Instructions for Use

CuratOR® SC431-CCU

4K/60p Surgical Field Camera System

Camera Control Unit

CuratOR® SC431-CH

4K/60p Surgical Field Camera System

Camera Head

Important

Please read this Instructions for Use carefully before use to familiarize yourself with how to use the product properly.
Please retain this manual for future reference.

SYMBOLS

This manual and this product use the safety symbols below. They denote critical information. Please read them carefully.

WARNING	Failure to abide by the information in a WARNING may result in serious injury and can be life threatening.
CAUTION	Failure to abide by the information in a CAUTION may result in moderate injury and/or property or product damage.
	Indicates a warning or caution.
	Indicates a prohibited action.

This product has been adjusted specifically for use in the region to which it was originally shipped.
If operated outside this region, the product may not perform as stated in the specifications.

PRECAUTIONS

Important

This product has been adjusted specifically for use in the region to which it was originally shipped. If operated outside this region, the product may not perform as stated in the specifications.

To personal safety and proper maintenance, please read carefully the "PRECAUTIONS" section and the caution statements on the unit.

Symbols on the product

Symbol	This symbol indicates
	Power button: Press to turn the product's power on or off.
	Alternating current
	Direct current
	Dangerous voltage
	CAUTION
	Crossed-out wheeled bin marking (product): the product should not be disposed of as unsorted waste but must be sent to separate collection facilities for recovery and recycling in EU.
	CE marking: EU conformity mark in accordance with the provisions of Council Directive and/or Regulation (EU).
	UKCA marking: Mark signifying compliance with UK regulations
	Recycling symbol for corrugated cardboard used for packaging
	Recycling symbol
	Material labeling of corrugated cardboard based on the European Packaging Waste Directive
	Maximum stacking limit (the number in the symbol varies according to the product.)
	This side up
	Keep dry
	Fragile

WARNING

⚠ WARNING

If the unit begins to emit smoke, smells like something is burning, or makes strange noises, disconnect all power connections immediately and contact your EIZO representative for advice.

Attempting to use a malfunctioning unit may result in fire, electrical shock, or equipment damage.

⚠ WARNING

Do not disassemble or modify the unit.

Opening the cabinet may result in electrical shock or burn by high-voltage or high-temperature parts. Modifying the unit may result in fire or electrical shock.

⚠ WARNING

Refer all servicing to qualified service personnel.

Do not attempt to service this product yourself as opening or removing covers may result in fire, electrical shock, or equipment damage.

⚠ WARNING

Keep foreign objects or liquids away from the unit.

Metal parts, flammable materials, or liquids accidentally falling into the cabinet may result in fire, electrical shock, or equipment damage.

If an object or liquid falls/spills into the cabinet, unplug the unit immediately. Have the unit checked by a qualified service engineer before using it again.

⚠ WARNING

Place the unit properly at a sturdy and stable place.

Follow the Instructions for Use and place the unit properly in a location that is secure and reinforced. If the unit is not placed in a proper location, it may drop or fall over, resulting in personal injury or equipment damage.

If the unit falls, disconnect the power immediately and ask your local EIZO representative for advice. Do not continue using a damaged unit. Using a damaged unit may result in fire or electrical shock.

⚠ WARNING

Use the unit in an appropriate location.

Otherwise, fire, electrical shock, or equipment damage may result.

- Do not place outdoors.
- Do not place in any form of transportation (ships, aircraft, trains, automobiles, etc.).
- Do not place in dusty or humid environments.
- Do not place in locations where water may be splashed on the screen (bathrooms, kitchens, etc.)
- Do not place in locations where steam comes in direct contact with the screen.
- Do not place near heat generating devices or humidifiers.
- Do not place in locations where the product is subject to direct sunlight.
- Do not place in environments with inflammable gas.
- Do not place in environments with corrosive gases (such as sulfur dioxide, hydrogen sulfide, nitrogen dioxide, chlorine, ammonia, and ozone).
- Do not place in environments with dust, components that accelerate corrosion in the atmosphere (such as sodium chloride and sulfur), conductive metals, and so on.

⚠ WARNING

Keep the plastic packing bags away from babies and children.

The plastic packing bags may cause suffocation.

⚠ WARNING

Use the enclosed power cord and connect to the standard power outlet in your country.

Be sure to use within the rated voltage of the power cord. Otherwise, fire or electric shock may result.

Power supply: 100-240 Vac 50/60 Hz

⚠ WARNING

Use the enclosed AC adapter.

The enclosed AC adapter (FSP120M-KAA) is for use with this product only. Do not use the AC adapter with other equipment. Do not use an AC adapter designed for other devices with this product.

Connecting to power sources that do not match the power ratings of the AC adapter may result in fire or electrical shock.

⚠ WARNING

To disconnect the power cord or adapter power cable, grasp the plug firmly and pull.

Tugging on the cord or cable may damage it and result in fire or electrical shock.

⚠ WARNING

The equipment must be connected to a grounded main outlet.

Failure to do so may result in fire or electric shock.

⚠ WARNING

Use the correct voltage.

- The unit is designed for use with a specific voltage only. Connection to another voltage than specified in this "Instructions for Use" may cause fire, electric shock, or equipment damage. Power supply: 100-240 Vac 50/60 Hz
- Do not overload your power circuit, as this may result in fire or electric shock.

⚠ WARNING

Handle the power cord and AC adapter with care.

Do not place heavy objects on the power cord or AC adapter, or pull or tie the power cord. Using a damaged power cord or AC adapter may result in fire or electrical shock.

⚠ WARNING

The operator should not touch the patient while touching the product.

This product has not been designed to be touched by patients.

⚠ WARNING

Never touch the power plug, AC adapter or power cord during a thunderstorm.

Touching them may result in electrical shock.

⚠ WARNING

Be careful when handling the remote control batteries.

Incorrect use may cause ruptures, fluid leaks, and burns.

- If a battery is swallowed, consult a doctor immediately.
- If battery liquid gets on skin or clothing, wash it off with clean water
- If battery fluid gets in your eyes, rinse immediately with clean water and consult your doctor
- Do not use batteries other than those specified (batteries for the included remote control)
- Properly install and replace batteries
- Insert batteries with the correct polarity (+ and -)
- When replacing batteries, use batteries of the same type and model
- When replacing batteries with products that use two or more batteries, use new batteries of the same type and brand
- Quickly remove used batteries from the remote control
- Remove the batteries from the remote control when not in use for a long time
- Do not use a battery with a scratch on the coating
- Do not disassemble, heat, wet, or short-circuit the batteries
- Do not recharge non-rechargeable batteries
- Dispose of used batteries in accordance with local and local government regulations

CAUTION

⚠ CAUTION

Do not move the drive mechanism of the camera head by hand.

Always operate the drive mechanism of the camera head using the CCU control panel or the remote control. Manually moving it by hand may damage the product and prevent it from functioning properly.

⚠ CAUTION

Check the operational state before use.

Begin use after ensuring that there are no problems with the displayed image.

⚠ CAUTION

Cables/cords with built-in fastening features should be used in a secured manner.

If they are not fixed securely, cables/cords may disconnect, and operations may be disrupted.

⚠ CAUTION

Disconnect cables and remove accessories when moving the unit.

Otherwise, the cables or accessories may become detached when moving, resulting in injury.

⚠ CAUTION

Do not block the ventilation holes on the front bottom and back of the Camera Control Unit (CCU).

- Do not place any objects on the ventilation slots.
- Do not install the unit in a place with poor ventilation or inadequate space.
- Do not use the CCU on its side or upside down.

Blocking the ventilation slots prevents proper airflow and may result in fire, electrical shock, or equipment damage.

Additionally, the metal parts can become hot, posing a risk of burns.

⚠ CAUTION

Do not touch the power plug or AC adapter with wet hands.

Touching them may result in electrical shock.

⚠ CAUTION

Do not place any objects around the power plug.

This is to facilitate disconnecting the power plug in case of a problem to avoid fire or electrical shock.

⚠ CAUTION

The AC adapter becomes hot during use.

- Do not touch the AC adapter while it is energized. Touching it may cause a low temperature burn.
- Do not cover or place anything on top of the AC adapter. Do not place the AC adapter on top of things that trap heat such as carpets, blankets, etc. Keep the AC adapter away from direct sunlight and heat sources. Failure to do so may result in fire.
- Before moving the product, be sure to turn off the power switch, disconnect the power plug from the power outlet, and wait until it has cooled completely.

⚠ CAUTION

Do not suspend the AC adapter in midair.

Using the adapter while it is hanging suspended may result in fire or electrical shock.

⚠ CAUTION

Do not place the AC adapter in a vertical orientation.

Otherwise, dust or water may enter the adapter and may result in fire or electrical shock. For more information, see Connecting the power cord [▸ 27].

⚠ CAUTION

Do not subject the product to impact due to dropping it or any other causes.

Using the adapter after it has been subjected to impact may result in fire or electrical shock.

⚠ CAUTION

Periodically clean the area around the power plug and the ventilation slot of the product.

Dust, water, or oil adhered to this area may result in fire.

⚠ CAUTION

Unplug the unit before cleaning it.

Cleaning the unit while it is plugged into a power outlet may result in electrical shock.

⚠ CAUTION

If you plan to leave the unit unused for an extended period of time, disconnect the power plug from the wall socket after turning off the power switch for the safety and the power saving.

⚠ CAUTION

Dispose of this product in accordance with the laws of the locality or country of residence.

Notice for This Product

Indications for Use

This product is intended for use in capturing surgical fields.

Attention

- This product and the images captured with this product are not intended for diagnostic or treatment use.
- This product may not be covered by warranty for uses other than those described in this manual.
- The specifications stipulated in this manual are only applicable when the enclosed power cord is used.
- Only use EIZO accessories products specified by EIZO with this product.
- Be sure to connect SC431-CCU using a camera cable before use SC431-CH. If used in connection with other devices, it will not be covered under warranty.

Precautions for Use

- Dew condensation may form on the surface, lens, ND filter, or interior of this product when it is brought into a cold room, when the temperature suddenly rises, or when it is moved from a cold room to a warm room. Also, when using this product in a room where an air conditioner is running, adjust the position of the product so that the air conditioner's wind does not directly hit it. If the air conditioner directly hits the product, condensation may form on the inside of the lens. If condensation occurs, remove the filter cover and ND filter, dry thoroughly, and then reattach them. Using it in this condition may result in reduced image quality or cause malfunction.
- The following phenomena that appears on the captured screen are unique to CMOS imaging sensors, and is not a malfunction.
  - White dots
    CMOS imaging sensors may occasionally display small white dots on the screen due to cosmic rays or similar factors. This is due to the principles of CMOS sensors and is not a malfunction of the product. Also, white spots are more noticeable under the following conditions.
    • Use in high temperatures
    • When the gain is increased
    • When slowing the shutter speed
  - Aliasing distortion
    If you take pictures of fine patterns, lines, etc., you may see patterns or colors that are different from the original ones.

Cybersecurity Warnings and Responsibilities

- Please take the following measures to protect products and information assets from cyber attacks.
  - Prevent unauthorized physical access to the product by third parties.
  - When connecting to a network, use this product on a secure network using a firewall or similar.
- If EIZO Corporation or its distributor instructs to update the software, update it immediately. Use software update data provided by EIZO Corporation or through its distributors.

Cleaning

- Periodic cleaning is recommended to keep the product looking new and to prolong its operation lifetime.
- Gently wipe off any dirt on the product with a small amount of water or a soft cloth dampened with a mild detergent diluted in water.
- The coating on the lens surface (ND filter) is easily damaged, so use a soft cloth soaked in a small amount of water to gently wipe it off.

Attention

- Never use a thinner, benzene, wax, or abrasive cleaner as they may damage the product.
- Use of alcohol or other chemicals for disinfection may lead to cracks, changes in gloss, discoloration, fading, or deterioration of display image quality. Be careful of the following points when using the product.
  - Do not let chemicals come into direct contact with the product.
  - Do not use wet wipers that have been impregnated with chemical solution, as they may contain a lot of liquid.
  - Do not allow chemicals to enter gaps or the interior of the product.
- For more information on cleaning and disinfection, please refer to our web site.
  How to check: Access www.eizoglobal.com and type "disinfect" in the site search box to search.

Disinfection with chemicals

- Use a soft cloth lightly moistened with a cleaning solution to gently wipe.
  When disinfecting the product, it is recommended to use chemicals that have been tested by EIZO (see the table below). Note that even if these chemicals are used, there is no guarantee that the product will not be damaged or deteriorated.

Classification	Chemical type	Concentration
Alcohols	Ethanol	70 v/v%
Alcohols	Isopropanol	70 v/v%
Chlorine-based	Sodium hypochlorite	0.1 %
Amphoteric surfactants	Alkyldiaminoethylglycine hydrochloride	0.2 %
Quaternary ammonium salt	Benzalkonium chloride	0.2 %
Biguanide	Chlorhexidine gluconate	0.1 %
Oxidizing agent	Accelerated hydrogen peroxide solution	0.5 %

CONTENTS

1 Introduction

1.1 Features

1.1.1 Camera head performance

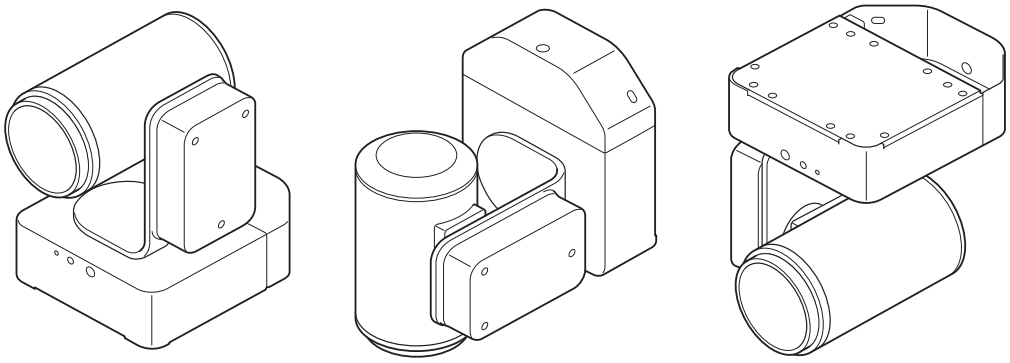
- 4K resolution 60P
  4K UHD (3840 x 2160) images can be shot at 60 frames per second
- 30x optical zoom

1.1.2 Mechanism (PTR)

- Intelligent PTR (Pan / Tilt / Roll)
  The PTR and camera can be controlled together. You can set a wide range of shooting angles.

1.1.3 Installation

- The camera head can be installed at 90° and 180°



- The camera control unit (CCU) is connected to the camera head with a single cable, enabling power supply and video signal transmission. It provides excellent ease of installation and portability.

1.1.4 Operations

- Operations via CCU control panel
- IR remote control included
- Communication control (RS-232C/LAN)

1.1.5 Output interface

- 4K UHD compatible
  - HDMI (YUV422/YUV420)
  - 12G-SDI Type 1
- 2K FHD compatible
  - HDMI (YUV422)
  - 3G-SDI Level A (not compatible with Level B)
- Embedded audio output for each HDMI/SDI port
- Analog audio output (line level)

1.1.6 Other functions

- YUV Color Matrix (4K UHD)
- Automatically adjusts image brightness
- Noise reduction
- Image flip (up/down, left/right). Supports ceiling mounting.
- Image Shake Stabilizer
- Microphone

1.2 Package Contents

Check that all of the following items are included in the package.

The CCU is used in combination with the camera head. In addition to this manual, please check the included items listed in the SC431-CH Setup Manual. Additionally, please prepare a camera cable (sold separately as an optional accessory).

Note
• It is recommended that the box and packing materials be stored so that they can be used to move or transport this product.

Attention
• If you do not use the remote for an extended period of time, remove the batteries.

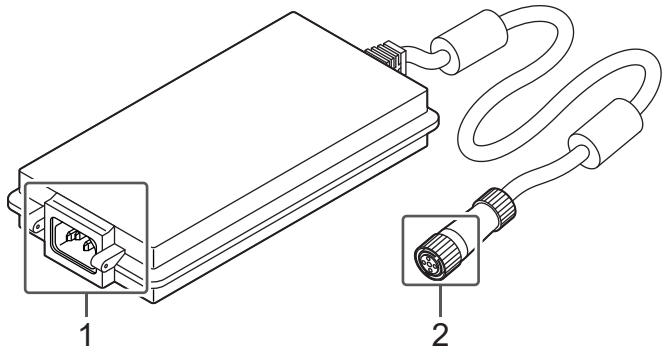
- CCU
- AC adapter (FSP120M-KAA)
- Power cord
- HDMI cable clamp x 2
- IR remote control[*1]
- AAA batteries x 2[*2]
- Rubber feet x 4
- Instructions for Use (this document)
- Operation Guide

[*1] If using the remote control holder (sold separately), attach the holder using the double-sided tape or tapping screws included with the remote control holder.

[*2] Manufacturer: Panasonic Energy Co., Ltd.
Address: Matsushita-cho, Moriguchi City, Osaka 570-8511, Japan

1.3 Controls and Functions

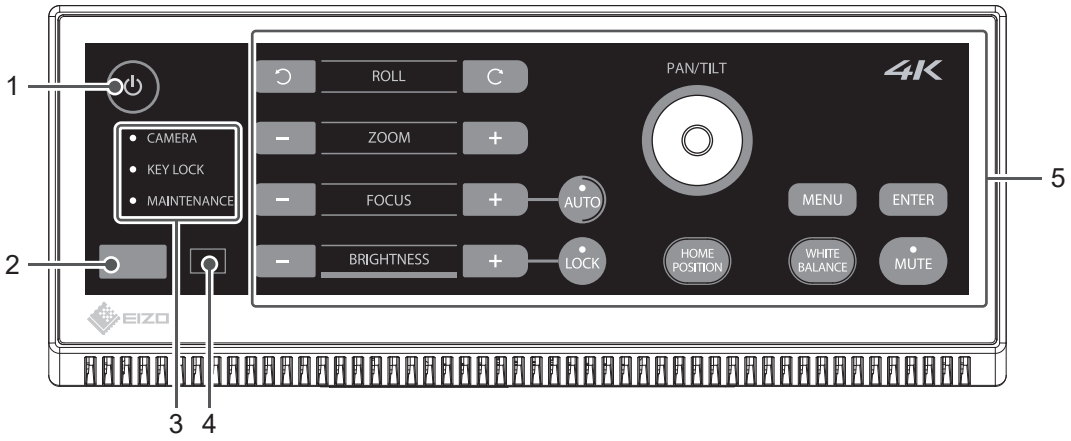
1.3.1 AC adapter



1. AC IN terminal	Connects the power cord.
2. DC OUT terminal	Connects to the DC IN terminal of the CCU.

1.3.2 CCU

Front



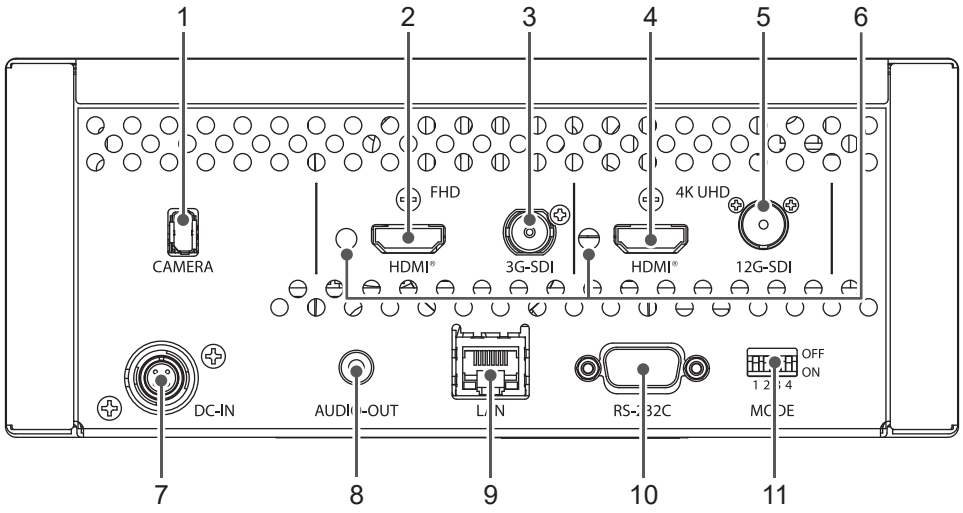
1. Power switch	Turns the power on or off. When turning off the power, press and hold for more than one seconds. The built-in LED lights up based on the status of the product (see 6.10 LED Lighting Specifications [▶ 62]).
2. USB port [*1]	Connects a USB flash drive to load/export settings and update the software.
3. LED	The LEDs light up based on the status of the product (see 6.10 LED Lighting Specifications [▶ 62]). • CAMERA: Indicates that the camera head can be operated. • KEY LOCK: Indicates that operations of the control panel are key locked.[*2] • MAINTENANCE: Indicates that the USB flash drive is being connected.

4. Infrared sensor (remote control receiver)	This is the receiver for the remote control. Please do not obstruct the receiver.
5. Control Panel	Operates the camera head and menu (see 3.1 Camera Head Operations [▶ 33]).

*1 Please remove the cover when using.

*2 If you want to release the lock, see 3.3 Operations to Unlock KEY LOCK [▶ 36].

Back



1. Camera head connection port	Connects the CCU to the camera head with a camera cable.
2. HDMI signal output port (FHD)[*1]	Connects to a monitor with HDMI signal output. Outputs FHD video and audio.[*2]
3. SDI signal output port (BNC) (FHD)[*1]	Connects to a monitor with SDI signal output. Outputs FHD video and audio.[*2, *3]
4. HDMI signal output port (4K UHD) [*1]	Connects to a monitor with HDMI signal output. Outputs 4K UHD video and audio.[*2]
5. SDI signal output port (BNC) (4K UHD)[*2]	Connects to a monitor with SDI signal output. Outputs 4K UHD video and audio.[*2, *4]
6. HDMI cable clamp mounting hole	Attach the clamp to prevent the HDMI cable from disconnecting.
7. DC IN terminal	Connects to the DC OUT terminal of the included AC adapter.
8. Audio output port	Connects to an audio device. Outputs analog audio.
9. LAN connection port	Connects a LAN cable and controls the camera head externally.[*5]
10. RS-232C port	Connects the CCU to a computer with an RS-232C cable (D-Sub 9-pin) to control the camera head externally.

11. MODE switch	This is a dip switch for switching settings. If you make changes to the settings, be sure to restart the power. Everything is off in the factory default state. • Dip switch 1: Use "OFF." • Dip switch 2: Use "OFF." • Dip switch 3: Use "OFF." • Dip switch 4: "ON" indicates PAL (50 Hz) mode. "OFF" indicates NTSC (59.94 Hz) mode.

*1 Video and audio are simultaneously output from FHD and 4K UHD HDMI and SDI ports (four types in total).

*2 Audio output is disabled in the default settings. Activate the audio output for each port from "Audio" setting on the menu screen.

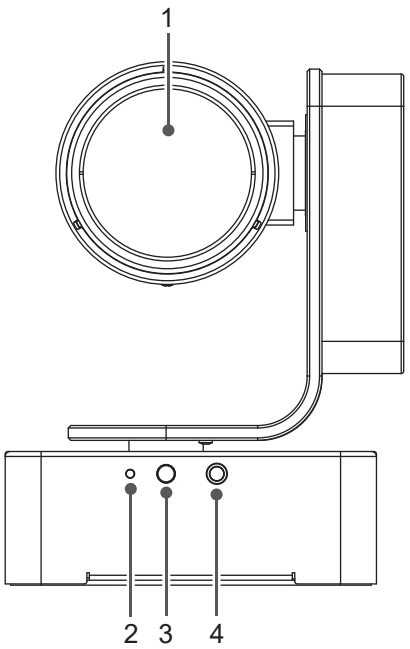
*3 Supports 3G/HD-SDI.

*4 Supports 12G-SDI.

*5 Supports 100BASE-TX. Please use a CAT5 or higher cable.

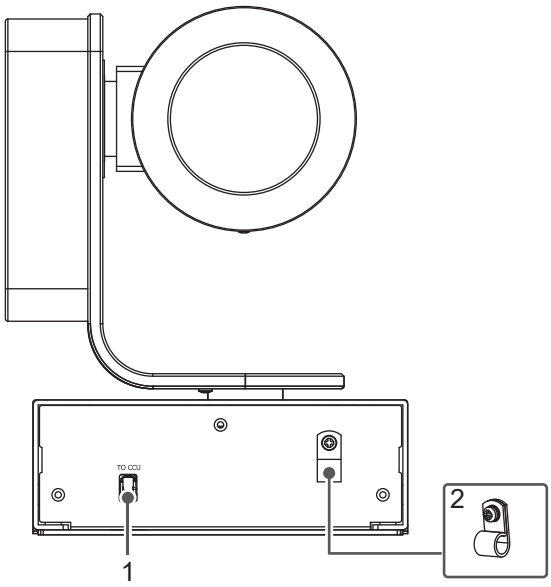
1.3.3 Camera head

Front



1. Lens	This is the zoom lens. A close-up lens, ND filter, and filter cover are pre-installed in the factory default state.
2. LED	The LED lights up depending on the status of the camera head (see 6.10 LED Lighting Specifications [▶ 62]).
3. Infrared sensor (remote control receiver)	This is the receiver for the remote control. Please do not obstruct the receiver.
4. Microphone	This is a microphone used for recording audio.

Back



1. CCU connection port	Connects the CCU to the camera head with a camera cable.
2. Cable clamp	Secures the camera cable.

2 Setup

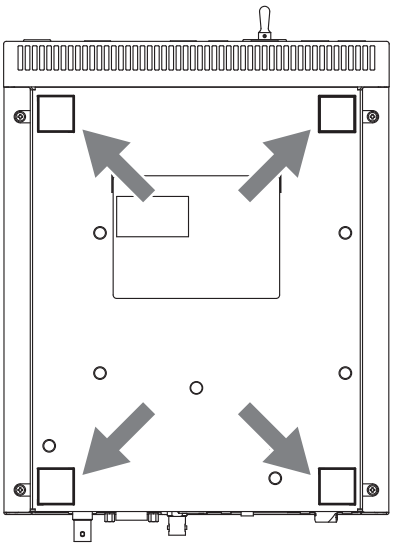
2.1 Installation

2.1.1 Installation conditions

- Place it in a stable place that is secure and reinforced.
- Be sure to turn off the power supply, follow safety precautions, and install it in an appropriate location.
- Do not place it in the following places:
  - Hot or cold places
    The operating environment temperature range is 0 °C to 40 °C (0 °C to 35 °C for the camera head).
  - Places with high humidity
    The operating environment humidity is 20% to 80% (R.H., no condensation).
  - Near devices generating strong magnetic fields such as transformers or motors
  - Near devices generating radio waves such as transceivers or mobile phones
  - Near television or radio transmission stations emitting powerful radio waves
  - Places affected by fluorescent lights or window reflections
  - Under unstable lighting (where flickering occurs)
  - Near laser light
  - Near high-voltage lines and tracks
  - Dusty or sandy places
  - Vibrating places
  - Places where water droplets are likely to occur
  - Places with high levels of vapor or oil
  - Special environments such as flammable atmospheres
  - Locations where radiation, X-rays, salt damage, or corrosive gases occur
  - Locations where chemicals are used, such as pools or hot springs
- Install the CCU horizontally. Please do not place it vertically.

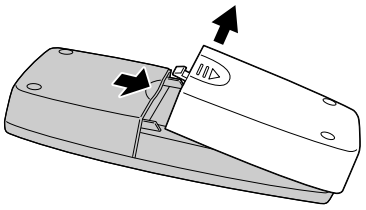
2.1.2 Attaching the rubber feet (optional)

1. When placing the CCU on a cart or similar surface, attach the included rubber feet (4) to the bottom.

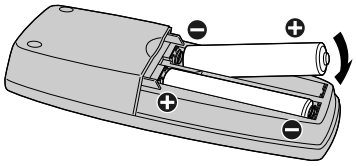


2.2 Preparing the Remote Control

1. Remove the cover.

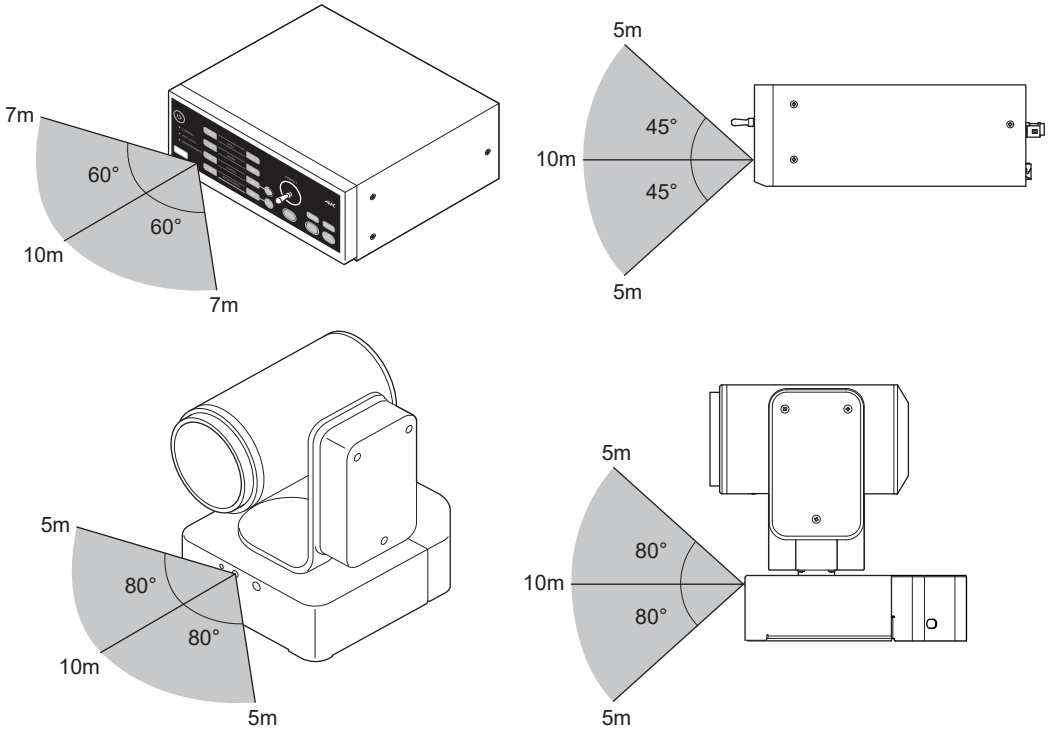


2. Insert AAA batteries and place the cover back on.



Attention

- Use the remote control within the range shown in the figure below.
- The remote control may not work due to interference with the infrared rays of other devices in the operating room (navigation systems, automatic doors, surgical tables, etc.). In that case, please operate the CCU control panel.

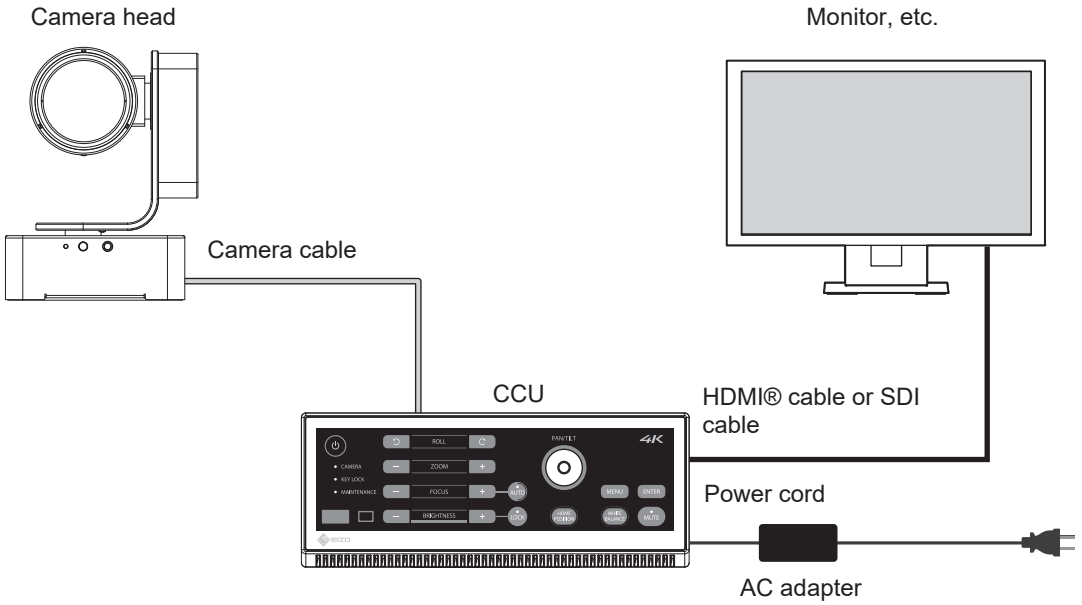


2.3 Connection

Attention

- Always operate the drive mechanism of the camera head using the CCU control panel or the remote control. Manually moving it by hand may damage the product and prevent it from functioning properly.

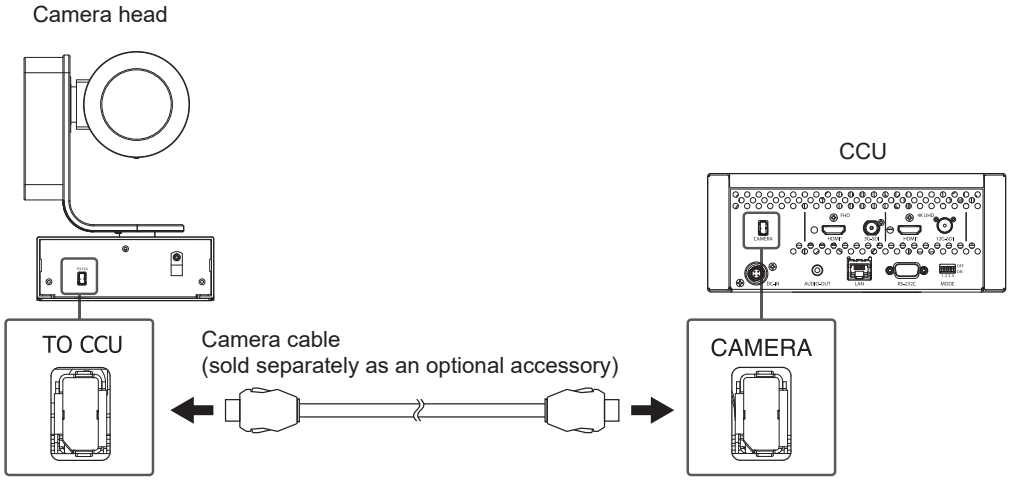
2.3.1 Connection example



2.3.2 Connecting the camera head to the CCU

1. Connect the camera head to the CCU using a camera cable (sold separately as an optional accessory).

Attention
• Do not use cables that are damaged. • Unplug the power cord. • Be careful of the following points when connecting cables. – Do not touch connector pins. – Do not touch the pin at the end of a cable connected to a connector. – Use a grounding band or similar to remove static electricity before making the connections.

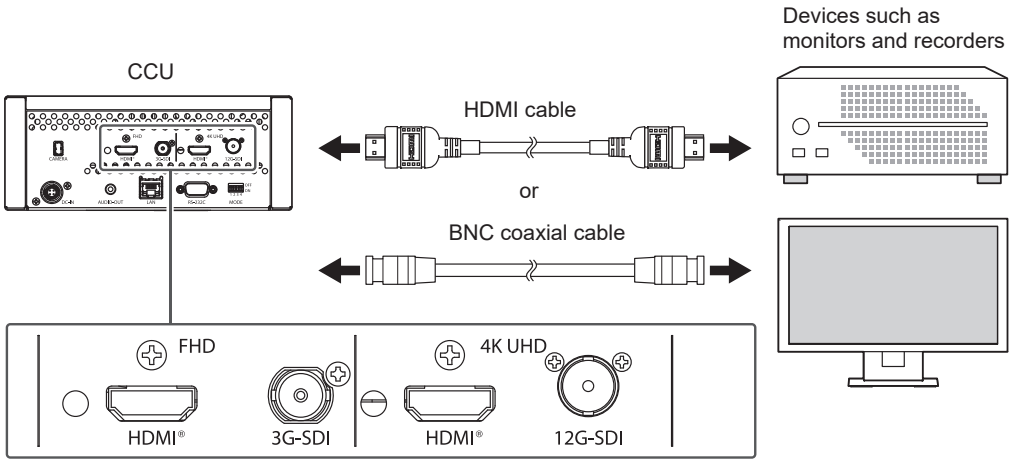


2.3.3 Connect a monitor or recorder

In order to display and record images taken with the camera head, it is necessary to connect a device such as a monitor or recorder.

1. Connect each output terminal on the back of the CCU to the input terminals of various devices.

Attention
• The CCU outputs audio via HDMI and SDI, but if the connected monitor or recorder does not support these formats, you will need to connect a stereo mini jack cable. • When connecting to an HDMI signal output port, install a clamp (accessory) to prevent it from falling out.



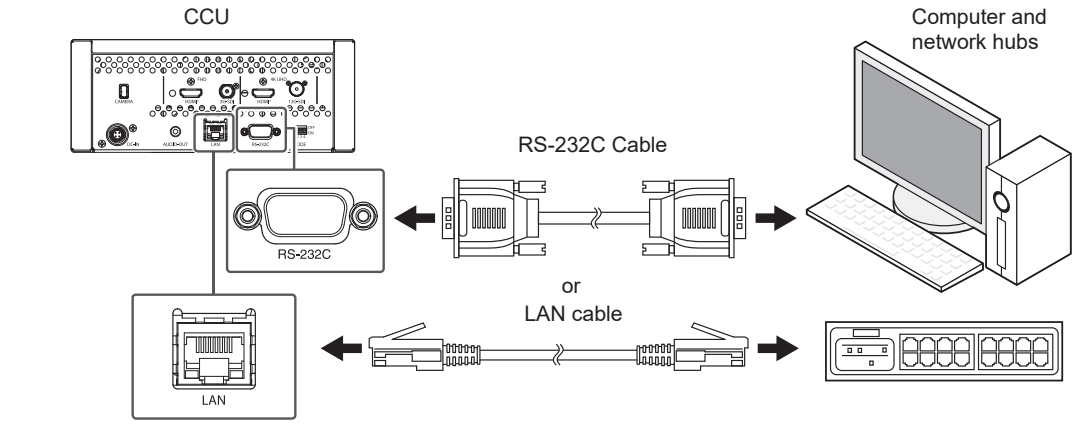
2.3.4 Connecting a computer (Optional)

To operate the camera head using software, connect the CCU to a computer.

1. Use either the LAN cable or the RS-232C cable to connect the CCU to the computer.

Attention

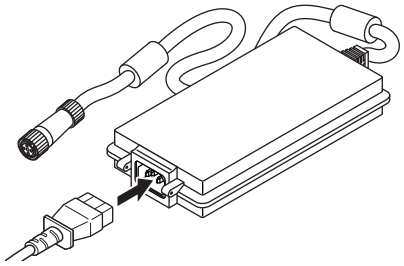
- Use a CAT5 or higher straight LAN cable.
- When connecting via a LAN cable, configure the network settings.
  The IP address is "192.168.1.100" in the default factory state.
  Change to an IP address that is compatible with the network in your environment.
  For more information, contact your system administrator.
- When connecting via RS-232C, use a cross cable.
- For more information on communication protocols, contact your local EIZO representative.



2.3.5 Connecting the power cord

Attention
• When disconnecting the power cord, be sure to unplug the power plug from the outlet first. • Use the included power cord.

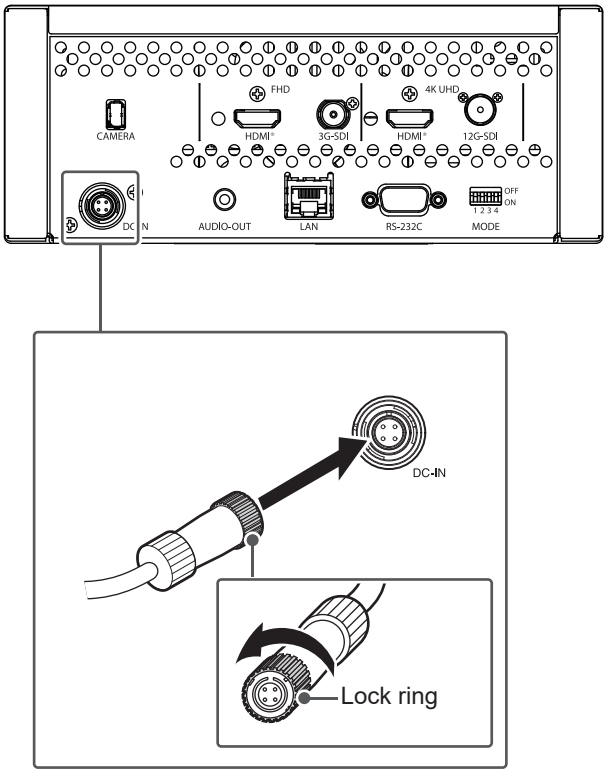
1. Connect the power cord to the AC IN terminal of the AC adapter.
   Insert the power cord fully.



2. Connect the DC OUT terminal of the AC adapter to the DC IN terminal of the CCU.
   Align the connector shape and insert it, then turn the lock ring clockwise to securely fasten it.

Note
• If the lock ring is too hard to rotate, push it far enough towards the CCU side before turning the lock ring.

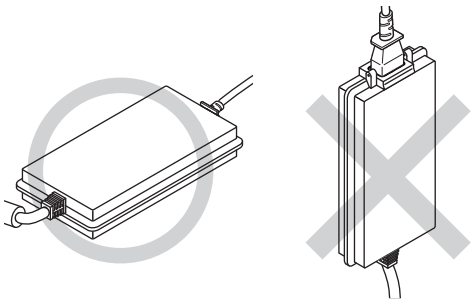
CCU



3. Check the rating of the AC adapter and connect the power plug to the power outlet.

Attention

- When positioning the AC adapter vertically, do not place it with the AC IN port facing up.



OK: Horizontal placement NG: Vertical placement

- Do not use any materials or objects that will cover the AC adapter.
- To prevent it from falling, secure it with a cable tie or other means as needed.

When the power cord is connected, the power is turned on at the same time, and a test pattern is displayed.

After that, the image captured with the camera head is displayed on the monitor.

Please check whether the brightness is appropriate in the actual image and make adjustments.

For more information, see 2.4 Adjustment [▶ 28].

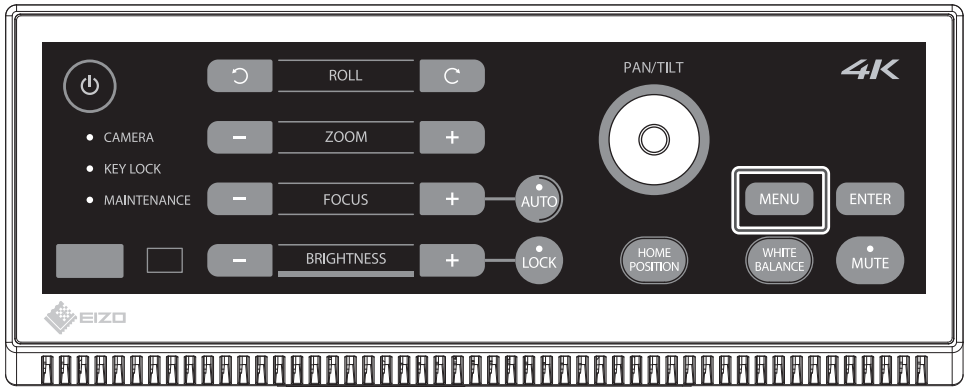
2.4 Adjustment

When the power cord is connected, the power is turned on at the same time, and a test pattern is displayed on the connected monitor. After that, the image captured with the camera head is displayed on the monitor. It may take a while for video to appear on the monitor after the power is turned on.

Before using this product, we recommend that you make a few settings according to the environment you are using.

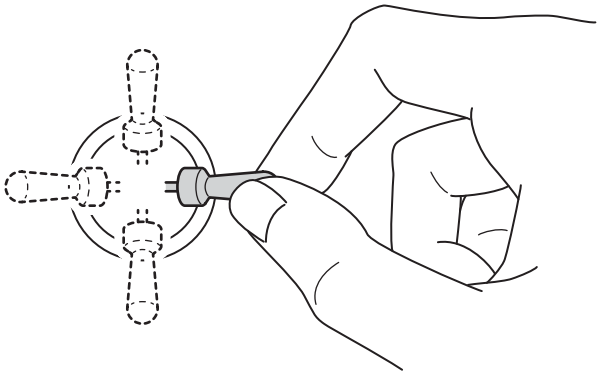
Settings are configured through the menu screen displayed on the monitor. Display the menu by following these steps.

1. If the power is off, turn it on using the power switch on the front of the CCU.
2. Press the "MENU" button.
   The Menu screen is displayed on the monitor.



Note

- The menu screen will close if there is no operation for a while.
- Menu items are selected by operating the joystick.



2.4.1 Setting the installation orientation

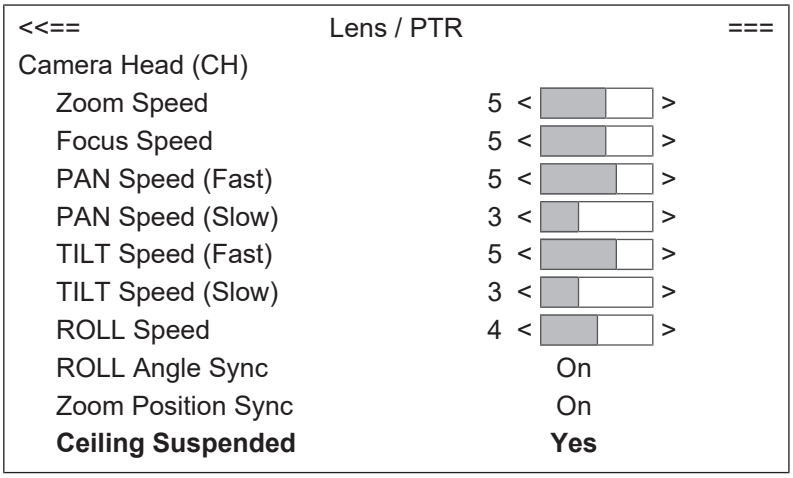
When the camera head is mounted on a ceiling, it is necessary to set the installation direction.

By setting the installation direction, the image is reversed and intuitive operation is possible.

1. Press the "MENU" button.
2. Select "Lens / PTR" and push the joystick to the right.

===	CuratOR SC431	===
Brightness		=>
Picture		=>
Color		=>
Lens / PTR		**=>**
Video Output		=>
Audio		=>
Device Settings		=>
Save / Load		=>
Information		=>
Languages	English	

3. Select "Ceiling Suspended" and select "Yes" by pushing the joystick to the right or left.



   The settings are applied.
4. Press the "MENU" button to exit the settings.

2.4.2 Adjusting the brightness

The first time you use this product, you will need to adjust the brightness.

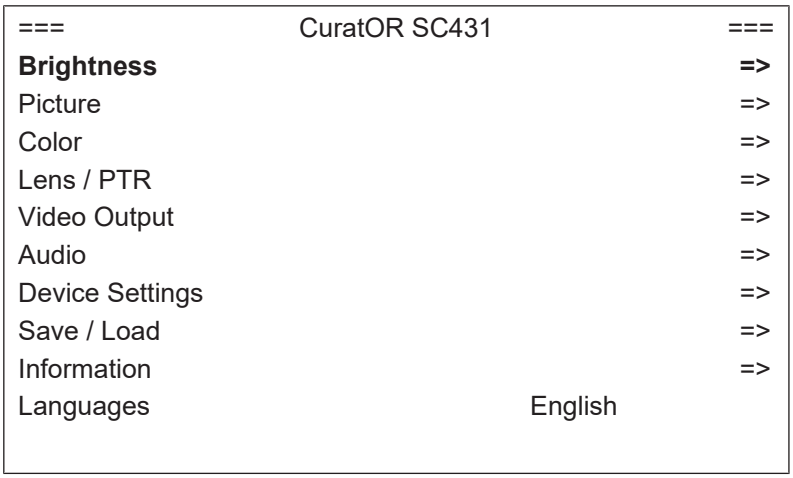
Please check whether the brightness is appropriate in the actual image and make adjustments.

Configure the following settings to match your usage environment.

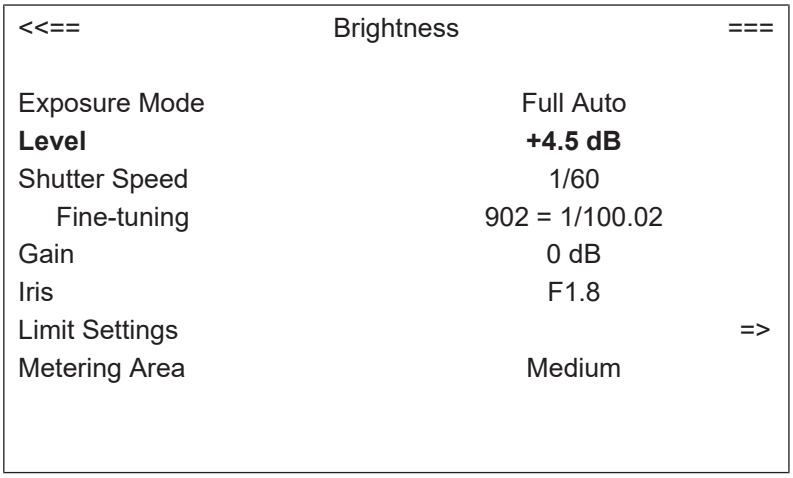
Changing the brightness "Level"

If it is too bright or too dark, change the brightness level.

1. Press the "MENU" button.
   The Menu screen is displayed on the monitor.
2. Select "Brightness" and push the joystick to the right.



3. Select "Level" and then push the joystick to the right or left.



   Push the joystick to the right to make it brighter, and to the left to dim it.
4. Press the "MENU" button to exit the settings.

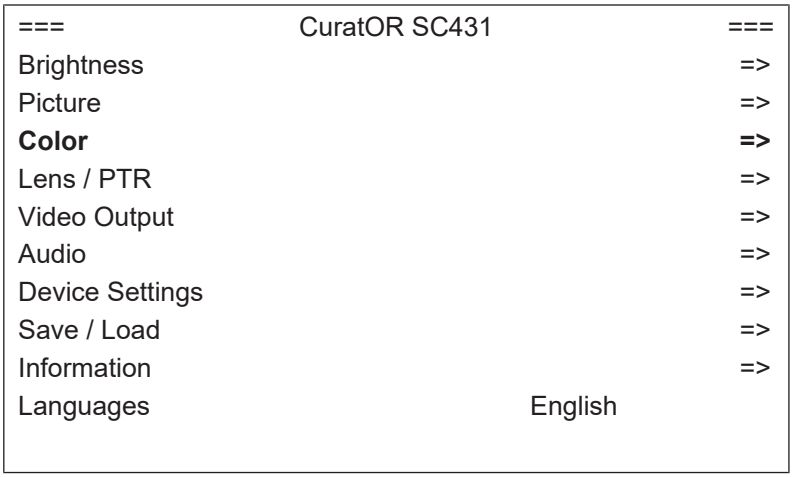
For detailed adjustments in the "Brightness" menu, see 4.1 Brightness [▶ 38].

Configuring the white balance with the "One-push" function

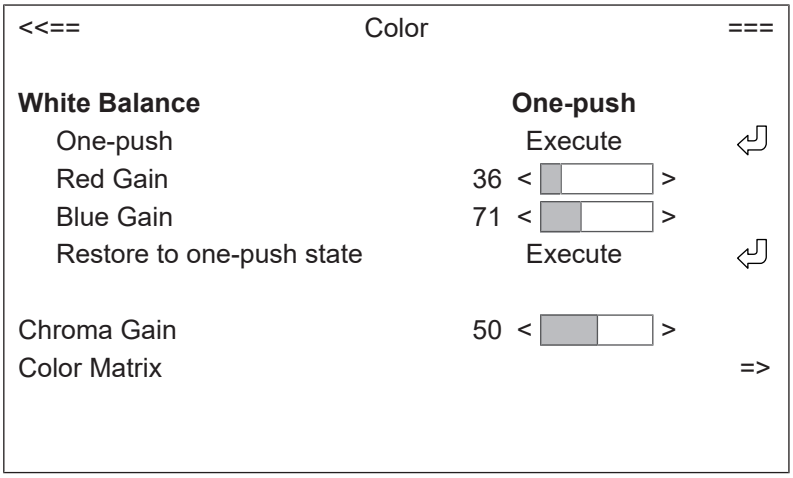
When the white balance is influenced by the red tones of the surgical field (blood/organs), you can configure it to prevent automatic color shifts during surgery.

Please configure the settings under the light source that is actually used in surgery.

1. Press the "MENU" button.
   The Menu screen is displayed on the monitor.
2. Select "Color" and push the joystick to the right.



3. Select "White Balance," push the joystick right or left, and select "One-push."

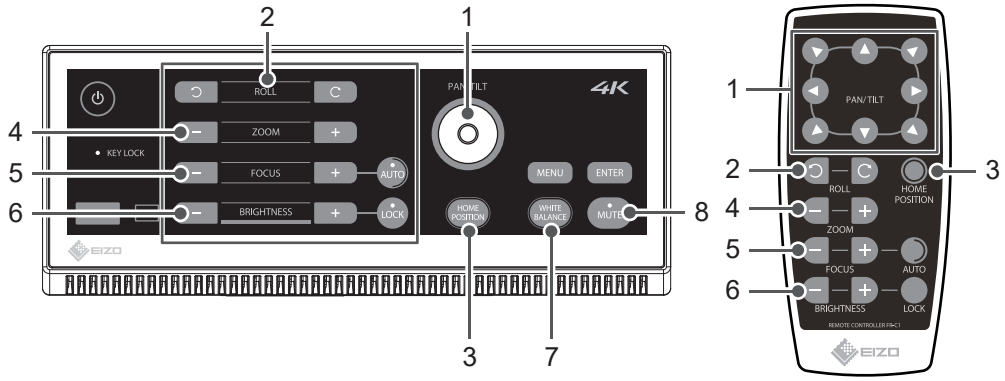


4. Take a picture of an achromatic subject (such as a reflective object, white paper, etc.) on the entire screen, push the joystick down, select "Execute" with the "One-push" button, and then press the "ENTER" button.
   The white balance will be adjusted.
5. Press the "MENU" button to exit the settings.

3 Operations

Attention
• Always operate the drive mechanism of the camera head using the CCU control panel or the remote control. Manually moving it by hand may damage the product and prevent it from functioning properly.

3.1 Camera Head Operations

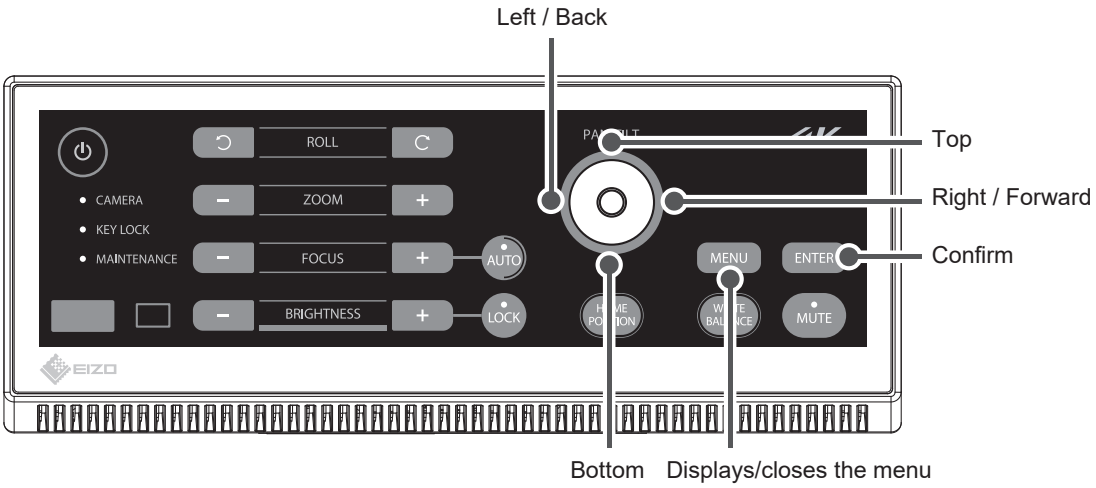


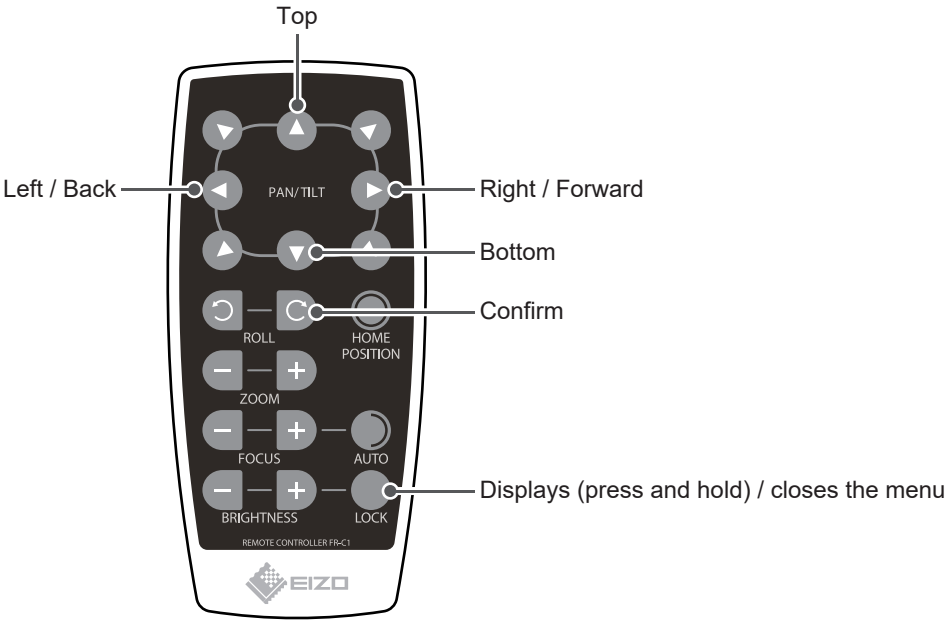
1. PAN / TILT	Operates the pan / tilt function of the camera head. The camera head moves in the direction you push the joystick. For the remote control, the camera head moves in the direction indicated by the button while the button is pressed.
2. ROLL	Performs roll operations for the camera head. ↺: Rotate counterclockwise ↻: Rotate clockwise
3. HOME POSITION	Press and hold the button (for about two seconds) to return the camera head to its original position.
4. ZOOM	Performs zoom operations for the camera head. "+": Telephoto direction "-": Wide-angle direction

5. FOCUS	Performs focus operations for the camera head. "+": Focus farther "-": Focus closer Press the "AUTO" button: One-push autofocus Hold down the "AUTO" button (for about two seconds): Real-time autofocus When real-time autofocus is operating, press the "AUTO" button to switch to one-push autofocus. Press the "+" and "-" buttons to switch to manual focus. The LED on the "AUTO" button changes depending on the focus operation status. • Flashing green: One-push autofocus • Solid green: Real-time autofocus • Off: Manual focus **Note** • When photographing subjects at a fixed distance, it is recommended to use one-push autofocus or manual focus. Using real-time autofocus may cause focus fluctuations. • If the focus is not correct, see 6.4 Focus is Not Correct [▶ 60].
6. BRIGHTNESS	Adjusts the brightness. Press the "+" and "-" buttons to change the brightness of the image. Press the "LOCK" button to fix the brightness. The LED on the "LOCK" button changes according to the brightness lock status. • Solid green: Locked (brightness is fixed) • Off: Unlocked **Note** • The lock will be released when a reboot is performed.
7. WHITE BALANCE	Automatically corrects color cast caused by the influence of the light source's color. If you hold down the "WHITE BALANCE" button (for about two seconds), the white balance at that point is maintained. When pressing the button, take a picture of an achromatic subject (reflective object, white paper, etc.) on the entire screen under the actual lighting conditions to be used.
8. MUTE	Mutes the internal microphone of the camera head. The LED on the "MUTE" button changes according to the mute state. • Solid orange: Muted • Off: Unmuted

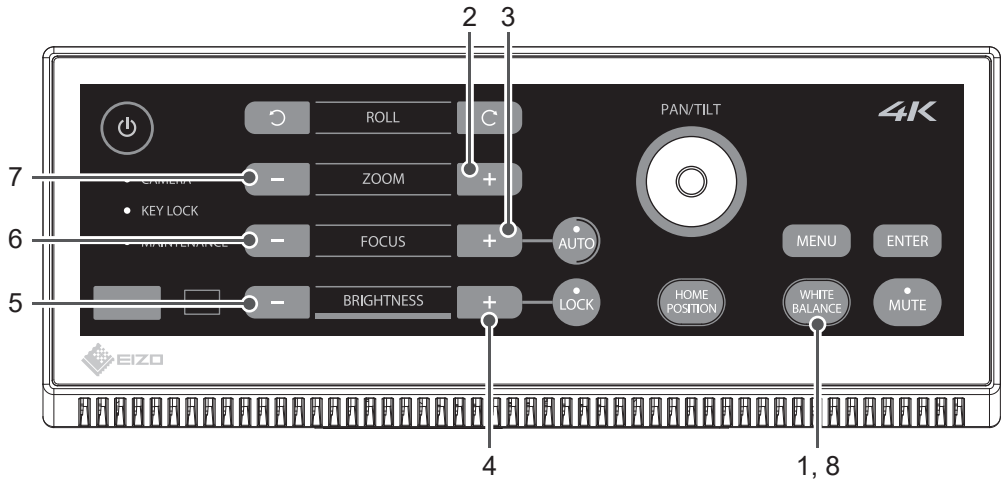
Note
• The buttons enclosed with black circles ("HOME POSITION" and "WHITE BALANCE") and the button enclosed with a black semicircle ("AUTO" for "FOCUS") respond when pressing and holding the button for about two seconds.

3.2 Menu Operations





3.3 Operations to Unlock KEY LOCK



Press the CCU control panel buttons in the following order to release the key lock.

1. "WHITE BALANCE"
2. "+" in "ZOOM"
3. "+" in "FOCUS"
4. "+" in "BRIGHTNESS"
5. "-" in "BRIGHTNESS"
6. "-" in "FOCUS"
7. "-" in "ZOOM"
8. "WHITE BALANCE"

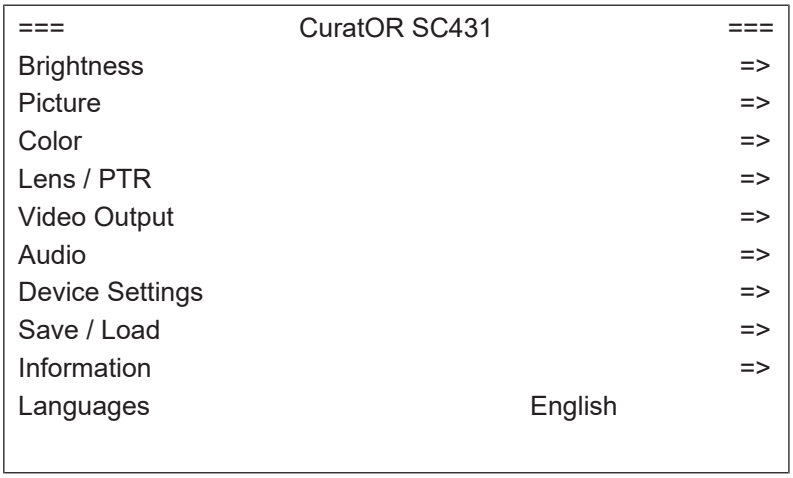
4 Settings

This chapter describes the functions that can be adjusted/set by pressing the "MENU" button on the front of the CCU.

Note

- The menu screen will close if there is no operation for a while.
- Use the joystick or remote control to select and confirm a menu selection.
  For more information, see 3 Operations [▶ 33].

1. Press the "MENU" button.
   The Menu screen is displayed on the monitor.



2. Select the setting you want to configure and push the joystick to the right.
   - "Brightness" (see 4.1 Brightness [▶ 38])
   - "Picture" (see 4.2 Picture [▶ 40])
   - "Color" (see 4.3 Color [▶ 42])
   - "Lens / PTR" (see 4.4 Lens / PTR [▶ 43])
   - "Video Output" (see 4.5 Video Output [▶ 45])
   - "Audio" (see 4.6 Audio [▶ 46])
   - "Device Settings" (see 4.7 Device Settings [▶ 47])
   - "Save / Load" (see 4.8 Save / Load [▶ 49])
   - "Information" (see 4.9 Information [▶ 50])
   - "Languages" (see 4.10 Languages [▶ 53])

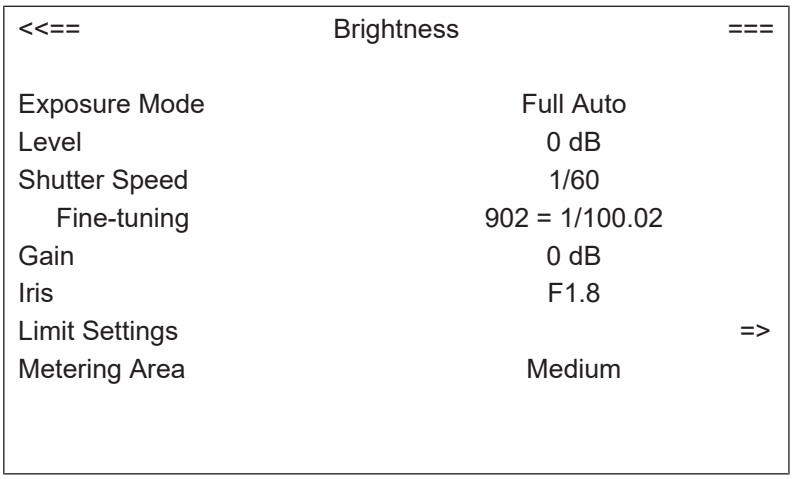
Note

- For a list of menu options and default settings, see 7.4 Menu List and Default Settings [▶ 66].

4.1 Brightness

Perform settings related to the brightness of images.

For a list of menu options and default settings, see Brightness [▶ 66].



Exposure Mode

Settings: "Full Auto" / "Shutter Priority" / "Gain Priority" / "Iris Priority" / "Manual"

Automatically adjusts the brightness of the image.

- "Full Auto"
  Automatically adjusts the shutter speed, gain, and iris.
- "Shutter Priority"
  Manually specifies the shutter speed, and automatically adjusts the gain and iris.
- "Gain Priority"
  Manually specifies the gain, and automatically adjusts the shutter speed and iris.
- "Iris Priority"
  Manually specifies the iris, and automatically adjusts the shutter speed and gain.
- "Manual"
  Manually adjusts the shutter speed, gain, and iris.

Level

Settings: "-6.0 dB" to "+6.0 dB"

Specifies the exposure brightness level.

Automatically adjusts to the specified brightness.

You can set this when "Exposure Mode" is set to "Full Auto" / "Shutter Priority" / "Gain Priority" / "Iris Priority."

Shutter Speed

Settings: 59.94 Hz: "1/60" / "1/90" / "1/100" / "1/120" / "1/180" / "1/250" / "1/350" / "1/500" / "1/725" / "1/1000" / "1/1500" / "1/2000" / "1/2500" / "1/3000" / "1/5000" / "1/10000" / "Fine-tuning"
50 Hz: "1/50" / "1/75" / "1/100" / "1/120" / "1/150" / "1/215" / "1/300" / "1/425" / "1/600" / "1/1000" / "1/1250" / "1/1750" / "1/2500" / "1/3000" / "1/5000" / "1/10000" / "Fine-tuning"

Specifies the shutter speed.

If the image is too bright, reduce the shutter speed, and if it is too dark, increase the shutter speed to adjust the brightness.

You can set this when "Exposure Mode" is set to "Shutter Priority" or "Manual."

When "Gain priority," "Iris Priority" or "Full Auto" is adjusted automatically, it is grayed out.

Fine-tuning

Settings: 59.94 Hz: "8 = 1/60.14" to "1711 = 1/250.05"
50 Hz: "8 = 1/50.17" to "1727 = 1/214.98"

Use this function to fine-tune the shutter speed if flickering or horizontal stripes appear in the captured image due to interference with the lighting frequency.

You can set this when "Exposure Mode" is set to "Shutter Priority" or "Manual" and "Shutter Speed" is set to "Fine-tuning."

Gain

Settings: "0 dB" / "3 dB" / "6 dB" / "9 dB" / "12 dB" / "15 dB" / "18 dB" / "21 dB" / "24 dB" / "27 dB" / "30 dB" / "33 dB" / "36 dB" / "39 dB" / "42 dB" / "45 dB" / "48 dB" / "51 dB"

Sets the exposure sensitivity. This determines the brightness of the image.

You can set this when "Exposure Mode" is set to "Gain Priority" / "Manual."

Iris

Settings: "F1.8" / "F2" / "F2.8" / "F4" / "F5.6" / "F8" / "F11" / "F16"/ "F22"

Specifies the aperture value manually.

You can set this when "Exposure Mode" is set to "Iris Priority" or "Manual."

Limit Settings

Sets the range to adjust "Shutter Speed," "Gain" and "Iris."

- "Shutter Speed"
  You can set this when "Exposure Mode" is set to "Full Auto," "Gain Priority" or "Iris Priority."
- "Gain"
  You can set this when "Exposure Mode" is set to "Full Auto," "Shutter Priority" or "Iris Priority."
- "Iris"
  You can set this when "Exposure Mode" is set to "Full Auto," "Shutter Priority" or "Gain Priority."

Metering Area

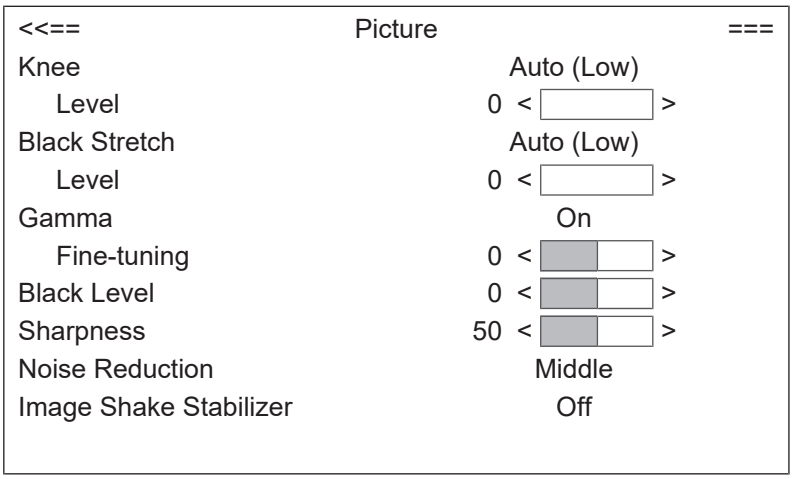
Settings: "Small" / "Medium" / "Large" / "Entire"

You can set the metering area for exposure.

4.2 Picture

Perform settings related to the contrast of images.

For a list of menu options and default settings, see Picture [▶ 66].



Knee

Settings: "Auto (Low)" / "Auto (High)" / "Manual"

Adjusts the high-intensity areas of images to suppress overexposure.

- "Auto (Low)"
  Sets the knee point to 90% and automatically adjusts the knee slope according to the image.
- "Auto (High)"
  Sets the knee point to 80% and automatically adjusts the knee slope according to the image.
- "Manual"
  Manually adjusts the knee point.

Knee - Level

Settings: "0" to "8"

Sets the knee point manually.

Black Stretch

Settings: "Auto (Low)" / "Auto (High)" / "Manual"

Adjusts dark areas of the image to reduce black crush.

- "Auto (Low)"
  Automatically adjusts the correction amount with a smaller maximum value based on the image.
- "Auto (High)"
  Automatically adjusts the correction amount with a larger maximum value based on the image.
- "Manual"
  Manually adjusts the amount of correction.

Black Stretch - Level

Settings: "0" to "8"

Manually set the amount of black stretch correction.

Gamma

Settings: "On" / "Off"

Enables or disables gamma correction for images.

Gamma - Fine-tuning

Settings: "-10" to "+10"

Manually sets the amount of gamma correction.

Black level

Settings: "-50" to "50"

Manually adjust the black level setting. You can set it when "Black Stretch" is set to "Manual."

Sharpness

Settings: "0" to "100"

Manually adjusts the settings to emphasize the outlines of the image.

Noise Reduction

Settings: "Off" / "Low" / "Middle" / "High"

Sets the level at which video noise is suppressed.

Image Shake Stabilizer

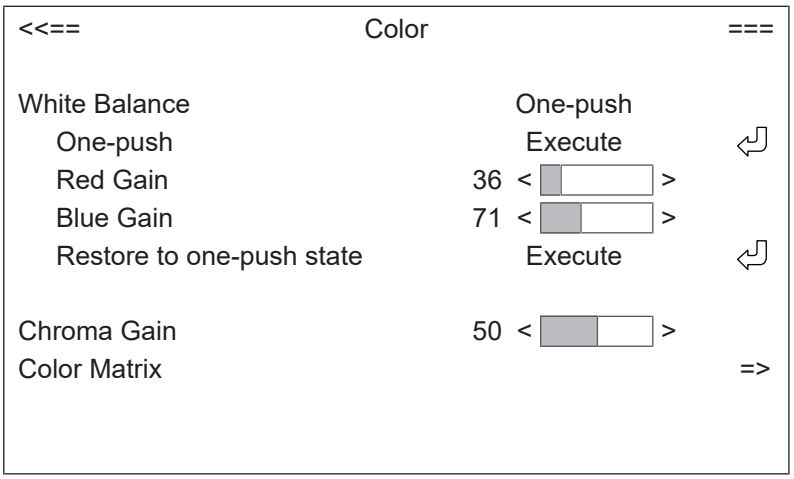
Settings: "On" / "Off"

Enable or disable the image shake stabilizer.

4.3 Color

Perform settings related to the color display.

For a list of menu options and default settings, see Color [▶ 67].



White Balance

Settings: "Auto (Normal)" / "Auto (Full)" / "One-push" / "Manual"

Sets the white balance.

- "Auto (Normal)"
  Automatically adjusts the white balance (2500K to 9500K) according to the operating environment.
- "Auto (Full)"
  Automatically adjusts the white balance (across the entire range) according to the operating environment.
- "One-push"
  Adjusts when "Execute" under "One-Push" is selected, and the "ENTER" button is pressed. After the adjustment is complete, the color is retained and is not affected by the conditions surrounding the subject.
- "Manual"
  Manually adjusts the white balance.

White Balance - One-push

Settings: "Execute"

Performs one-push white balance. After the adjustment is complete, the color is retained and is not affected by the conditions surrounding the subject.

White Balance - Red Gain / Blue Gain

Settings: "0" to "200"

Manually adjusts the white balance.

Can be set when "White Balance" is "Manual."

White Balance - Restore to one-push state

Settings: "Execute"

Resets the manually adjusted white balance.

Can be set when "White Balance" is "Manual."

Chroma Gain

Settings: "0" to "100"

Adjusts the color intensity of the image.

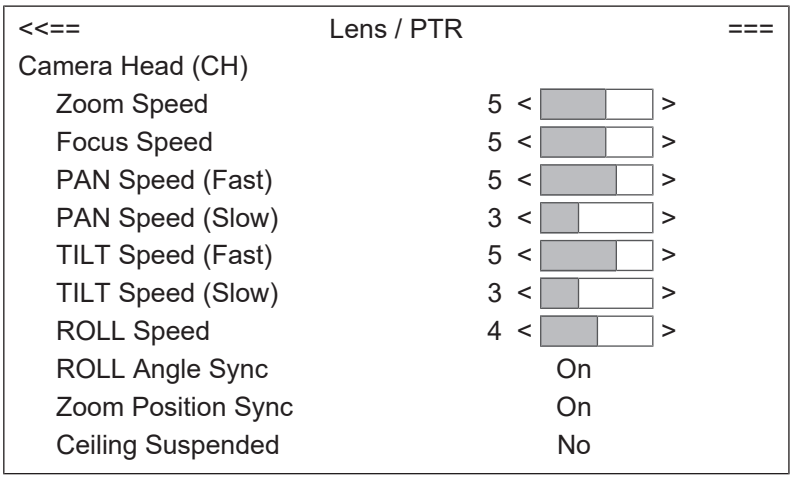
Color Matrix

Adjusts the hue and saturation of six colors.

4.4 Lens / PTR

Perform settings to set the speed at which the camera head moves and the direction of installation.

For a list of menu options and default settings, see Lens / PTR [▶ 67].



Zoom Speed

Settings: "1" to "8"

Adjusts the zoom speed.

Focus Speed

Settings: "1" to "8"

Adjusts the focus speed.

PAN Speed (Fast)

Settings: "1" to "7"

Adjusts the pan speed when operating the remote control and when the joystick is tilted significantly.

PAN Speed (Slow)

Settings: "1" to "7"

Adjust the pan speed when the joystick is tilted slightly.

It does not apply during remote control operation.

TILT Speed (Fast)

Settings: "1" to "7"

Adjusts the tilt speed when operating the remote control and when the joystick is tilted significantly.

TILT Speed (Slow)

Settings: "1" to "7"

Adjust the tilt speed when the joystick is tilted slightly.

It does not apply during remote control operation.

ROLL Speed

Settings: "1" to "7"

Adjusts the rotation speed when operating the remote control and when operating the control panel.

ROLL Angle Sync

Settings: "Off" / "On"

Simultaneously controls pan and tilt based on the roll angle to intuitively move the image up/down or left/right on the screen.

Zoom Position Sync

Settings: "Off" / "On"

Automatically adjust the pan/tilt rotation speed according to the zoom position.

- + side: Low speed
- - side: High Speed

Ceiling Suspended

Settings: "Yes" / "No"

Changes the orientation of the image and the direction of pan/tilt movement.

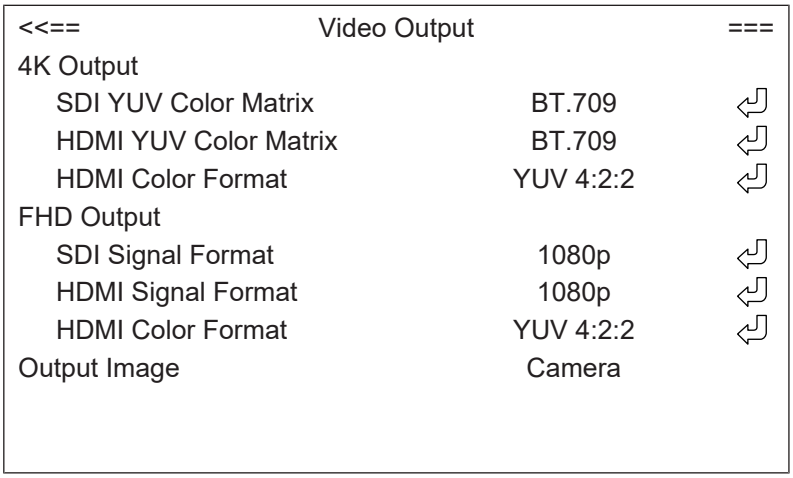
If the camera head is mounted on a ceiling, select "Yes."

4.5 Video Output

Perform settings for the output format of images.

This product supports simultaneous output across all ports.

For a list of menu options and default settings, see Video Output [▶ 67].



4K Output - SDI YUV Color Matrix / HDMI YUV Color Matrix

Settings: "BT.2020" / "BT.709"

Selects the RGB-to-YUV conversion method for output.

"BT.709" is recommended. If "BT.2020" is selected, the saturation may appear enhanced.

4K Output - HDMI Color Format

Settings: "YUV 4:2:2" / "YUV 4:2:0"

Selects the color format.

FHD Output - SDI Signal Format / HDMI Signal Format

Settings: "1080p" / "1080i"

Selects the resolution for output.

FHD Output - HDMI Color Format

Settings: "RGB (Limited)" / "RGB (Full)" / "YUV 4:2:2"

Selects the color space for output.

When connected to a DVI device, only "RGB (Full)" will be available.

Output Image

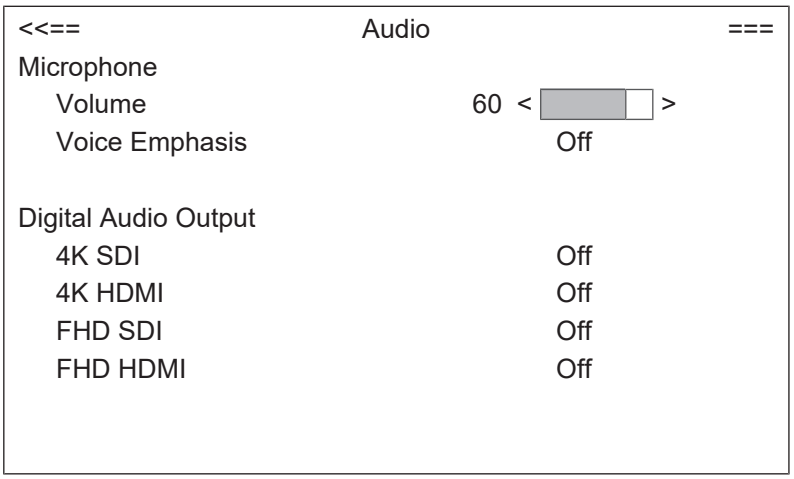
Settings: "Camera" / "Color Bar" / "Gray Scale" / "Cross Line"

Selects the image to be output to the monitor.

4.6 Audio

Perform the audio output settings from the CCU.

For a list of menu options and default settings, see Audio [▶ 68].



Microphone - Volume

Settings: "0" to "80"

Adjusts the volume of the camera head's internal microphone.

Microphone - Voice Emphasis

Settings: "On" / "Off"

Sets voice emphasis for the camera head's internal microphone.

Digital Audio Output - 4K SDI / 4K HDMI / FHD SDI / FHD HDMI

Settings: "On" / "Off"

Sets each audio output on/off individually.

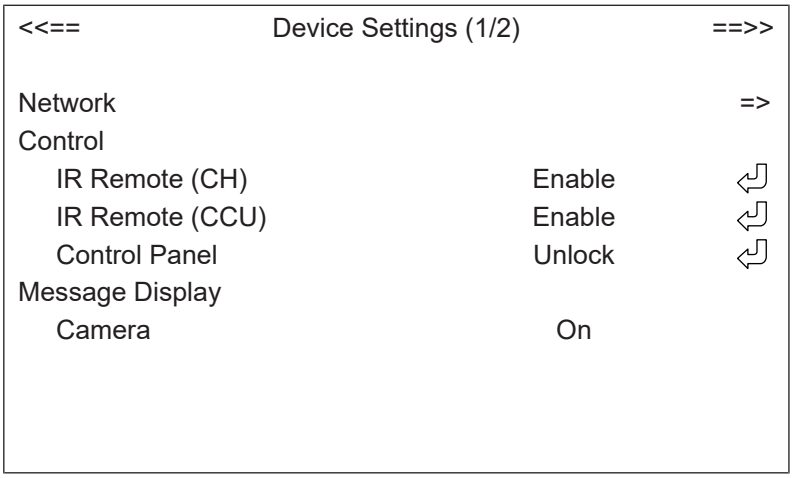
Even if it set to "On," no audio is output when the "MUTE" LED on the front of the CCU is on.

4.7 Device Settings

Configures various device settings.

For a list of menu options and default settings, see Device Settings [▶ 68].

Device Settings (1/2)



Network

You can set the network address settings.

- "IP address"
  Sets the IP address.
- "Subnet Mask"
  Sets the subnet mask.
- "Gateway"
  Sets the gateway.
- "Apply"
  Confirms the network settings. This is only enabled when the network settings are changed.

Control - IR Remote (CH)

Settings: "Enable" / "Disable"

Enables or disables the remote control receiver on the camera head.

Control - IR Remote (CCU)

Settings: "Enable" / "Disable"

Enables or disables the remote control receiver on the CCU.

Control - Control Panel

Settings: "Lock" / "Unlock"

Sets whether to use the front panel.

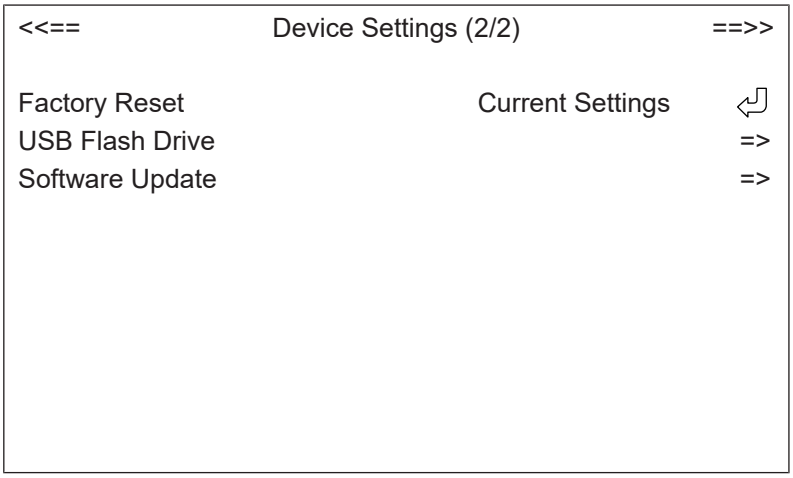
When the value is set to "Lock," the KEY LOCK LED will light up, and operations from the front panel will be disabled (if you want to unlock the lock, see 3.3 Operations to Unlock KEY LOCK [▶ 36]).

Message Display - Camera

Settings: "On" / "Off"

Sets whether to display a message with the camera head operation results.

Device Settings (2/2)



Factory Reset

Settings: "Current Settings" / "All Settings"

Resets the settings to the factory defaults.

- "Current Settings"
  Resets while retaining the "Video Output," "Network", and "Save / Load" settings.
- "All Settings"
  Resets all settings including "Video Output," "Network", and "Save / Load."

USB Flash Drive

Settings: "Export all settings" / "Import all settings"

Uses a USB flash drive to export or import settings.

It is enabled when a USB flash drive is connected to the USB port.

- "Export all settings"
  Saves all settings to the USB flash drive in at once.
- "Import all settings"
  Updates all settings from the USB flash drive at once.

Software Update

Performs a software update using a USB flash drive.

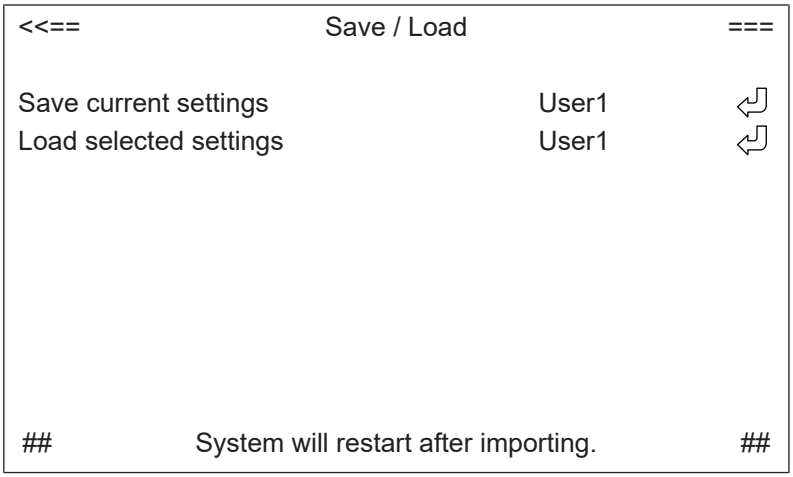
It is enabled when a USB flash drive is connected to the USB port.

4.8 Save / Load

You can save and load settings for this product.

Use this feature to manage multiple settings and switch between them according to the operating environment.

For a list of menu options and default settings, see Save / Load [▶ 68].



Save current settings

Settings: "User1" to "User8" / "System"

Saves the current settings to the specified user setting number.

Load selected settings

Settings: "User1" to "User8" / "System"

Loads and applies settings from the specified user setting number.

If you update the settings, a reboot will occur.

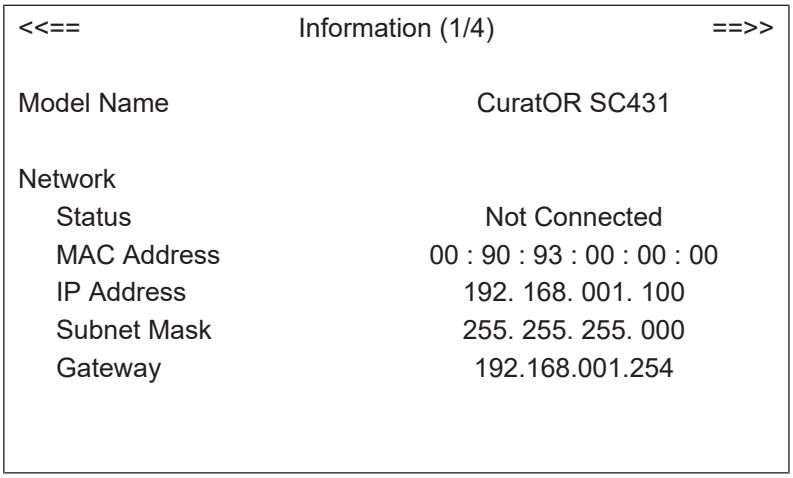
4.9 Information

Displays device information for this product.

The device information is for viewing only. It cannot be changed.

For a list of menu options and default settings, see Information [▶ 68].

Information (1/4)



Model Name

Settings: "CuratOR SC431"

Indicates the model name of the product.

Network - Status

Settings: "Connected" / "Not Connected"

Displays the connection status of the network.

Network - MAC Address

Settings: "xx:xx:xx:xx:xx:xx"

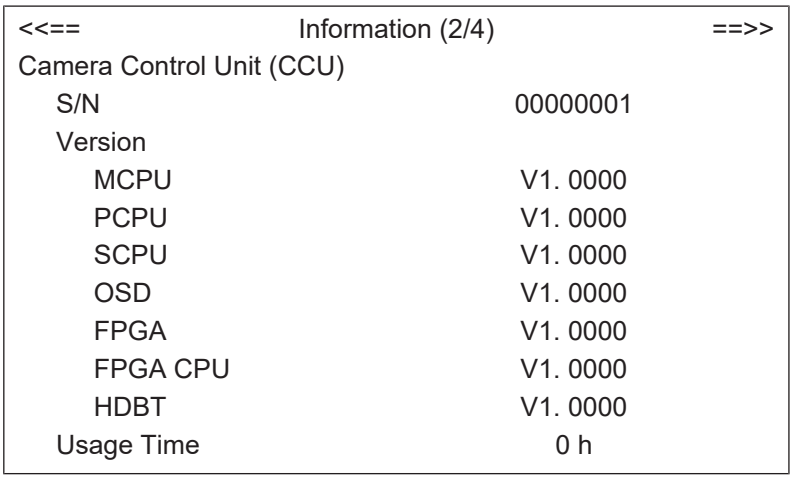
Indicates the unique device identification number of the product. It is also listed on the bottom of the CCU.

Network - IP Address / Subnet Mask / Gateway

Settings: "0.0.0.0" to "255.255.255.255"

Displays the IP address, subnet mask, and gateway of the product.

Information (2/4)



S/N

Settings: "xxxxxxxx"

Displays the CCU serial number (S/N).

Version – MCPU / PCPU / SCPU / OSD / FPGA / FPGA CPU / HDBT

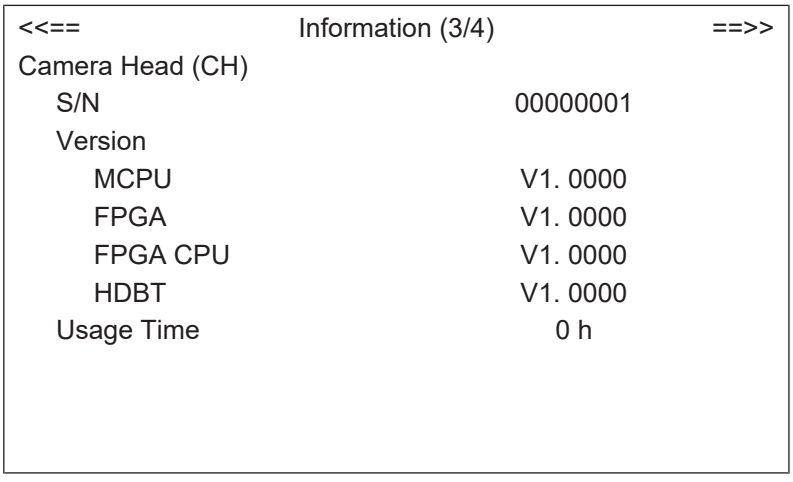
Settings: "Vx.xxxx"

Displays version information about the CCU.

Usage Time

Displays the total usage time of the CCU.

Information (3/4)



S/N

Settings: "xxxxxxxx"

Displays the serial number (S/N) of the camera head.

Version – MCPU / FPGA / FPGA CPU / HDBT

Settings: "Vx.xxxx"

Displays version information about the camera head.

Usage Time

Displays the total usage time of the camera head.

Information (4/4)

<<==	Information (4/4)	==>>
Log		
Camera Control Unit (CCU)		
Number of logs	0	
Last	None	
2nd	None	
3rd	None	
Camera Head (CH)		
Number of logs	0	
Last	None	
2nd	None	
3rd	None	

Camera Control Unit (CCU) - Number of logs

Settings: "0" to "240"

Displays the total number of logs stored in the CCU.

Camera Control Unit (CCU) - Last

Settings: "xxxxxxxxxx, xxxxxxxxxx, xxxxxx" / "None"

Displays the most recent log among the logs stored in the CCU.

The log includes the CCU usage time, camera head usage time, and error ID.

Camera Control Unit (CCU) - 2nd

Settings: "xxxxxxxxxx, xxxxxxxxxx, xxxxxx" / "None"

Displays the second most recent log stored in the CCU.

The log includes the CCU usage time, camera head usage time, and error ID.

Camera Control Unit (CCU) - 3rd

Settings: "xxxxxxxxxx, xxxxxxxxxx, xxxxxx" / "None"

Displays the third most recent log stored in the CCU.

The log includes the CCU usage time, camera head usage time, and error ID.

Camera Head (CH) - Number of logs

Settings: "0" to "240"

Displays the total number of logs stored in the camera head.

Camera Head (CH) - Last

Settings: "xxxxxxxxxx, xxxxxxxxxx, xxxxxx" / "None"

Displays the most recent log among the logs stored in the camera head.

The log includes the CCU usage time, camera head usage time, and error ID.

Camera Head (CH) - 2nd

Settings: "xxxxxxxxxx, xxxxxxxxxx, xxxxxx" / "None"

Displays the second most recent log stored in the camera head.

The log includes the CCU usage time, camera head usage time, and error ID.

Camera Head (CH) - 3rd

Settings: "xxxxxxxxxx, xxxxxxxxxx, xxxxxx" / "None"

Displays the third most recent log stored in the camera head.

The log includes the CCU usage time, camera head usage time, and error ID.

4.10 Languages

Selects the display language.

For a list of menu options and default settings, see Languages [▶ 69].

===	CuratOR SC431	===
Brightness		=>
Picture		=>
Color		=>
Lens / PTR		=>
Video Output		=>
Audio		=>
Device Settings		=>
Save / Load		=>
Information		=>
Languages	**English**	

Languages

Settings: "Japanese" / "English"

Selects the display language.

5 Maintenance

This chapter describes features for administrators related to the maintenance of this product.

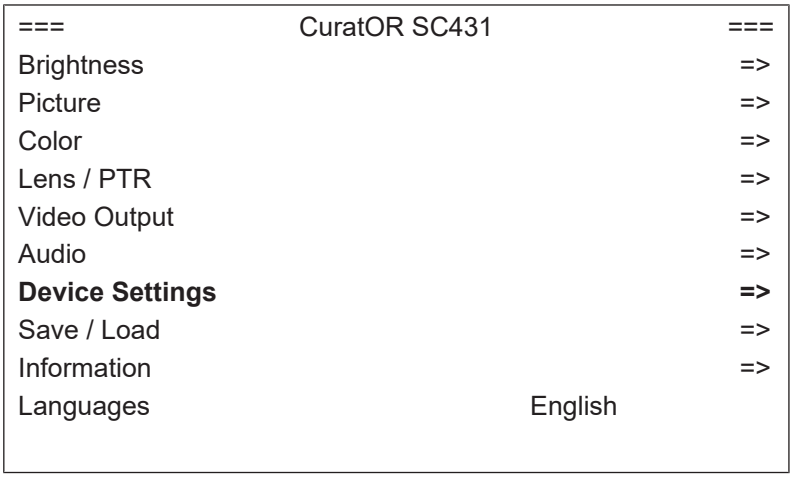
5.1 Exporting Settings

The settings for this product can be saved at once to a USB flash drive. Use this function when you want to match the settings of a CCU in another operating room.

If you want to load a setting value, see 5.2 Loading settings [▶ 56].

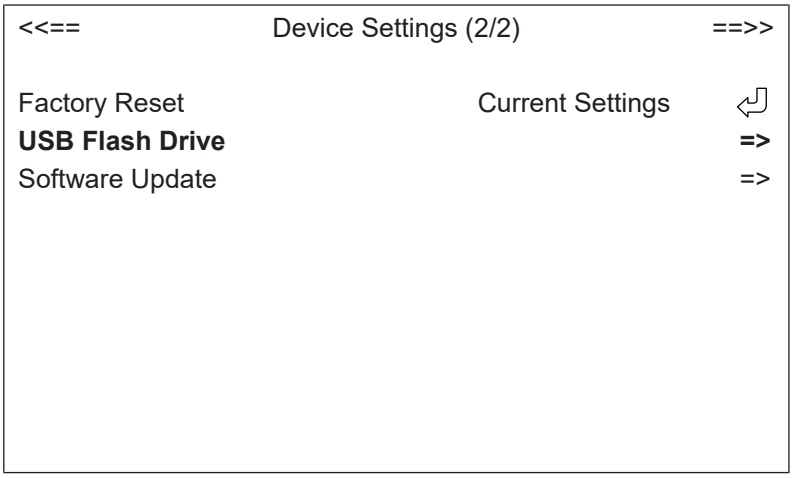
Attention
• A USB flash drive is required to use this function. Please prepare one separately. • The USB flash drive must be formatted in FAT32 format. • Make sure the USB flash drive is writable. If it is not writable, an error message will be displayed.

1. Insert the USB flash drive into the USB port on the front of the CCU.
2. Press the "MENU" button.
3. Select "Device Settings" and push the joystick to the right.

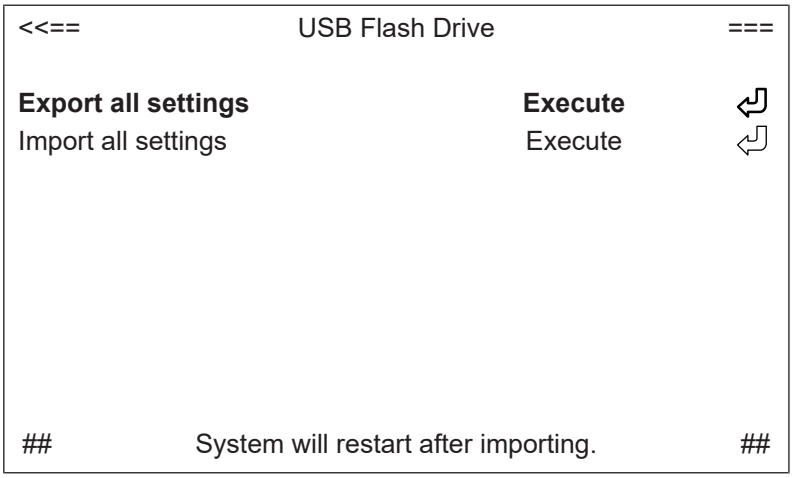


4. Push the joystick to the right to display "Device Settings (2/2)."

5. Select "USB Flash Drive" and push the joystick to the right.



6. Select "Export all settings" and press the "ENTER" button.
   The setting information is saved to the USB flash drive.



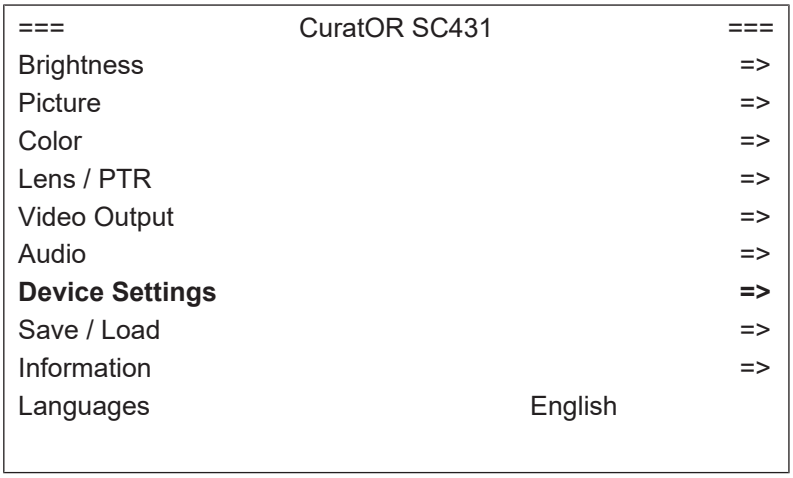
5.2 Loading settings

The settings for this product can be loaded and updated at once from a USB flash drive. Use this function when you want to match the settings of a CCU in another operating room.

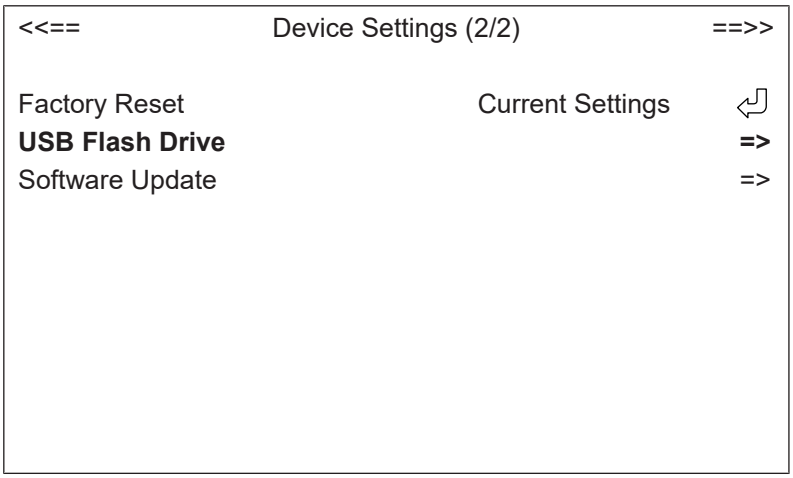
Only settings exported from a CCU can be loaded.

For information on exporting setting values, see 5.1 Exporting Settings [▶ 54].

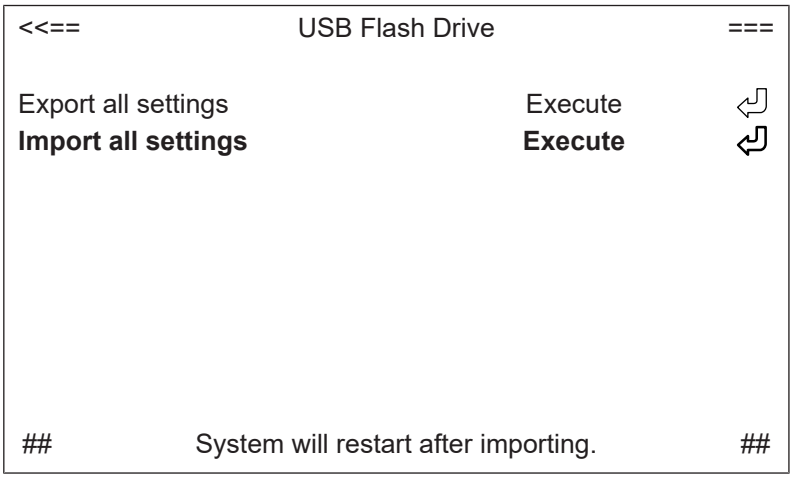
1. Insert the USB flash drive into the USB port on the front of the CCU.
2. Press the "MENU" button.
3. Select "Device Settings" and push the joystick to the right.



4. Push the joystick to the right to display "Device Settings (2/2)."
5. Select "USB Flash Drive" and push the joystick to the right.



6. Select "Import all settings" and press the "ENTER" button.
   The settings will be read and the reboot will begin.



5.3 Software Update

You can use a USB flash drive to update the software.

6 Troubleshooting

6.1 Camera Image is Not Displayed

The power switch of the CCU does not light up

- Check whether the power cord is connected properly.
- Check whether the DC OUT terminal of the AC adapter is correctly connected to the DC IN terminal of the CCU.

The power switch of the CCU is flashing

- If it is flashing orange, the system is being updated. Please wait until it is completed.
- If it is flashing green, log data is being output. Please wait until it is completed.
- If orange and green flashes alternately, a malfunction has occurred in the product. Check the LED status (see 6.10 LED Lighting Specifications [▶ 62]).

No display on the monitor screen

- Is the monitor connected to the product turned on?
- Check whether the video signal cable is connected properly. Connect the signal cables to the connectors of the corresponding output signal (see Back [▶ 17]).
- Check whether the CCU MODE switch is set correctly (see Back [▶ 17]).
- If outputting a signal in FHD, try setting the signal format (see FHD Output - SDI Signal Format / HDMI Signal Format [▶ 45]).
- If outputting a 4K UHD HDMI signal, are you using an HDMI cable that is compatible with HDMI 2.0 or higher?
- If outputting a 4K UHD SDI signal, are you using a 12G-SDI compatible BNC coaxial cable?

The color bar is displayed (even after around 30 seconds)

- Check whether the camera cable is connected correctly.
- Is an error message displayed on the monitor screen? (see Error message appears on the screen [▶ 61]).

CCU CAMERA LED Is blinking or not lit (remains off)

- Turn on the power switch.
- Check whether the camera cable is connected correctly.
- Turn off the power, and then turn it on again.

A signal error message appears on the monitor screen

- Check whether the video signal cable is connected properly. Connect the signal cables to the connectors of the corresponding output signal (see Back [▶ 17]).
- Check whether the CCU MODE switch is set correctly (see Back [▶ 17]).
- If outputting a signal in FHD, try setting the signal format (see FHD Output - SDI Signal Format / HDMI Signal Format [▶ 45]).
- If outputting a 4K UHD HDMI signal, are you using an HDMI cable that is compatible with HDMI 2.0 or higher?

- If outputting a 4K UHD SDI signal, are you using a 12G-SDI compatible BNC coaxial cable?

The colors of the camera image are strange

- Try adjusting the color format of the camera head (see 4K Output - SDI YUV Color Matrix / HDMI YUV Color Matrix [▶ 45], 4K Output - HDMI Color Format [▶ 45], FHD Output - HDMI Color Format [▶ 45]).
- Try adjusting the color format of the monitor (see the User's Manual of your monitor for details).
- Try adjusting the white balance of the camera head (see White Balance [▶ 42]).

Image is flickering or horizontal stripes are visible

Horizontal stripes and flickers may occur in the captured images when taken under lighting such as fluorescent or mercury lamps.

- Set "Brightness" - "Exposure Mode" to "Shutter Priority" and then set "Shutter Speed" to "1/100" (see Exposure Mode [▶ 38], Shutter Speed [▶ 38]).
- If the above settings do not resolve the issue, set "Shutter Speed" to "Fine-tuning" and then change the "Fine-tuning" value to a value where the horizontal stripes are not visible (see Shutter Speed [▶ 38], Fine-tuning [▶ 39]).

6.2 No Audio Output

- Is the "MUTE" button LED on the CCU not on? If the LED is lit, press the "MUTE" button to unmute (see 3.1 Camera Head Operations [▶ 33]).
- Is the corresponding output port for "Audio" - "Digital Audio Output" turned "Off"? If it is "Off," change it to "On" (see Digital Audio Output - 4K SDI / 4K HDMI / FHD SDI / FHD HDMI [▶ 46]).
  All settings are "Off" in the factory default state (see Audio [▶ 68]).
- Is the "Volume" value in "Audio" - "Microphone" too low? Try adjusting "Volume" to an appropriate level (see Microphone - Volume [▶ 46]).

6.3 Pan / Tilt / Roll Not Functioning

- Is the pan / tilt / roll speed of the camera head set too low? Adjust the value to an appropriate level (see PAN Speed (Fast) [▶ 43], PAN Speed (Slow) [▶ 44], TILT Speed (Fast) [▶ 44], TILT Speed (Slow) [▶ 44], ROLL Speed [▶ 44]).
- Is the setting for "Device Settings" - "Control" - "IR Remote (CH)" or "IR Remote (CCU)" set to "Disable"? If it is set to "Disable," change it to "Enable" (see Control - IR Remote (CH) [▶ 47], Control - IR Remote (CCU) [▶ 47]).
- Is the camera head in contact with surrounding objects? Remove any obstructions, then press and hold the "HOME POSITION" button (for about two seconds) on the front of the CCU to return the camera head to the home position.
- Is the camera head LED blinking alternately in orange and green? This indicates a step-out error due to movement obstruction. Remove any obstructions, then press and hold the "HOME POSITION" button (for about two seconds) on the CCU front panel to reset the camera head (see Camera head front [▶ 63]).
- Check the status of the CCU power switch LED (see 6.10 LED Lighting Specifications [▶ 62]).

6.4 Focus is Not Correct

- Is autofocus being used? When one-push autofocus is on, the focus does not follow even when the subject moves. If you want the focus to follow the subject, try using real-time autofocus (see 3.1 Camera Head Operations [▶ 33]).
- Is the image dark? It may be difficult to focus when it is dark.
  - Adjust the brightness (see Adjusting the brightness [▶ 30]).
  - Try adjusting "Limit Settings" (see Limit Settings [▶ 39]).
  - Remove the ND filter attached to the camera head and then adjust the brightness (see "Remove the ND filter (optional)" in the SC431-CH Setup Manual, Adjusting the brightness [▶ 30]).

6.5 Inside of the Lens Becomes Foggy

- Is condensation present? If condensation has occurred, turn off the CCU power switch, remove the filter cover and ND filter, dry thoroughly, and then reinstall (see "Removing the ND filter (optional)" in the SC431-CH Setup Manual).
- If the wind of the air conditioner hits the camera head directly, adjust the wind direction or change the mounting position of the camera head. If an air conditioner directly hits the camera head, condensation may form on the inside of the lens.

6.6 If Operations are Not Possible

[When operating with a CCU]

- Is the "KEY LOCK" LED on the CCU not on? If the light is on, CCU operations are locked. Release the lock (see 3.3 Operations to Unlock KEY LOCK [▶ 36]).

[When operating with a remote control]

- Is the setting for "Device Settings" - "Control" - "IR Remote (CH)" or "IR Remote (CCU)" set to "Disable"? If it is set to "Disable," change it to "Enable" (see Control - IR Remote (CH) [▶ 47], Control - IR Remote (CCU) [▶ 47]).
- Check that the remote control receiver of the CCU or camera head is not hidden or dirty.
- Make sure that you are operating the remote control within the remote control reception range of the CCU or camera head (see 2.2 Preparing the Remote Control [▶ 22]).
- Check if the batteries in the remote control are depleted. If a battery is depleted, replace it with a new one.
- Check if there is any noise interference affecting the remote control (see 2.2 Preparing the Remote Control [▶ 22]).

6.7 USB Flash Drive Not Recognized

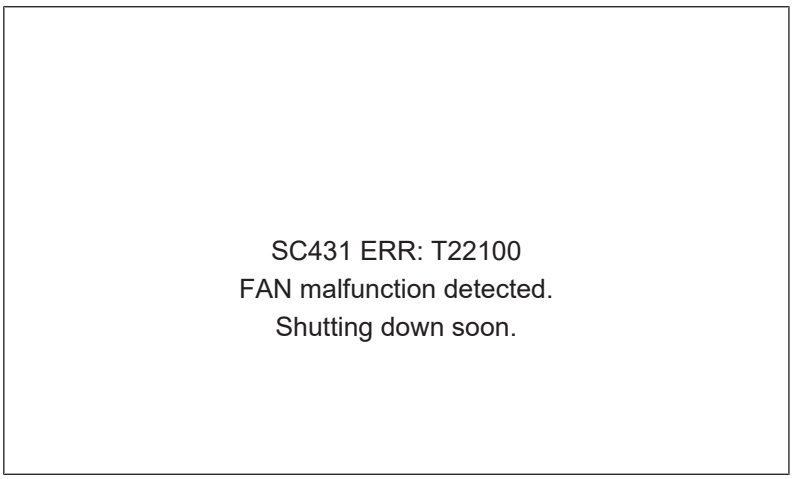
- Please check if the partition uses a USB memory formatted in GPT format. This product does not support a USB memory formatted in GPT format. Please use a USB memory formatted in MBR format.
- Is the USB flash drive formatted in FAT32 format? Format the USB flash drive in FAT32 format on a computer.
- Is a USB flash drive equipped with a security function connected? This product does not support security protection features. Please use a USB flash drive without security protection.
- Is a USB storage device other than a USB flash drive connected? This product does not support HDD or SSD devices. Please connect a USB flash drive.

- Is the USB memory connected via a USB hub? This product does not support connecting USB flash drives via a USB hub. Please connect the USB flash drive directly to the CCU.

6.8 Other Problems

Error message appears on the screen

Example:



- The product may be malfunctioning. Please contact your local EIZO representative (see 6.9 When Contacting Your Local EIZO Representative [▶ 61]).
- Check the error code (ERR: ******) in the error message. You can determine which product is faulty.
  - CCU: *1****, *2****, *3****, *4****
  - Camera head: *5****, *6****

The CCU power switch LED or camera head LED is flashing

- An error may have occurred in the product. Check the status of the CCU power switch LED and camera head LED (see 6.10 LED Lighting Specifications [▶ 62]).

6.9 When Contacting Your Local EIZO Representative

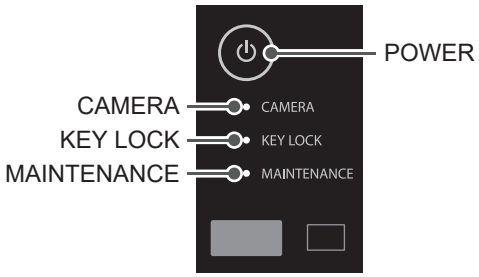
- When requesting or consulting with your local EIZO representative for repairs or inspections, please check the details you would like to let us know (see What to let us know when requesting repairs [▶ 82]) before contacting us.

6.10 LED Lighting Specifications

The LED lights up or blinks depending on the system status.

When contacting your local EIZO representative, your local EIZO representative may ask you to check the LED status.

Front of CCU



LED status	Product status
• POWER: Off	The power is off.
• POWER: Solid orange	Indicates standby mode.
• POWER: Flashing orange	The system is being updated.
• POWER: Solid green	The CCU is working.
• POWER: Flashing green	Log data is being output.
• POWER: Blinks orange and green alternately	An error has occurred in the product. When making an inquiry, please provide the number of times the orange and green lights blink, respectively (see 6.9 When Contacting Your Local EIZO Representative [▶ 61]).
• POWER: Solid green • CAMERA: Flashing green	Connection to the camera head is being checked.*1
• POWER: Solid green • CAMERA: Solid green	Camera head is connected.
• POWER: Solid green • KEY LOCK: Solid green	Key lock is enabled.
• POWER: Solid green • KEY LOCK: Flashing green	Remote control operations are being received.
• POWER: Solid green • MAINTENANCE: Flashing orange	USB flash drive is being connected.*1
• POWER: Solid green • MAINTENANCE: Solid orange	USB flash drive is connected.

*1 If the connected device cannot be recognized, the LED will not respond.

Camera head front

LED status	Product status
• Off	The power is off.
• Solid orange	Pan / tilt / roll is operating.
• Solid light orange	The camera head system is being updated.
• Flashing orange	Pan / tilt / roll is returning to its home position.
• Solid green	The camera image is being output.
• Flashing green	Camera head is starting up. The CCU system is being updated. Log data is being output.
• Flashes alternately in the order of one orange blink followed by one green blink (CCU POWER LED is lit green).	The pan/tilt movement of the camera head is obstructed, causing the camera head to be out of sync. Remove obstructions and hold the "HOME POSITION" button (for about two seconds) to move the camera head to the home position. Depending on the state of the camera head, the LED on the camera head will be lit or flashed differently. • Flashing orange: Pan / tilt / roll is returning to its home position. • Solid green: The camera image is being output.
• Flashes alternately in the order of one orange blink followed by four green blinks (on the CCU, POWER LED flashes four green blinks followed by one orange blink alternately).	An error has occurred in the product. When making an inquiry, please provide the number of times the orange and green lights blink, respectively (see 6.9 When Contacting Your Local EIZO Representative [▸ 61]).

7 Specifications

7.1 CCU List of Specifications

7.1.1 Functions

Image quality adjustment		Exposure mode, metering area, YUV color matrix, white balance, sharpness
Gain		Auto/Manual (0 dB to 51 dB)
Shutter speed	[59.94 Hz]	1/60 – 1/10000
	[50 Hz]	1/50 – 1/10000
Image inversion		Flip up/down/left/right

7.1.2 Video Format

4K UHD	HDMI	2160/59.94p, 2160/50p
	SDI	2160/59.94p, 2160/50p
2K FHD	HDMI	1080/59.94p, 1080/59.94i, 1080/50p, 1080/50i
	SDI	1080/59.94p, 1080/59.94i, 1080/50p, 1080/50i

7.1.3 Output Terminals

4K	HDMI x 1, 12G-SDI (BNC) x 1
2K	HDMI x 1, 3G-SDI (BNC) x 1

7.1.4 Remote control

Remote control	LAN, RS-232C, infrared remote control (using AAA batteries)

7.1.5 Power

Input	DC 24 V±10 %, 2.92 A
Maximum Power Consumption	70 W or less

7.1.6 Physical Specifications

Dimensions (W x H x D)	220.0 mm x 87.5 mm x 270.0 mm (excluding protrusions)
Net Weight	Approx. 3.1 kg

7.1.7 Operating Environmental Requirements

Temperature	0 ˚C – 40 ˚C
Humidity	20 % – 80 % R.H. (no dew condensation)
Air Pressure	540 hPa – 1060 hPa

7.1.8 Transport / Storage Conditions

Temperature	-20 ˚C – 60 ˚C
Humidity	10 % – 90 % R.H. (no dew condensation)
Air Pressure	200 hPa – 1060 hPa

7.2 AC Adapter Specifications

7.2.1 Power

Input	100 – 240 VAC ± 10%, 47 Hz – 63 Hz, 1.6 A – 0.8 A
Maximum Power Consumption	77 W or less
DC OUT terminal	DC 24 V, 5.0 A

7.2.2 Operating Environmental Requirements

Temperature	0 ˚C – 40 ˚C
Humidity	20 % – 80 % R.H. (no dew condensation)
Air Pressure	540 hPa – 1060 hPa

7.2.3 Transport / Storage Conditions

Temperature	-20 ˚C – 60 ˚C
Humidity	10 % – 90 % R.H. (no dew condensation)
Air Pressure	200 hPa – 1060 hPa

7.3 Camera Head Specification List

7.3.1 Camera head

Imaging sensor	1/2.8" single board CMOS
Effective number of pixels	3840 x 2160
Zoom magnification	30x optical motorized zoom
Focal length	f = 4.5 mm± 7% (Wide end) to 135 mm± 7% (Tele end)
Horizontal field of view	Approx. 62.3° (Wide end) to approx. 2.5° (Tele end)
Shooting range (standard value)	With close-up lens: 100 mm to ∞ mm (Wide end), 700 mm to ∞ mm (Tele end)
Filter diameter	72 mm (close-up lens)
Focus control	Motorized (auto/manual)
Iris control	Motorized (auto/manual)
Pan rotation range	±170°
Tilt rotation range	+90° to -30°
Roll rotation range	±200°
Pan rotation speed	8.6°/s to 0.05°/s, 7-step selection
Tilt rotation speed	8.6°/s to 0.05°/s, 7-step selection
Roll rotation speed	30°/s to 0.2°/s, 7-step selection
Other	Internal microphone

7.3.2 Physical Specifications

Dimensions (W x H x D)	161.0 mm x 211.5 mm x 213.7 mm (with cable cover attached)
Net Weight	Approx. 3.3 kg (with cable cover attached)

7.3.3 Operating Environmental Requirements

Temperature	0˚C – 35˚C
Humidity	20 % – 80 % R.H. (no dew condensation)
Air Pressure	540 hPa – 1060 hPa

7.3.4 Transport / Storage Conditions

Temperature	-20 ˚C – 60 ˚C
Humidity	10 % – 90 % R.H. (no dew condensation)
Air Pressure	200 hPa – 1060 hPa

7.4 Menu List and Default Settings

7.4.1 Brightness

Exposure Mode	Full Auto
Level	0 dB
Shutter Speed	[59.94 Hz] 1/60 [50 Hz] 1/50
Shutter Speed - Fine-tuning	[59.94 Hz] 902 = 1/100.02 [50 Hz] 1125 = 1/99.97
Gain	0 dB
Iris	F1.8
Limit Settings - Limit Settings - Shutter Limit (High)	[59.94 Hz] 1/10000 [50 Hz] 1/10000
Limit Settings - Limit Settings - Shutter Limit (Low)	[59.94 Hz] 1/60 [50 Hz] 1/50
Limit Settings - Limit Settings - Gain Limit (Max)	30 dB
Limit Settings - Limit Settings - Gain Limit (Min)	0 dB
Limit Settings - Limit Settings - Iris Limit (Open)	F2
Limit Settings - Limit Settings - Iris Limit (Close)	F11
Metering Area	Medium

7.4.2 Picture

Knee	Auto (Low)
Knee - Level	0
Black Stretch	Auto (Low)
Black Stretch - Level	0
Gamma	On
Gamma - Fine-tuning	0
Black Level	0
Sharpness	50
Noise Reduction	Middle
Image Shake Stabilizer	Off

7.4.3 Color

White Balance	One-push
White Balance - One-push	Execute
White Balance - Red gain	36
White Balance - Blue gain	71
White Balance - Restore to one-push state	Execute
Chroma Gain	50
Color Matrix - Color Matrix (1/2) - Red Hue	0
Color Matrix - Color Matrix (1/2) - Red Saturation	0
Color Matrix - Color Matrix (1/2) - Green Hue	0
Color Matrix - Color Matrix (1/2) - Green Saturation	0
Color Matrix - Color Matrix (1/2) - Blue Hue	0
Color Matrix - Color Matrix (1/2) - Blue Saturation	0
Color Matrix - Color Matrix (2/2) - Yellow hue	0
Color Matrix - Color Matrix (2/2) - Yellow Saturation	0
Color Matrix - Color Matrix (2/2) - Cyan Hue	0
Color Matrix - Color Matrix (2/2) - Cyan Saturation	0
Color Matrix - Color Matrix (2/2) - Magenta Hue	0
Color Matrix - Color Matrix (2/2) - Magenta Saturation	0

7.4.4 Lens / PTR

Zoom Speed	5
Focus Speed	5
PAN Speed (Fast)	5
PAN Speed (Slow)	3
TILT Speed (Fast)	5
TILT Speed (Slow)	3
ROLL Speed	4
ROLL Angle Sync	On
Zoom Position Sync	On
Ceiling Suspended	No

7.4.5 Video Output

4K Output - SDI YUV Color Matrix	BT.709
4K Output - HDMI YUV Color Matrix	BT.709
4K Output - HDMI Color Format	YUV 4:2:2
FHD Output - SDI Signal Format	1080p
FHD Output - HDMI Signal Format	1080p
FHD Output - HDMI Color Format	YUV 4:2:2
Output Image	Camera

7.4.6 Audio

Microphone - Volume	60
Microphone - Voice Emphasis	Off
Digital Audio Output - 4K SDI	Off
Digital Audio Output - 4K HDMI	Off
Digital Audio Output - FHD SDI	Off
Digital Audio Output - FHD HDMI	Off

7.4.7 Device Settings

Device Settings (1/2) - Network - IP Address	192.168.001.100
Device Settings (1/2) - Network - Subnet Mask	255.255.255.000
Device Settings (1/2) - Network - Gateway	192.168.001.254
Device Settings (1/2) - Control - IR Remote (CH)	Enable
Device Settings (1/2) - Control - IR Remote (CCU)	Enable
Device Settings (1/2) - Control - Control Panel	Unlock
Device Settings (1/2) - Message Display - Camera	On
Device Settings (2/2) - Factory Reset	Current Settings
Device Settings (2/2) - USB Flash Drive - Export all settings	Execute
Device Settings (2/2) - USB Flash Drive - Import all settings	Execute
Device Settings (2/2) - Software Update	Cancel

7.4.8 Save / Load

Save current settings	User1
Load selected settings	User1

7.4.9 Information

Information (1/4) - Model Name	CuratOR SC431
Information (1/4) - Network - Status	xxx[*1]
Information (1/4) - Network - MAC Address	xx:xx:xx:xx:xx:xx[*1]
Information (1/4) - Network - IP Address	xxx.xxx.xxx.xxx[*1]
Information (1/4) - Network - Subnet Mask	xxx.xxx.xxx.xxx[*1]
Information (1/4) - Network - Gateway	xxx.xxx.xxx.xxx[*1]
Information (2/4) - S/N	xxxxxxxx[*1]
Information (2/4) - Version - MCPU	Vx.xxxx[*1]
Information (2/4) - Version - PCPU	Vx.xxxx[*1]
Information (2/4) - Version - SCPU	Vx.xxxx[*1]
Information (2/4) - Version - OSD	Vx.xxxx[*1]
Information (2/4) - Version - FPGA	Vx.xxxx[*1]
Information (2/4) - Version - FPGA CPU	Vx.xxxx[*1]
Information (2/4) - Version - HDBT	Vx.xxxx[*1]
Information (2/4) - Usage Time	0 h
Information (3/4) - S/N	xxxxxxxx[*1]
Information (3/4) - Version - MCPU	Vx.xxxx[*1]
Information (3/4) - Version - FPGA	Vx.xxxx[*1]
Information (3/4) - Version - FPGA CPU	Vx.xxxx[*1]
Information (3/4) - Version - HDBT	Vx.xxxx[*1]
Information (3/4) - Usage Time	0 h

Information (4/4) - Log - Camera Control Unit (CCU) - Number of logs	0
Information (4/4) - Log - Camera Control Unit (CCU) - Last	None
Information (4/4) - Log - Camera Control Unit (CCU) - 2nd	None
Information (4/4) - Log - Camera Control Unit (CCU) - 3rd	None
Information (4/4) - Log - Camera Head (CH) - Number of logs	0
Information (4/4) - Log - Camera Head (CH) - Last	None
Information (4/4) - Log - Camera Head (CH) - 2nd	None
Information (4/4) - Log - Camera Head (CH) - 3rd	None

*1 The display may vary depending on the operating environment.

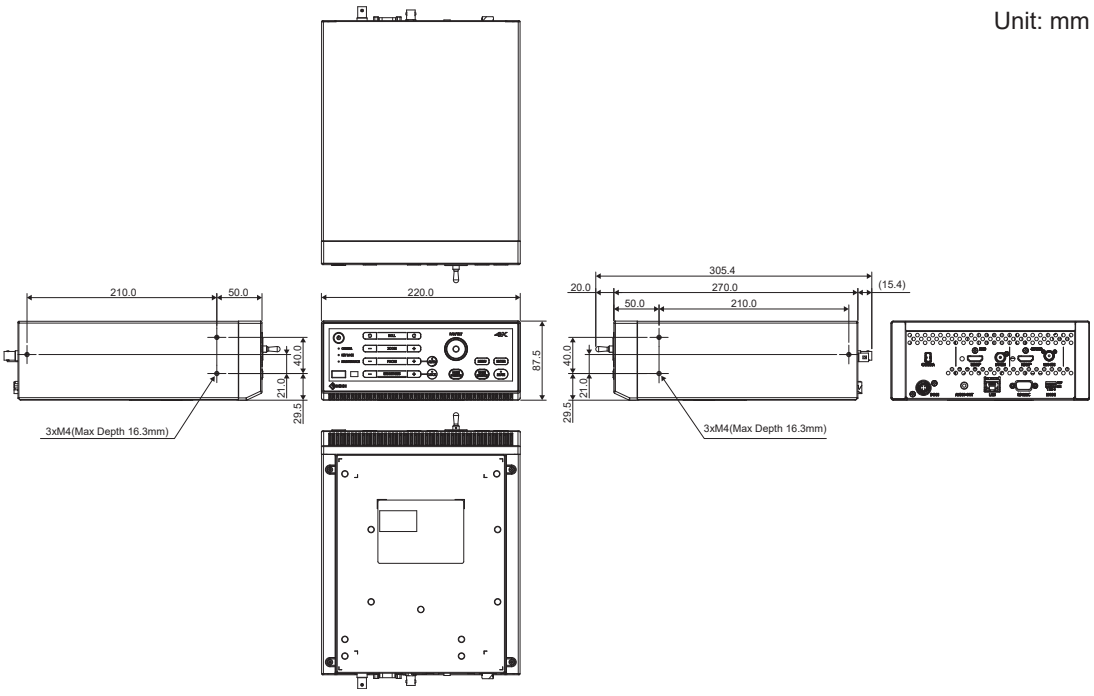
7.4.10 Languages

Languages	English

7.5 Dimensions

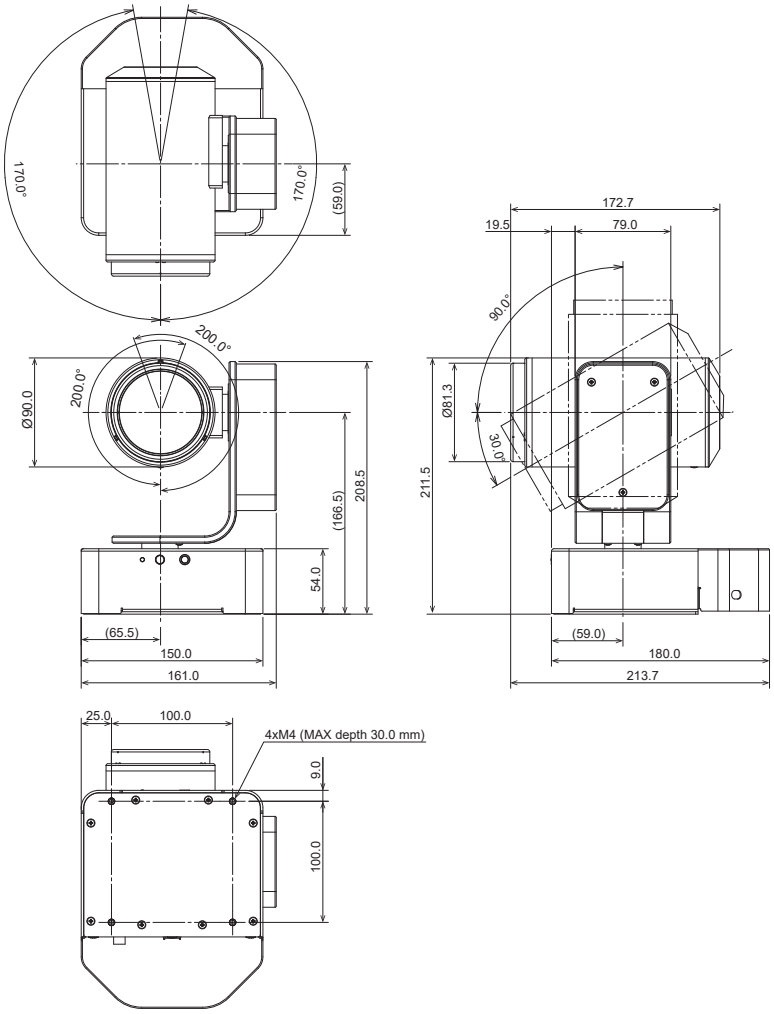
7.5.1 CCU

Unit: mm



7.5.2 Camera head

Unit: mm



7.6 Accessories

The following accessories are available separately.

Camera Cable (5 m)	SCC500
Camera Cable (25 m)	SCC2500
Camera Cable (35 m)	SCC3500
Camera Cable Adapter	SCA02
Remote Controller Holder	SRH01

Appendix

Trademark

The terms HDMI, HDMI High-Definition Multimedia Interface, HDMI trade dress and the HDMI Logos are trademarks or registered trademarks of HDMI Licensing Administrator, Inc.

The SuperSpeed USB Trident Logo is a registered trademark of USB Implementers Forum, Inc.

EIZO, the EIZO logo and CuratOR are registered trademarks of EIZO Corporation in Japan and other countries.

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License

License information for the open source software used in this product is available at www.eizoglobal.com/support/oss/.

Medical Standard

- It shall be assured that the final system is in compliance to IEC60601-1 requirement.
- Power supplied equipment can emit electromagnetic waves, that could influence, limit or result in malfunction of the product. Install the equipment in a controlled environment, where such effects are avoided.

Classification of Equipment

- Type of protection against electric shock: Class I
- EMC class: IEC60601-1-2 Group 1 Class A
- Classification of medical device (EU): Class I
- Mode of operation: Continuous
- IP Class: IPX0

EMC Information

The SC431 (SC431-CCU and SC431-CH) has the ability to capture and output images with a camera.

Environments of Intended Use

The SC431 is intended to be used in the following environments.

- Professional healthcare facility environments such as clinics and hospitals (including use in the vicinity of high-frequency surgical equipment such as electrosurgical knives).

The following environments are not suitable for using the SC431.

- Home healthcare environments
- In the vicinity of short-wave therapy equipment
- RF shielded room of the medical equipment systems for MRI
- In shielded location Special environments
- Installed in vehicles including ambulances
- Other special environments

⚠ WARNING

- The SC431 requires special safety precautions regarding EMC (Electromagnetic Compatibility). You need to carefully read EMC Information and the "PRECAUTIONS" section in this document, and observe the following instructions when installing and operating the product.

⚠ WARNING

- The SC431 should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the equipment or system should be observed to verify normal operation in the configuration in which it will be used.

⚠ WARNING

- When using a portable RF communication equipment, keep it 30 cm (12 inches) or more away from any part, including cables, of the SC431 Otherwise, degradation of the performance of this equipment could result.

⚠ WARNING

- Anyone who connects additional equipment to the signal input part or signal output parts, configuring a medical system, is responsible that the system complies with the requirements of IEC60601-1-2.

⚠ WARNING

- Images may be distorted if the product is used near a device such as high-frequency surgical equipment. Check in advance to ensure that no problems occur during use.

⚠ WARNING

- Do not touch the signal input/output connectors while using SC431. It may affect the displayed image.

⚠ WARNING

- Be sure to use cables that satisfy the following requirements.
  Use of cables that do not satisfy the requirements could result in increased electromagnetic emissions, reduced electromagnetic immunity of this equipment, and incorrect operation.

Cable	Max. cable length	Shielding	Ferrite core
DC Cord	2.5 m	Shielded	With ferrite cores
AC Cord	2 m	Unshielded	Without ferrite cores
BNC Cable (SDI)	30 m	Shielded	Without ferrite cores
HDMI cable	5 m	Shielded	Without ferrite cores
RS-232C Cable	5 m	Shielded	Without ferrite cores
USB cable	5 m	Shielded	Without ferrite cores
Camera cable	35 m	Shielded	Without ferrite cores
LAN cable	30 m	Unshielded	Without ferrite cores
Audio cable	5 m	Shielded	Without ferrite cores

Technical Descriptions

Electromagnetic emissions

The SC431 is intended for use in the electromagnetic environment specified below.

The customer or the user of the SC431 should assure that it is used in such an environment.

Emission test	Compliance	Electromagnetic environment - Guidance
RF emissions CISPR11	Group 1	SC431 uses RF energy only for its internal function. Therefore, its RF emission are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class A	The EMISSIONS characteristics of SC431 make it suitable for use in industrial areas and hospitals (CISPR11 class A). If it is used in a residential environment (for which CISPR11 class B is normally required) SC431 might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.
Harmonic emissions IEC61000-3-2	Class A	
Voltage fluctuations / flicker emissions IEC61000-3-3	Complies	

Electromagnetic immunity

SC431 has been tested at the following compliance levels (C) according to the testing requirements (T) for professional healthcare facility environments specified in IEC60601-1-2.

The customer or the user of SC431 should assure that SC431 is used in the following environment.

Immunity test	Test level (T)	Compliance level (C)	Electromagnetic environment - Guidance
Electrostatic discharge (ESD) IEC61000-4-2	±8 kV contact discharge ±15 kV air discharge	±8 kV contact discharge ±15 kV air discharge	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transients / bursts IEC61000-4-4	±2 kV power lines ±1 kV input / output lines	±2 kV power lines ±1 kV input / output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surges IEC61000-4-5	±1 kV line to line ±2 kV line to ground	±1 kV line to line ±2 kV line to ground	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 IEC61000-4-11	0 % U_T (100 % dip in U_T) 0.5 cycles and 1 cycle 70 % U_T (30 % dip in U_T) 25 cycles / 50 Hz 0 % U_T (100 % dip in U_T) 250 cycles / 50 Hz	0 % U_T (100 % dip in U_T) 0.5 cycles and 1 cycle 70 % U_T (30 % dip in U_T) 25 cycles / 50 Hz 0 % U_T (100 % dip in U_T) 250 cycles / 50 Hz	Mains power quality should be that of a typical commercial or hospital environment. If the user of SC431 requires continued operation during power mains interruptions, it is recommended that SC431 be powered from an uninterruptible power supply or a battery.
Power frequency magnetic fields IEC61000-4-8	30 A/m (50 / 60 Hz)	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment. The product should be kept at least 15 cm away from the source of power frequency magnetic fields during use.

Immunity test	Test level (T)	Compliance level (C)	Electromagnetic environment - Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of SC431, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance
Conducted disturbances induced by RF fields IEC61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	d = 1.2√P
	6 Vrms ISM bands between 150 kHz and 80 MHz[*1]	6 Vrms	d = 1.2√P
Radiated RF fields IEC61000-4-3	3 V/m 80 MHz – 2.7 GHz	3 V/m	d = 1.2√P, 80 MHz – 800 MHz d = 2.3√P, 800 MHz – 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[*2], should be less than the compliance level in each frequency range[*3]. Interference may occur in the vicinity of equipment marked with the following symbol. 

Note

- U_T is the a.c. mains voltage prior to application of the test level.
- At 80 MHz and 800 MHz, the higher frequency range applies.
- These guidelines regarding conducted interference induced by RF fields or radiated RF fields may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[*1] 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.

[*2] 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 SC431 is used exceeds the applicable RF compliance level above, SC431 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating SC431.

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

Recommended separation distances between portable or mobile RF communication equipment and the SC431

SC431 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of SC431 can help prevent electromagnetic interference by maintaining a minimum distance (30 cm) between portable and mobile RF communications equipment (transmitters) and SC431. SC431 has been tested at the following compliance level (C) for the requirement test level (T) of the proximity electromagnetic field immunity in the RF communication service.

Test frequency (MHz)	Bandwidth*1 (MHz)	Service*1	Modulation*2	Test level (T)*3 (V/m)	Compliance level (C) (V/m)
385	380 – 390	TETRA 400	Pulse modulation*2 18 Hz	27	27
450	430 – 470	GMRS 460, FRS 460	FM ±5 kHz deviation 1 kHz sine	28	28
710	704 – 787	LTE Band 13, 17	Pulse modulation*2 217 Hz	9	9
745					
780					
810	800 – 960	GSM 800 / 900, TETRA 800, iDEN 820 CDMA 850, LTE Band 5	Pulse modulation*2 18 Hz	28	28
870					
930					
1720	1700 – 1990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation*2 217 Hz	28	28
1845					
1970					
2450	2400 – 2570	Bluetooth®, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation*2 217 Hz	28	28
5240	5100 – 5800	WLAN 802.11 a/n	Pulse modulation*2 217 Hz	9	9
5500					
5785					

*1 For some services, only the uplink frequencies are included.

*2 The carrier wave is modulated using a 50 % duty cycle square wave signal.

*3 Test levels were calculated based on maximum power and a separation distance of 30 cm.

The customer or the user of SC431 can help prevent interference caused by the proximity magnetic field by maintaining a minimum distance (15 cm) between RF transmitters and SC431. SC431 has been tested at the following compliance level (C) for the requirement test level (T) of proximity magnetic field immunity.

Test frequency	Modulation	Test level (T) (A/m)	Compliance level (C) (A/m)
134.2 kHz	Pulse modulation[*1] 2.1 kHz	65	65
13.56 MHz	Pulse modulation[*1] 50 kHz	7.5	7.5

[*1] The carrier wave is modulated using a 50 % duty cycle square wave signal.

SC431 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. For other portable and mobile RF communication equipments (transmitters), minimum distance between portable and mobile RF communications equipment (transmitters) and SC431 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)		
	150 kHz – 80 MHz $d = 1.2\sqrt{P}$	80 MHz – 800 MHz $d = 1.2\sqrt{P}$	800 MHz – 2.7 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at 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

- At 80 MHz and 800 MHz, the separation distance for a higher frequency range must be applied.
- These guidelines regarding conducted interference induced by RF fields or radiated RF fields may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Warning for Radio interference

For U.S.A, Canada Only

FCC Supplier's Declaration of Conformity

We, the Responsible Party

Company: EIZO Inc.

Address: 5710 Warland Drive, Cypress, CA 90630

Phone: (562) 431-5011

declare that the product

Trade name: EIZO

Model: CuratOR SC431-CCU/SC431-CH

is in conformity with Part 15 of the FCC Rules. Operation of this product 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.

WARNING!

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

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

Note

Use the specified cable below or EIZO signal cable so as to keep interference within the limits of a Class A digital device.

- AC Cord
- Shielded Signal Cable

Canadian Notice

This Class A information technology equipment complies with Canadian ICES-003.

Cet équipement informatique de classe A est conforme à la norme NMB-003 du Canada.

For Europe, Australia, New Zealand, etc Only

Warning

Operation of this equipment in a residential environment could cause radio interference.

Warnung

Der Betrieb dieses Geräts in einer Wohnumgebung könnte Funkstörungen verursachen.

Avertissement

L’utilisation de cet équipement dans une zone résidentielle pourrait provoquer des interférences radio.

LIMITED WARRANTY

EIZO Corporation (hereinafter referred to as “EIZO”) and distributors authorized by EIZO (hereinafter referred to as the “Distributors”) warrant, subject to and in accordance with the terms of this limited warranty (hereinafter referred to as the “Warranty”), to the original purchaser (hereinafter referred to as the “Original Purchaser”) who purchased the product specified in this document (hereinafter referred to as the “Product”) from EIZO or Distributors, that EIZO and Distributors shall, at their sole discretion, either repair or replace the Product at no charge if the Original Purchaser becomes aware within the Warranty Period (defined below) that the Product malfunctions or is damaged in the course of normal use of the Product in accordance with the description in the instruction manual of the Product (hereinafter referred to as the “User’s Manual”).

The period of this Warranty is two (2) years from the date of purchase of the Product (hereinafter referred to as the “Warranty Period”).

EIZO and Distributors shall bear no liability or obligation with regard to the Product in relation to the Original Purchaser or any third parties other than as provided under this Warranty.

EIZO and Distributors will cease to hold or store any parts (excluding design parts) of the Product upon expiration of five (5) years after the production of the Product is discontinued.

In repairing the Product, EIZO and Distributors will use renewal parts which comply with our QC standards. If the unit cannot be repaired due to its condition or the stockout of a relevant part, EIZO and Distributors may offer the replacement by a product with equivalent performance instead of repairing it.

The Warranty is valid only in the countries or territories where the Distributors are located. The Warranty does not restrict any legal rights of the Original Purchaser.

Notwithstanding any other provision of this Warranty, EIZO and Distributors shall have no obligation under this Warranty whatsoever in any of the cases as set forth below:

1. Any defect of the Product caused by freight damage, modification, alteration, abuse, misuse, accident, incorrect installation, disaster, adherent dust, faulty maintenance and/or improper repair by third party other than EIZO and Distributors;
2. Any incompatibility of the Product due to possible technical innovations and/or regulations;
3. Any deterioration of the sensor, including measurement value of the sensor;
4. Any defect of the Product caused by external equipments;
5. Any defect of the Product caused by the use under environmental conditions not anticipated by EIZO;
6. Any deterioration of the attachments of the Product (e.g. cables, User’s Manual, CD-ROM, etc.);
7. Any deterioration of the consumables, and/or accessories of the Product (e.g. batteries, remote controller, touch pen, etc.);
8. Any deformation, discoloration, and/or warp of the exterior of the Product;
9. Any defect of the Product caused by placement in a location where it may be affected by strong vibrations or shocks;
10. Any defect of the Product caused by leaking battery liquid;
11. Any deterioration or malfunction of the cooling fan caused by adherent dust.

To obtain service under the Warranty, the Original Purchaser must deliver the Product, freight prepaid, in its original package or other adequate package affording an equal degree of protection, assuming the risk of damage and/or loss in transit, to the local Distributor. The Original Purchaser must present proof of purchase of the Product and the date of such purchase when requesting services under the Warranty.

The Warranty Period for any replaced and/or repaired product under this Warranty shall expire at the end of the original Warranty Period.

EIZO OR DISTRIBUTORS ARE NOT RESPONSIBLE FOR ANY DAMAGE TO, OR LOSS OF, DATA OR OTHER INFORMATION STORED IN ANY MEDIA OR ANY PART OF ANY PRODUCT RETURNED TO EIZO OR DISTRIBUTORS FOR REPAIR.

EIZO AND DISTRIBUTORS MAKE NO FURTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO, INCLUDING, WITHOUT LIMITATION, THE PRODUCT AND ITS QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE.

IN NO EVENT SHALL EIZO OR DISTRIBUTORS BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, CONSEQUENTIAL OR OTHER DAMAGE WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFIT, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT OR IN ANY CONNECTION WITH THE PRODUCT, WHETHER BASED ON CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, EVEN IF EIZO OR DISTRIBUTORS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THIS EXCLUSION ALSO INCLUDES ANY LIABILITY WHICH MAY ARISE OUT OF THIRD PARTY CLAIMS AGAINST THE ORIGINAL PURCHASER. THE ESSENCE OF THIS PROVISION IS TO LIMIT THE POTENTIAL LIABILITY OF EIZO AND DISTRIBUTORS ARISING OUT OF THIS LIMITED WARRANTY AND/OR SALES.

After-sales service

If you have questions about support for this product, please contact your local EIZO representative.

What to let us know when requesting repairs

- Product name
- CCU serial number (example: S/N 12345678)[*1]
- Camera head serial number (example: S/N 12345678)[*2]
- CCU version[*3]
- Camera head version[*4]
- Error message
- LED blinking pattern on the front of the CCU
- Usage time

[*1] Check the Information screen (see Information (2/4) [▶ 51]). If you are unable to check the Information screen, check the label (8-digit number) on the bottom of the CCU.

[*2] Check the Information screen (see Information (3/4) [▶ 51]). If you are unable to check the Information screen, check the label (8-digit number) on the back of the camera head.

[*3] Check the version only if you can check the information screen (see Information (2/4) [▶ 51]).

[*4] Check the version only if you can check the information screen (see Information (3/4) [▶ 51]).

Disposal

When disposing of this product and accessories, they are treated as industrial waste, so please dispose of it in accordance with the regulations of the region or local government where this product is being used.

EIZO Corporation
153 Shimokashiwano, Hakusan, Ishikawa 924-8566 Japan

EIZO Europe GmbH
Belgrader Straße 2, 41069 Mönchengladbach, Germany

00N0N587A1
IFU-SC431-CCU

www.eizoglobal.com

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