etc., caused by misuse or carelessness of the customer**
- 3 **When disassembly, repair, or modification of the unit is performed by the customer**
- 4 **Inconveniences, damnification, or damages by not being able to record and/or display the video due to any reasons including failure or malfunction of the unit**
- 5 **Inconveniences, damnification, or damages resulting from malfunction of the system combining with any third party equipment**
- 6 **A liability claim or any claim for a privacy violation by an individual or a group that was the subject of the video that the customer has shot (including recording) that became public by any reason (including using with the network user authentication turned OFF)**
- 7 **The registered information is lost due to any reason (including initializing this unit because the authentication information such as user name or password is forgotten)**

■ Cautions regarding network

Since this unit is used connected to a network, following mischief may occur.

- 1 **Leaking or divulging of information through the unit**
- 2 **Fraudulent operation of the unit by a malicious third party**
- 3 **Obstruction and/or stopping of the unit by a malicious third party**

It is customer's responsibility to take sufficient network security measures including the following to prevent damage caused by such mischief. Please note that Panasonic is not liable in any way for damage caused by such mischief.

- Use the unit on a network where safety is secured by using a firewall, etc.
- When using the unit on a system where a PC is connected, make sure that checking and cleaning of infection by computer virus and malicious program is performed periodically.
- In order to prevent malicious attacks, use the authentication system and change the default setting values by using 8 characters or more including 3 or more character types for the authentication information (such as user name and password) so that a third party cannot guess your authentication information.

- Store the authentication information (user name, password, etc.) appropriately so it is not visible to the third party.
- Periodically change the authentication information (user name, password, etc.) and do not use the same authentication information as other accounts.
- To prevent the setting information in the unit to leak to the network, execute measure such as restricting the access with user authentication, etc.
- Do not install in a location where the unit, cable, etc., can be easily damaged.

■ Security

Take caution so the unit or memory card is not stolen, lost, or neglected. Note that Panasonic is not liable to leakage, falsification, or loss of information caused by them.

■ When requesting repairs, or when transferring ownership/disposing of the product

- After first taking note of personal information, make sure you delete information in this unit that includes personal information, including the wireless LAN connection settings, etc., that you have registered or set in this unit, using the following menu settings:
 - [NETWORK] menu → [UTILITY] → [NETWORK INITIALIZE]
 - [OTHERS] menu → [MENU INITIALIZE]
- Remove the Memory Card from this unit when requesting a repair.
- Settings may return to factory default when this unit is repaired.
- Please contact the dealer where you purchased this unit or Panasonic if above operations are not possible due to malfunction.
- (For the **X2000**)

When requesting a repair for the handle unit, request a repair for the video camera as well, as the cause of the problem may be in the video camera.

Accessories/Optional accessories

Accessories

For details about procedures such as mounting accessories, refer to the corresponding descriptions in “Chapter 1 Overview” → “Accessories” of Operating Instructions (PDF version). Check the accessories before using this unit.

Product numbers correct as of January 2020. These may be subject to change.

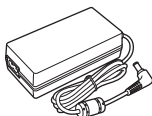
Battery pack (→ 27)

AG-VBR59



AC adaptor (→ 28)

SAE0011A



AC cable (→ 28)

- For AC adaptor

(A) K2CT2YY00095

- In Saudi Arabia, always use (A).

(B) K2CQ2YY00117

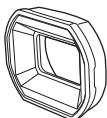
(C) K2CJ2YY00152



Lens hood

DVYE1189Z

- Pre-attached to the main unit.



Eye cup (→ 31)

DVZE1040Z



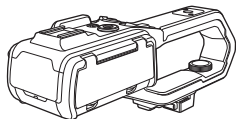
■ For the X2000

The following accessories are also supplied.

Handle unit (→ 25)

VW-HU1

- To purchase as a supplied accessory, use part number 1KC1VWHU1PPK when ordering.



1AC2HCX2500Z

Microphone holder

- The microphone holder mounting screws are supplied with the microphone holder.



Microphone holder mounting screws

1PP1HCX2500Z

- Length 12 mm (×2)



NOTE

- Appropriately discard the AC cable cap (if attached) and packing materials after taking the product out.

Optional accessories

Some optional accessories may not be available in some countries.

Product numbers correct as of January 2020. These may be subject to change.

- **Battery charger (AG-BRD50)**
- **Battery pack (AG-VBR59, VW-VBD58)**
- **LED video light (VW-LED1E)**
- **Stereo microphone (VW-VMS10E)**
- **Unidirectional microphone (AG-MC200G)***
- **Handle unit (VW-HU1)**

* Handle unit ( supplied,  optional (VW-HU1)) required.

When turning on the power for the first time

The time zone, date, and time are not set when the unit is shipped.

[TIME ZONE] is displayed in the LCD monitor when the power is turned on for the first time. Follow the guidance and make the settings in the order of [TIME ZONE] and then [CLOCK SETTING].

- You can do these operations either with the multial or by touching the LCD monitor.

[TIME ZONE]

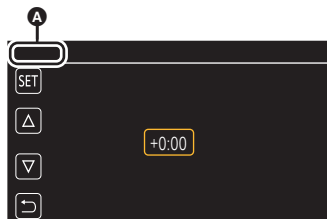
Set the time difference from the Greenwich Mean Time.

- A** [TIME ZONE]

1 Set the time difference.

2 Select [SET].

Once the setting for [TIME ZONE] is completed, the [CLOCK SETTING] screen is displayed.



NOTE

- The setting for the date/time of the main unit changes together with the time zone settings.
- This can also be set with the [OTHERS] menu → [CLOCK] → [TIME ZONE].

[CLOCK SETTING]

Set the year, month, date, and time.

- A** [CLOCK SETTING]

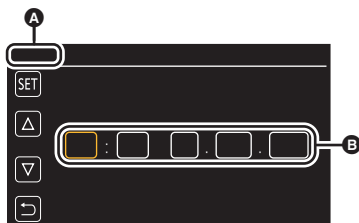
- B** 0 : 0 1. JAN. 2020

1 Set the year, month, date, and time.

The year can be set between 2018 and 2037.

2 Select [SET].

Once the setting is complete, the camera image screen is displayed.



NOTE

- This can also be set with the [OTHERS] menu → [CLOCK] → [CLOCK SETTING].

What you can do with this unit

Recording to the memory card

Recording in following types is possible.

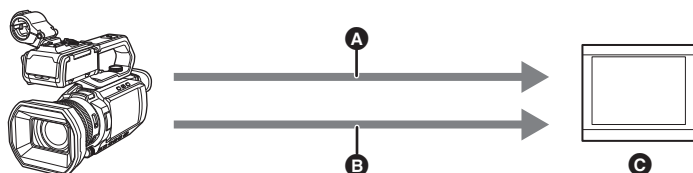
- MOV recording (UHD and FHD recording)
- MP4 recording (UHD and FHD recording)
- AVCHD recording
- Simultaneous recording
- Relay recording
- Interval recording
- Background recording
- Pre-recording

Linking to external devices

Connecting to TV/monitor

Connect to a TV/monitor and output images.

- When using **X2000** use a BNC cable (<SDI OUT> terminal) to connect a TV/monitor.



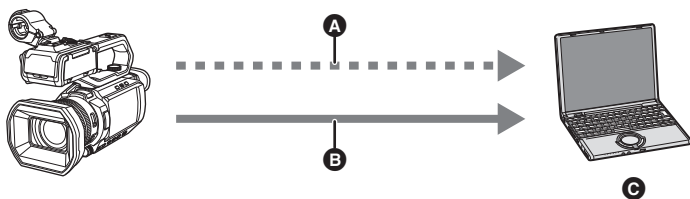
- A** HDMI cable
- B** (For the **X2000**)
BNC cable (<SDI OUT> terminal)
- C** TV/Monitor
- Use a commercially-available High Speed HDMI cable. If possible, we recommend using a cable with a length of 3 m or less.
- (For the **X2000**)
Use a commercially-available 5C-FB or equivalent double-shielded cable for the BNC cable.

When using a DVI converter, etc., to connect an HDMI cable to this unit, make sure that you connect last to the <HDMI> terminal on this unit. Connecting first to the <HDMI> terminal on this unit may cause a malfunction.

Card reader mode

Data (files) for performing nonlinear editing on a computer are transferred.

- The unit supports USB2.0.



- A** Memory card*1
- B** USB2.0 cable*2
- C** Computer

*1 Memory cards are optionally available. They are not supplied with the unit.

*2 A USB2.0 cable is not supplied with the unit.

Use a commercially-available generic USB cable conforming to USB2.0. If possible, we recommend using a cable with a length of 1.5 m or less.

The unit does not offer a bus-powered function.

Connecting to the network

This unit is equipped with wireless LAN. It can connect to wireless LAN devices via a network.

Available functions

When the unit is connected to a network, the following functions are available.

- Connecting to HC ROP app

You can remotely control this unit with the HC ROP app by connecting this unit with an iPhone/iPad or Android terminal via wireless LAN.

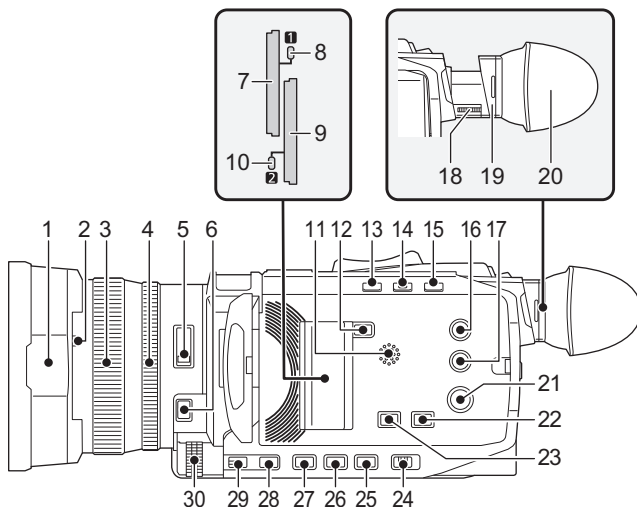
- Streaming function

You can perform streaming of audio and video currently shot with the unit over a network (wireless LAN).

Description of parts

Main unit

- The illustrations in this document show the handle unit (**X2000** supplied, **X1500** optional) removed.



- 1 Lens hood**
- 2 Lens cover switching lever**
Opens/closes the lens cover.
- 3 Focus ring (→ 43)**
When the <FOCUS A/M/∞> button is pressed to set to manual focus mode ([MF]) you can focus manually.
- 4 Rear ring (→ 42)**
You can manually perform zoom operations, adjust the iris (the lens stop), and adjust the AE level (exposure compensation).
 - You can switch the function to be adjusted by setting with the menu, pressing the USER button assigned to [REAR RING], or touching the USER button icon.
- 5 <ND FILTER> switch**
Selects the ND filter to suit the illumination of the subject.
 <1/64>:
 Reduces the amount of light entering the MOS sensor to 1/64.
 <1/16>:
 Reduces the amount of light entering the MOS sensor to 1/16.
 <1/4>:
 Reduces the amount of light entering the MOS sensor to 1/4.
 <CLR>:
 Does not use the ND filter.
- 6 <FOCUS A/M/∞> button (→ 43)**
Select the focus function.

- 7 Card slot 1 (→ 35)**
A slot for the memory card.
- 8 Card 1 access lamp**
Indicates the access status for recording and playback of the memory card inserted in card slot 1.
- 9 Card slot 2 (→ 35)**
A slot for the memory card.
- 10 Card 2 access lamp**
Indicates the access status for recording and playback of the memory card inserted in card slot 2.
- 11 Built-in speaker**
Outputs audio during playback.
Audio is not output from the built-in speaker when headphones are connected to the headphone terminal.
- 12 <SLOT SEL> button**
Selects the card slot to record to or play back from.
- 13 <USER1> button**
Used as a USER button (USER1).
• [LEVEL GAUGE] is allocated at the time of purchase.
Switches display/hide of level gauge.
- 14 <USER2> button**
Used as a USER button (USER2).
• [BACKLIGHT] is allocated at the time of purchase.
Switches enable/disable of the auto iris control function for backlight compensation.
- 15 <O.I.S.>/<USER3> button**
Switches enable/disable of the optical image stabilizer function.
This is also used as the USER button (USER3).
- 16 <THUMBNAIL> button (→ 46)**
Press the button to switch between the camera image screen and the thumbnail screen.
- 17 <DISP/MODE CHK> button**
Switches display/hide of information other than the time counter, time stamp, zebra pattern, and marker.
Press and hold the button to display information about the settings of the various shooting functions and information such as a list of the functions assigned to the USER button. Each press of the button switches the information page in order.
- 18 Diopter adjustment dial**
Adjusts the diopter scale so that the viewfinder screen can be viewed clearly.
- 19 Eyepiece**
Do not leave the eyepiece pointed toward the sun. Doing so might damage the devices inside.
- 20 Eye cup (→ 31)**
- 21 Power button (→ 36)**
Press the button to switch the power on/off.
- 22 <WHITE BAL> button (→ 43)**
Selects the method for adjustment of the white balance.
- 23 <AE LEVEL>/<USER4> button (→ 43)**
Switches enable/disable of the AE level function.
Set the target value of the AE level in the [SCENE FILE] menu → [AE LEVEL EFFECT].
This is also used as the USER button (USER4).
- 24 <AUTO/MANU> switch (→ 41)**
Selects the method to adjust the focus, gain, iris, white balance, and shutter speed at shooting.
<AUTO>:
Adjusts automatically. (Auto mode)
<MANU>:
Adjusts manually. (Manual mode)
- 25 <SHUTTER> button (→ 45)**
Switches the shutter mode.

26 <GAIN> button (→ 45)

Selects the method for adjusting screen brightness.

27 <IRIS> button (→ 42)

Selects the method for adjustment of the lens stop.

28 <MENU> button (→ 37)

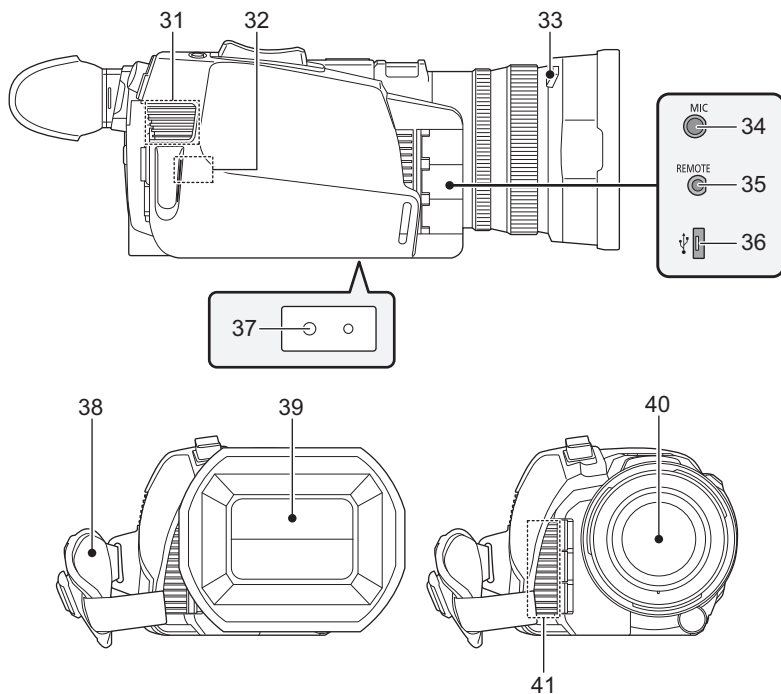
Displays the menu. Pressing the <MENU> button while the menu is displayed closes the menu. Press the button while the thumbnail screen is displayed to display the operation screen of the thumbnail menu, and clips can be deleted.

29 <EXIT> button

Returns to one level higher when the menu is displayed. Pressing the <EXIT> button without confirming the setting value will not reflect the change in the setting.

30 Multidial (→ 41)

Moves, selects, and sets the menu while the menu is displayed. Use the multidial to also operate thumbnails, select the multi manual function and select/set the various operation icons.



31 Fan inlet

Fan inlet for cooling fan. Do not block this while the unit is being used.

32 Wireless LAN Transmitter

33 Lens hood release button

34 <MIC> terminal

Connect an external microphone (stereo mini jack).

35 <REMOTE> terminal

Connects the remote control unit (commercially-available) to control some functions remotely.

36 USB terminal

Connect to a computer with the USB2.0 cable to transfer data.

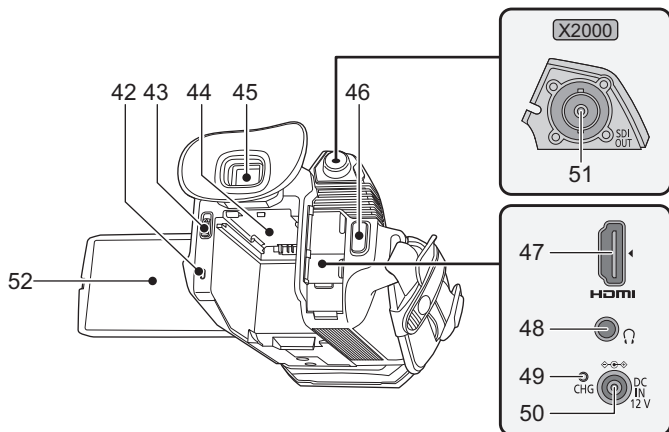
37 Tripod mounting holes

Attach the tripod. (bottom)

- Mounting hole size
 - 1/4-20 UNC (screw length 5.5 mm or shorter)
- Attaching a tripod with a screw length of 5.5 mm or more may damage the unit.

38 Grip belt (→ 30)**39 Lens cover****40 Lens****41 Fan outlet**

Fan outlet for cooling fan. Do not block this while the unit is being used.

**42 Status indicator (→ 36)**

Illuminates when power is on.

43 Battery release lever (→ 27)

Used when removing the battery from the main unit.

44 Battery mounting section (→ 27)

Attaches a battery.

45 Viewfinder**46 REC button (on the grip)**

Starts or stops the recording.

It is possible to directly record from the thumbnail mode.

47 <HDMI> terminal

A terminal to output video signal by connecting a monitor, etc.

48 Headphones terminal

Connects audio monitoring headphones.

49 Charging lamp (→ 28)

Illuminates when the battery is charging.

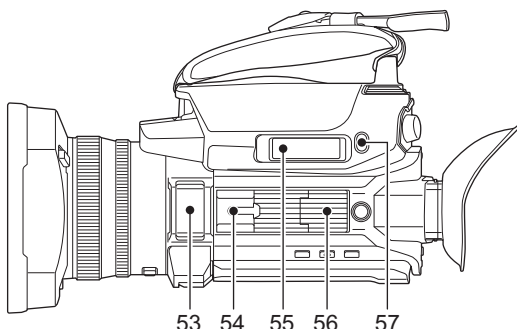
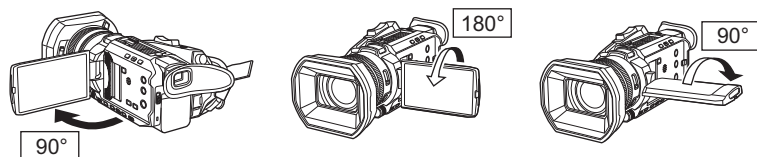
50 <DC IN 12V> terminal (→ 28)

Connects the supplied AC adaptor and supplies an external power.

51 (For the X2000) <SDI OUT> terminal

A terminal to output SDI signal by connecting a monitor, etc.

52 LCD monitor



53 Built-in microphone

This is the built-in stereo microphone
<L>/<R>.

54 Accessory shoe (on the main unit)

Attach a video light, etc.

55 Zoom lever (on the grip)

Adjusts the zoom of an image.

<T>: Zooms in the image.

<W>: Zooms out the image.

- Adjust the volume when playing back clips.

56 Handle unit mounting section (→ 31)

57 <USER5> button

Used as a USER button (USER5).

- [REC CHECK] is set at the time of purchase.
Automatically plays back the last approximately 3 seconds of the previously shot clip.



14 <CH1> switch

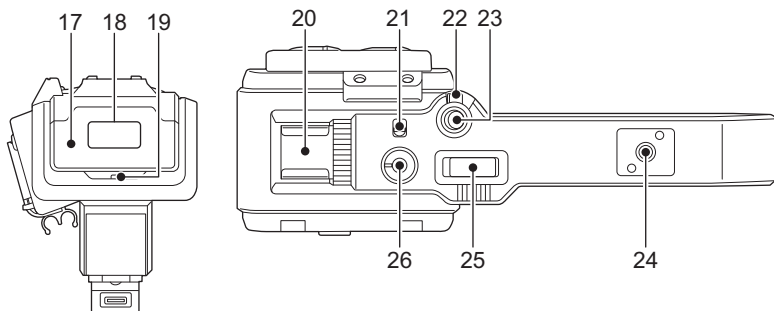
Selects how the recording level for audio channel 1 is adjusted.

15 <AUDIO LEVEL CH1> dial

Adjust the recording level of audio channel 1.

16 Handle unit mounting screw (→ 31)

Secures the handle unit to the main unit.



17 Light cover

- Keep the light cover out of reach of children to prevent swallowing.

18 Built-in LED light

19 Tally lamp

Illuminates when the recording is started. Flashes when the battery level becomes low.

Whether or not to illuminate the lamp can be set in the menu.

20 Accessory shoe (on the handle)

Attach a video light, etc.

21 <LIGHT> switch

Switches the built-in LED light on/off.

22 Hold lever

Disables the REC button (on the handle) when switched to <HOLD>.

23 REC button (on the handle)

Starts or stops the recording.

24 Accessory mounting hole

Accessories can be attached.

- Mounting hole size
 - 1/4-20 UNC (screw length 5.5 mm or shorter)

25 Zoom lever (on the handle)

Adjust the zoom of an image.

<T>: Zooms in the image.

<W>: Zooms out the image.

26 Light dimmer dial

Adjusts the brightness of the built-in LED light.

Turn to <+> to brighten, turn to <-> to dim.

Power supply

A battery or the supplied AC adaptor can be used as the power supply for the unit.

- The unit is compatible to following batteries. (As of January 2020)
 - AG-VBR59 (supplied/optional, supports quick charging)
 - VW-VBD58 (optional)
- AG-VBR59 supports quick charging. Use a battery charger (AG-BRD50: optional) to perform quick charging.

Attaching and removing the battery

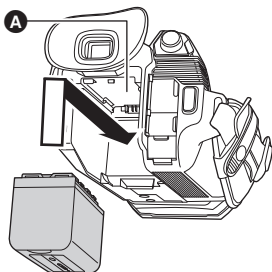
- Press the power button to turn off the unit. (→ 36)

Attaching the battery

- 1 Push the battery against the battery mounting section on the main unit and slide forward to attach.**

Press in the battery until it clicks and gets locked.

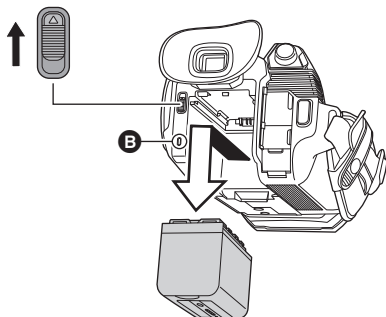
- A** Battery mounting section



Removing the battery

Be sure to hold down the power button until the status indicator goes off. Then remove the battery while supporting the unit to prevent it from dropping.

- B** Status indicator

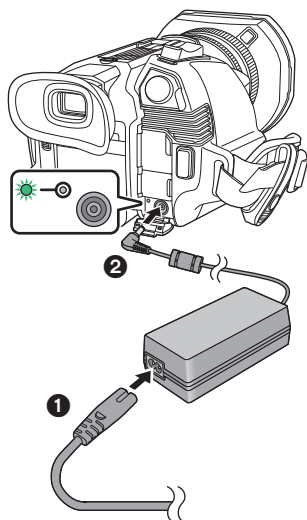


Move the battery release lever in the direction indicated by the arrow and remove the battery when unlocked.

Charging the battery

The battery is not charged at the time of purchase. Use only after charging sufficiently. It is recommended that you have one extra battery.

- It is recommended to perform charging of the battery in a location with ambient temperature of 10 °C to 30 °C (same for the battery temperature).
- Use the supplied AC adaptor. Do not use the AC adaptor of another device.
- The supplied AC cable is dedicated for this unit. Do not use with any other device. Also, do not use AC cable from other device on this unit.
- The battery is not charged when the power is on.



1 Connect the AC cable to the AC adaptor and the AC outlet.

- Insert the plugs as far as they will go.

2 Connect the AC adaptor to the <DC IN 12V> terminal.

- As the charging lamp lights up green, charging starts. It will turn off when the charging is completed.
- If the charging lamp flashes, refer to page 9.
- The DC plug of the AC adaptor, depending on its angle, may block your view of the charging lamp. To check the charging lamp status, adjust the angle of the DC plug.

■ Connecting to the AC outlet

It is possible to use this unit with power supplied from the AC outlet by turning on the unit with the AC adaptor connected.

Even when you use the AC adaptor for recording images, keep the battery connected.

This allows you to continue the recording even if a power failure occurs or the AC adaptor is unplugged from the AC outlet by accident.

- The AC adaptor is in the standby condition when the mains plug is connected. The primary circuit is always “live” as long as the AC adaptor is connected to an electrical outlet.

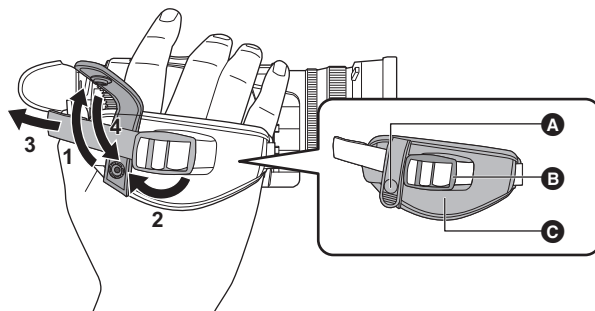
**NOTE**

- Do not use any other AC adaptors except the supplied one.
- We recommend using Panasonic batteries (→ 27).
- If you use other batteries, we cannot guarantee the quality of this product.
- Do not heat or expose to flame.
- Do not leave the battery(ies) in a car exposed to direct sunlight for a long period of time with doors and windows closed.
- Do not expose to low air pressure at high altitudes.
- Do not expose to extremely low air pressure, as this may result in explosions or leakage of flammable liquids and gases.

Attaching accessories

Adjusting the grip belt

- Adjust the grip belt so that it fits the size of your hand.
- If the buckle is difficult to tighten, move the pad forward and tighten the buckle again.



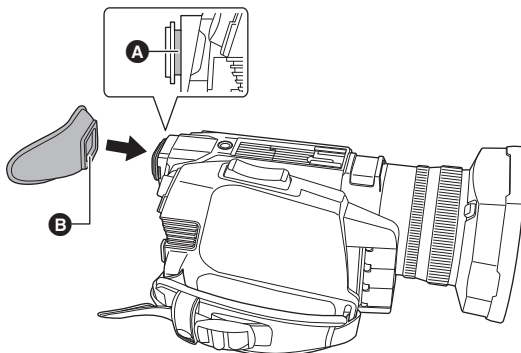
- A** Button
- B** Buckle
- C** Pad

- 1** Undo the button of the grip belt.
- 2** Open the buckle section.
- 3** Pull the end of the belt.
- 4** Do up the button of the grip belt.

Attaching the eye cup

- 1 **Attach the eye cup by aligning the groove on the mounting part of the eye cup with the inner ridge of the eye cup.**

The illustration below is an example of attaching the eye cup to use it with your right eye. If you rotate the eye cup to the left by 180° before attaching it, you can use it with your left eye.



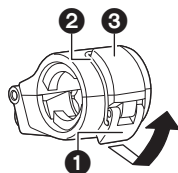
- A** Groove
- B** Ridge

Attaching the handle unit ([X2000] supplied, [X1500] optional)

- Press the power button to turn off the unit. (→ 36)

- 1 **Open the microphone holder.**

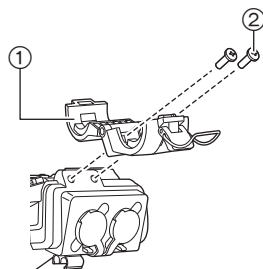
Open buckle ①, and detach fitting ② from hook ③.



2 Attach the microphone holder to the microphone holder mounting section on the handle unit.

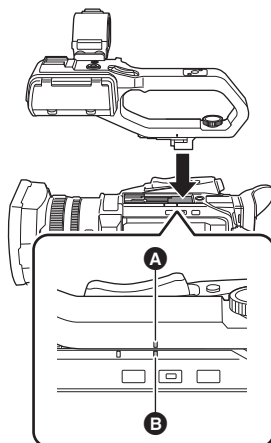
- Attach using a commercially-available screwdriver.
- There will be some rubbing noises with the rubber when screwing in the microphone holder mounting screws, but please ensure they are done up tightly.

- ① Microphone holder
- ② Microphone holder mounting screws



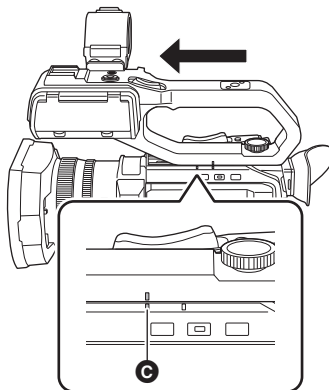
3 Push the handle unit into the handle unit mounting section on the camera.

Match the positions of mounting mark **A** on the handle unit and mounting mark **B** on the camera when pushing in.

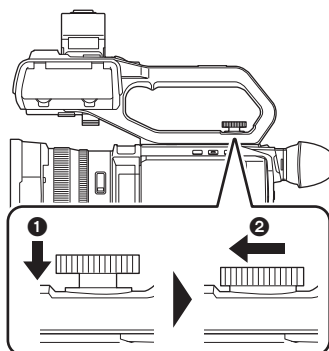


4 Slide the handle unit in the direction indicated by the arrow.

Slide up to mounting mark **C**.



5 While pressing the handle unit mounting screw down, turn it in the direction indicated by arrow **2** until it stops.



■ How to remove

Remove by doing the steps for attaching in reverse.

NOTE

- Keep the microphone holder mounting screws out of reach of children to prevent swallowing.

Preparing the memory card

Memory cards supported by the unit

The SD cards can be used with the camera.

- Panasonic memory cards are recommended.
- Keep the memory card out of reach of children to prevent swallowing.

Speed Class during shooting

The memory card to use differs depending on the file format and the recording format. Use memory cards compatible with the Speed Class or UHS Speed Class.

The recording may stop suddenly when a memory card not compatible with the required Speed Class is used.

Speed Class and UHS Speed Class are the speed specification regarding continuous writing. Check the display on the label and other information on the memory card.

File format	Recording bit rate or recording function	Supported memory cards and Speed Classes	Example of card display
MOV/MP4	200 Mbps, 150 Mbps, 100 Mbps, Super slow recording	• SDXC memory card with UHS Speed Class 3	
	72 Mbps, 50 Mbps	• SDXC memory card with Speed Class 10	 CLASS 
AVCHD	All	• SD card with Speed Class 4 or better	 CLASS 

When the file format is MOV or MP4

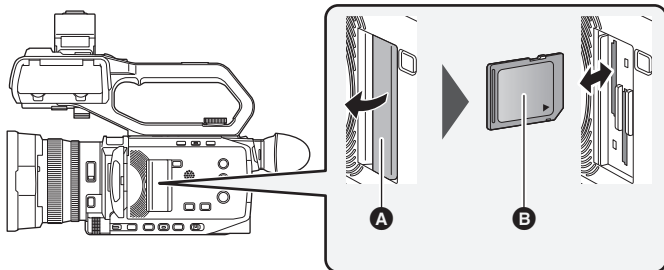
- SDXC memory cards can be used. SDHC memory cards cannot be used.

Inserting/removing the memory card

Inserting the memory card

The memory card to use with the unit should always be formatted on the unit. (→ 38)

- Formatting the memory card will erase all of the recorded data which cannot be restored.



- A** Card slot cover
- B** Label side

1 Open the card slot cover.

2 Insert the memory card into the card slot.

- Card slot 1 and slot 2 can each insert one memory card.
- With the label facing in the direction indicated in the diagram, push in until there is a click.

Do not force or apply excess force when inserting the memory card.

3 Close the card slot cover.

Removing the memory card

1 Open the card slot cover.

- Confirm that the card access lamp is not flashing in orange.
- Data is being written/loaded when the card access lamp is flashing in orange, so do not remove the memory card.

2 Press in the memory card further into the main unit and let go.

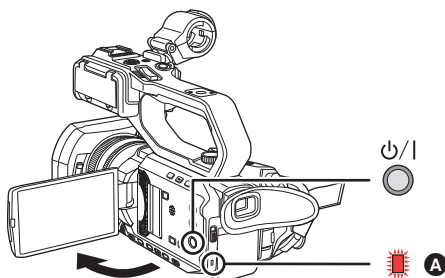
- Pull the memory card straight out when it is released from the card slot.

3 Close the card slot cover.

Turning on/off the power

Turning the unit on and off with the power button

- 1** Open the LCD monitor and press the power button to turn on the unit.



A The status indicator lights on.

■ To turn off the unit

Hold down the power button until the status indicator goes off.

NOTE

- The [TIME ZONE] screen is displayed when the power is turned on for the first time. (→ 17)
Set the time zone, date, and time.
- The built-in battery (rechargeable battery) will discharge. The setting for date/time may be initialized when the unit is not turned on for approximately 6 months.
Set the date/time again after charging the built-in battery.

Turning the unit on and off with the LCD monitor/viewfinder

Opening the LCD monitor or extending the viewfinder turns on the unit. Closing the LCD monitor/viewfinder turns off the unit.

During normal use, you may find it convenient to turn the unit on/off using the LCD monitor or viewfinder.

- The unit will not turn off unless the LCD monitor is closed and the viewfinder is retracted.
- The unit will not turn off during recording or while connected to a network even if the LCD monitor is closed and the viewfinder is retracted.
- In the following cases, opening the LCD monitor or extending the viewfinder does not turn on the unit. Press the power button to turn on the unit.
 - When the unit is originally purchased
 - When you have turned off the unit using the power button

Basic operation of the menu

The setting of the unit can be changed with the menu in accordance to the shooting scene or recording contents.

Set data is written and saved in the main unit memory.

- When you press the <MENU> button, the menu is displayed.
- There are 2 methods of operation: a method to operate with the multial, or a method to touch the LCD monitor.

Configuration of the menu

[THUMBNAIL] menu	Performs confirmation or deleting of the recording clip. This menu can be set when the thumbnail screen is displayed.
[CAMERA] menu	Sets the basic functions of the camera. This menu cannot be set when the thumbnail screen is displayed.
[SCENE FILE] menu	Sets the setting regarding scene file. This menu sets the detailed image quality adjustment of the camera video. Also, selection of the scene file, writing the scene file data to the main unit memory, and loading from the main unit memory can be performed. This menu cannot be set when the thumbnail screen is displayed.
[AUDIO] menu	Sets the input/output function of audio.
[VIDEO OUT/LCD/VF] menu	Configures the settings for the external output, the information to display in the LCD monitor or viewfinder and the output format.
[RECORDING] menu	Sets the various items in the recording function.
[NETWORK] menu	Sets the setting regarding the network function.
[SYSTEM] menu	Configures the settings regarding the recording format of video and audio.
[OTHERS] menu	Configures the settings for writing/loading/initializing user files to the internal memory, and the basic unit settings.

Formatting the memory card

Before recording with a memory card that is to be used for the first time in this unit, format it. All data will be deleted when the card is formatted. Save any important data to a computer, etc.

- When using 2 memory cards, you must format both of the memory cards.

- 1** Select the [RECORDING] menu → [FORMAT MEDIA] → [SLOT1]/[SLOT2].
- 2** When the confirmation message is displayed, select [SET].
- 3** When the completion message is displayed, select [↶].

NOTE

- Do not turn this unit off or remove the memory card, while formatting. Do not expose the unit to vibrations or shock.
- This function can be operated also by touching the LCD monitor.
- It may take few seconds after closing the completion message until it can record.

Format the cards using this unit. (Do not format using other devices, such as a computer, etc. Doing so may make the cards unusable in this unit.)

Menu list

For details on specifications, visit the Operating Instructions (PDF version).

- *1 This can be set when the handle unit (**X2000** supplied, **X1500** optional) is attached to the unit.
- *2 This can be set when the handle unit has not been attached to the unit.
- *3 Available for setting when using **X2000**.

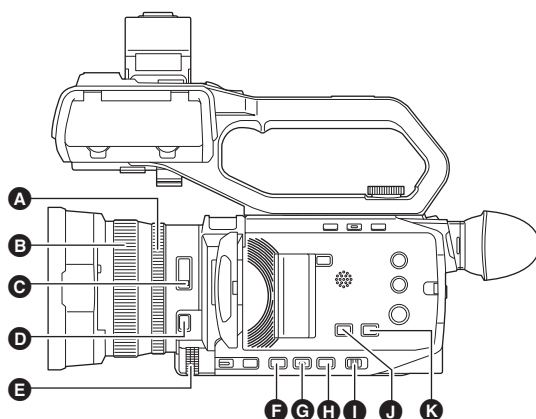
[THUMBNAIL] menu	[PLAYBACK]	[CLIP SEL], [RESUME PLAY]
	[CLIP]	[PROTECT], [DELETE], [COPY], [INFORMATION]
	[DISPLAY]	[DATA]
[CAMERA] menu	[SW MODE]	[ZOOM RING], [IRIS RING], [SUPER GAIN], [AGC LIMIT], [O.I.S.], [HYBRID O.I.S.], [O.I.S. MODE], [ATW], [ATW SPEED], [ATW TARGET R], [ATW TARGET B], [W.BAL PRESET], [W.BAL VAR], [H.ZOOM SPEED], [i.ZOOM], [REAR RING], [AUTO SLOW SHTR], [AF SPEED], [AREA MODE], [IR REC], [IR REC COLOR], [FACE DETECT/ TRACKING MODE]
	[USER SW]	[USER1] to [USER12]

[SCENE FILE] menu	[FILE SELECT], [NAME EDIT], [LOAD/SAVE/INITIALIZE], [MASTER DTL], [DTL CORING], [V.DTL LEVEL], [RB GAIN CONTROL SETTING], [CHROMA LEVEL], [CHROMA PHASE], [MATRIX], [COLOR CORRECTION], [SKIN TONE DTL.], [MASTER PED], [GAMMA MODE SEL], [BLACK GAMMA], [KNEE MODE], [DRS], [DRS EFFECT DEPTH], [NR CONTROL], [AE LEVEL], [AE LEVEL EFFECT]	
[AUDIO] menu	[HANDLE UNIT INPUT SETTING]* ¹	[INPUT1 MIC LEVEL], [INPUT2 MIC LEVEL], [INPUT1 LINE LEVEL], [INPUT2 LINE LEVEL]
	[MIC SETTING]* ²	[CH1 LEVEL], [CH2 LEVEL], [CH1 LEVEL CONTROL], [CH2 LEVEL CONTROL]
	[INPUT SETTINGS]	[CH1 MIC LOWCUT], [CH2 MIC LOWCUT], [CH1 LIMITER], [CH2 LIMITER], [MIC LIMITER LINK]
	[OUTPUT SETTINGS]	[AUDIO OUT]
	[ALARM]	[BATTERY END], [MEDIA END], [WARNING]
[VIDEO OUT/LCD/VF] menu	[VIDEO OUT SEL]* ³	
	[SDI OUT]* ³	[OUT FORMAT], [SDI AUDIO GAIN CHG], [SDI REC REMOTE], [SDI OUT CHAR], [SDI OUT ZEBRA]
	[HDMI OUT]	[OUT FORMAT], [HDMI TC OUT], [HDMI REC REMOTE], [HDMI OUT CHAR], [HDMI OUT ZEBRA]
	[LCD]	[BRIGHTNESS], [COLOR LEVEL], [CONTRAST], [BACK LIGHT], [RED TINT], [BLUE TINT], [SELF SHOOT]
	[VF]	[BRIGHTNESS], [COLOR LEVEL], [CONTRAST], [RED TINT], [BLUE TINT], [VF COLOR]
	[INDICATOR]	[FULL AUTO], [SLOT1/2 STATUS], [2 SLOTS FUNC.], [STREAMING], [NETWORK], [BATTERY REMAIN], [REC FORMAT], [FRAME RATE], [CLIP NAME], [REC REMOTE], [REC MODE], [FBC], [DRS], [O.I.S.], [SCENE FILE], [AREA/FACE], [AUDIO LEVEL METER], [GAIN], [ND FILTER], [SHUTTER], [IRIS], [AE LEVEL], [ZOOM/FOCUS], [WHITE BALANCE], [FACE DETECTION], [DATE/TIME], [MULTI MANUAL], [D.ZOOM], [IR REC], [PLAYBACK STATUS]
	[MARKER]	[CENTER MARKER], [SAFETY MARKER], [FRAME MARKER]
	[FOCUS ASSIST]	[FOCUS ASSIST SW], [EXPAND MODE], [EXPAND VALUE], [PEAKING LEVEL], [PEAKING COLOR], [DETAIL], [DETAIL LEVEL], [DETAIL FREQ.]
	[EI ASSIST]	[ZEBRA], [ZEBRA1 DETECT], [ZEBRA2 DETECT], [ZEBRA2], [WFM MODE], [WFM TRANSPARENCE]

Basic operation of the menu

[VIDEO OUT/LCD/ VF] menu	[LEVEL GAUGE]	[LEVEL GAUGE], [LEVEL GAUGE RESET]
[RECORDING] menu	[FORMAT MEDIA]	
	[CLIP NAME]	[CAM INDEX], [NEXT CARD COUNT]
	[2 SLOTS FUNC.], [PRE REC]	
	[REC FUNCTION]	[REC MODE], [INTERVAL TIME]
	[TC/UB]	[TC PRESET], [UB PRESET], [FREE/REC RUN], [DF/NDF], [UB MODE]
	[REC COUNTER], [TIME STAMP]	
[NETWORK] menu	[DEVICE SEL], [NETWORK FUNC]	
	[IP REMOTE]	[ENABLE/DISABLE], [USER ACCOUNT], [ACCOUNT LIST]
	[STREAMING]	[STREAMING FORMAT], [START TRIGGER], [CONNECTION INFO.], [RECEIVER URL], [RTSP PORT], [MULTICAST ADDRESS], [MULTICAST PORT], [LOAD (SD CARD)], [SAVE (SD CARD)], [START]
	[WLAN PROPERTY]	[TYPE], [SSID], [CHANNEL], [ENCRYPTION], [ENCRYPT KEY]
	[WLAN IPv4 SETTING]	[DHCP], [IP ADDRESS], [SUBNET MASK], [DEFAULT GATEWAY], [PRIMARY DNS], [SECONDARY DNS]
	[INFORMATION]	[STATUS]
	[UTILITY]	[NETWORK INITIALIZE]
[SYSTEM] menu	[FREQUENCY], [FILE FORMAT], [REC FORMAT], [SUPER SLOW]	
[OTHERS] menu	[FILE]	[SCENE FILE(SD CARD)], [SETUP FILE(SD CARD)], [SETUP FILE(MEMORY)], [SLOT FOR LOAD/SAVE]
	[HANDLE TALLY LED]	
	[CLOCK]	[CLOCK SETTING], [TIME ZONE], [DATE FORMAT]
	[USB DEVICE]	[CARD READER MODE], [SERVICE MODE]
	[INFORMATION]	[VERSION], [OPERATION TIME], [UPDATE]
	[ECO MODE]	[BATTERY], [AC], [NETWORK]
	[LANGUAGE], [MENU INITIALIZE]	

Manual recording



- A** Rear ring
- B** Focus ring
- C** <ND FILTER> switch
- D** <FOCUS A/M/∞> button
- E** Multidial
- F** <IRIS> button
- G** <GAIN> button
- H** <SHUTTER> button
- I** <AUTO/MANU> switch
- J** <AE LEVEL>/<USER4> button
- K** <WHITE BAL> button

■ About auto mode/manual mode

Switch between auto mode and manual mode with the <AUTO/MANU> switch.

<AUTO>: auto mode

- Focus, iris, gain, shutter, and white balance are automatically adjusted.

<MANU>: manual mode

- To adjust focus, iris, gain, shutter speed, and white balance manually, set the unit to manual mode.

NOTE

- The settings made in manual mode are not maintained for the following settings when you switch to auto mode:
 - Focus, lens stop, gain, shutter speed, white balance

■ Camera operations that are disabled in auto mode

- The following camera operations are disabled in auto mode:
 - <IRIS> button, <GAIN> button, <SHUTTER> button, <WHITE BAL> button, <FOCUS A/M/∞> button, focus ring, rear ring*
- * When set with the [CAMERA] menu → [SW MODE] → [REAR RING] → [IRIS]
- The following USER button functions are disabled in auto mode:
 - [AWB]/[FBC]/[ONE PUSH AF]/[ATW]/[FOCUS ASSIST]

Rear ring function settings

Set the [CAMERA] menu → [SW MODE] → [REAR RING], and you can switch the function to be adjusted by the rear ring.

- Zoom
- Manual iris adjustment
- AE level (exposure compensation) adjustment

Zoom

- 1** Select the [CAMERA] menu → [SW MODE] → [REAR RING] → [ZOOM].
- 2** Rotate the rear ring.

Iris

- 1** Select the [CAMERA] menu → [SW MODE] → [REAR RING] → [IRIS] or [IRIS/AE LEVEL].
- 2** Switch to <MANU> with the <AUTO/MANU> switch to enter manual mode.
- 3** Press the <IRIS> button to switch to manual iris mode.
[STD] disappears.
- 4** Rotate the rear ring.

AE level (exposure compensation)

- 1 Select the [SCENE FILE] menu → [AE LEVEL] → [ON].
- 2 Select the [CAMERA] menu → [SW MODE] → [REAR RING] → [IRIS/AE LEVEL].
- 3 When the <AUTO/MANU> switch is set to manual mode, use one of the following operations to switch one of iris, gain, or shutter speed to auto.
 - Press the <IRIS> button to switch to auto iris mode.
 - Press the <GAIN> button to switch to auto gain mode.
 - Press the <SHUTTER> button to switch to auto shutter mode.
- 4 Rotate the rear ring.

NOTE

- When manual iris mode is enabled, the iris is adjusted when the rear ring is turned.

Focusing (manual focus)

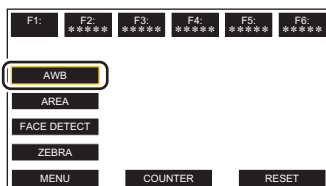
- 1 Switch to <MANU> with the <AUTO/MANU> switch to enter manual mode.
- 2 Press the <FOCUS A/M/∞> button to switch to manual focus mode.
[AF] and [MF] switch each time you press the button. The focal point goes to infinity after you press and hold the button, and then the manual focus mode is engaged.
- 3 Rotate the focus ring.

White balance adjustment

Follow the steps below to adjust the white balance automatically.

- White balance/black balance adjustment is done using the [AWB] USER button function. Make the settings beforehand.
It is set in the [USER6] button icon at the time of purchase.

To display the operation icon, touch and hold the screen for approximately 2 seconds while the camera recording screen is being displayed.



■ When stored in white balance [Ach]

1 Switch to <MANU> with the <AUTO/MANU> switch to enter manual mode.

2 Set the gain value. (→ 45)

Normally, set this to 0 dB. If it is too dark, set the gain to an appropriate value.

3 Press the <WHITE BAL> button to switch to [Ach].

Each time you press the button, the white balance switches in the order "Preset", [Ach], [Bch].

4 Change the <ND FILTER> switch settings according to the light conditions.

5 Place the white pattern at a point where the light conditions match those for the light source for the subject, and zoom in on the white pattern so that the white color appears in the screen.

6 Adjust the iris (the lens stop).

Adjust the iris so that the brightness of Y GET is approx. 70%.

7 Either press the USER button assigned to [AWB] or touch the USER button icon.

Automatic adjustment of the white balance starts and the white balance adjustment value is memorized.

 NOTE

- The content previously set is maintained in [Ach] or [Bch]. Make the settings again if the lighting conditions have changed.

When having no time to adjust the white balance

1 Press the <WHITE BAL> button to switch to "Preset".

2 Either press the USER button assigned to [AWB] or touch the USER button icon to switch the white balance.

[P 3200K], [P 5600K], and "VAR" (the value set in the [CAMERA] menu → [SW MODE] → [W.BAL VAR]) change in order.

- When "VAR" is selected, turning the multi-dial can set any white balance value between [V 2000K] and [V 15000K].

 NOTE

- The "VAR" value displayed on the camera image screen is not guaranteed to be an absolute value. Use it for reference purposes only.

Gain

If the camera screen is dark, increase the gain to brighten the screen.

1 Switch to <MANU> with the <AUTO/MANU> switch to enter manual mode.

2 Press the <GAIN> button to switch to manual gain mode.

The gain display is highlighted in orange.

3 Turn the multial to adjust, then press the multial.

The setting changes to the value displayed and exits.

Press the <EXIT> button to exit without changing the setting.

Setting the shutter speed

1 Switch to <MANU> with the <AUTO/MANU> switch to enter manual mode.

2 Press the <SHUTTER> button to switch to manual shutter mode.

The shutter speed display is highlighted in orange.

3 Turn the multial to select the shutter speed.

4 Press the multial.

The setting changes to the value displayed and exits.

Press the <EXIT> button to exit without changing the setting.

Playing back clips



1 Press the <THUMBNAIL> button.

The thumbnail screen is displayed.

2 Select the clip to play back.

Playback from operation icons



Playback operation	Operating procedure
Playback/pause	Touch ►/ .
Fast-reverse playback	Touch ◀◀. Touch twice to increase the speed.
Fast-forward playback	Touch ▶▶. Touch twice to increase the speed.
Stop (return to thumbnail screen)	Touch ■.

Updating the unit's firmware

Confirm the firmware version of the unit in the [OTHERS] menu → [INFORMATION] → [VERSION], access the most current information regarding firmware in the website described in NOTE, and download the firmware as necessary.

NOTE

- Update is completed by loading the downloaded file to the unit via the memory card. Insert the memory card that stores the update file into card slot 1, and select the [OTHERS] menu → [INFORMATION] → [UPDATE].
For the latest update information, check the support website below. (As of January 2020)
https://panasonic.jp/support/global/cs/e_cam
(This website is in English only.)
- When updating the firmware, use the AC adaptor or sufficiently charged battery.
- Do not turn off the power while updating the firmware. Rewriting of the firmware may fail and the unit may not be activated.

Specifications

General

Power

7.28 V $\approx$ (when battery is used)

12 V $\approx$ (when the AC adaptor is used)

Power consumption

22.9 W (Charging)

X1500

14.4 W (When the LCD monitor is used)

X2000

15.5 W (When the LCD monitor is used)

Item	X1500	X2000
Ambient operating temperature	0 °C to 40 °C	
Ambient operating humidity	10% to 80% (relative humidity, no condensation)	
Mass	Approx. 0.9 kg (main unit only, excluding lens hood, battery, and supplied accessories)	Approx. 0.9 kg (main unit only, excluding handle unit, lens hood, battery, and supplied accessories)
	Approx. 1.2 kg (including lens hood, battery and eye cup)	Approx. 1.5 kg (including handle unit, lens hood, battery and eye cup)
External dimensions (W×H×D)	129 mm×93 mm×257 mm (including lens hood and eye cup, excluding protrusions)	129 mm×159 mm×257 mm (including handle unit, lens hood, and eye cup, excluding protrusions)

Camera

Pickup device	1/2.5 type (1/2.5 ") MOS solid-state image sensing device for colors Total pixels: approx. 8,570,000 pixels
Number of pixels	Number of effective pixels: approx. 8,290,000 pixels
Lens	Optical image stabilizer lens, motorized 24× zoom F1.8 to F4.0 (f=4.12 mm to 98.9 mm) 35 mm conversion: f=25.0 mm to 600.0 mm
Filter diameter	62 mm
ND filter	<CLR>, <1/4>, <1/16>, <1/64>

Minimum object distance (M.O.D)	Approx. 0.1 m (wide angle) from the lens Approx. 1.2 m (telephoto angle) from the lens
IR cut filter	Has functionality to switch IR filter on/off (switched with [IR REC] USER button or menu)
Gain setting	0 dB to 30 dB ● When [S.GAIN] is assigned to a USER button, [SUPER GAIN]/[SUPER GAIN+] can be set
Color temperature setting	ATW, ATW LOCK, Ach, Bch, preset 3200 K/preset 5600 K/VAR (2000 K to 15000 K)
Shutter speed	When the [SYSTEM] menu → [FREQUENCY] → [59.94Hz] is set ● 59.94i/59.94p mode: 1/60 sec., 1/100 sec., 1/120 sec., 1/180 sec., 1/250 sec., 1/350 sec., 1/500 sec., 1/750 sec., 1/1000 sec., 1/1500 sec., 1/2000 sec., 1/3000 sec., 1/4000 sec., 1/8000 sec. ● 29.97p mode: 1/30 sec., 1/50 sec., 1/60 sec., 1/100 sec., 1/120 sec., 1/180 sec., 1/250 sec., 1/350 sec., 1/500 sec., 1/750 sec., 1/1000 sec., 1/1500 sec., 1/2000 sec., 1/3000 sec., 1/4000 sec., 1/8000 sec. ● 23.98p mode: 1/24 sec., 1/48 sec., 1/50 sec., 1/60 sec., 1/100 sec., 1/120 sec., 1/180 sec., 1/250 sec., 1/350 sec., 1/500 sec., 1/750 sec., 1/1000 sec., 1/1500 sec., 1/2000 sec., 1/3000 sec., 1/4000 sec., 1/8000 sec. When the [SYSTEM] menu → [FREQUENCY] → [50.00Hz] is set ● 50.00i/50.00p mode: 1/50 sec., 1/60 sec., 1/100 sec., 1/125 sec., 1/180 sec., 1/250 sec., 1/350 sec., 1/500 sec., 1/750 sec., 1/1000 sec., 1/1500 sec., 1/2000 sec., 1/3000 sec., 1/4000 sec., 1/8000 sec. ● 25.00p mode: 1/25 sec., 1/50 sec., 1/60 sec., 1/100 sec., 1/125 sec., 1/180 sec., 1/250 sec., 1/350 sec., 1/500 sec., 1/750 sec., 1/1000 sec., 1/1500 sec., 1/2000 sec., 1/3000 sec., 1/4000 sec., 1/8000 sec.
Slow shutter speed	When the [SYSTEM] menu → [FREQUENCY] → [59.94Hz] is set ● 59.94i/59.94p mode: 1/8 sec., 1/15 sec., 1/30 sec. ● 29.97p mode: 1/8 sec., 1/15 sec. ● 23.98p mode: 1/6 sec., 1/12 sec. When the [SYSTEM] menu → [FREQUENCY] → [50.00Hz] is set ● 50.00i/50.00p mode: 1/6 sec., 1/12 sec., 1/25 sec. ● 25.00p mode: 1/6 sec., 1/12 sec.

Specifications

Super slow recording	• [SYSTEM] menu → [FREQUENCY] → [59.94Hz] When the number of recording pixels is 1920×1080 (FHD) Recording frame rate 120 fps, slow motion effect 1/2 speed (in 59.94p mode), slow motion effect 1/4 speed (in 29.97p mode), 1/5 speed (in 23.98p mode) • [SYSTEM] menu → [FREQUENCY] → [50.00Hz] When the number of recording pixels is 1920×1080 (FHD) Recording frame rate 100 fps, slow motion effect 1/2 speed (in 50.00p mode), slow motion effect 1/4 speed (in 25.00p mode)
Minimum illuminance of subject	1.5 lx (F1.8, [SUPER GAIN+] is enabled, when shutter speed is 1/30 sec.)
Digital zoom	2×/5×/10×/i.ZOOM (maximum 48×)
Built-in LED light (When using the handle unit (X2000 supplied, X1500 optional))	Illuminance: approx. 70 lx (1.0 m) Illumination angle: approx. 30° Color temperature: approx. 4600 K
Lens hood	Hood with lens cover

Memory card recorder

Recording media	SDHC memory card (4 GB to 32 GB), SDXC memory card (exceeding 32 GB to 128 GB): UHS-I, UHS Speed Class 3 compatible • Refer to "Speed Class during shooting" (→ 34).
Recording slot	2 slots
System frequency	59.94 Hz/50.00 Hz
File format	MOV (HEVC), MOV, MP4 (HEVC), MP4, AVCHD
Recording format	• MOV: 4:2:0 (10bit) UHD (3840×2160); HEVC LongGOP 200M (Average approx. 200 Mbps)/ HEVC LongGOP 150M (Average approx. 150 Mbps) • MOV: 4:2:0 (8bit) UHD (3840×2160); 420LongGOP 150M (Average approx. 150 Mbps)/ 420LongGOP 100M (Average approx. 100 Mbps) • MOV: 4:2:2 (10bit) UHD (3840×2160); 422LongGOP 150M (Average approx. 150 Mbps) FHD (1920×1080); 422LongGOP 100M (Average approx. 100 Mbps)/ 422LongGOP 50M (Average approx. 50 Mbps)/ 422ALL-I 200M (Average approx. 200 Mbps)/ 422ALL-I 100M (Average approx. 100 Mbps) • MP4: 4:2:0 (10bit) UHD (3840×2160); HEVC LongGOP 100M (Average approx. 100 Mbps)/ HEVC LongGOP 72M (Average approx. 72 Mbps)

Recording format	● MP4: 4:2:0 (8bit) UHD (3840×2160); 420LongGOP 72M (Average approx. 72 Mbps) FHD (1920×1080); 420LongGOP 50M (Average approx. 50 Mbps) ● AVCHD: 4:2:0 (8bit) FHD (1920×1080); PS (Average approx. 25 Mbps)/PH (Average approx. 21 Mbps)/ HA (Average approx. 17 Mbps) HD (1280×720); PM (Average approx. 8 Mbps)
Number of recording pixels/ Recording video signal	3840×2160/59.94p, 50.00p, 29.97p, 25.00p, 23.98p 1920×1080/59.94p, 50.00p, 29.97p, 25.00p, 23.98p, 59.94i, 50.00i 1280×720/59.94p, 50.00p
Recording and playback time	Refer to the operating instructions (PDF) for information about the recording and playback times.
2-slot function	Relay recording, simultaneous recording, background recording
Still image recording	Recording format: JPEG (DCF/Exif2.2) ● Refer to the operating instructions (PDF) for information about recording methods and the number of recording pixels.

Digital video

Number of quantizing bits	● MOV: 4:2:2 (10bit)/4:2:0 (8bit)/4:2:0 (10bit (HEVC)) ● MP4: 4:2:0 (8bit)/4:2:0 (10bit (HEVC)) ● AVCHD: 4:2:0 (8bit)
Video compression format	● MOV/MP4: H.264/MPEG-4 AVC High Profile, H.265/MPEG-H HEVC Main10 Profile ● AVCHD: H.264/MPEG-4 AVC High Profile

Digital audio

Recording audio signal	● MOV: 48 kHz/24bit, 2ch ● MP4/AVCHD: 48 kHz/16bit, 2ch
Audio compression format	● MOV: LPCM ● MP4: AAC ● AVCHD: Dolby Audio™
Headroom	12 dB

Streaming

Video compression format	H.264/MPEG-4 AVC Main Profile H.264/MPEG-4 AVC High Profile
Video resolution	1920×1080 (FHD), 1280×720 (HD), 640×360, 320×180
Streaming method	Unicast, Multicast
Frame rate	- When set to the [SYSTEM] menu → [FREQUENCY] → [59.94Hz]: 30 fps, 60 fps - When set to the [SYSTEM] menu → [FREQUENCY] → [50.00Hz]: 25 fps, 50 fps
Bit rate	24 Mbps, 20 Mbps, 16 Mbps, 14 Mbps, 8 Mbps, 6 Mbps, 4 Mbps, 3 Mbps, 2 Mbps, 1.5 Mbps, 1 Mbps, 0.7 Mbps, 0.5 Mbps
Audio compression format	AAC-LC: 48 kHz/16-bit, 2ch
Supported protocol	RTSP/RTP/RTMP/RTMPS

Wi-Fi

Compliance standard	IEEE802.11b/g/n compliant
Frequency range used (central frequency)	2412 MHz to 2462 MHz [1 to 11ch]
Encryption method	Wi-Fi compliant WPA™/WPA2™
Access method	Infrastructure mode

Video output

Item	(X1500)	(X2000)
<SDI OUT> terminal	—	- BNC terminal ×1 0.8 V [p-p], 75 Ω, 3G/1.5G HD-SDI compatible - Output format 1920×1080: 59.94p LEVEL-A, 50.00p LEVEL-A, 59.94i, 50.00i, 29.97PsF, 25.00PsF, 23.98PsF 1280×720: 59.94p, 50.00p
<HDMI> terminal	- HDMI type A terminal ×1 (not compatible with VIERA Link) - Output format 3840×2160: 59.94p, 50.00p, 29.97p, 25.00p, 23.98p 1920×1080: 59.94p, 50.00p, 59.94i, 50.00i, 29.97p, 25.00p, 23.98p 1280×720: 59.94p, 50.00p 720×480: 59.94p 720×576: 50.00p	

Audio input

Built-in microphone	Supports stereo microphone
<MIC> terminal	3.5 mm diameter stereo mini jack × 1
<INPUT 1>/<INPUT 2> terminal (When using the handle unit (X2000 supplied, X1500 optional))	XLR×2, 3-pin Input high impedance, <LINE>/<MIC>/<+48V> (Switched with <INPUT1>/<INPUT2> switch) • <LINE>: 4 dBu/0 dBu (switched with menu) • <MIC>: −40 dBu/−50 dBu/−60 dBu (switched with menu)

Audio output

Item	X1500	X2000
<SDI OUT> terminal	—	LPCM 2ch • Gain switching: 0 dB/−6 dB/−8 dB (switched with menu)
<HDMI> terminal	LPCM 2ch	
Headphone terminal	3.5 mm diameter stereo mini jack × 1	
Speaker	15 mm diameter, round ×1	

Other input/output

<REMOTE> terminal	2.5 mm diameter super mini jack × 1
USB terminal (USB2.0)	Micro-AB terminal, 5pin, with USB mass storage functionality (read only)
<DC IN 12V> terminal	DC12 V, EIAJ type 4

Monitor

LCD monitor	8.8 cm (3.5 ") LCD monitor (approx. 2,760,000 dots)
Viewfinder	0.6 cm (0.24 ") EVF (equivalent to approx. 1,560,000 dots)

Handle unit ([X2000] supplied, [X1500] optional)

Power consumption

Maximum approx. 3.1 W (when connected to the camera)

Mass	Approx. 305 g (main part of the handle unit only, excluding microphone holder and microphone holder mounting screws)
External dimensions (W×H×D)	Approx. 71 mm× 89 mm× 207 mm (including protrusions, excluding microphone holder)

AC adaptor

Power source

100 V – 240 V ~ 50 Hz/60 Hz, 1.2 A 79 VA (100 V ~) – 99 VA (240 V ~)

Power output

12 V === 3.0 A

Ambient operating temperature	0 °C to 40 °C
Ambient operating humidity	10% to 90% (relative humidity, no condensation)
Mass	Approx. 225 g
External dimensions (W×H×D)	115 mm×37 mm×57 mm (excluding the DC cable section)

Battery pack (AG-VBR59)

Voltage/capacity

7.28 V === 5900 mAh 43 Wh

Charging current	Maximum 4000 mA
Ambient operating humidity	0% to 80% (relative humidity, no condensation)
Mass	Approx. 230 g
External dimensions (W×H×D)	41.3 mm×51.3 mm×69.6 mm

Panasonic Warranty

1. Subject to the conditions of this warranty Panasonic or its Authorised Service Centre will perform necessary service on the product, without charge for parts or labour, if in the opinion of Panasonic the product is found to have a manufacturing defect within one (1) year or (12 months) (the "warranty period") from the date of purchase appearing on your purchase receipt.
2. This warranty only applies to Panasonic products purchased in Australia and sold by Panasonic Australia, its Authorised Distributors, or Dealers, and only where the products are used and serviced within Australia or its territories. Warranty cover only applies to the services that are carried out by a Panasonic Authorised Service Centre and only if valid proof of purchase is presented when the warranty service is requested.
3. This warranty only applies if the product has been installed and/or used in accordance with the manufacturer's recommendations (as noted in the operating instructions) under normal use and reasonable care (in the opinion of Panasonic). The warranty does not cover damage, malfunction or failure resulting from use of incorrect voltages, incorrect installation, accident, misuse, neglect, build-up of dirt or dust, abuse, maladjustment of customer controls, mains supply problems, thunderstorm activity, infestation by insects or vermin, tampering or repair by unauthorised persons (including unauthorised alterations), exposure to abnormally corrosive conditions, or any foreign object or matter having entered the product.
4. This warranty does not cover the following items unless the fault or defect existed at the time of purchase:
 - (a) Consumable parts
 - (b) Cosmetic parts
 - (c) Worn or damaged parts
 - (d) Information stored on Hard Disk Drives, Optical Discs, USB Devices, SD Cards, Tapes
 - (e) DTV reception issues caused by TV Aerial / Cabling / Wall socket(s)
5. Some products may be supplied with Ethernet connection hardware. The warranty is limited on such products and will not cover:
 - (a) Internet and or DLNA connection / setup related problems
 - (b) Access fees and or charges incurred for internet connection
 - (c) Incompatible software or software not specifically stipulated in the product operations manual; and
 - (d) Any indirect or consequential costs associated with the incorrect use or misuse of the hardware, its connection to the internet or any other device.
6. To claim warranty service, when required, you should:
 - Contact Panasonic's Customer Care Centre on 132 600 for Service Centre information.
 - Confirm the opening and acceptance times with the Authorised Service centre that you choose.
 - Then send or take the product to a Panasonic Authorised Service Centre together with your proof of purchase receipt.
 - Any freight and insurance costs associated with the transport of the product to and/or from your nearest Authorised Service Centre must be arranged and paid for by you.
7. The warranties hereby conferred do not extend to, and exclude, any costs associated with the installation, de-installation or re-installation of a product, including costs related to the mounting, de-mounting or remounting of any screen, (and any other ancillary activities), delivery, handling, freight, transportation or insurance of the product or any part thereof or replacement of and do not extend to, and exclude, any damage or loss occurring by reason of, during, associated with, or related to such installation, de-installation, re-installation or transit.

Panasonic Authorised Service Centres are located in major metropolitan areas and most regional centres of Australia, however, coverage will vary dependant on product. For advice on exact Authorised Service Centre locations for your product, please telephone our Customer Care Centre on 132600 or visit our website and use the Service Centre Locator.

In addition to your rights under this warranty, Panasonic products come with consumer guarantees that cannot be excluded under the Australian Consumer Law. If there is a major failure with the product, you can reject the product and elect to have a refund or to have the product replaced or if you wish you may elect to keep the goods and be compensated for the drop in value of the goods. You are also entitled to have the product repaired or replaced if the product fails to be of acceptable quality and the failure does not amount to a major failure.

If there is a major failure in regard to the product which cannot be remedied then you must notify us within a reasonable period by contacting the Panasonic Customer Care Centre. If the failure in the product is not a major failure then Panasonic may choose to repair or replace the product and will do so in a reasonable period of time from receiving notice from you.

THIS WARRANTY CARD AND THE PURCHASE DOCKET (OR SIMILAR PROOF OF PURCHASE) SHOULD BE RETAINED BY THE CUSTOMER AT ALL TIMES

If you require assistance regarding warranty conditions or any other enquiries, please visit the Panasonic

Australia website www.panasonic.com.au or contact by phone on **132 600**

If phoning in, please ensure you have your operating instructions available.

Panasonic Australia Pty. Limited

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**Disposal of Old Equipment and Batteries
Only for European Union and countries with
recycle systems**

These symbols are only valid in the European Union
and countries with recycle systems.

If you wish to discard this product, please contact
your local authorities or dealer and ask for the
correct method of disposal.

Panasonic Corporation

Web site: <http://www.panasonic.com>

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