SONY

4-742-987-**14** (1)
2021-08

HD Video Camera

Instructions for Use

Before operating the unit, please read this manual thoroughly and retain it for future reference.

MCC-1000MD

Exmor R HDMI CE UK CA

Indications for Use/Intended Use

The Sony MCC-1000MD is intended to acquire HD color video images from medical microscopes and other compatible medical imaging systems.
The acquired video image can be displayed on a compatible monitor for visualization as a secondary view to the microscope binoculars.
The MCC-1000MD is a medical grade camera for use primarily with medical microscopes for acquiring video images of surgical procedures including Neuro surgery and Ophthalmic surgery. It is suitable for use in hospital operating rooms, hospital examination rooms and similar medical environments.

Notes

- Output images from this equipment cannot be used for diagnostic use.
- This equipment is for medical professionals.

WARNING

To reduce the risk of fire or electric shock, do not expose this equipment to rain or moisture.

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

No modification of this equipment is allowed.

Warning

To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

Warning

This unit has no power switch.
To disconnect the main power, unplug the power plug.

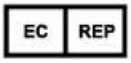
When installing the unit, incorporate a readily accessible disconnect device in the fixed wiring, or connect the power plug to an easily accessible socket-outlet near the unit.
Do not position the ME equipment where it is difficult to unplug the power plug.
If a fault should occur during operation of the unit, operate the disconnect device to switch the power supply off, or disconnect the power plug.

Symbols on the product

Consult the instructions for use
Follow the directions in the instructions for use for parts of the unit on which this symbol appears.

This symbol indicates the manufacturer, and appears next to the manufacturer's name and address.

This symbol indicates the Importer, and appears next to the Importer's name and registered office address.



This symbol indicates the European Community representative, and appears next to the European Community representative's name and address.

This symbol indicates the date of manufacture.

This symbol indicates the serial number.

This symbol indicates the equipotential terminal which brings the various parts of a system to the same potential.

This symbol indicates the medical device in the European Community.

This symbol indicates the Unique Device Identifier (UDI), and appears next to the bar code representation of the Unique Device Identification.

Storage and transport temperature

This symbol indicates the acceptable temperature range for storage and transport environments.

Storage and transport humidity

This symbol indicates the acceptable humidity range for storage and transport environments.

Storage and transport pressure

This symbol indicates the acceptable atmospheric pressure range for storage and transport environments.

For customers in the U.S.A.

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.
You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.
All interface cables used to connect peripherals must be shielded in order to comply with the limits for a digital device pursuant to Subpart B of part 15 of FCC Rules.

If you have any questions about this product, you may call;
Sony Customer Information Service Center
1-800-222-7669 or http://www.sony.com/

Supplier's Declaration of Conformity

Trade Name	: SONY
Model	: MCC-1000MD
Responsible party	: Sony Electronics Inc.
Address	: 16535 Via Esprillo, San Diego, CA 92127 U.S.A.
Telephone Number:	858-942-2230

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.

For customers in the U.S.A.

Caution

Federal law (United States of America) restricts this device to sale by or on the order of a licensed healthcare practitioner.

℞
ONLY

For customers in Canada

This unit has been certified according to Standard CAN/CSA-C22.2 No. 60601-1.

Important safeguards and notices for use in the medical environments

1. All devices connected to the unit must be certified or compliant according to IEC 60601-1, IEC 60950-1, and IEC 60065 standards and other IEC/ISO standards applicable to the devices.

2. Furthermore, the system as a whole must comply with IEC 60601-1 standards. All peripheral devices connected to the signal input/output sections of the unit constitute the medical-use system, and therefore, the user is responsible for ensuring that the system as a whole complies with IEC 60601-1 standards. If in doubt, consult qualified Sony service personnel.

3. Connecting the unit to other devices may increase the leakage current.

4. For all peripheral devices connected to the unit that operate on commercial power supplies and do not comply with IEC 60601-1 standards, incorporate an isolation transformer that complies with IEC 60601-1 standards and connect to the commercial power supply via the transformer.

5. The unit generates, uses, and may radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference on other devices. If the unit causes interference (which can be determined by disconnecting the power cord from the unit), try the following.

- Relocate the unit with respect to the affected devices.
- Connect the unit and the affected devices to different branch circuits.

  For more information, consult qualified Sony service personnel.
  (Applicable standard: IEC 60601-1-2)

Important EMC notices for use in medical environments

- The MCC-1000MD needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the instructions for use.
- The MCC-1000MD is intended for use in a professional healthcare facility environment.
- Portable and mobile RF communications equipment, such as cellular phones, can affect the MCC-1000MD.

Warning

- Portable RF communications equipment should be used no closer than 30 cm (12 inches) to any part of the MCC-1000MD. Otherwise, degradation of the performance of this equipment could result.
- If the MCC-1000MD will be used adjacent to or stacked with other equipment, normal operation of the MCC-1000MD under such configurations should be verified via observation.
- The use of accessories and cables other than those specified, with the exception of replacement parts sold by Sony Corporation, may result in increased emissions or decreased immunity of the MCC-1000MD.

List of cables used for EMC test	
Type of cable	Specifications
CCMC-SA15 cable	15 m, shielded
CCMC-EA05 cable	5 m, shielded

Guidance and manufacturer's declaration – electromagnetic emissions		
The MCC-1000MD is intended for use in the electromagnetic environment specified below. The customer or the user of the MCC-1000MD should assure that it is used in such an environment.		
Emission test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The MCC-1000MD uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11 CISPR 32	Class B	The MCC-1000MD is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
The MCC-1000MD is intended for use in the electromagnetic environment specified below. The customer or the user of the MCC-1000MD should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, a relative humidity of at least 30% is recommended.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines ±1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0% U_T (100% dip in U_T) for 0.5/1 cycles [a] 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25/30 cycles [a] (for 0.5 sec) 0% U_T (100% dip in U_T) for 250/300 cycles [a] (for 5 sec)	0% U_T (100% dip in U_T) for 0.5/1 cycles [a] 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25/30 cycles [a] (for 0.5 sec) 0% U_T (100% dip in U_T) for 250/300 cycles [a] (for 5 sec)	Mains power quality should be that of a typical commercial or hospital environment. If the user of the MCC-1000MD requires continued operation during power mains interruptions, it is recommended that the MCC-1000MD be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			
a For example, 10/12 means 10 cycles at 50 Hz or 12 cycles at 60 Hz.			

Guidance and manufacturer's declaration – electromagnetic immunity			
The MCC-1000MD is intended for use in the electromagnetic environment specified below. The customer or the user of the MCC-1000MD should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the MCC-1000MD, including cables, than the recommended separation distance calculated from the equation appliance to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands [c]	3 Vrms	$d = 1.2\sqrt{P}$
	6 Vrms 150 kHz to 80 MHz in ISM bands [c]	6 Vrms	

Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz	3 V/m	IEC 60601-1-2: 2007 $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz IEC 60601-1-2: 2014 $d = 2.0\sqrt{P}$ 80 MHz to 2.7 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with following symbol: 

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the MCC-1000MD is used exceeds the applicable RF compliance level above, the MCC-1000MD should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the MCC-1000MD.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

c The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

Recommended separation distances between portable and mobile RF communications equipment and the MCC-1000MD

The MCC-1000MD is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the MCC-1000MD can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the MCC-1000MD as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m				
	IEC 60601-1-2 : 2007			IEC 60601-1-2 : 2014	
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 2.7 GHz $d = 2.0\sqrt{P}$
0.01	0.12	0.12	0.23	0.12	0.20
0.1	0.38	0.38	0.73	0.38	0.63
1	1.2	1.2	2.3	1.2	2.0
10	3.8	3.8	7.3	3.8	6.3
100	12	12	23	12	20

For transmitters rated a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Guidance and manufacturer's declaration – electromagnetic immunity					
The MCC-1000MD is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. Portable RF communications equipment should be used no closer than 30 cm (12 inches) to any part of the MCC-1000MD. Otherwise, degradation of the performance of this equipment could result.					
Immunity test	Band [a]	Service [a]	Modulation	IEC 60601 test level	Compliance level
Proximity fields from RF wireless communications equipment IEC 61000-4-3	380 – 390 MHz	TETRA 400	Pulse modulation 18 Hz	27 V/m	27 V/m
	430 – 470 MHz	GMRS 460 FRS 460	FM ±5 kHz deviation 1 kHz sine	28 V/m	28 V/m
	704 – 787 MHz	LTE Band 13, 17	Pulse modulation 217 Hz	9 V/m	9 V/m
	800 – 960 MHz	GSM 800/ 900 TETRA 800 iDEN 820 CDMA 850 LTE Band 5	Pulse modulation 18 Hz	28 V/m	28 V/m
	1,700 – 1,990 MHz	GSM 1800 CDMA 1900 GSM 1900 DECT LTE Band 1, 3, 4, 25 UMTS	Pulse modulation 217 Hz	28 V/m	28 V/m
	2,400 – 2,570 MHz	Bluetooth WLAN 802.11 b/g/n RFID 2450 LTE Band 7	Pulse modulation 217 Hz	28 V/m	28 V/m
	5,100 – 5,800 MHz	WLAN 802.11 a/n	Pulse modulation 217 Hz	9 V/m	9 V/m
NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.					
a For some services, only the uplink frequencies are included.					

Caution

When you dispose of the unit or accessories, you must obey the laws in the relative area or country and the regulations in the relative hospital regarding environmental pollution.

Warning on power connections

Use a proper power cord for your local power supply.

1. Use the approved Power Cord (3-core mains lead) / Appliance Connector / Plug with earthing-contacts that conforms to the safety regulations of each country if applicable.

2. Use the Power Cord (3-core mains lead) / Appliance Connector / Plug conforming to the proper ratings (Voltage, Ampere).

If you have questions on the use of the above Power Cord / Appliance Connector / Plug, please consult a qualified service personnel.

Warning on power connections for medical use

Customers in the U.S.A. and Canada should use the following type of power cord. Customers in other countries or regions should use the power cord prescribed by their country or region.

	U.S.A. and Canada
Plug type	HOSPITAL GRADE*
Cord type	Min. Type SJT
	Min. 18 AWG
Minimum rating for plug and appliance couplers	10 A / 125 V
Safety approval	UL Listed and CSA

* Note: Grounding reliability can only be achieved when the equipment is connected to an equivalent receptacle marked "Hospital Only" or "Hospital Grade".

Warning

The apparatus shall not be exposed to dripping or splashing. No objects filled with liquids, such as vases, shall be placed on the apparatus.

Caution

When installing, ensure the following space around the periphery of the unit, taking ventilation and servicing into consideration.

– Rear side: 10 cm (4 in.) or more
– Left/Right sides: 10 cm (4 in.) or more
– Top side: 10 cm (4 in.) or more

Caution

Do not use the device in a MR (Magnetic Resonance) environment.
It may cause a malfunction, fire, and unwanted movement.

For the customers in the U.S.A.

SONY LIMITED WARRANTY - Please visit http://www.sony.com/psa/warranty for important information and complete terms and conditions of Sony's limited warranty applicable to this product.

For the customers in Canada

SONY LIMITED WARRANTY - Please visit http://www.sonybiz.ca/pro/lang/en/ca/article/resources-warranty for important information and complete terms and conditions of Sony's limited warranty applicable to this product.

For the customers in Europe

Sony Professional Solutions Europe - Standard Warranty and Exceptions on Standard Warranty.
Please visit https://pro.sony/support-services/primesupport/support-professional-solutions-europe-standard-product-warranty for important information and complete terms and conditions.

For the customers in Korea

SONY LIMITED WARRANTY - Please visit http://bpeng.sony.co.kr/handler/BPAS-Start for important information and complete terms and conditions of Sony's limited warranty applicable to this product.

Precautions for Use

Safety precautions for using this unit

- Viewing images may result in eye strain, fatigue, nausea, or other symptoms of discomfort. It is best to take frequent breaks when viewing content. Because the length and frequency of breaks will differ from person to person, be sure to trust your instincts when deciding to take breaks from viewing. When feelings of discomfort occur, stop viewing the images until the symptoms subside, and consult with a specialist physician if necessary.
- Avoid using this unit while walking or exercising, or in areas that shake violently, as doing so can increase the chances of feelings of discomfort.
- When connecting the unit to medical equipment, refer to "Precautions when connecting this unit to medical equipment".

Precautions when connecting this unit to medical equipment

- Before using this unit for medical purposes, be sure to confirm that use of this unit will not cause symptoms that may interfere with medical practice, such as eye strain, fatigue, and nausea, etc.
- Refrain from using this unit if symptoms occur that interfere with medical practice, or if such symptoms are likely to occur.
- Depending on the conditions of the video input to the unit (e.g., the steadiness, movement speed, and focus position of the video, the distance from subject, the area of the image the user is viewing) and the general health of the user, the user may experience visual fatigue, tiredness, and other discomfort.

Use with electrosurgical knives and similar devices

If this unit is used together with an electrosurgical knife, etc., the picture may be disturbed, warped or otherwise abnormal as a result of strong radio waves or voltages from the device. This is not a malfunction.
When you use this unit simultaneously with a device from which strong radio waves or voltages are emitted, confirm the effect of this before using such devices, and install this unit in a way that minimizes the effect of radio wave interference.

Usage and storage locations

Store the unit in a level, well-ventilated place.
Avoid using or storing the unit in the following places.

- Extremely cold or hot locations (Operating temperatures: 0 °C to 40 °C (32 °F to 104 °F))
- Locations in direct sunlight for long periods, or close to heating appliances (The inside of a vehicle can reach up to 50 °C (122 °F) in the summer when the windows are closed.)
- Humid or dusty places
- Locations where the unit may be exposed to rain
- Locations subject to strong vibrations
- Locations close to strong magnetic fields
- Near TVs that emit strong electromagnetic waves, or near locations where radio waves are emitted
- Locations with a strong risk of fire or explosion

Precautions concerning laser beams

Laser beams may damage the CMOS image sensor. When shooting scenes that include laser beams, be careful not to allow laser beams to hit the surface of the CMOS image sensor (do not let laser beams enter the lens).

Do not subject the unit to strong impacts

Dropping the camera head or exposing it to excessive shocks may damage it.

Do not subject the unit to sudden changes in temperature

Sudden changes in temperature may affect the camera picture output.

Do not leave the unit with the camera facing the sun

Sunlight can enter the camera, be focused inside the unit and cause a fire.

Cleaning

Before cleaning the unit, be sure to disconnect the power cord.

When the cabinet becomes dirty

- Clean the surface with a 50 to 70 v/v% concentration of isopropyl alcohol or a 76.9 to 81.4 v/v% concentration of ethanol.
- Stubborn stains may be removed with a soft cloth such as a cleaning cloth lightly dampened with mild detergent solution and then cleaned using the above chemical.
- Do not use solvents such as benzene or thinner, or acid, alkaline or abrasive detergent, or chemical cleaning cloth for cleaning the surface, as they will damage the surface.
- Do not use unnecessary force to rub the surface with a stained cloth. The surface may be scratched.

Transporting the unit

When transporting the unit, use the original carton and packing to wrap it and ensure it is not subject to violent impacts.

After use

Press the ⏻ (on/standby) switch to turn the standby mode.

When not using the unit for a long period of time

Disconnect the power cord.

On moisture condensation

If the unit is suddenly taken from a cold to a warm location, or if ambient temperature suddenly rises, moisture may form on the outer surface of the unit and/or inside of the unit. This is known as condensation. If condensation occurs, turn off the unit and wait until the condensation clears before operating the unit. Operating the unit while condensation is present may damage the unit.

Phenomena specific to the CMOS image sensor

The following phenomena are specific to the CMOS image sensor, and their presence on the shooting screen do not indicate malfunctions.

White spots

The CMOS image sensor is fabricated using extremely high-precision technology, however, in very rare cases, outside influence, such as cosmic rays, may cause minute white spots to appear on the screen. This not a malfunction, but is related to the principle of the imaging element.

White spots may also be visible in the following situations.

- When the unit is used in locations subject to high temperatures
- When the gain is raised

Aliasing

When shooting fine patterns or lines, a jagged or flickering effect may occur.

Flicker

When shooting under discharge tube lighting, such as fluorescent lamps, sodium lamps, or mercury vapor lamps, the screen may flicker, change color, or horizontal stripes may appear to roll across the screen.

Focal plane distortion

Due to characteristics of how the CMOS image sensor reads image signals, subjects that quickly move across the screen may appear slightly distorted.
Additionally, light from a flash or quickly flashing light sources may cause the brightness to change at the top and bottom of the screen.

Precautions concerning heat generation by the unit

Be careful during operation of the unit, as the metal surfaces of the unit may become hot. Generation of heat during operation of the unit is not a malfunction.

Table of Contents

Overview

Preparations

Shooting

Menu Display and Detailed Settings

System Operation Examples

Appendices

Package Configuration

Make sure the following items are supplied with the Sony MCC-1000MD HD Video Camera (hereafter referred to as the "unit").
The number in parentheses indicates how many pieces of a particular item are supplied.

- Lens mount cap (1)
- Before Using This Unit (1)
- CD-ROM
  (Instructions for Use in PDF format) (1)
- Warranty Booklet (1)
- Service Contact List (1)
- Information for Customers in Europe (1)

Features of This Unit

This equipment uses an image sensor to convert an image from an optical device, then into a signal processor which converts it into an electrical video signal output.
This unit is a separated camera control unit-type HD video camera consisting of a camera control unit (CCU) and camera head equipped with a 1/2.8 type HD CMOS image sensor providing an effective resolution of approximately 2.07 million pixels (1920 × 1080).
This camera lets you shoot HD images with 1,080 effective scanning lines even in progressive format, allowing you to capture details and movement in videos with greater clarity than in interlaced format.
Additionally, synchronized operation of two of these units allows you to shoot 3D videos.

Cutting-edge camera technologies

1/2.8 type Exmor R CMOS sensor

Equipped with three Exmor R CMOS sensors, this camera allows shooting in Full HD.

Compact, lightweight camera head

The camera head is compact (approx. 34 × 39 × 43 mm (approx. 1 $^{3}/_{8}$ × 1 $^{9}/_{16}$ × 1 $^{3}/_{4}$ in.)), and lightweight (approx. 60 g (approx. 2.1 oz.)), making it easy to install and attach anywhere.
The camera cable (not supplied) between the camera head and camera control unit can be extended to up to 20 m (65.6 ft.).

Shooting modes for diverse imaging applications

Picture profile function

This function allows the camera operator to easily call up customized picturetonal settings to suit particular shooting conditions. You can register up to six picture profiles.

Picture flip

You can flip the camera picture output horizontally, vertically, or both horizontally and vertically.

Freeze function (still image)

You can freeze the video signal and output it as a still image.

Two-camera support for 3D shooting

Using the built-in 3D-SYNC IN/OUT connectors, you can synchronize the image signals from two cameras to shoot 3D images.

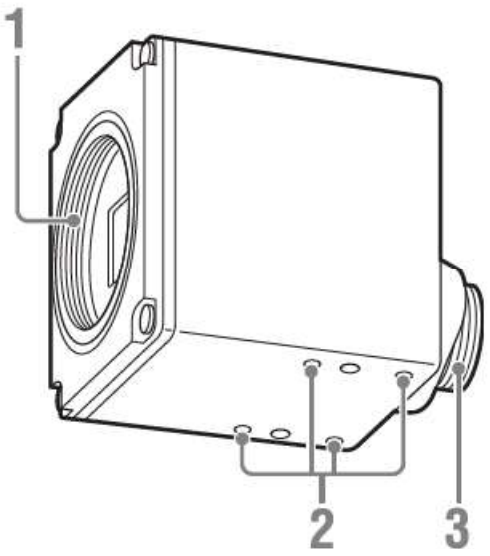
Intuitive control via the front panel

The BRIGHTNESS, RED, and BLUE knobs on the front panel provide an intuitive way to adjust the picture.

Part Names and Functions

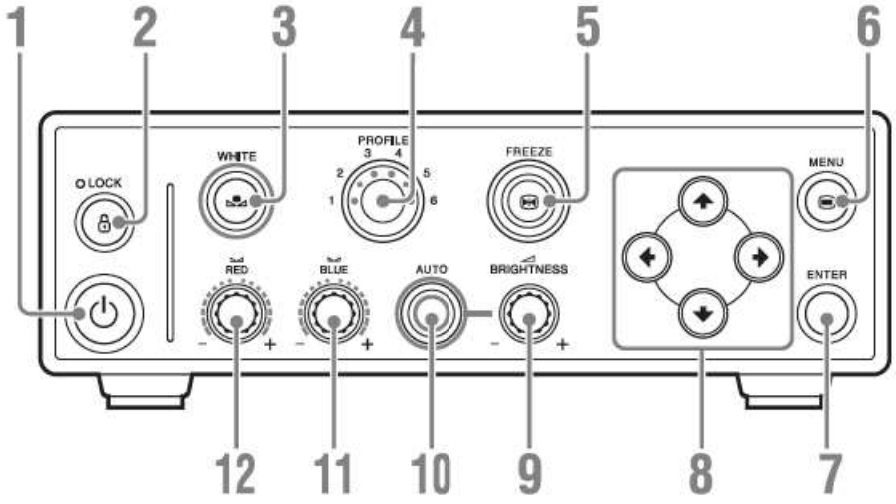
See the pages enclosed in parentheses for details about the corresponding function and how to use it.

Camera head



1. **Lens mount** ***(page 24)***
   Use this to mount a C-mount lens, microscope adapter, etc.
2. **Screw holes (M1.7, depth: 2.2 mm (3/32 inch))**
   Use these when mounting the camera on a wall, ceiling, or tripod.
3. **Camera cable connector (20 pin)** ***(page 25)***

Camera control unit (CCU) front panel



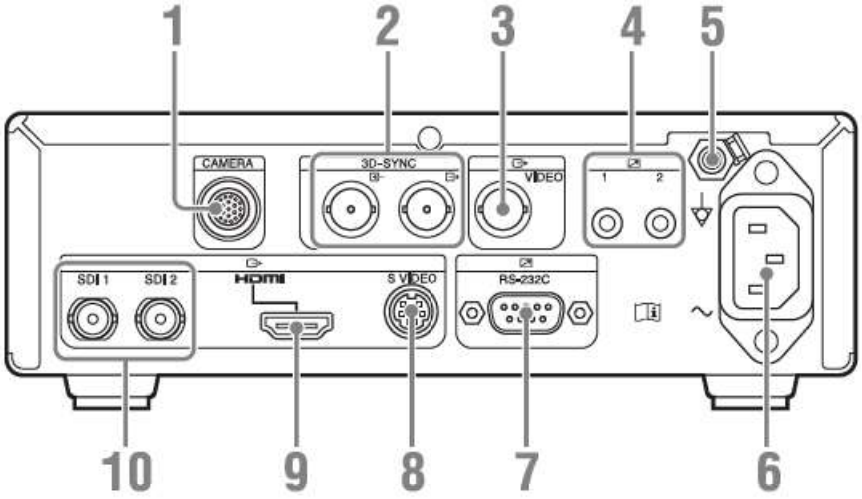
1. ⏻ **(on/standby) switch** ***(page 28)***
2. **LOCK (lock) button** ***(page 53)***
3. **WHITE (white balance) button** ***(page 32)***
4. **PROFILE (Picture Profile selection) button** ***(page 36)***
5. **FREEZE (still image) button** ***(page 35)***
6. **MENU button** ***(page 41)***
7. **ENTER (confirm) button** ***(page 41)***
8. **↑/↓/←/→ (cursor) button** ***(page 41)***
9. **BRIGHTNESS (brightness adjustment) knob** ***(page 35)***

10. **AUTO (automatic exposure) button** ***(page 34)***

11. **BLUE (B-gain) knob** ***(page 33)***

12. **RED (R-gain) knob** ***(page 33)***

Camera control unit (CCU) rear panel



Warning

Using this unit for medical purposes

The connectors on this unit are not isolated. Do not connect any device other than one which conforms to IEC 60601-1 standards. When an information technology device or AV device that uses an alternating current is connected, current leakage may result in an electric shock to the patient or operator. If use of such a device is unavoidable, isolate its power supply by connecting an isolation transformer, or by connecting an isolator between the connecting cables. After implementing these measures, confirm that the reduced risk now conforms to IEC 60601-1 standards.

Caution

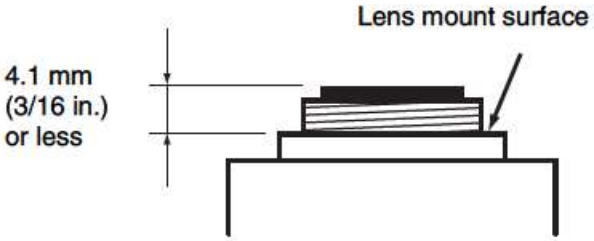
Do not come into contact with the terminals of the rear panel connectors and patients at the same time.
Doing so may result in a generation of voltage that can be harmful to patients if the unit is malfunctioning.
Always disconnect the power cord before connecting and disconnecting connectors.

1. **CAMERA connector** ***(page 25)***
2. **3D-SYNC IN (3D-SYNC input) connector, 3D-SYNC OUT (3D-SYNC output) connector (BNC type)** ***(page 53)***
3. **VIDEO (composite video) output connector (BNC type)** ***(page 27)***
4. **Remote contact switch connector 1, 2 (stereo mini jack)** ***(page 52)***
5. **Equipotential ground connector**
   Used to make an equipotential ground connection.
6. **~ (power) connector** ***(page 28)***
7. **RS-232C connector (D-sub 9-pin)** ***(page 54)***
8. **S VIDEO output connector (mini DIN 4-pin)** ***(page 27)***

9. **HDMI output connector (HDMI, type A)** *(page 27)*
10. **SDI output connector 1, 2 (BNC type)** *(page 27)*

Lens Mounting

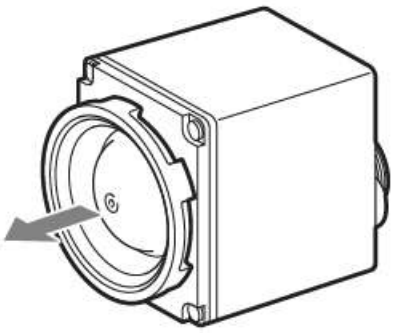
C-mount lenses with a protrusion of 4.1 mm (3/16 in.) or less from the lens mount surface can be attached to the camera head.



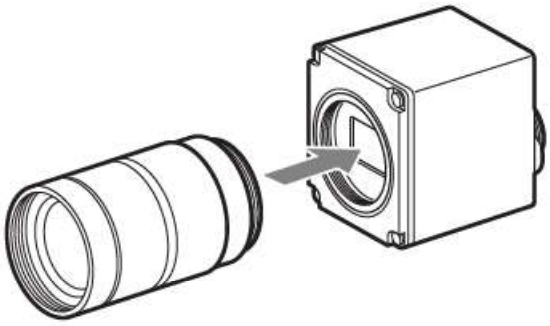
Be sure to use a lens whose protrusion from the lens mount surface is 4.1 mm (3/16 in.) or less. Mounting a lens with a maximum protrusion of 4.2 mm (3/16 in.) or more may damage the internal mechanism of the camera head.

Mounting the lens

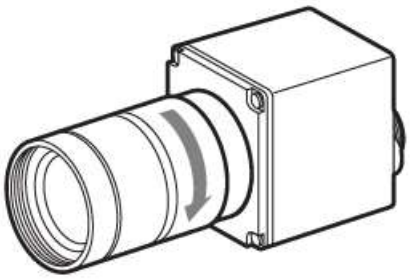
1 Remove the lens mount cap.



2 Align the threads of the lens mount and camera mount and insert the lens.



3 Slowly turn the lens clockwise to securely attach it to the camera.



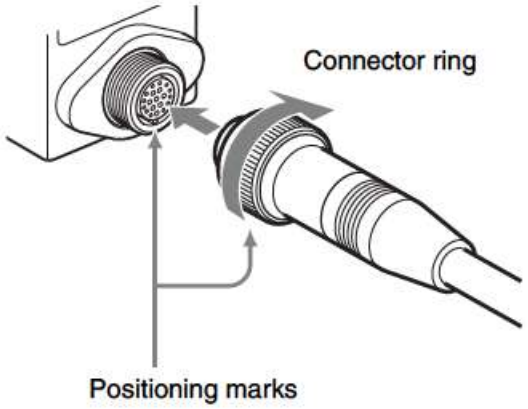
Connection between the Camera Head and CCU

Use a camera cable (not supplied) to connect the camera head to the CAMERA connector on the CCU.
You can use one of the following four types of camera cable.
CCMC-SA06 (standard 6 m (19.6 ft.))
CCMC-SA10 (standard 10 m (32.8 ft.))
CCMC-SA15 (standard 15 m (49.2 ft.))
CCMC-EA05 (extension 5 m (16.4 ft.))

Notes on using camera cables

- When disconnecting or connecting the camera cable, be sure to turn off the power supply for the CCU and all equipment connected to the CCU. Doing so while the power is on may result in malfunctions to the equipment.
- Make sure that the camera head and CCU are connected via the camera cable before starting the unit.
- Insert the connector by pushing it straight in, taking care not to bend the pins.
- Make sure connectors are securely inserted. A loose connection may result in noise. When removing a connector, be sure to hold it by the connector itself and not the cable.

Connecting the camera cable to the camera head



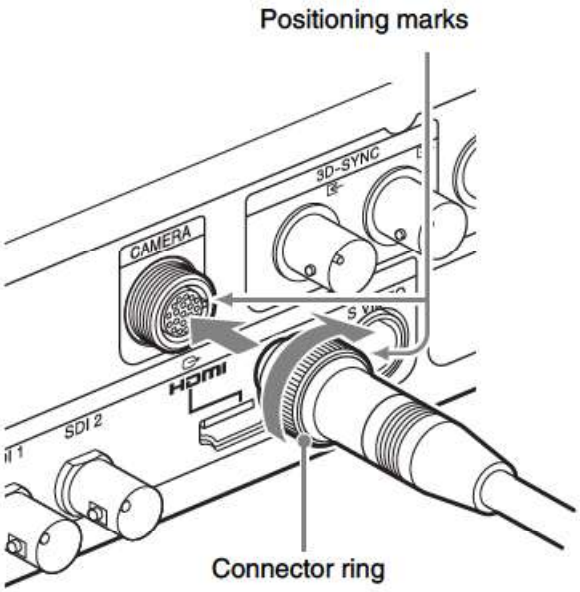
1 Align the positioning marks on the camera cable connector and the round camera cable plug, and then push the plug in.

2 Turn cable connector ring to tighten the connection.

Note

Do not connect this unit to camera heads and CCUs of different models.

Connecting the camera cable to the CAMERA connector on the CCU

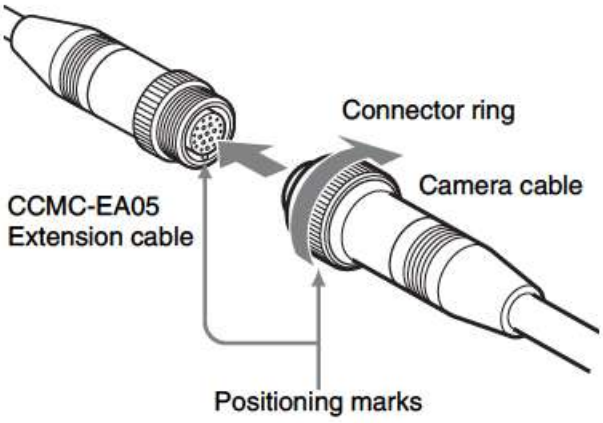


1 Align the positioning marks on the CAMERA connector and the round camera cable plug, and then push the plug in.

2 Turn cable connector ring to tighten the connection.

Connecting an extension cable

When using the CCMC-EA05 extension cable (not supplied), connect it as shown below.



1 Align the positioning marks on the extension cable's round connector (female) and the camera cable's round connector (male), and then push them together.

2 Turn cable connector ring to tighten the connection.

Notes

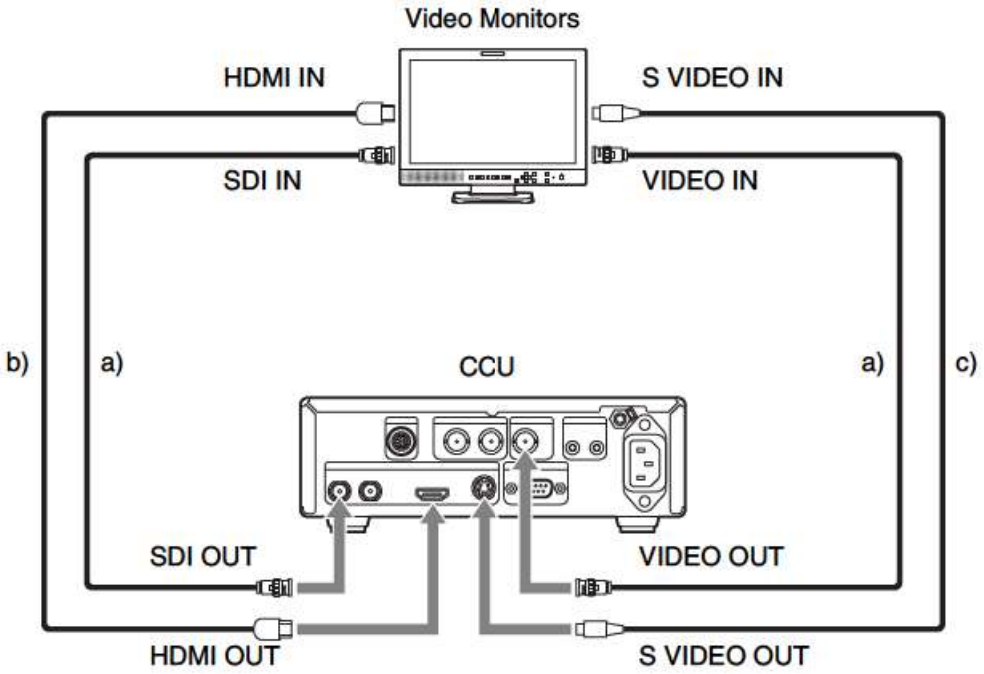
- Use only one extension cable. Operation is not guaranteed when more than one extension cable is used.
- When used in conjunction with a standard CCMC-SA15 cable, the total cable length can be extended to up to 20 m (65.6 ft.).

Connecting Video Monitors

Camera picture output is output from all of the video output connectors (VIDEO, S VIDEO, HDMI, SDI) on the rear CCU panel.
You can check the camera picture output by connecting a video monitor that supports the respective video output to any of these connectors.
Both sides of an SD image are cut from a 16:9 image and output as a 4:3 image.

Notes

- Before connecting the cables, make sure that the unit is turned off.
- When connecting video monitors, only do so using a direct cable. Using a conversion adapter may cause the camera picture output to output incorrectly.



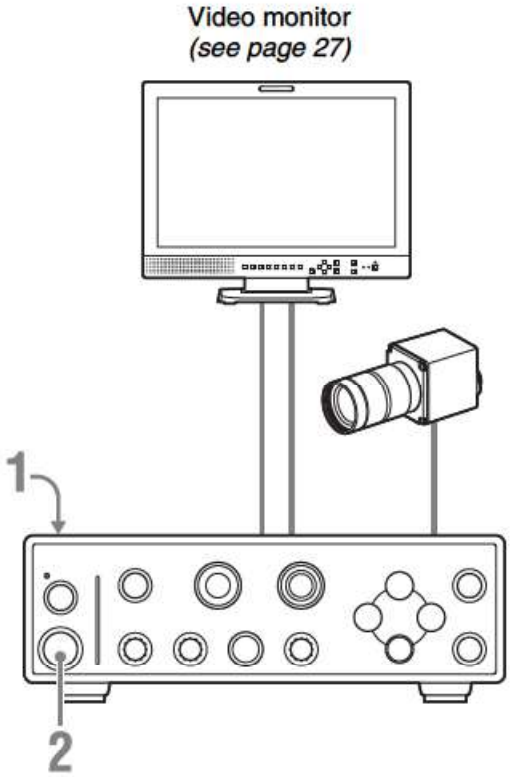
a) 75 Ω coaxial cable
b) HDMI cable
c) S connector cable

Note

We recommend using Sony HDMI cables (not supplied).

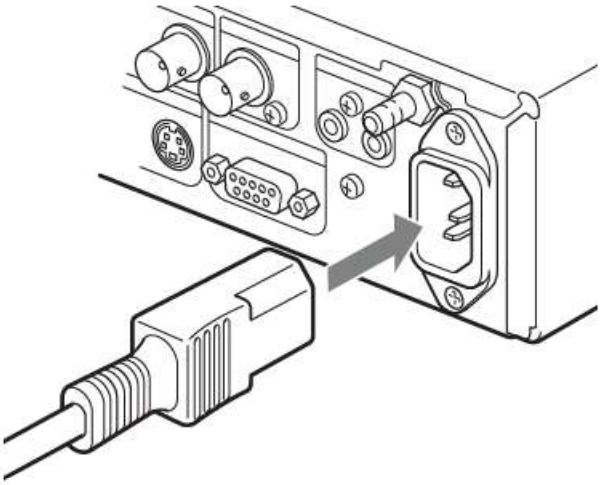
Start-up

Turning the power on



1 Connect the power cord to the ~ (power) connector on the CCU rear panel.

Make sure the power cord is not plugged into an outlet when connecting it to the CCU.



2 Press the ⏻ (on/standby) switch.

The indicator will turn green and camera picture output will appear on the video monitor.

Note

When you start the unit after replacing the camera head, startup may take longer than usual.

Entering standby mode

Press the ⏻ (on/standby) switch again.
The unit enters standby mode, and the indicator turns orange.

Note

If you disconnect the power cord without setting the unit to standby mode, setting information may be lost.

Output Format Settings

The output format for this unit can be set to NTSC or PAL. Set the output format according to where the unit will be used. The factory default setting is NTSC.

You can adjust unit settings by connecting it to a video monitor, pressing the MENU button, and then selecting items from the menu that is displayed on the screen.

Setting the output format

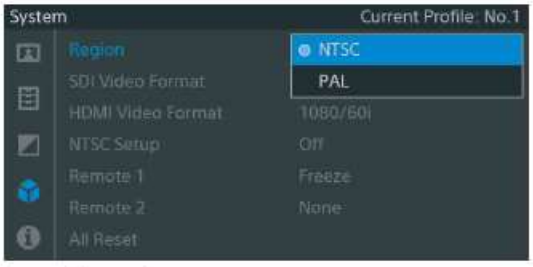
This is set in the [System] menu's [Region] option.

1 Display the [System] menu, select [Region], and then press the ENTER button.

For details on menu operations, see "Basic Menu Operations" (page 41).

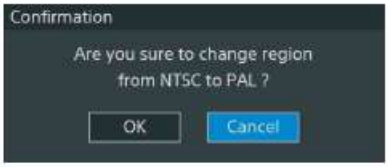
2 Press the ↑/↓ buttons to select an output format, and then press the ENTER button.

● will appear in front of the currently set output method.



A confirmation message appears.

3 Select [OK], and press the ENTER button.



The output method is now set.

Note

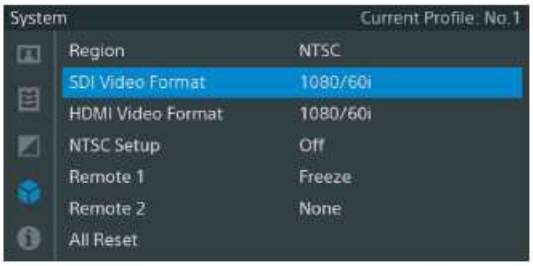
When you change the [Region] setting, the SDI and HDMI output signal formats will return to factory default values. Be sure to reconfigure the output signal formats if necessary.

Setting the output signal format

Set the output signal format according to the connected video monitor in the [System] menu's [SDI Video Format] or [HDMI Video Format] option.

1 Display the [System] menu, select [SDI Video Format] or [HDMI Video Format], and then press the ENTER button.

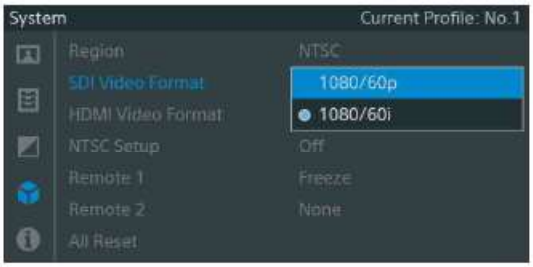
Select [SDI Video Format] if an SDI input video monitor is connected, and select [HDMI Video Format] if an HDMI input video monitor is connected.



For details on menu operations, see "Basic Menu Operations" (page 41).

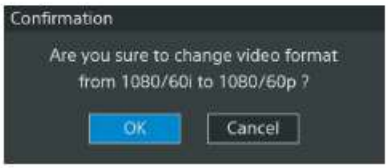
2 Press the ↑/↓ buttons to select an output signal format, and then press the ENTER button.

● will appear in front of the currently set output signal format.



The output of the screen changes to the selected output signal format, and a confirmation message appears.

3 To confirm the selected output signal format, select [OK] and press the ENTER button.



Tip

If the video monitor does not support the selected output signal format, the confirmation message cannot be operated (i.e., the message will not appear). In such cases, the switching operation will be canceled in 15 seconds, and the output signal format will revert to the format from before the change.

4 Press the MENU button to close the menu screen.

Output signal types

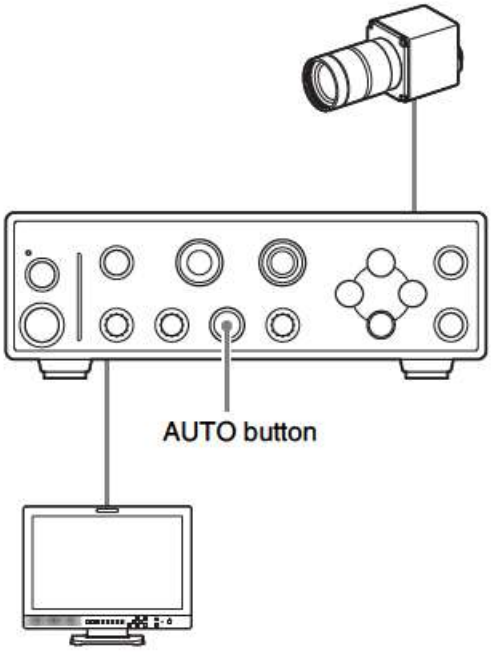
The type of signals output from the unit will differ depending on the settings in the [System] menu's [Region] option. Output signals are shown in the table below.

Region	SDI output	HDMI output	VIDEO output / S VIDEO output
NTSC	1080/59.94p, 1080/59.94i	1080/59.94p, 1080/59.94i, 480/59.94p	NTSC[1)]
PAL	1080/50p, 1080/50i	1080/50p, 1080/50i, 576/50p	PAL[1)]

1) The left and right edges of a 16:9 image are cropped, and the image is output as a 4:3 image.

Shooting

When the unit starts up, camera picture output being shot on this unit is output from the video output connectors (VIDEO, S VIDEO, HDMI, SDI) on the rear panel of the CCU.



Viewing camera picture output

Connect a video monitor to any of the video output connectors.

For details, see "Connecting Video Monitors" (page 27).

Adjusting camera picture output

You can automatically adjust the brightness.

To automatically adjust the brightness

Press the AUTO button to activate the indicator. The AE function is now activated. The gain value and shutter speed change automatically, and the brightness is adjusted automatically at all times.

To adjust the brightness manually, turn the AE function off. For details, see "Adjusting the Brightness" (page 34).

You can also activate saved Picture Profiles to adjust camera picture output.

For details, see "Picture Profile" (page 36).

Adjusting the White Balance

The white balance must be adjusted according to the color temperature of the light source.

Note

When [Fluorescein] is set to [On] in the [Function] menu, the white balance will be set to fluorescein mode settings and cannot be adjusted.

Preset mode

The color temperature is set to a preset value (3200K under factory default settings) in this mode.
Use this mode when you do not have time to adjust the white balance or when you want to shoot with a fixed white balance configured in the picture profile settings.

Offset mode

The camera picture output color balance can be changed by adjusting the R and B gain values in this mode *(see page 33)*.
To enable offset mode, set [White Balance] > [Preset On/Off] to [Off] and [Offset On/Off] to [On] in the [Picture] menu.

Executing auto white balance

You can adjust the white balance automatically by pressing the WHITE button on the CCU front panel.

Note

Auto white balance is not available in the following cases.

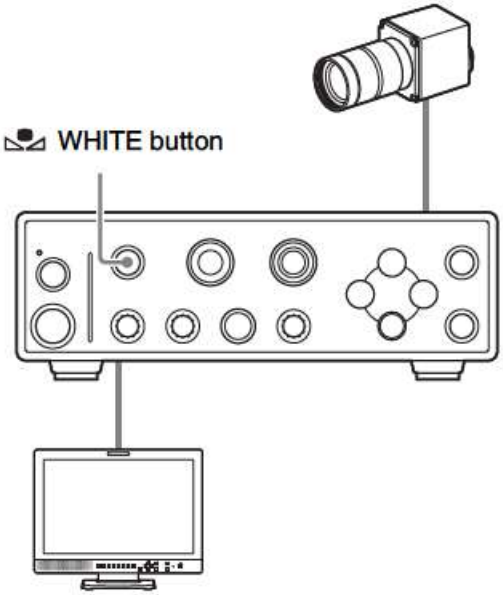
- When preset mode is enabled
- When [Fluorescein] is set to [On] in the [Function] menu
- When the image being shot is a color bar

1 Place a white object (such as a piece of white paper) under the same conditions as the light source illuminating the subject, and zoom in so that the entire screen is filled with the white object.

A white object (white cloth or wall) close to the subject may be used as a substitute.
Make sure that no high-intensity spotlights are in the screen.

2 Press the WHITE button.

Auto white balance adjustment begins.



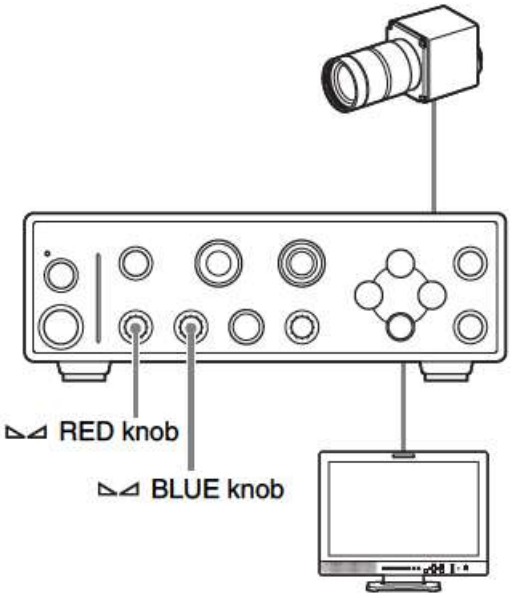
A message will appear on the video monitor during adjustment.
When white balance adjustment finishes normally, a completion message appears.

- After performing auto white balance, the white balance information is stored, and the unit returns to the normal shooting mode.

Changing the camera picture output color balance

If you want to intensify the red or the blue in the camera output picture, for example, adjust the offset value of the white balance, and change the color balance.
Perform adjustments using the knobs or using [White Balance] in the [Picture] menu.
You can also save the configured offset value to internal memory. (Doing so allows you to recall the value even after readjusting the white balance.)

Using the knobs



Turn the RED or BLUE knob to adjust the R or B white gain offset value.
Turning the RED knob clockwise strengthens red, while turning it counterclockwise strengthens green. Turning the BLUE knob clockwise strengthens blue, while turning it counterclockwise strengthens yellow.

You can reset the offset value to 0 (factory default setting) by holding down the RED or BLUE knobs for one second or longer.

Using the [White Balance] setting in the [Picture] menu

You can adjust the white balance offset value by selecting [Red Gain Offset] or [Blue Gain Offset] for [White Balance] in the [Picture] menu.
Press the ←/→ buttons to set the value on the slider that appears.

The gray circle on the slider indicates the setting value before the change, and the blue circle indicates the current setting value.

Tip

When a slider is displayed, holding down the ←/→ buttons increases the incremental speed at which the value changes, allowing you to set your target value faster.

Adjusting the Brightness

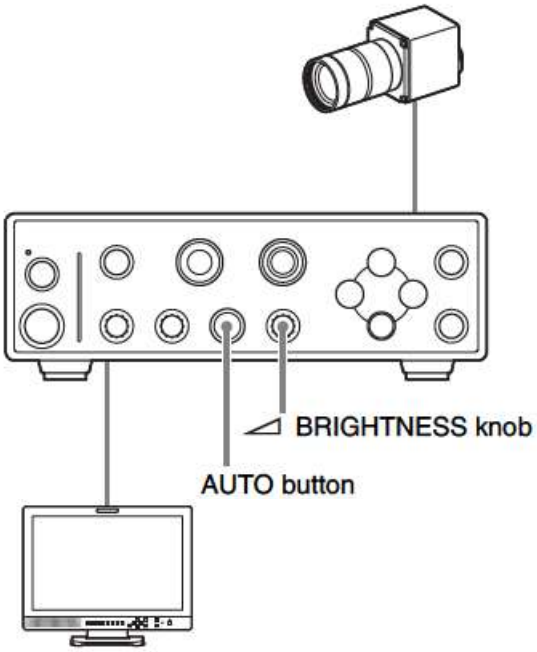
This unit is equipped with an AE function that automatically adjusts the brightness to optimum levels through a combination of settings of the gain and shutter speed. You can also make adjustments using the ◿ BRIGHTNESS knob, which also adjusts the brightness through a combination of the gain and shutter speed settings. However, you can also set the gain and shutter speed separately in the [Picture] > [Exposure] menu for special shooting conditions.

Note

If the knobs are turned too quickly, adjustments may not be registered. Be sure to turn the knobs slowly.

Using the AE function

To turn on the AE function, press the AUTO button to light it. The gain and shutter speed change automatically based on shooting conditions, and the brightness is adjusted to optimal settings.
The AE function adjustment level (AE level), the adjustment mode, and the upper and lower limit values can all be set in the [Picture] menu by going to [Exposure] > [Mode] and selecting [Auto] *(see page 43)*.



Setting the AE level

The AE level sets the automatic brightness level adjustment by specifying how much brighter or darker it is than the standard level. Perform sets using the ◿ BRIGHTNESS knob or using [Exposure] in the [Picture] menu.

To set the AE level using the ◿ BRIGHTNESS knob

When the AE function is on, you can also set the AE level by turning the ◿ BRIGHTNESS knob. Turning the knob clockwise will raise the AE level (brighter than the standard level), and turning it counterclockwise will lower the AE level (darker than the standard level).

You can reset the AE level to factory default settings by holding down the ◿ BRIGHTNESS knob for one second or longer.

To set the AE level using the [Exposure] setting in the [Picture] menu

In [Picture] menu's [Exposure] > [Mode], select [Auto], and then set [Auto Exposure Level]. Press the ←/→ buttons to set the value on the slider that appears.

The gray circle on the slider indicates the setting value before the change, and the blue circle indicates the current setting value.

Tip

When a slider is displayed, holding down the ←/→ buttons increases the incremental speed at which the value changes, allowing you to set your target value faster.

Using the BRIGHTNESS knob

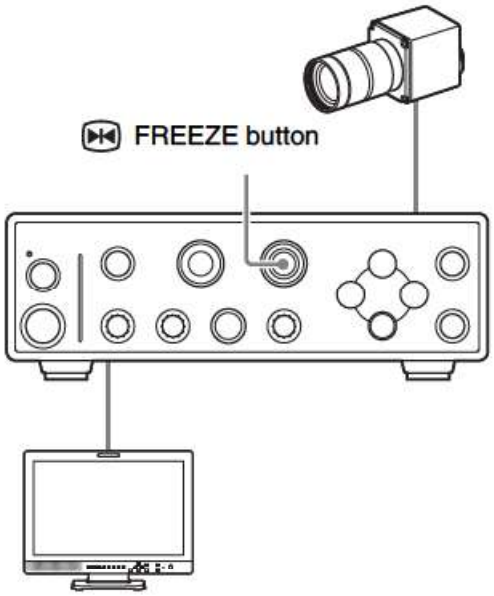
By turning the ◿ BRIGHTNESS knob with the AE function off, you can adjust the brightness with a combination of gain and shutter speed settings. Turning the knob clockwise will brighten the image (higher gain or a slower shutter speed), and turning it counterclockwise will darken the image (lower gain or a faster shutter speed).

You can reset the AE level to factory default settings by holding down the ◿ BRIGHTNESS knob for one second or longer.

Outputting a Still Image

To output a still image

Press the ⏭ FREEZE button on the CCU front panel to output camera images as a still image. When still image output is enabled, the ⏭ FREEZE button lights.



To return to normal picture

Press the ⏭ FREEZE button again.

Tips

- Adjustments to image quality settings may be made in the [Picture] menu during still image output, however, these changes will not be reflected in the still images. Once you switch back to normal picture, the image quality changes can be checked.
- During still image output, effects will not be reflected when switching Picture Profiles. Once you switch back to normal picture, Picture Profile changes can be checked.
- Color bar output will be disabled when you switch to still image output.

Fluorescein Mode

This unit is equipped with a fluorescein mode that produces optimal image quality when shooting subjects that are fluorescing with fluorescein.
To enable fluorescein mode, set [Fluorescein] to [On] in the [Function] menu.

Note

The white balance cannot be adjusted during fluorescein mode.

During fluorescein mode, the color can be adjusted using a different method from normal mode via [Color] in the [Picture] menu.

Adjusting the saturation for only the fluorescing color

Adjust the saturation for only the color fluorescing due to the excitation light with [Color] > [Saturation] in the [Picture] menu.

Adjusting the hue for only the fluorescing color

Adjust the hue for only the color fluorescing due to the excitation light with [Color] > [Hue] in the [Picture] menu.

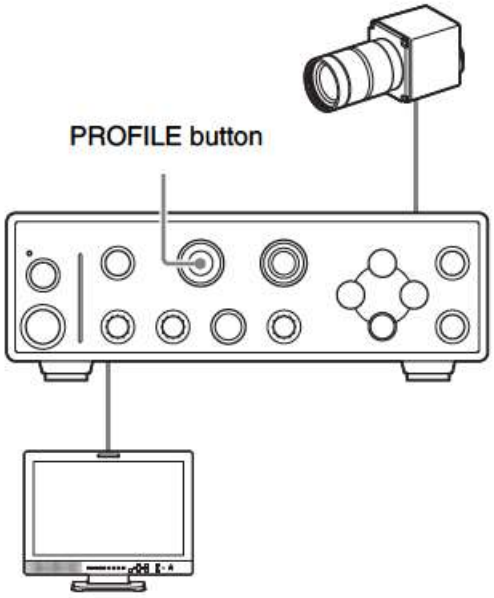
Picture Profile

You can customize settings to match shooting conditions and save these as a picture profile to load when necessary.
Simply select the picture profile to shoot at your preferred image quality settings.
You can save up to six different picture profiles on this unit (No. 1 to No. 6). There are six factory presets stored as defaults.

To register a picture profile, use the [Picture] menu's [Profile] option. To activate a picture profile, press the PROFILE button.

Registering/activating picture profiles

You can easily switch to registered settings just by activating the picture profile.
When you activate a picture profile, the activated picture profile number will be displayed on the video monitor for 3 seconds.



Selecting a picture profile

To select a picture profile with PROFILE button

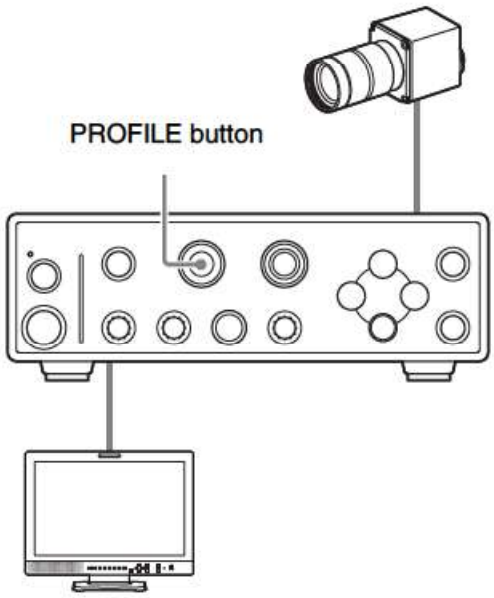
Press the PROFILE button and select the picture profile you want to activate.
The lit indicator changes with each press of the button, activating the picture profile of the lit number.

Tip

Holding down the PROFILE button allows you to select the picture profile in reverse order.

Note

The way in which the picture profiles change is determined by the [Profile] > [Profile Selection Range] setting in the [Picture] menu.



Each time the profile is changed, the unit will adjust the image quality according to the selected profile.

To load a picture profile from the [Picture] menu

1 Display the menu screen, and in the [Picture] menu, select [Profile] and then press the ENTER button.

2 Select [Select], and press the ENTER button.

3 Select the profile to load, and press the ENTER button.

The unit will adjust the image quality according to the selected profile.

4 Press the MENU button to close the menu screen.

Registering a picture profile

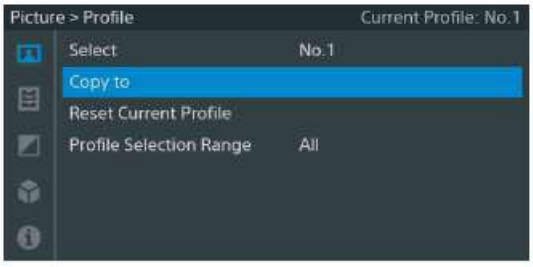
When you change the settings after a picture profile is activated, the settings for the activated picture profile number will be overwritten automatically.

Copying picture profile settings

You can register the setting information for the current picture profile as a separate profile number.

1 Display the menu screen, and in the [Picture] menu, select [Profile] and then press the ENTER button.

2 Select [Copy to], and press the ENTER button.



3 Select the profile to register the setting, and press the ENTER button.

The current settings are copied to the selected picture profile.

4 Once settings are complete, press the MENU button to close the menu screen.

Resetting the selected picture profile

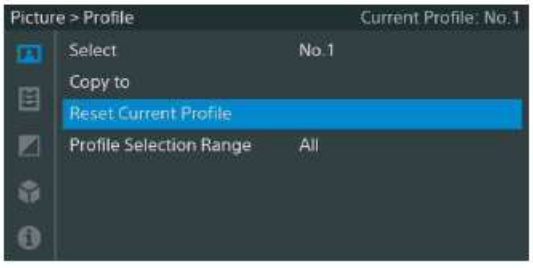
You can return the selected picture profile settings to factory defaults (standard values).

For details on factory default values, see "Picture profile standard setting values (factory default settings)" (page 39).

1 Press the PROFILE button and select the picture profile you want to reset.

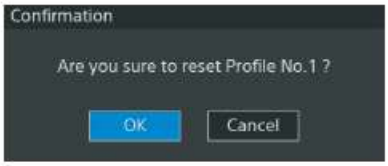
2 Display the menu screen, and in the [Picture] menu, select [Profile] and then press the ENTER button.

3 Select [Reset Current Profile], and press the ENTER button.



A confirmation message will appear.

4 Select [OK], and press the ENTER button.



The values will be reset to factory default settings.

5 Once settings are complete, press the MENU button to close the menu screen.

Specifying the Picture Profile Selection Range

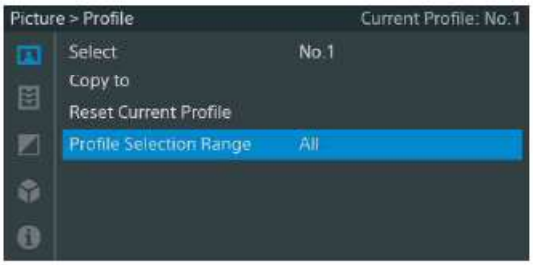
You can specify the selectable range of picture profiles that are available when you press the PROFILE button on the front panel to select a picture profile.
The selectable range of picture profiles specified here will also be used when picture profiles are assigned to a foot switch.

1 Press the MENU button

The menu screen appears.

2 Select [Profile] in the [Picture] menu, and press the ENTER button.

3 Select [Profile Selection Range], and press the ENTER button.



4 Select the picture profile selection range, and press the ENTER button.

The picture profiles change as follows for each selection range.
All: 1 → 2 → 3 → 4 → 5 → 6 → 1…
1/2: 1 → 2 → 1…
1/2/3: 1 → 2 → 3 → 1…

5 Once settings are complete, press the MENU button to close the menu screen.

Picture profile standard setting values (factory default settings)

Setting values for each item in the [Picture] menu are preset in picture profiles No. 1 to No. 6.

For details on each item, see "[Picture] menu" (page 43).

Item		Picture Profile No.1 Standard 1	No.2 HDR 1 (Inverted)	No.3 HDR 1	No.4 Standard 2	No.5 HDR 2	No.6 Fluorescein
Exposure	Mode	Auto	Auto	Auto	Auto	Auto	Auto
	Sensitivity	Normal	Normal	Normal	Low	Normal	Normal
	Area	Full	Full	Full	Full	Middle	Middle
	Level	80%	80%	80%	80%	80%	80%
	Speed	+50	+50	+50	+50	+50	+50
	Auto Shutter Limit	1/2000	1/2000	1/2000	1/2000	1/10000	1/10000
	Auto Gain Limit	12dB	12dB	12dB	12dB	12dB	12dB
	Gain	0	0	0	0	0	0
	Shutter Mode	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed
	Shutter Speed	1/60	1/60	1/60	1/60	1/60	1/60
White Balance	Preset On/Off	Off	Off	Off	Off	Off	Off
	Preset	3200	3200	3200	3200	3200	3200
	Offset On/Off	On	On	On	On	On	On
	Red Gain Offset	0	0	0	0	0	0
	Blue Gain Offset	0	0	0	0	0	0
Enhance/ Noise Reduction	Sharpness On/ Off	On	On	On	On	On	On
	Sharpness Level	50	50	50	0	0	0
	Sharpness Frequency	0	0	0	40	0	0
	Knee Aperture Level	0	0	0	0	0	0
	Noise Reduction On/Off	On	On	On	Off	On	On
	Noise Reduction Level	3	6	6	1	3	3
Knee/ White Clip	Knee On/Off	On	On	On	On	On	On
	Knee Saturation	0	0	0	0	0	-99
Gamma	Master Curve	2.2	2.4wide	2.4wide	2.2	HLG	2.2
	Black Gamma	0	0	0	0	0	-99
Color	Saturation	0	0	0	0	0	0
	Hue	0	0	0	–4	0	0
	Low Key Saturation	0	0	0	0	0	0
Flip		Off	HV Flip	Off	Off	Off	Off
Fluorescein		Off	Off	Off	Off	Off	On

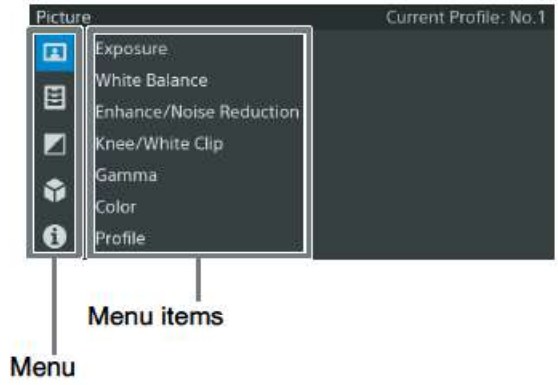
Menu Structure and Layers

On this unit, you can adjust settings necessary for shooting by using the menus displayed on a video monitor.

For details on connecting a video monitor, see "Connecting Video Monitors" (page 27).

Menu structure

Press the MENU button to display the menu and select various menu items.



[Picture] menu
Adjust the image quality and other settings related to shooting *(page 43)*.

[Function] menu
Adjust the settings related to camera functions *(page 48)*.

[White/Black Adjust] menu
Adjust settings for the color balance *(page 49)*.

[System] menu
Adjust settings related to output format and output signal *(page 50)*.

[Information] menu
Displays the unit serial number and software version *(page 51)*.

Menu layers

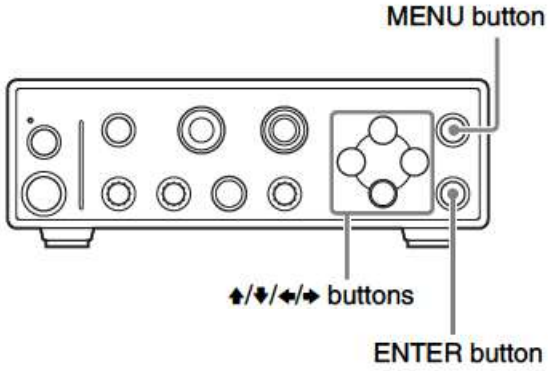
- MENU
  - Picture
    - Exposure
    - White Balance
    - Enhance / Noise Reduction
    - Knee / White Clip
    - Gamma
    - Color
    - Profile
  - Function
    - Digital Zoom
    - Flip
    - Freeze
    - Fluorescein
    - Center Marker
    - Image On Screen
    - Test Signal
  - White/Black Adjust
    - White Shading
    - Auto Black Balance
    - Master Black Level
  - System
    - Region
    - SDI Video Format
    - HDMI Video Format
    - NTSC Setup [1)]
    - Remote1
    - Remote2
    - All Reset
  - Information
    - Version
    - CCU Serial No.
    - CHU Serial No.

1) Appears only when [Region] is set to [NTSC].

Basic Menu Operations

This section describes basic setting methods for menus.

Menu controls



MENU button

This button displays/hides the menu.

↑/↓/←/→ buttons

These buttons are used to select menu items or setting values.

ENTER button

This button is used to confirm setting values for selected menu items and to execute operations.

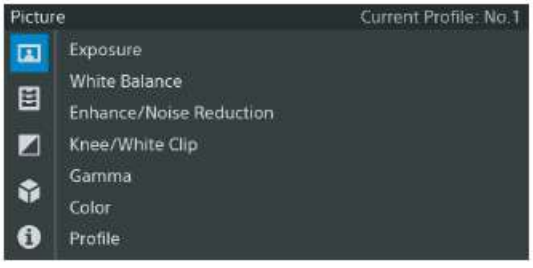
Displaying the menu

Press the MENU button.

The menu's home screen will appear on the video monitor.

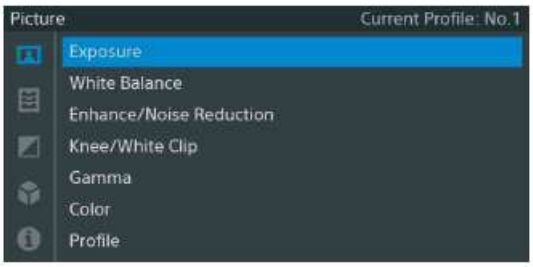
Setting the menus

1 Press the ↑/↓ buttons to select a menu to set.



2 Press the ENTER button or → button.

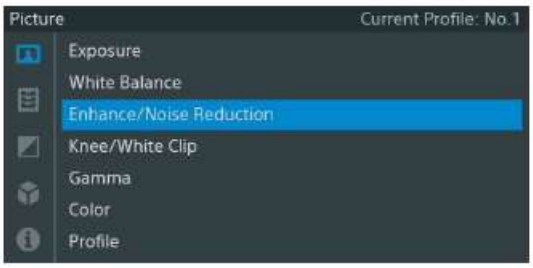
The cursor will move to the right side of the menu item area.



Tip

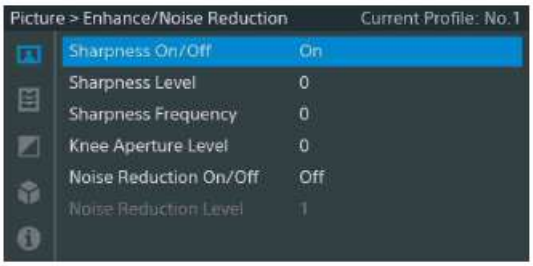
Press the ← button to return to the next higher menu layer.

3 Press the ↑/↓ buttons to select a menu item.



4 Press the ENTER button or → button.

The current setting value appears.

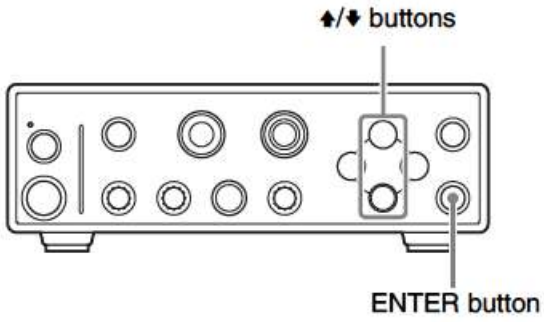


When a menu item is selected with an On/Off or switching only option without a detailed item, proceed to step 6.

5 For menu items with submenu items, press the ↑/↓ buttons to select a menu item to set, and then press the ENTER button or → button.

Other options will appear.

6 Press the ↑/↓ buttons to select a value to set, and then press the ENTER button to confirm.



The setting will change and the changed status will be displayed.
If the ENTER button is pressed for executable items, the respective functions will execute.

A slider for setting values will appear depending on the menu item.
In that case, press the ←/→ buttons to set the value.

The gray circle on the slider indicates the setting value before the change, and the blue circle indicates the current setting value.

Tip

When a slider is displayed, holding down the ←/→ buttons increases the incremental speed at which the value changes, allowing you to set your target value faster.

Hiding the menu

Press the ▭ MENU button.

The menu will disappear.

Menu List

Functions and setting values for each menu item are as follows.
Factory default values are shown in bold (Ex.: **Auto**).

[Picture] menu

Picture

Menu items	Submenus and setting values	Details
Exposure Picture brightness (exposure) adjustment	Mode **Auto** Manual	Select a mode to adjust picture brightness. Auto: Brightness is automatically adjusted. Manual: Adjust the brightness manually. The shutter speed and gain can be set. **Tips** • If the AUTO button is pressed when in [Manual] mode, the camera will switch to [Auto] mode. • When the AUTO button is pressed when in [Auto] mode, the camera will switch to [Manual] mode.
	Sensitivity High **Normal** Low	Set the sensitivity. High: Operate with high sensitivity. Normal: Operate with normal sensitivity. Low: Operate with low sensitivity. Noise is reduced.
	When in [Auto] mode	
	Area **Full** Large Middle Spot Slit	Specify the metering area for exposure adjustment. Full: Entire screen. Large: Equal to [Full] vertically and 75% of [Full] horizontally. Middle: 75% of [Large] both vertically and horizontally. Spot: 10% of [Large] both vertically and horizontally. Slit: Equal to [Full] vertically and 10% of [Large] horizontally. **Tip** Holding down the AUTO button displays the selected monitoring area on the video monitor for 3 seconds.
	Auto Exposure Level 0 to 100% (**80%**)	Set the exposure level.
	Auto Exposure Speed –99 to 0 to +99 (**+50**)	Select the amount of time needed (AE convergence time) to achieve the correct exposure.

Picture		
Menu items	**Submenus and setting values**	**Details**
Exposure Picture brightness (exposure) adjustment	Auto Shutter Limit When [Region] is set to [NTSC] 1/60 1/100 1/125 1/250 1/500 1/1000 **1/2000** 1/4000 1/10000 When [Region] is set to [PAL] 1/50 1/100 1/125 1/250 1/500 1/1000 **1/2000** 1/4000 1/10000	Set the fastest shutter speed for the auto shutter.
	Auto Gain Limit 1 to 30 dB (**12 dB**)	Set the maximum gain value for AE adjustment.
	When in [Manual] mode	
	Gain **0** to 30 dB	Select the gain.
	Shutter Mode **High Speed** Slow	Select the electronic shutter mode. High Speed: Set the shutter speed in seconds. Use this when you want to shoot fast-moving subjects without blurring or when you want to adjust the brightness. Slow: Set the shutter speed in cumulative frames. Use this when you want to shoot clear images with minimal noise under low-light conditions.

Picture

Menu items	Submenus and setting values	Details
Exposure Picture brightness (exposure) adjustment	Shutter Speed When [Region] is set to [NTSC] **1/60** 1/100 1/125 1/250 1/500 1/1000 1/2000 1/4000 1/10000 When [Region] is set to [PAL] **1/50** 1/100 1/125 1/250 1/500 1/1000 1/2000 1/4000 1/10000	Select the shutter speed.
	Frame **2** to 8	Set the cumulative frame count.
White Balance White balance settings	Preset On/Off **Off** On	Select whether to set the color temperature to the preset value.
	When [Preset On/Off] is set to [On]	
	Preset 2100 to 10000K (**3200K**)	Set the preset value for the color temperature in 100 K steps.
	Offset On/Off Off **On**	Select whether to adjust the R and B gain values manually.
	When Preset On/Off] is set to [Off] and [Offset On/Off] is set to [On]	
	Red Gain Offset –99 to **0** to +99	Adjust the red level.
	Blue Gain Offset –99 to **0** to +99	Adjust the blue level.
	When [Preset On/Off] is set to [Off]	
	Auto White Balance	Perform automatic white balance adjustment.

Picture		
Menu items	**Submenus and setting values**	**Details**
Enhance / Noise Reduction Image correction settings	Sharpness On/Off Off **On**	Select whether to perform edge enhancement.
	Sharpness Level –99 to 0 to +99 (**+50**)	Adjust the edge enhancement level.
	Sharpness Frequency –99 to **0** to +99	Adjust the edge enhancement frequency.
	Knee Aperture Level –99 to **0** to +99	Adjust the knee aperture (i.e., edge enhancement for areas with higher brightness than the knee point).
	Noise Reduction On/Off Off **On**	Select whether to perform noise reduction.
	Noise Reduction Level 1 to 6 (**3**)	Adjust the noise reduction level.
Knee / White Clip Bright area adjustment settings	Knee On/Off Off **On**	Select whether to compress bright areas of the image.
	Knee Mode **Auto** Manual	Auto: Automatically calculate the optimal brightness level at which to start compression and degree of compression based on the brightness level of the image being shot. Manual: Manually adjust the brightness level at which to start compression and the degree of compression.
	When [Knee Mode] is set to [Manual]	
	Knee Point 50 to 109 (**90**)	Adjust the brightness level at which to start compression.
	Knee Slope –99 to **0** to +99	Adjust the degree of compression.
	Knee Saturation –99 to **0** to +99	Adjust the coloring of the compressed areas.
	White Clip On/Off Off **On**	Select whether to compress the areas that are brighter than the maximum brightness level so that they are within the maximum level.
	When [White Clip On/Off] is set to [On]	
	White Clip Level 90.0 to 109.0 (**108.0**)	Adjust the maximum brightness level.

Picture

Menu items	Submenus and setting values	Details
Gamma Gamma correction settings	Master On/Off Off **On**	Select whether to change the gradation expression for light and dark via gamma correction.
	When [Master On/Off] is set to [On]	
	Master Level –99 to **0** to +99	Adjust the level of gradation expression for light and dark using gamma correction.
	Master Curve **2.2** 2.4wide HLG	Select the reference curve to be used for gamma correction. Images with appropriate gradation are output by matching this setting with the gamma setting of the video monitor. **Note** The knee function cannot be used while 2.4wide or HLG is selected.
	Black Gamma –99 to **0** to +99	Adjust the level for the black gamma function that can elevate dark areas of the image to enhance gradation or crush them to reduce noise.
Color Image vividness settings	Saturation –99 to **0** to +99	Adjust the vividness.
	Hue –99 to **0** to +99	Adjust the hue.
	Low Key Saturation –99 to **0** to +99	Adjust the vividness of dark areas of the image.
Profile Picture Profile operations	Select No.1 No.2 No.3 No.4 No.5 No.6	Load the selected picture profile.
	Copy To No.1 No.2 No.3 No.4 No.5 No.6	Copy the setting values of the currently selected picture profile to the selected profile No.
	Reset Current Profile	Return the currently selected picture profile content to factory default values.
	Profile Selection Range **All** 1/2 1/2/3	Specify the selectable range of picture profile numbers that are available when using the PROFILE button on the front panel or a foot switch (when the picture profile function is assigned) to select a picture profile. All: 1 → 2 → 3 → 4 → 5 → 6 → 1… 1/2: 1 → 2 → 1… 1/2/3: 1 → 2 → 3 → 1…

[Function] menu

Function

Menu items	Submenus and setting values	Details
Digital Zoom Digital zoom settings	**×1.0** to ×2.5	Adjust the digital zoom magnification.
Flip Image flip	**Off** H Flip V Flip HV Flip	Flip output image. When you change the setting, the selected setting appears on the video monitor for 3 seconds. Off: Does not flip image. H Flip: Flips image horizontally. V Flip: Flips image vertically. HV Flip: Flips image horizontally and vertically.
Freeze Still image output	**Off** On	Output the picture as a still image. Off: Outputs a normal picture. On: Outputs a still image.
Fluorescein Fluorescein mode settings	**Off** On	Switch between activated/deactivated for fluorescein mode, which reduces blue light during fluorescein shooting. Off: Deactivated On: Activated
Center Marker Center marker display	**Off** On	Select whether to display the center marker.
Image On Screen Graphics overlay setting	Off **On**	Select whether to display graphics on the output image during front panel operations. Off: Do not display graphics. On: Displays graphics.
Test Signal Camera output, color bar, and test signal switching	**Off** Multi EBU 75% EBU 100% Test Saw	Specify whether to output the camera image, color bar, or test signal. Off: Outputs the camera image. Multi: Outputs the multi-format color bar. EBU 75%: Outputs the EBU 75% color bar. EBU 100%: Outputs the EBU 100% color bar. Test Saw: Outputs the test signal.

[White/Black Adjust] menu

White/Black Adjust		
Menu items	**Submenus and setting values**	**Details**
White Shading Optical shading adjustment	Auto White Shading	Perform auto shading.
	On/Off Off **On**	Select whether to enable shading adjustment.
	R/G/B Select **R** G B	Select the channel for which to adjust shading.
	H Saw –99 to **0** to +99	Correct H Saw shading.
	H Para –99 to **0** to +99	Correct H Para shading.
	V Saw –99 to **0** to +99	Correct V Saw shading.
	V Para –99 to **0** to +99	Correct V Para shading.
Auto Black Balance Auto black balance execution		Perform auto black balance.
Master Black Level Master black level adjustment	–99 to **0** to +99	Adjust the master black level.

[System] menu

System

Menu items	Submenus and setting values	Details
Region Output Format Settings	**NTSC** PAL	Select the appropriate output format for your region of use.
SDI Video Format SDI output signal format settings	When [Region] is set to [NTSC] 1080/60p **1080/60i** When [Region] is set to [PAL] 1080/50p **1080/50i**	Select the SDI output signal format. **Tip** The 1080/59.94p and 1080/59.94i formats appear as [1080/60p] and [1080/60i], respectively, on this unit's menus.
HDMI Video Format HDMI output signal format settings	When [Region] is set to [NTSC] 1080/60p **1080/60i** 480/60p When [Region] is set to [PAL] 1080/50p **1080/50i** 576/50p	Select the HDMI output signal format. **Tips** • The 1080/59.94p and 1080/59.94i formats appear as [1080/60p] and [1080/60i], respectively, on this unit's menus. • If the connected video monitor does not support the selected format, the video monitor will display images in the format it supports.
NTSC Setup NTSC setup settings	Available only when [Region] is set to [NTSC] **Off** On	Select whether to add 7.5% setup to the signals output from the VIDEO and S VIDEO connectors when [Region] is set to [NTSC].
Remote 1 Settings for remote contact switch connector 1	None **Freeze** Fluorescein Picture Profile Flip HV Flip All Digital Zoom	Select a function to execute using the foot switch connected to the remote contact connector 1. None: Does nothing. Freeze: Switch between On/Off for still image output. Fluorescein: Switch between activated/deactivated for fluorescein mode. Picture Profile: Selects the next picture profile No. The selectable range of picture profiles is determined by the [Profile] > [Profile Selection Range] setting in the [Picture] menu. Flip HV: Switches the status of the image flip function as follows. Do not flip → horizontal and vertical flip → do not flip… Flip All: Switches the status of the image flip function as follows. Do not flip → horizontal flip → vertical flip → horizontal and vertical flip → do not flip… Digital Zoom: Enables/disables digital zoom.

System

Menu items	Submenus and setting values	Details
Remote 2 Settings for remote contact switch connector 2	**None** Freeze Fluorescein Picture Profile 1/2 Picture Profile All Flip HV Flip All Digital Zoom	Select a function to execute using the foot switch connected to remote contact connector 2. None: Does nothing. Freeze: Switch between On/Off for still image output. Fluorescein: Switch between activated/deactivated for fluorescein mode. Picture Profile: Selects the next picture profile No. The selectable range of picture profiles is determined by the [Profile] > [Profile Selection Range] setting in the [Picture] menu. Flip HV: Switches the status of the image flip function as follows. Do not flip → horizontal and vertical flip → do not flip… Flip All: Switches the status of the image flip function as follows. Do not flip → horizontal flip → vertical flip → horizontal and vertical flip → do not flip… Digital Zoom: Enables/disables digital zoom.
All Reset		Resets all settings on the unit to their factory default values. However, the [Region] setting will not be reset to its factory default value.

[Information] menu

Information

Menu items	Submenus and setting values	Details
Version Software version display		Displays the unit software version.
CCU Serial No. CCU serial number display		Display the CCU serial number.
CHU Serial No. Camera head serial number display		Display the camera head serial number.

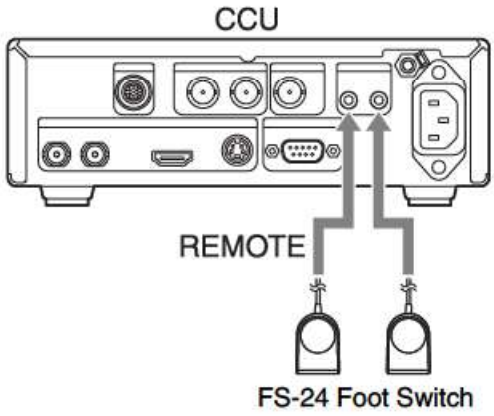
System Operation Examples

Using the Foot Switch

You can connect the foot switch to the remote contact switch connector 1 to 2 on the rear CCU panel to use functions on this unit. You can connect up to two foot switches.

Connecting the foot switch

Connect the foot switch to remote contact switch connector 1 or 2 while the unit is turned off.

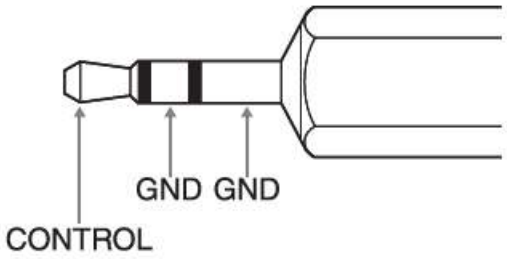


Caution

The FS-24 has an Ingress Protection rating of IPX3. Therefore, do not operate it environments exposed to splashing liquids (e.g., surgical operating rooms).
For safety, use a device with a rating of IPX6 or higher when operating in such environments.

Remote contact switch connectors 1 and 2

Connector specifications (stereo mini jack)



Set the functions to use

Set the functions to use with the foot switch.

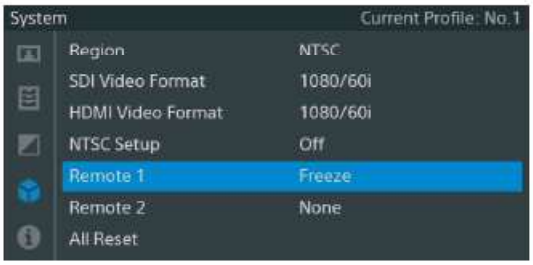
For details on the function controlled by the foot switch, see "[System] menu" (page 50).

1 Press the ▭ MENU button.

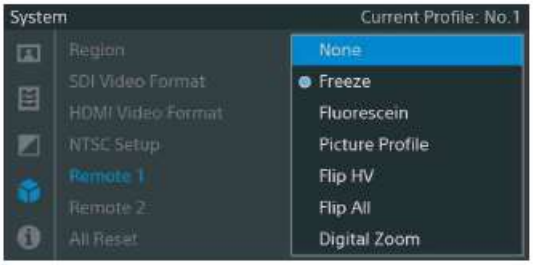
The menu screen will appear.

2 In the [System] menu, select [Remote 1] or [Remote 2] and press the ENTER button.

When connected to remote contact switch connector 1, select [Remote 1], and when connected to remote contact switch connector 2, select [Remote 2].



3 Select the functions to use with the foot switch, and then press the ENTER button.



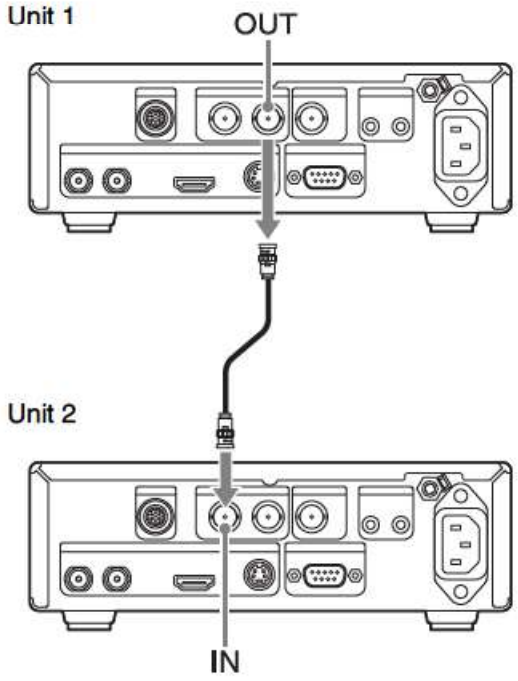
4 When two foot switches are connected, select functions to use with the second foot switch as well.

5 Once settings are complete, press the ▭ MENU button to close the menu screen.

Using Two Cameras to Shoot 3D Images

You can shoot 3D images by using two units connected as described below.
To connect two units, use a commercially-available 75 Ω coaxial cable.
Recommended cable: 5CFB, length of 1 m (3.3 ft) or less

1 Using a commercially-available 75 Ω coaxial cable, connect the first unit's 3D-SYNC OUT connector on the CCU to the second unit's 3D-SYNC IN connector on the CCU.



2 Set the video format and image quality settings so that they match on both units.

Notes

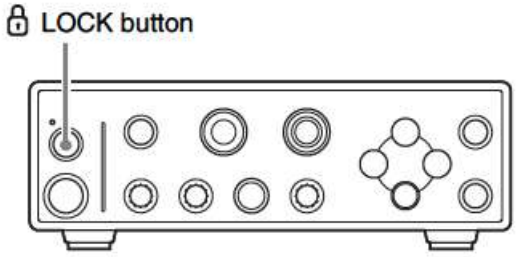
- When adjusting the installation of two camera heads, be sure to keep 3D standards in mind so as not to adversely effect human subjects.
- Use camera cables of equal length for both of the cameras.

Locking CCU Operations

You can lock button and knob operations on the front panel of the CCU by pressing the 🔒 LOCK button on the front panel. The 🔒 LOCK button lights while operations are locked. When a button or knob other than the ⏻ (on/standby) switch or 🔒 LOCK button is operated while operations are locked, the 🔒 LOCK button blinks and a warning message is displayed on the connected video monitor.

Note

Operations for the ⏻ (on/standby) switch and 🔒 LOCK button will not be locked.

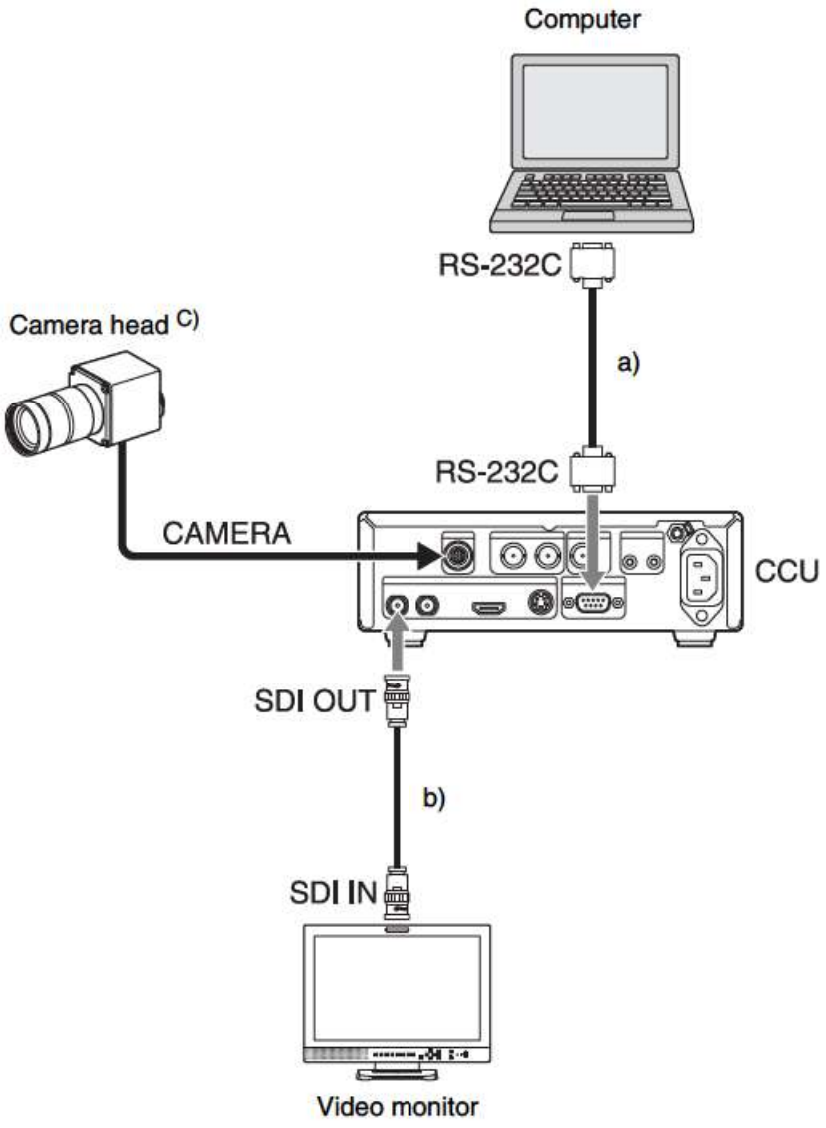


Releasing the lock

Press the 🔒 LOCK button again.

Controlling the Unit with a Computer

This unit can be controlled from a computer using the RS-232C interface.



a) D-sub 9-pin remote control cable
b) 75 Ω coaxial cable
c) For details on connecting to the camera head, see *page 25*.

For specifications on the cable that connects from the unit to a computer, or details about RS-232C control, contact Sony service representative.

Troubleshooting

Before you call for service, please check the problems and solutions described below. If you cannot solve the problem, contact the nearest authorized dealer.

Power

Symptom	Cause	Solution
The unit does not power on when you press the ⏻ (on/standby) switch.	The unit is not connected to AC power.	Connect AC Power.
All of the LED indicators on the front panel (except the power indicator) are blinking.	A system error occurred.	Remove the power cord and check the camera cable and connection with other devices. If the problem persists, contact Sony service representative.

Shooting

Symptom	Cause	Solution
No picture is output from the camera.	The camera head and CCU are not securely connected.	Check the connection with the camera head.
	The [System] menu's [Region] option setting differs from your video monitor settings.	Correctly set the [System] menu's [Region] setting *(see page 50)*. You can also change the [Region] setting as follows. To set to [NTSC]: Press the 🔒 LOCK button while holding down the MENU and ↑ buttons. To set to [PAL]: Press the 🔒 LOCK button while holding down the MENU and ↑ buttons.
	The [System] menu's [SDI Video Format] option setting differs from your video monitor settings.	Correctly set the [System] menu's [SDI Video Format] setting *(see page 50)*.
Camera picture output is distorted (does not display properly).	The camera head and CCU are not securely connected.	Check the camera cable connection. Insert the camera cable's connector fully, and turn the connector ring to secure it.

Errors/Warnings

When an error occurs on this unit, a warning or precautionary message will appear on all outputs. In addition, all of the LED indicators on the front panel (except the power indicator) may blink, depending on the message.
Follow the instructions in the message to solve the problem.

Error display

When the following messages appear, all of the LED indicators on the front panel (except the power indicator) will blink rapidly.

Message	Explanation
System Error: XX	"XX" stands for the error number. When this message appears, contact Sony service representative with the error number.

Warning display

When the following messages appear, all of the LED indicators on the front panel (except the power indicator) will blink.

Message	Explanation
Camera head disconnected. Turn off camera and check camera connection.	The camera head is not connected. Disconnect the power cord, and check the connections.

Specifications

General

Power requirements
100 V to 240 V AC, 50/60 Hz

Input current
0.40 A – 0.25 A

Operating temperature
0 °C to 40 °C (32 °F to 104 °F)

Operating humidity
20% to 80% (no condensation allowed)

Operating pressure
700 hPa to 1,060 hPa

Storage and transport temperature
–20 °C to +60 °C (–4 °F to +140 °F)

Storage and transport humidity
20% to 90% (no condensation allowed)

Storage and transport pressure
700 hPa to 1,060 hPa

Weight
Camera head: approx. 60 g (approx. 2.1 oz.)
Camera control unit: approx. 1.9 kg (approx. 4 lb. 3.0 oz.)

Dimensions (WHD, excluding longest protrusions)
Camera head:
approx. 34 × 39 × 43 mm
(approx. $1\ ^{3}/_{8} \times 1\ ^{9}/_{16} \times 1\ ^{3}/_{4}$ in.)
Camera control unit:
approx. 200 × 62 × 264 mm
(approx. $7\ ^{7}/_{8} \times 2\ ^{1}/_{2} \times 10\ ^{1}/_{2}$ in.)

Supplied items
See *"Package Configuration" (page 19)*

Camera head

Image device
1/2.8 type, Exmor R CMOS image sensor, RGB 3CMOS type
Effective pixels: 1920 (H) × 1080 (V)

Lens mount
C-mount

Sensitivity
F13 (Typical) (At 1080/59.94i, 89.9% reflection, 2000 lx, "Sensitivity" is "Normal")
F20 (Typical) (At 1080/59.94i, 89.9% reflection, 2000 lx, "Sensitivity" is "High")

Picture S/N
63 dB (Y) (Typical)

Horizontal resolution
1000 TV lines or more

Gain
0 dB to 30 dB

Shutter speed
$^{1}/_{60}$ to $^{1}/_{10000}$

Camera cable connector
20-pin, round

Camera control unit

Input connectors

Remote contact switch connectors 1, 2
Stereo mini jack

Output connectors

VIDEO OUT
BNC, 1.0 Vp-p, 75 Ω, unbalanced

S VIDEO OUT
4-pin mini DIN connector
Y: 1.0 Vp-p, 75 Ω, unbalanced
C (BURST): 0.286 Vp-p, 75 Ω (NTSC)
C (BURST): 0.3 Vp-p, 75 Ω (PAL)

HDMI OUT
HDMI connector

SDI OUT

BNC, HD/3G: 0.8 Vp-p/75 Ω
HD: Conforms to SMPTE 292M
3G: Conforms to SMPTE 424M

Input/output connectors

CAMERA

20-pin, round

RS-232C

D-sub 9-pin

3D SYNC IN, OUT

BNC

Other connector

⏚ Equipotential ground connector

Separately-sold accessories

Camera cable

CCMC-SA06 (standard 6 m (19.6 ft.))
Mass Approx. 470 g (1 lb. 0.58 oz.)
CCMC-SA10 (standard 10 m (32.8 ft.))
Mass Approx. 745 g (1 lb. 10 oz.)
CCMC-SA15 (standard 15 m (49.2 ft.))
Mass Approx. 1,100 g (2 lb. 6.8 oz.)
CCMC-EA05 (extension 5 m (16.4 ft.))
Mass Approx. 400 g (14 oz.)

Foot switch

FS-24

2D camera adapter

CCMA-2DAR

Caution

The FS-24 has an Ingress Protection rating of IPX3. Therefore, do not operate it environments exposed to splashing liquids (e.g., surgical operating rooms).
For safety, use a device with a rating of IPX6 or higher when operating in such environments.

Medical Specifications

Protection against electric shock:
Class I
Protection against harmful ingress of water:
Ordinary
Degree of safety in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide:
Not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide
Mode of operation:
Continuous

Design and specifications are subject to change without notice.

Notes

- Always verify that the unit is operating properly before use. SONY WILL NOT BE LIABLE FOR DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO, COMPENSATION OR REIMBURSEMENT ON ACCOUNT OF THE LOSS OF PRESENT OR PROSPECTIVE PROFITS DUE TO FAILURE OF THIS UNIT, EITHER DURING THE WARRANTY PERIOD OR AFTER EXPIRATION OF THE WARRANTY, OR FOR ANY OTHER REASON WHATSOEVER.
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Index

V

W

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Surrey KT13 0XW, United Kingdom

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