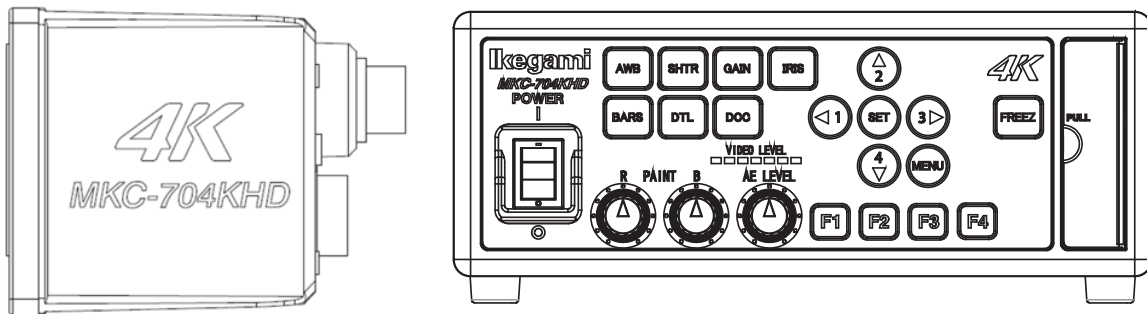


MKC-704KHD

Digital Process Compact 3CMOS Color Camera

Operation Manual



Ikegami

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Safety Precautions

For safe and correct usage



Thoroughly read the “Safety Precautions” and the operation manual before using the unit. Keep them carefully after reading and use as ready reference.

Pictorial Symbols

The “Safety Precautions” and markings on the product contain various pictorial symbols to assure the safety use of the product and prevent an injury to you and other persons as well as property damage.






As each symbol has the following meanings, thoroughly understand them before using the unit.

Please note that some precautions may not be applicable to the product that you purchased.

WARNING:	Indicates a potentially hazardous situation that may arise due to improper handling by taking no notice of this symbol and could result in a serious injury or death.
	
CAUTION:	Indicates a potentially hazardous situation that may arise due to improper handling by taking no notice of this symbol and could result in an injury or property damage only.
	





[Note] △ means a heads-up.

Examples of symbols




	Symbol “⊘” means a prohibited action. The content of prohibited matter is mentioned near or in the figure. (The figure on the left side represents “Caution for disassembling”.)
	Symbol “←” means a mandatory or directive content. Practical precautions are shown in the figure. (The figure on the left side represents “Pull out power plug from plug outlet.”)
	Symbol “i” This mark is a symbol of an operator to advise the annex.
	Symbol “ ” This mark is a symbol that represents the connection to the power supply
	Symbol “○” This mark is a symbol that represents the disconnection to the power supply

CAUTION










When using the unit:

	Do not place a receptacle containing water or a small metallic piece on the unit! If water spills in the unit, a fire or electric shock may be caused.
	Do not use other power supply voltage than specified! A fire or electric shock may be caused.
	Do not put a metal body or flammable material into the opening of the unit! Do not drop in such material! A fire or electric shock may be caused.
	Do not make alterations to the unit! A fire or electric shock may be caused.

When installing the unit:

	Do not set the unit in an unstable place! It may drop or turn down, causing an injury.
	Do not connect to any other equipment than specified! A fire or electric shock may be caused.
	When it is installed, please contact the dealer or salesman.! When fixing the unit, do so in accordance with the specified procedure; otherwise it may drop or turn down, causing a fire, electric shock or injury. Especially when fixing it to the wall or ceiling, be sure to ask the dealer or salesman.

When an abnormal state occurs:

 	If the unit produces smoke, gives out a foul smell or produces an abnormal sound, turn off the power switch immediately and pull out the power plug! If the unit is used as it is, a fire or electric shock may be caused. Check that no smoke is produced, and then contact the dealer or sales representative.
 	If water or foreign matter enters the unit, turn off the power switch and pull out the power plug! If the unit is used as it is, a fire or electric shock may be caused. Check that no smoke is produced, and then contact the dealer or sales representative.
 	If the unit is dropped or the case is broken, turn off the power switch and pull out the power plug! If the unit is used as it is, a fire or electric shock may be caused. Contact the dealer or sales representative.
 	If the unit fails to operate properly, turn off the power switch and pull out the power plug! If the unit is used as it is, a fire or electric shock may be caused. Contact the dealer or sales representative.
	Do not use any damaged power cord (exposed core, broken wire, etc.)! If the unit is used as it is, a fire or electric shock may be caused. Contact the dealer or sales representative.



WARNING:

When installing the unit:

	Do not place a heavy thing on the unit! The unit may lose a balance or drop, causing an injury.
	Do not get a leg over the unit or carrying case! Do not sit down on it! The unit may break down or turn down, causing an injury.
	When moving the unit, be sure to turn off the power switch, pull out the power plug and remove the connecting cable between the unit and equipment beforehand. The cord may be damaged, causing a fire or electric shock.
	When the unit is not used for a long period of time, be sure to pull out the power plug for safety's sake. Otherwise, it may cause a fire.
	Turn off the power switch, to stop working safely, and then unplug the power plug.
	To avoid the risk of electric shock, this equipment must only a supply mains with protective earth.

When installing the unit:

	Do not block up the ventilating hole of the unit! If the ventilating hole of the unit is blocked up, heat will accumulate internally, causing a fire. Avoid the following usage: <ul style="list-style-type: none"> • Turning up or down the unit. Turning it sideways. • Pushing it in ill-ventilated place. • Placing it on a carpet etc. • Covering it with a table cloth etc.
	Do not place the equipment in the way of difficult disconnecting the power plug.



Hints on proper usage

When using the unit:

• When using the unit in a water-place such as bathroom, poolside, etc., prevent water from flowing into the unit and cable; otherwise causing an electric shock. When using it in rainy weather, during snowing, on the seaside or waterside, and in a cooking place, use care to prevent such an accident.
• When snow comes on, check the surrounding conditions before use. Stop using the unit temporarily as necessary and do not touch it; otherwise causing an electric shock.
• Do not connect any equipment whose required electric power exceeds the wattage (W) that can be supplied from the AC outlet. Refer to wattage shown near the AC outlet or in the operation manual.
• Do not bend (or twist or pull) the power cord and connecting cable excessively. The covering material of the cord and cable may break, causing an electric shock.
• A serviceman exchanges it is possible parts:AC cable. When exchanging an AC cable of an accessory.

When installing the unit:

Avoid installing the unit in a moist place, dusty place or any other place exposed to oily smoke and vapor; otherwise causing an electric shock. Do not place the unit near a cooking table or humidifier.
• As this unit is heavy (over 10Kg), carry it by 2 or more persons. If it is carried by one person, it may turn down or drop, sometimes causing a physical damage to the waist or hand or a physical injury.
• Take preventive measures against the overturn of the unit due to an earthquake or sudden shock. As the unit may overturn and cause a physical injury, take preventive measures against the overturn.

Maintenance

Turn off the power switch and pull out the power plug before maintenance; otherwise, causing an electric shock.
In order to keep a long and stable performance, "Periodical check" is recommended. For details of the periodical check, consult with the sales representative.
As the unit has high-voltage parts in it, an expert who has the knowledge about the product should perform these check, maintenance and repair; otherwise causing an electric shock.
When before and after each use, dirt can be seen, wipe the dirt/dust off the camera using a dry, soft cloth. If the stain is stubborn soak the cloth with water or detergent, wring well and wipe. If you use detergent, wipe off the detergent with a cloth that was soaked in just water and wring well. When wiping, always turn the power off, and take care not to spill water in the camera.

THE MKC-704KHD is authorized AAMI ES60601-1/EN60601-1 Class I IP rating of THE MKC-704KHD is IPX0. THE MKC-704KHD is a device for continuous operation.

A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A 급) 전자파적합기기로서 판매자또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

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

Please classify by the material, and dispose of them according to the law and the ordinance etc. of the country and the local government when you dispose of the main body and materials for packing.

The MKC-704KHD is not AP·APG equipment.

The BATTERY for BT1 in MKC-704KHD, that should be used same model as below when you need to exchange it.

MODEL : CR2032

Guidance and manufacturer's declaration - electromagnetic emissions		
The Model MKC-704KHD is intended for use in the electromagnetic environment specified below. The customer or the user of the Model MKC-704KHD should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic
RF emissions CISPR 11	Group 1	The Model MKC-704KHD uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. The Model MKC-704KHD is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC61000-3-3	Complies	

Immunity test	IEC 60601 test level	compliance level	Electromagnetic environment guidance
Electrostatic discharge(ESD) IEC61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	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 transient/burst IEC61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV for input/output lines	Main power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Main 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	<5% Ut (>95% dip In Ut) for 0.5 cycle 40% Ut (60% dip In Ut) for 5 cycle 70% Ut (30% dip In Ut) for 25 cycle <5% Ut (>95% dip In Ut) for 5 cycle	<5% Ut (>95% dip In Ut) for 0.5 cycle 40% Ut (60% dip In Ut) for 5 cycle 70% Ut (30% dip In Ut) for 25 cycle <5% Ut (>95% dip In Ut) for 5 cycle	Main power quality should be that of a typical commercial or hospital environment. If the user of the MODEL MKC-704KHD requires continued operation during power mains interruptions, It is recommended that the MODEL MKC-704KHD be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at characteristic of a typical location in a typical commercial or hospital environment.
NOTE It is the a.c.mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic emissions			
The Model MKC-704KHD is intended for use in the electromagnetic environment specified below. The customer or the user of the Model MKC-704KHD should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	compliance level	Electromagnetic environment guidance
Conducted RF IEC61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications should be used no closer to any part of the MODEL MKC-704KHD, Including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d=1.2\sqrt{P}$ $d=1.2\sqrt{P}$ 80~800 MHz $d=1.2\sqrt{P}$ 800 MHz~2.5 GHz where P is the maximum output power rating of the transmitter Inwatts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters(m) Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level In each frequency range ^{*b} . Interference may occur in the vicinity of equipment marked with the following symbol:
Radiated RF IEC61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range apply. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation Is affected by absorption and reflection from structures, objects and people.			
^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength In the location in which the MODEL MKC-704KHD Is used exceeds the applicable RF compliance level above, the MODEL MKC-704KHD should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the MODEL MKC-704KHD.			
^{*b} Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

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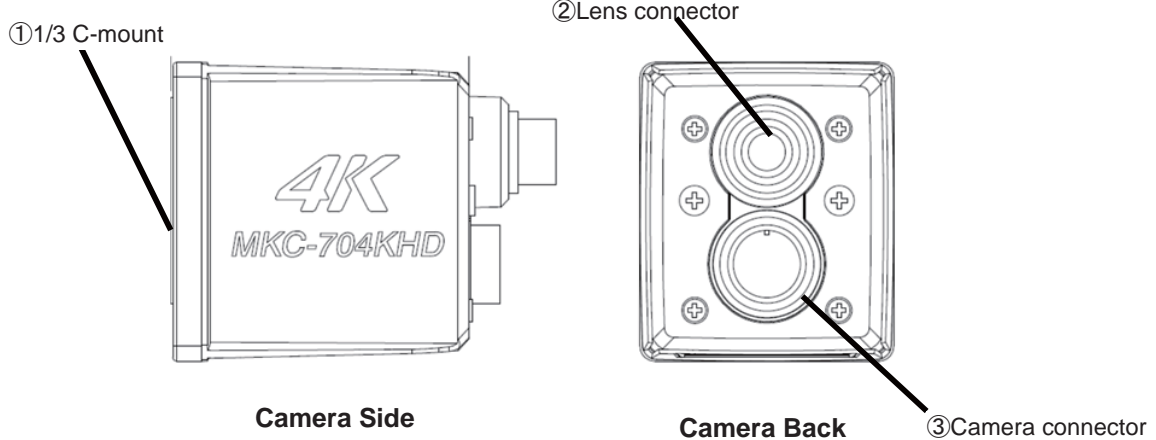
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1. Overview

MKC-704KHD is the ultra-small HDTV camera equipped with the 1/3 inch 3CMOS sensor for medical field, microscope, slit lamp, operation theatre light, especially Endoscopy. The sensitivity of near infrared light has been improved. And the fluorescence, such as ICG and 5-ALA can be observed. It equips the 4K signal output as a standard, and it performs highly image resolution to detail. In addition to the output of 4K signal, 3G/HD-SDI, DVI, the output of the NTSC/PAL type of VBS and Y/C is available at the same time. It has high resolution and outputs a good high-quality picture of the visibility more than a conventional camera by adoption of image correction function and tone correction function.

2. Names and Functions of Parts

2.1. Camera Head



① 1/3 C-mount

This is a mount for lens.

It accepts various kinds of C-mount lenses and microscope adapters.

② Lens connector

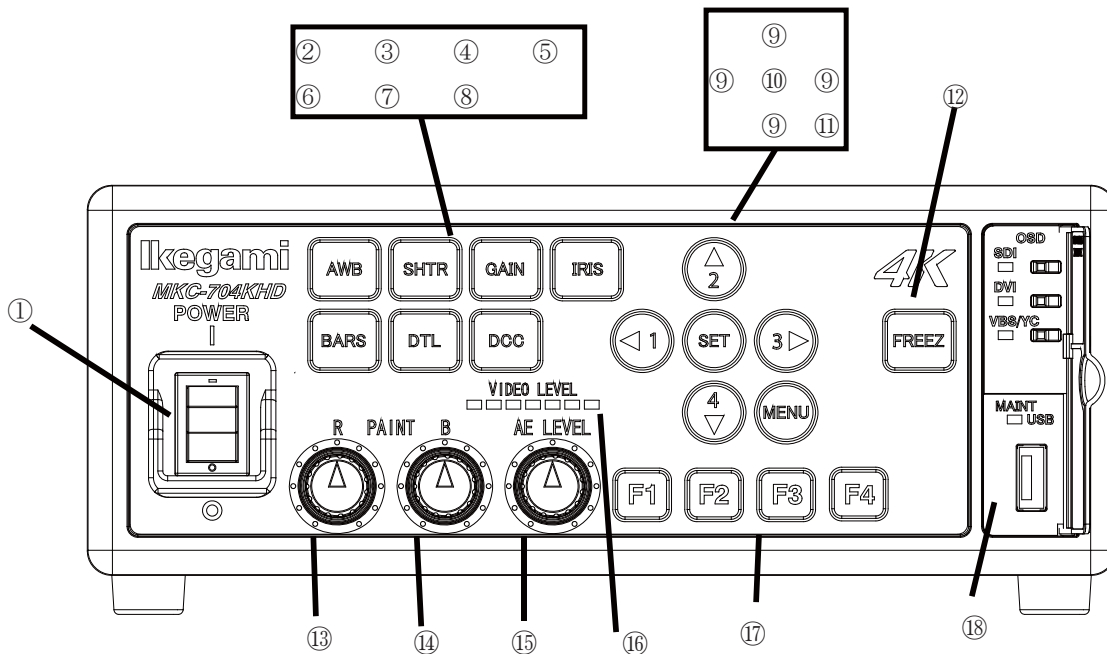
The dedicated microscope adapter or the IRIS cable of a C-mount lens is connected here.

③ Camera connector

The camera connector of a dedicated camera cable is connected here.

Please be aware that the camera connector is different in size between the camera head and the CCU.

2.2. CCU Front



① Power button

This is the power on/off Switch of the MKC-704KHD.

② White balance button

This executes the automatic white balance function. (Page16)

③ Electronic shutter button

This controls electronic shutter speed automatically, and adjusts to the most suitable output level.

④ Automatic sensitivity button

This button controls automatically a sensitivity setting inside the camera and adjusts to the best outputs level.

⑤ Automatic Iris button

This adjusts to an optimum condition automatically according to video brightness.

⑥ Color bar button

This outputs a color bar signal, included in the camera, to the video-out. It can be used for adjusting the brightness, contrast, etc. of a color monitor. (Page21)

⑦ DTL button

This will be made an edge enhancement and a video sharper.

⑧ Bright and dark correction

This will be make a clear video of the light and shade by making the light part lighter and making the dark part darker.

⑨ Arrow keys

This is used for selecting a menu item. And, it is possible to confirm the scene file of each key. (Page22)

⑩ Set button

This is used for deciding about performance of the function in the menu item

⑪ Menu button

This opens a menu, which a user can set as desired, on a monitor screen. And this puts out a menu on the monitor screen. For menu items that can be set, please see Menu Operation. (Page23)

⑫ Freeze button

This can freeze an image.

⑬ Color correction volume (red)

To finely control the red color density on the output picture.

⑭ Color correction volume (blue)

To finely control the blue color density on the output picture

⑮ Brightness volume

This can adjust the brightness of a video.

⑯ VIDEO LEVEL

The level of the video is indicated.

When LED of indication lights up in red, the video level means one octopus beyond 100%.

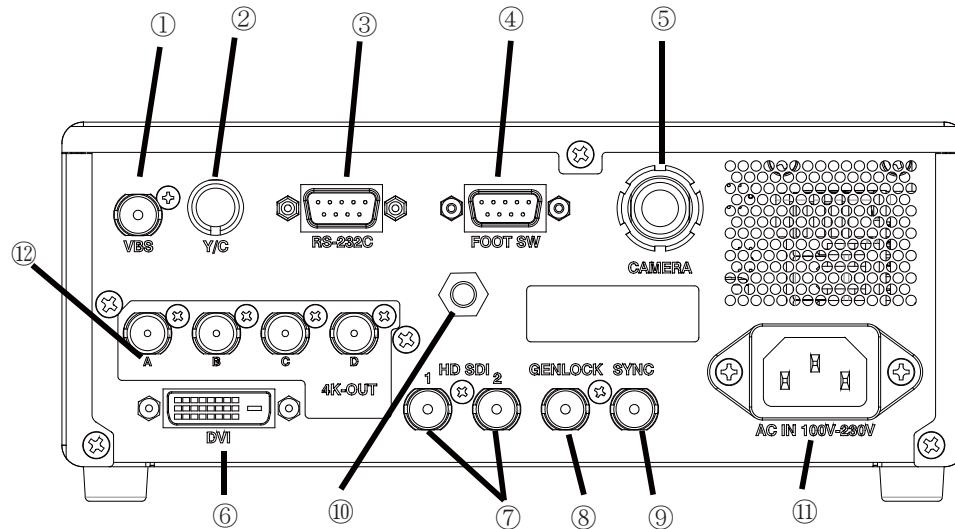
⑰ Function button

The function key set to F1~F4 is executed. (Page29)

⑱ Maintenance Door

The menu has been taken out in SDI,DVI and VBS/YC or the switch to which it's changed whether it isn't taken out and LED have been installed. I have had the USB connector which reads and writes data of scene files.

2.3. CCU Back



① VBS OUT (SD) connector

A VBS-input-compatible monitor etc. is connected here.

A coaxial cable with a 75 Ω impedance should be used for connection.

② S-VIDEO OUT (SD) connector

An S-VIDEO-input-compatible monitor etc. is connected here. An S-VIDEO cable (option) is required for connection. When using An S-VIDEO cable, you must install the ferrite core to the cable. Contact us if you use An S-VIDEO cable.

③ RS-232C connector

The RS-232C cable can be connected here.

④ FOOT SW connector

The extension cable from a foot switch (option) can be connected here. When using the FOOT SW, you must install the ferrite core to the cable. Contact us if you use FOOT SW .

⑤ Camera connector

The camera connector of a dedicated camera cable is connected here.

Please be aware that the camera connector is different in size between the camera head and the CCU.

⑥ DVI-D OUT connector

A DVI-D-input-compatible monitor etc. is connected here. A DVI-D cable (option) is required for connection.

⑦ HD-SDI OUT connector (2 lines)

An HD-SDI-input-compatible monitor etc. is connected here. The same video is output to two lines.

A coaxial cable with a 75 Ω impedance should be used for connection.

⑧ GEN LOCK connector

To synchronize the phase of a video with another system, this inputs a synchronizing signal from that system. A 3-value sync (HD) is supported.

⑨ **SYNC connector**

To synchronize the phase of a video with another system, this outputs a synchronizing signal to that system. A 3-value sync (HD) is supported.

⑩ **Equipotential terminal**

This is used to make the potential of a cabinet equal to other equipment.

⑪ **AC inlet**

The power cable included with a commercial power (100 to 240 VAC) is connected here.

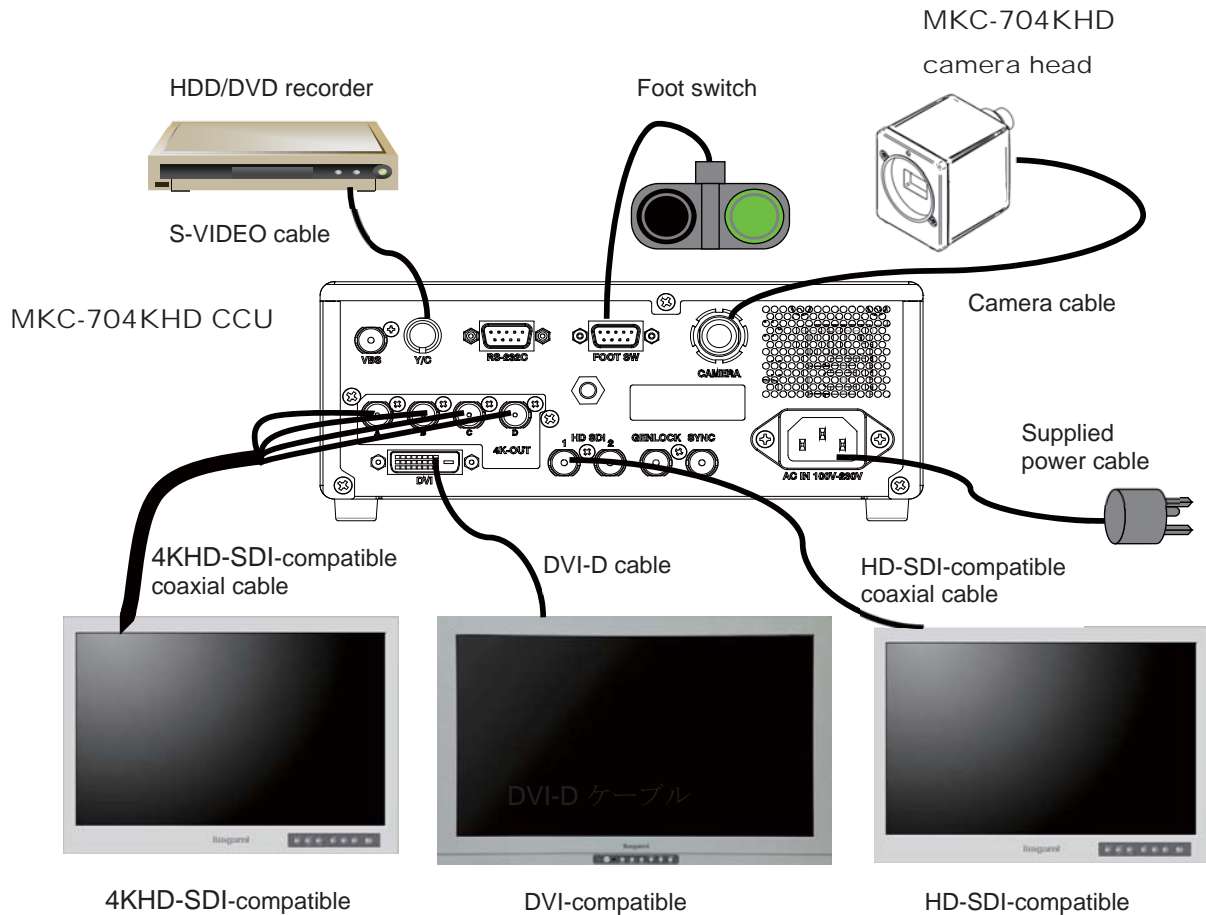
⑫ **4K-SDI OUT connector 3G-SDI (4 lines)**

4K-SDI-input-compatible monitor etc. is connected here.

Four coaxial cable with a 75 Ω impedance should be used for connection.

3. Service

3.1. Connection Example



- * The output from VIDEO OUT should be 75 Ω terminated at the receiver.
- * You should always use the supplied power cable for connection with the power supply.
- * 4KHD-SDI-compatible cable consists of four HDSDI cable.

Precautions During Connection

- Before connection, always power OFF the camera.
- The dedicated camera head should be connected. The other head should not be connected; otherwise, a failure will occur.

Attention on the installation

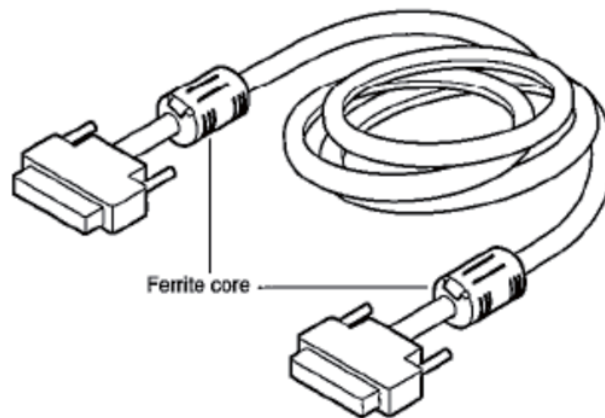
- They seem to install CCU in a well ventilated place and not to close an exhaust port, please separate and establish more than 2cm from a wall.
- When lining up 2 of CCU, please separate and establish more than 1.5cm.

- * Terminate the output from RGB OUT and VIDEO OUT at 75ohms on the receiver side.
- * FOOT SW to be connected to this device, it conforms to the IEC60601-1 : 2005
- * Equipment connected to this unit except FOOTSW that conform to IEC standards that apply to the equipment or IEC60601-1:2005
- * If you are connecting to a device that is in contact with the patient to make the connection in accordance with IEC60601-1 : 2005 Annex I Table I.1
- * While connected, it is necessary to fit the evaluation and IEC60601-1 : 2005 Section 16.
- * When FOOT SW is used in the operating room, you should always use the FOOT SW which is conformed to the IEC60529-IP6.
- * When FOOT SW is used beside the operating room, you should always use the FOOT SW the IEC60529- IP1.

DVI connector

This connector outputs a digital signal. Connect a DVI cable to this connector.

- * Use a DVI cable with a ferrite core at both ends. Contact Ikegami if you are unable to obtain such a cable.



3.2. Powering Up

1. Before power-up, make sure that the external equipment, such as the camera head and a monitor, is connected properly. Power up the external devices such as a monitor
2. Turn ON the main power switch on the CCU back.
 - The supplied power cable should always be connected to the AC inlet on the CCU back.
 - When it is powered up, the power button on the front will light up in olive green.
 - It can be powered off by pressing the power button or turning OFF the main power switch with the power button lit.
 - Immediately after power-up, a loading bar “Please wait•••” will appear on a monitor screen. While the gage of the loading bar is filled, the CCU and the camera head will be initialized automatically.
 - When a loading bar is filled, a loading bar "Please wait•••" disappears from the monitor screen automatically.
3. A video from the camera is output
 - It takes about 3 seconds until a picture is output after “Please wait•••” and a loading bar disappears, however, this is not a failure.
 - When it is powered off with an image frozen, this state will not be retained even after the power is turned ON again, but the normal shooting mode will be established.

* Before relocating the main unit, always turn off the main power, remove the power plug, and disconnect the cables connected among equipment.

* If any cable is disconnected during use, you should redo the above procedure from the beginning.

CUTION:



Precautions on Plugging or Unplugging the Camera Cable

Before plugging or unplugging the camera cable that connects the camera head and the CCU with each other, always power off the main unit.
If the camera cable is plugged or unplugged with the main unit powered ON, a failure will occur.

Precautions on Video from Camera

This machine uses a CMOS sensor.
Therefore, a video may encounter the following phenomena; however, this is not a failure.

With higher sensitivity or with still higher temperature, bright spots may appear in a video.

Under the lighting of a discharge tube, such as a fluorescent lamp, flicker or horizontal stripes appear on a screen. In this case, when, for a 50 Hz area, a shutter speed is set to 1/100 s, they will reduce, but not disappear completely.

For the subject moving fast on a screen, distortion may occur on the screen.

3.3. Setting a White Balance

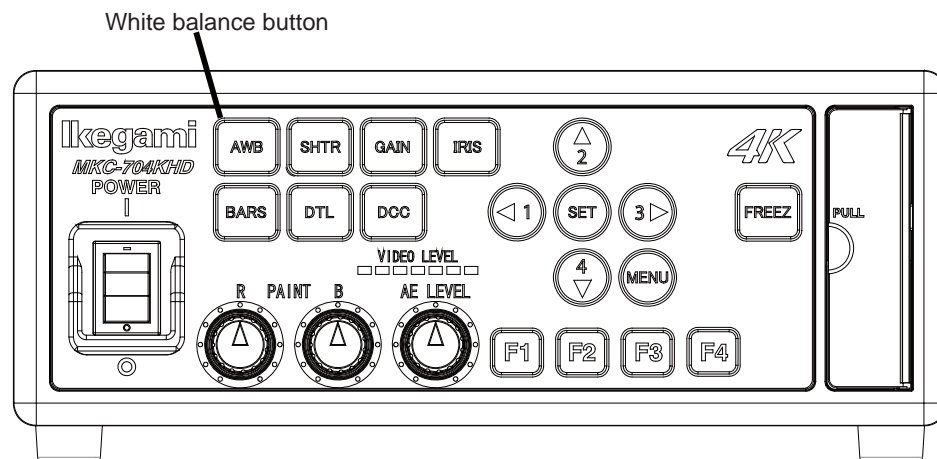
When using MKC-704KHD for the first time, or when the light source has been changed, adjust the White Balance.

The white balance can be adjusted automatically.

<Operation>

1. Shoot a white photographic object on the screen largely, and press the white balance button.

- During automatic adjustment, the white balance button lights up.



- “AWB” will appear on a monitor screen. When the adjustment is complete successfully, “AWB COMPLETED” will appear.



- When “AWB ERROR” appears, the white balance is not adjusted successfully. Recheck the image pickup conditions (a white subject, brightness, etc.), and readjust the white balance.
 - If the image level is too low.
 - If the image level is too high.
2. When the automatic adjustment is complete, the light of the auto white button will go out automatically.

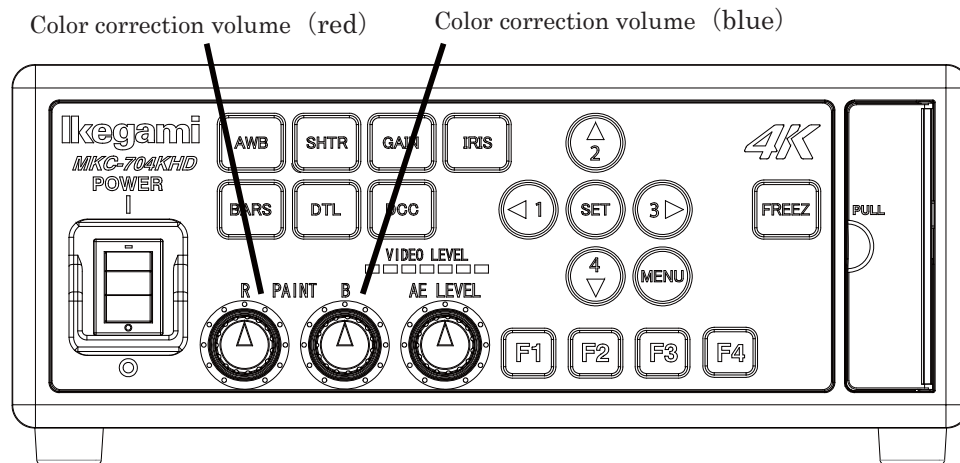
3.4. Adjusting a Paint

After white balance adjustment it is possible with the MKC-704KHD to carry out fine adjustment of the red level and blue level/density of picture as desire of user.

<Operation>

1. Turn the color correction volume (red) and the one (blue) to make adjustments.

- Turning it to the right and left raises and reduces the level respectively.



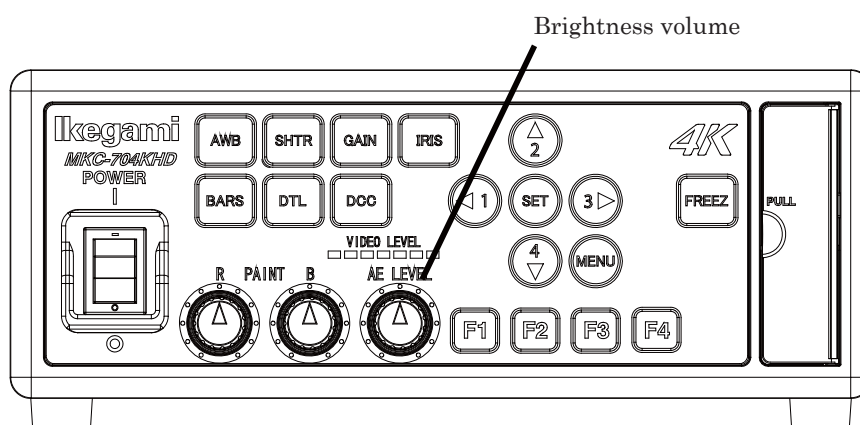
3.5. Adjusting an AE Level

The MKC-704KHD can adjust a shutter speed, sensitivity, Iris, gain, and an iris automatically, according to the preset exposure level. A screen becomes easy to see by raising the level when the screen is too dark, or reducing it when too bright.

This function is enabled when Auto sensitivity/ Electronic shutter/Auto Iris is AUTO.

<Operation>

1. Turn the brightness volume to make adjustments.
 - Turning it to the right and left brightens and darkens the screen respectively.

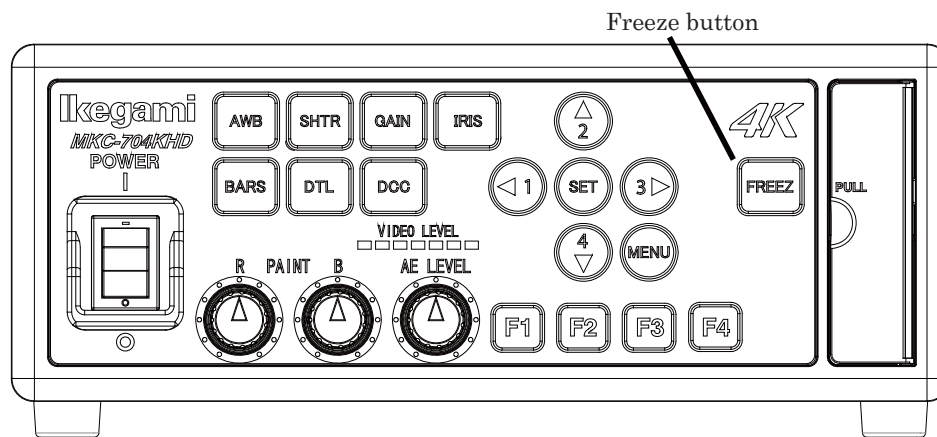


3.6. Outputting a Still Image

It is possible on the MKC-700HD to temporarily stop moving image output and switch to freeze frame output.

<Operation>

1. Press the freeze button.
 - A still image will be output immediately.
 - While a still image is output, the freeze button lights up.



2. To unfreeze the image, press the freeze button again.
 - The light of the freeze button will go out.

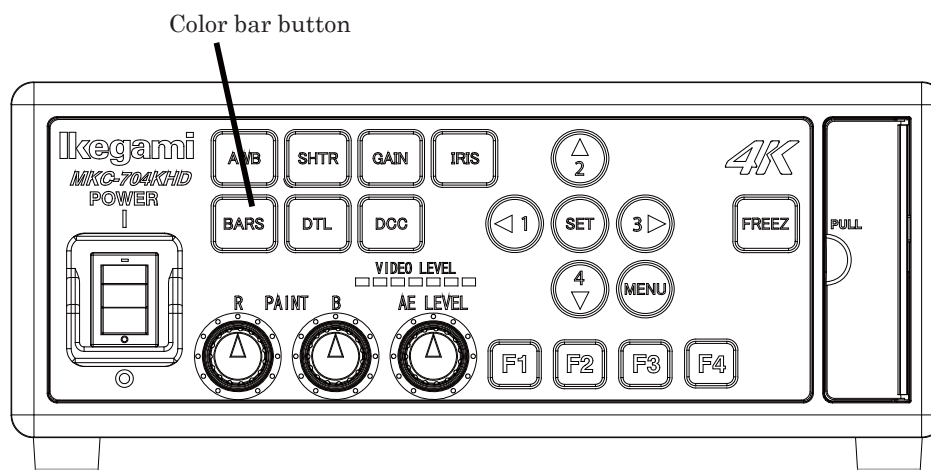
3.7. Outputting Color Bars

It is possible with the MKC-704KHD to output a color bar.

This is used when adjusting the color monitor brightness, contrast, etc.

<Operation>

1. Press the color bar button.
 - Color bars will be output immediately.
 - While color bars are output, the color bar button is lit in green.



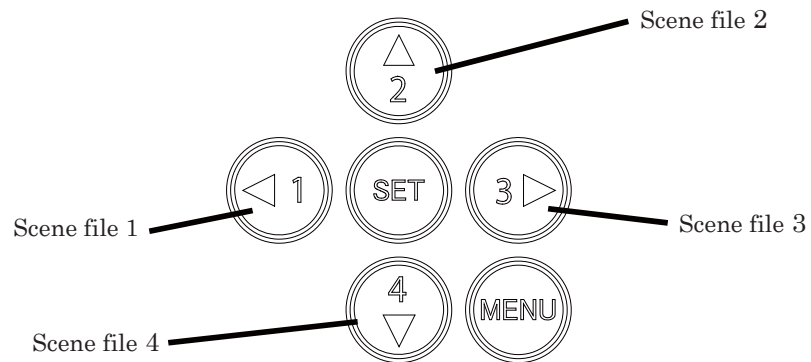
2. To restore a video from the camera, press the color bar button again.
 - The light of the color bar button will go out.

3.8. Selecting a Scene File

By storing settings often used on the MKC-704KHD beforehand in a scene file, it is possible to read them at any time. A maximum of four scene files can be stored.

<Loading>

1. The arrow key corresponding to the currently selected scene file is lit.
2. Select a scene file with the arrow key.
 - The numeral near an arrow key shows a scene file number.
 - The arrow key corresponding to the selected scene file will light up.
 - The settings in the scene file will take effect immediately.



4. Menu Operation

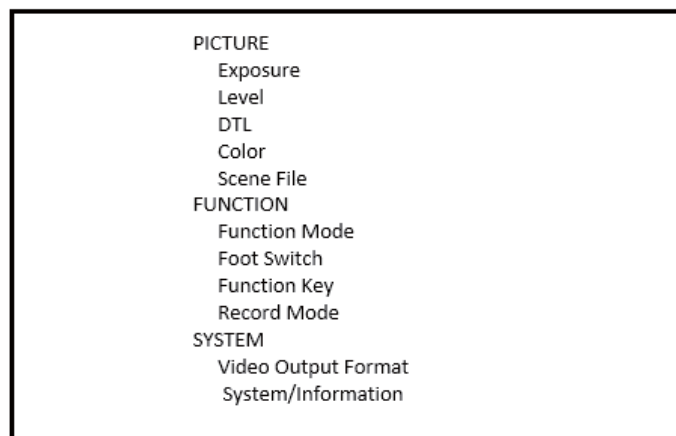
The MKC-704KHD has various kinds of functions that are very useful in service.

A user can select and set these functions as desired.

The basic procedure for operation is as follows.

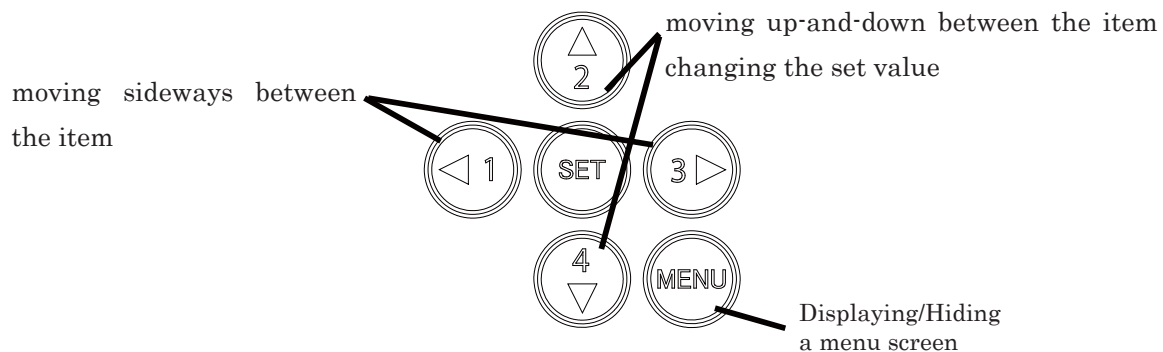
4.1. Operation Procedure

1. When you press the menu button on the CCU front, a menu will open on a monitor screen, where you can set various kinds of camera functions.



2. On the CCU front, the \uparrow/\downarrow key is used by moving up-and-down between the item and changing the set value of each item, and the \leftarrow/\rightarrow key is used by moving between the item sideways and adding a cursor to a setting space of each item.

The item by which "◎ Run" is indicated under the menu screen is to press a decision button, and its function is performed.



※When, with a menu screen displayed, you press the menu button on the CCU front, the settings will be saved and the menu screen will close.

4.2. PICTURE

4.2.1 Exposure

This is a setting for exposure of video.

PICTURE>Exposure	
Measurement Area	Middle
Area Display	ON
AE Level	-75
Speed	Middle
Peak Ratio	25
Shutter	Auto→
Gain	Auto→
High Sens.	OFF
Iris Control	Auto→

The 2nd hierarchy			The 3rd hierarchy		
Item	Defaults	setting	Item	Defaults	setting
Measurement Area	Middle	[Narrow] [Middle] [Full] [Circle] [User]			
Area Display	ON	[ON] [OFF]			
AE Level	-75	-128 ~ 127			
Speed	Middle	[Slow] [Middle] [Fast]			
Peak Ratio	25	0 ~ 63			
Shutter	Auto	[Manual]			
		L	Shutter Speed	OFF	[1/4] ~ [1/10000]
		[Auto]			
		L	Shutter Limit	1/4000	[1/100] ~ [1/10000]
Gain	Auto	[Manual]			
		L	Normal Gain	-9dB	[-9dB] ~ [24dB]
		[Auto]			
		┐	Base	-9dB	[-9dB] ~ [6dB]
		L	Range	12dB	[3dB] ~ [18dB]
High Sens.	OFF	[OFF] [Pixel Mix] [Line Mix] [P/L Mix]			
Iris Control	Auto	[Auto]			
		L	Iris Priority	Iris	[Iris] [Shutter]
		[Manual]			
		L	Iris Level	0	-128 ~ 127

4.2.2 Level

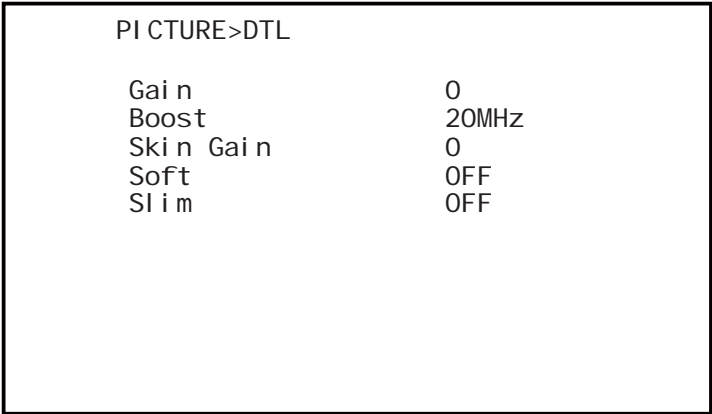
This is a setting for level of video.

PICTURE>Level	
Pedestal	0
Flare	7
Gamma	0
White Shading	OFF
Black Balance	OFF
R Paint	0
B Paint	0
Knee	ON

The 2nd hierarchy			The 3rd hierarchy		
Item	Defaults	setting	Item	Defaults	setting
Pedestal	0	-128~127			
Flare	7	0~50			
Gamma	0	-128~127			
White Shading	OFF	[OFF]			
		[ON]			
		L	A. White Shading		[Run]
Black Balance	OFF	[OFF]			
		[ON]			
		L	A. Black Balance		[Run]
R Paint	0	-128~127			
B Paint	0	-128~127			
Knee	ON	[ON] [OFF]			

4.2.3 DTL

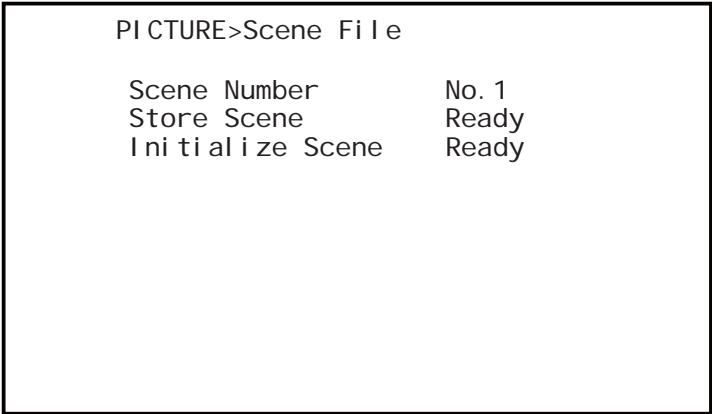
This is a setting for edge enhancement.



Item	Defaults	setting
Gain	0	－128～127
Boost	20MHz	[2MHz[～[26MHz]
Skin Gain	0	－128～127
Soft	OFF	[ON] [OFF]
Slim	OFF	[ON] [OFF]

4.2.5 Scene File

You can save or load the setting information as a scene file. Up to four scene files can be created.



Item	Defaults	setting
Scene Number	No.1	[No.1] [No.2] [No.3] [No.4]
Store Scene	Ready	[Ready] [No.1] [No.2] [No.3] [No.4]
Initialize Scene	Ready	[Ready] [No.1] [No.2] [No.3] [No.4]

4.3. FUNCTION

4.3.1 Function Mode

This is a setting for other functions.

FUNCTION>Function Mode	
Digital Zoom	×1.0
Flip	OFF
DNR Level	12
Real Time DPC	OFF
Auto Contrast	Low
Fluorescein	OFF
ICG	OFF

The 2nd hierarchy			The 3rd hierarchy		
Item	Defaults	setting	Item	Defaults	setting
Digital Zoom	x1.0	x1.0 ~ x4.0			
Flip	OFF	[OFF] [Flip] [Mirror] [Rotate]			
DNR Level	12	0 ~ 31			
Real Time DPC	ON	[ON] [OFF]			
Auto Contrast	Low	[Low] [Middle] [High]			
Fluorescein	OFF	[ON] [OFF]			
ICG	OFF	[OFF]			
		[ON]			
		┐	Normal Gain	+15dB	[-9dB] ~[24dB]
		┐	Gamma Cont.	ON	[ON] [OFF]
		┐	Black Press	OFF	[ON] [OFF]
		┐	Color	OFF	[ON] [OFF]
		┐	DTL	OFF	[ON] [OFF]
		┐	DNR Level	8	0 ~ 31
		┐	Iris	127	0 ~ 127
		┐	Shutter	OFF	[OFF] [1/30]
		┐	High Sens.	OFF	[OFF] [Pixel Mix] [Line Mix] [Pixel Line Mix]
		┐	Super Res.	OFF	[ON] [OFF]
		┐	Auto Contrast	OFF	[OFF] [Low] [Middle] [High]
		└	Operation	Manual	[Manual] [Auto]

4.3.2 Foot Switch

Set the behavior of a foot switch when operated. A maximum of four foot switch functions can be stored.

FUNCTION>Foot Swi tch

Foot Swi tch1

Foot Swi tch2

Foot Swi tch3

Foot Swi tch4

None

None

None

None

Item	Defaults	setting
Foot Switch 1	None	[None] [Flip] [Mirror] [Rotate] [ICG] [Fluorescein] [Zoom in] [Zoom Out] [A. Contrast] [Freeze] [Photo] [Rec] [Scene1<—>2] [Scene1<—>3] [Scene1<—>4] [Scene2<—>3] [Scene2<—>4] [Scene3<—>4] [Scene F(Rot)]
Foot Switch 2	None	Same as above.
Foot Switch 3	None	Same as above.
Foot Switch 4	None	Same as above.

4.3.3 Function Key

Set the behavior of a function key when operated. A maximum of four function keys can be stored.

FUNCTION>Function Key

Function Key1	None
Function Key2	None
Function Key3	None
Function Key4	None

Item	Defaults	setting
Function Key 1	None	[None] [Flip] [Mirror] [Rotate] [ICG] [Fluorescein] [Zoom In] [Zoom Out]
Function Key 2	None	Same as above.
Function Key 3	None	Same as above.
Function Key 4	None	Same as above.

4.4. SYSTEM

4.4.1 Video Output Format

This is a setting for an item about video signal.

SYSTEM>Vi deo Output Format	
Frame Rate	59.94fps
SDI Output	1080i
DVI Output	1080p
SD Aspect	Si de Cut
H Posi tion	0
V Posi tion	0
Genlock H Phase	0
Genlock V Phase	0
Center Marker	OFF

Item	Defaults	setting
Frame Rate	59.94fps	[59.94fps] [50fps]
SDI Output	1080i	[1080p] [1080i]
DVI Output	1080p	[1080p] [1080i]
SD Aspect	Side Cut	[Side Cut] [Letter Box]
H Position	0	-32 ~ 32
V Position	0	-8 ~ 8
Genlock H Phase	0	-128 ~ 127
Genlock V Phase	0	-128 ~ 127
Center Marker	OFF	[ON] [OFF]

About change in the setting.

When changing the setting of a frame rate, SDI output and DVI output, a screen is switched over step by step.

Example : When it was changed to 50Hz from 59.94Hz in Frame Rate.

```

SYSTEM>Vi deo  Output  Format

Frame Rate           59. 94fps⇒50fps
SDI  Output          1080i
DVI  Output          1080p
SD Aspect            Si de Cut
H Posi tion          0
V Posi tion          0
Genlock H Phase      0
Genlock V Phase      0
Center Marker        OFF

```

- ① ‘Processing . . .’ appears

```

SYSTEM>Vi deo  Output  Format

Frame Rate           50fps
SDI  Output          1080i
DVI  Output          1080p
SD Aspect            Si de Cut
H Posi tion          0
V Posi tion          0
Genlock H Phase      0
Genlock V Phase      0
Center Marker        OFF

Processing . . .

```

- ② ‘Camera Head Disconnected’ appears

Communication with a camera head is cut temporarily. During this process, it has a big screen disorder. However, this is not a failure.

```

SYSTEM>Vi deo  Output  Format

Frame Rate           50fps
SDI  Output          1080i
DVI  Output          1080p
SD Aspect            Si de Cut
H Posi tion          0
V Posi tion          0
Genlock H Phase      0
Genlock V Phase      0
Center Marker        OFF

Processing . . .
Camera Head Di sconnected

```

③ Yes/No appears

If the following indication goes out, it's chosen whether 'Yes' is chosen and continued or the 'No' be chosen and canceled.

It will be returned in the previous state automatically in several seconds without doing everything.

```
SYSTEM>Video Output Format

Frame Rate           50fps
SDI Output           1080i
DVI Output           1080p
SD Aspect            Side Cut
H Position           0
V Position           0
Genlock H Phase      0
Genlock V Phase      0
Center Marker        OFF

This setup has been changed!
Press 'Yes' to continue.
Press 'No' to cancel .
      Yes No
```

4.4.2 System/Information

To reset the set value in the state of the time of shipment from factory, record of setting data and reading and set on which the menu screen is fixed can be performed here. The version of the software appears.

SYSTEM>System/Information	
Initialize	Ready
USB Memory	CCU→USB
Menu Lock	OFF
CCU Ver.	-----
HEAD Ver.	-----
RECORDER Ver.	-----

Item	Defaults	setting
Initialize	Ready	[Ready] [Start]
USB Memory	CCU → USB	[CCU → USB] [USB → CCU]
Menu Lock	OFF	[ON] [OFF]
CCU Ver.	*****	*****
HEAD Ver.	*****	*****
RECORDER Ver.	*****	*****

4.5. Option

MKC-704KHD has the following OPTION.

CVA-300R/RI

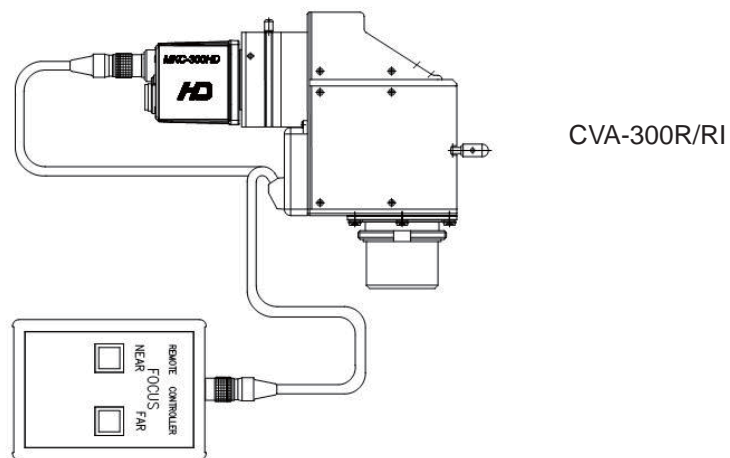
FC-300R/RI

CVA-300R/RI is a surgical microscope adapter for MKC-704KHD.

FC-300R/RI is a remote control for the CVA-300R/RI.

Advanced features of the CVA-300R/RI, FC-300R/RI, please refer to the operation manual of CVA-300RI.

■ CVA-300RI / FC-300RI are connected to a camera head



5. Advance Use

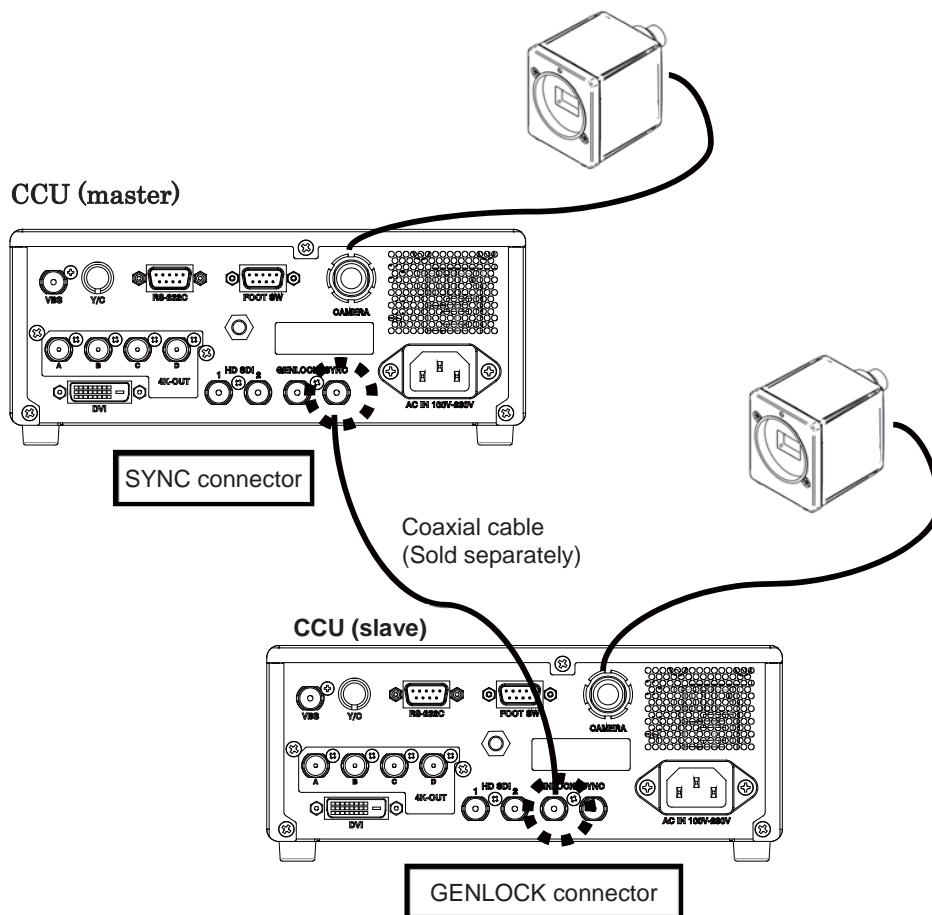
5.1. External Synchronization

To use this machine in external synchronization mode, input SYNC to the GENLOCK terminal on the CCU back. When SYNC is input to the GENLOCK terminal, the camera will enter external synchronization mode from internal synchronization mode automatically.

SYNC input conditions: 3-value SYNC: 0.6 Vp-p / 75 Ω

5.1.1 Wiring Example

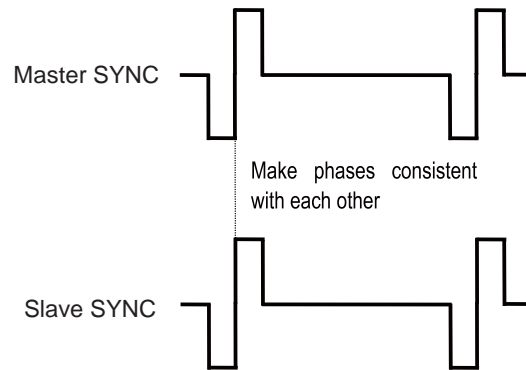
Prepare two sets of the CCU and camera for MKC-704KHD. Connect the SYNC connector on the CCU (master) and the GENLOCK connector on the CCU (slave) with each other, using a coaxial cable.



5.1.2 Setting

Observing the SYNC output waveforms of the master and the slave CCU, adjust PHASE so that H/V phases may become consistent with each other. The slave one (whose GENLOCK connector is connected) should be a target for the adjustment. The master one does not need the phase adjustments.

Choose [Video Output Format]→[Genlock H phase] [Genlock V phase] from the menu, and press the '→' '←' key.

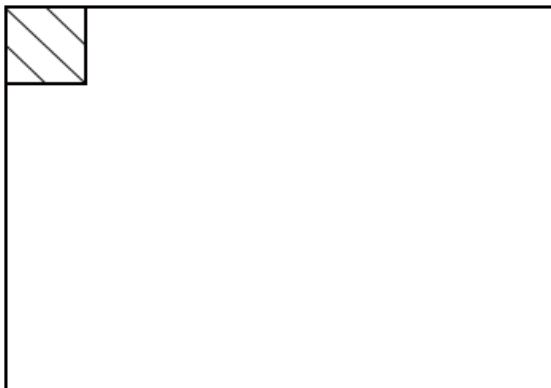


5.2. Manually Setting a Metering Frame

You can change the range of a metering frame as desired. By adjusting a metering frame, a video can automatically be adjusted in keeping with the use environment.

5.2.1 Setting

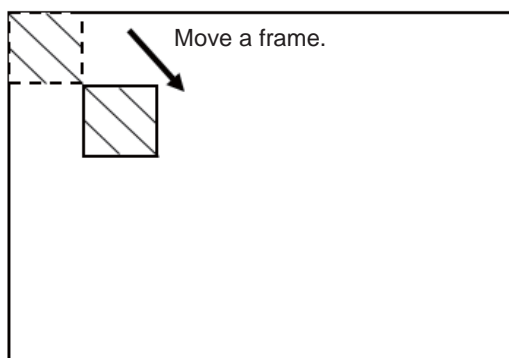
Choose [Exposure]→[Measurement Area]→[USER..] from the menu, and press the '→' key. You will enter the manual setting screen for a metering frame. The frame from which a metering frame is chosen is the part attracted by a slanted line in the screen.



You can set the position and size of a metering frame by using the part of the Slanted line.

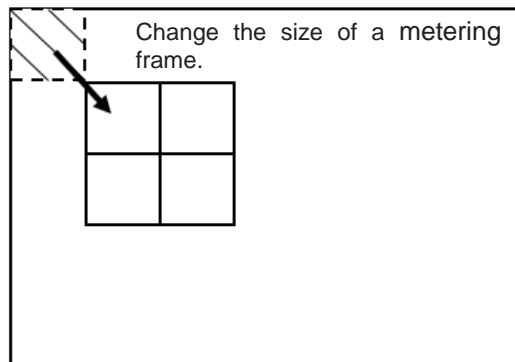
Setting the Position

It is possible to move a frame of the slanted line part using “↑” / “→” / “↓” / “←” in the CCU front ,and to fix the location of a metering frame using decision' button.(A fixed part is indicated by a white frame.) But, The size of the frame of the slanted line part which becomes a basis can't be changed. A metering frame is adjusted by moving a frame of the slanted line part and by operating decision' button.



Setting the Size

It is possible to adjust the size and the shape by combining a white frame which pressed a decision button and made them fix. Please adjust the area and the shape of a metering frame by using “↑” / “→” / “↓” / “←” buttons and the SET button.



Canceling the frame

When you would like to cancel a metering frame (a white frame) fixed, please move a slanted line frame to the frame which would like to cancel the metering frame. And press a 'decision' button.

Saving a setting

When a menu button of a front panel is pressed, it returns to the previous menu screen, and setting is preserved automatically. When it's changed to 'Manual', an established metering frame can be used.

5.3. Scene File

It is possible to set up to four scene files, which can be selected according to the shooting conditions, to this machine. You can also restore the factory defaults.

5.3.1 Saving a Scene File

A scene file can be created from a menu. Since the current settings are saved to a scene file, you should adjust the desired settings beforehand.

At [Scene File] on a menu, select one of the alternatives: [Store Scene 1] to [Store Scene 4], and press the SET button. The settings will be saved immediately to the scene file.

(Please see 3.8 Selecting a Scene File.)

5.3.2 Initializing a Scene File

At [Scene File] on a menu, select a file to initialize from the alternatives: [Initialize Scene 1] to [Initialize Scene 4], and press the 'decision' button. The selected scene file will be initialized immediately.

5.3.3 Setting a Scene File

To apply the saved scene file, operate a front panel (Page22) or a foot switch, a function switch.

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6. Specification

6.1. Rating

(1) Lens mount	C-mount
(2) Optical system	RGB prism
(3) Image pickup device	1/3-inch CMOS sensor x 3 Effective pixels: 1920 x 1080
(4) Scan mode	Progressive scan
(5) Aspect ratio	H16 : V9
(6) External synchronization input	3-value SYNC: 0.6 V _{p-p} / 75 Ω Note: The color frame in down-conversion will not be locked.
(7) Video output signal	
• 4K output	3840×1080P 59.94/50Hz 3G-SDI×4 (1 line) : 0.8V _{p-p} /75 Ω×4 1080I/59.94Hz, 1080I/50Hz, 1080P/59.94Hz, 1080P/50Hz HD-SDI (2 line): 0.8V _{p-p} /75 Ω DVI (1line): 1920×1080P 59.94/50Hz 1920×1080I 59.94/50Hz
• HDTV output	
• SDTV output	SD-VBS(1line) : 1.0V _{p-p} /75 Ω SD-Y/C(2line) : Y 1.0V _{p-p} /75 Ω 4P/DSUB C 0.286V _{p-p} /75 Ω
(8) Shutter Speed	1/100~1/10000 (Continuation is variable at the time of Auto Shutter Iris Control)
(9) Detail Enhancement	Horizontal : 2H Vertical : 2H
(10) Power supply	AC100 to 240 V ± 10%
(11) Power consumption	60W or less
(12) Operating temperature, humidity	0°C to +40°C 30% to +90% (At the time of non-dew condensation.)
(13) Outline dimensions/weight	Camera head: W34 x H40 x D40 mm / 100 g or less CCU: W210 x H80 x D270 mm / 3 kg or less
(14) Camera cable (standard)	5 + 10m cable (It is extended to 25m by a repeater.)
(15) Accessories	Instruction Manual

6.2. Performance

- | | |
|------------------------|---|
| (1) Resolution | Horizontal:1000 TV lines Vertical : 1000 TV lines (1080I 59.94/50 Hz) |
| (2) S/N ratio | 58 dB targeted (γ and detail OFF) |
| (3) Sensitivity | Standard 2000lux F16/3200K or more
(at the time of LIN MIX ON) |
| (4) Registration Error | Full Screen within 0.05% |

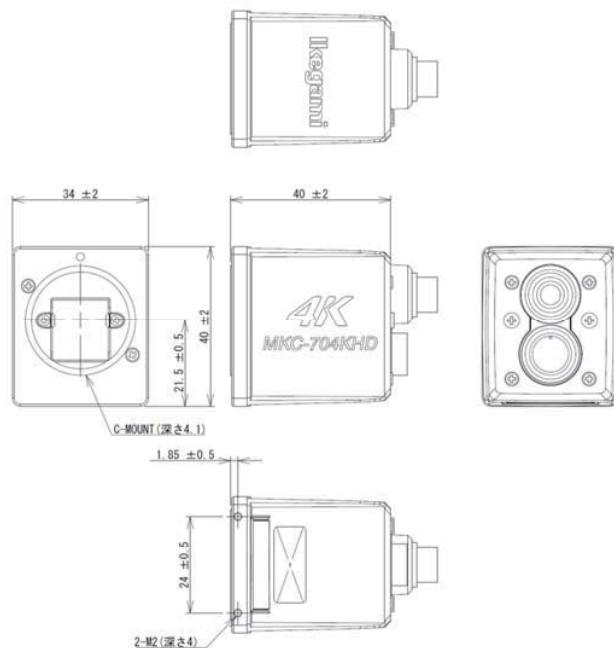
6.3. Function

- | | |
|--|--|
| (1) Auto Gain control function | (0~18dB) |
| (2) Base Gain selection function | -9dB~6dB
(It's possible to establish it every 3dB.) |
| (3) Painting | R、 Bch ±3dB |
| (4) Freeze function included | |
| (5) Slow Shutter | 1/30,1/15,1/8,1/4 field/sec |
| (6) Flare correction function | |
| (7) Shading correction function | |
| (8) Iris Control (shutter IRIS、 DC | Corresponding to IRIS) |
| (9) Color bars included | |
| (10) Image flip function (horizontally, vertically, horizontally and vertically) | |
| (11) Variable metering area function | |
| (12) video correction function | |
| (13) tone correction function | |
| (14) Auto Function | |
| • Auto White Balance | |
| • Auto Gain Control | |
| • Auto Shutter | |
| • Auto Knee | |
| (15) Scene File SAVE • LOAD function | |
| (16) ICG mode | |
| (17) Fluorescein mode | |
| (18) 2 linear addition and 1 linear reading switch function | |
| (19) H,V Centering function (H direction±32Pixel V direction±8Line) | |
| (20) Center Marker indication function | |
| (21) Digital zoom (At most 4 times) | |
| (22) pixel addition function | |

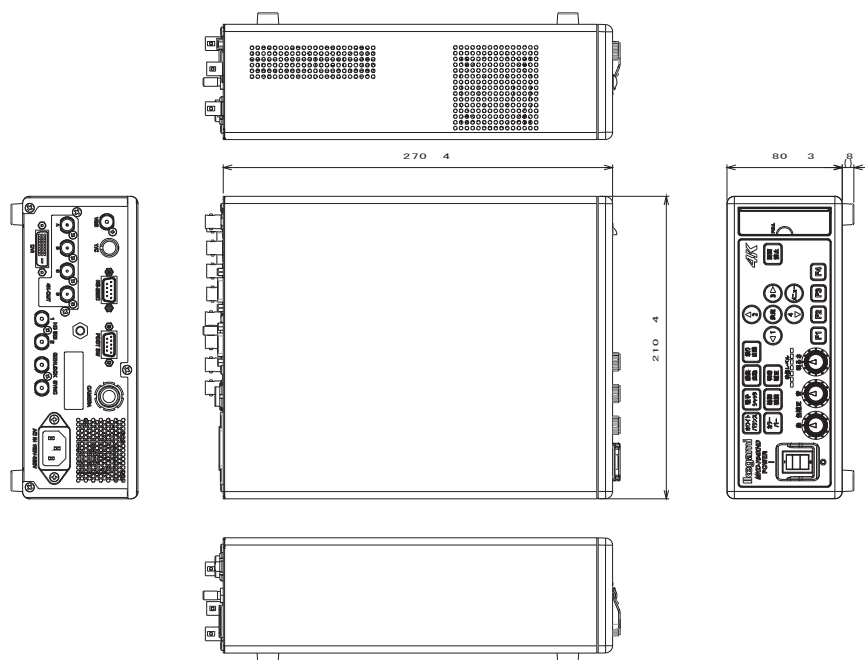
7. Appearances

7.1. Camera Head

Unit: mm



7.2. CCU



MKC-704KHD

Operation Manual

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