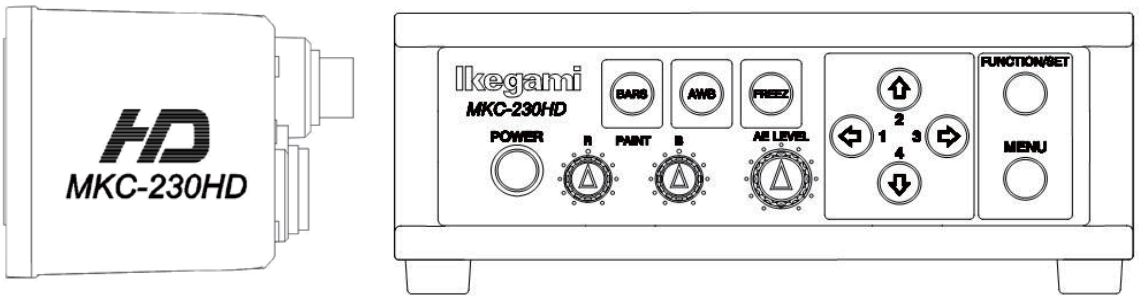
MKC-230HD Rev.A

Digital Process Compact 3CMOS Color Camera

Operation Manual



Ikegami

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 under- stand 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) ⚠: This symbol attracts your attention.

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.")
	The meanings of this mark are as follows. Attention、consuit ACCOMPANYING DOCUMENTS
	This mark is a symbol that represents the connection to the power supply
	" This mark is a symbol that represents the disconnection to the power supply

⚠WARNING

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.

⚠ CAUTION

When using 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.

Before relocating it, always turn off the power switch, remove the power plug, and disconnect the cables connected among equipment!
If a cord is damaged, a fire or an electric shock might occur.

Before taking it out of service for a long time, always remove the power plug from the outlet.
A fire might occur.

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:
- 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.

For Successful Use

When using the unit:

- **When it begins to thunder, consider the use environment. If necessary, take this machine out of service temporarily, and do not touch it.**
  An electric shock will occur.

- **Avoid bending (twisting, or pulling) the power cord and the connected cables forcibly.**
  If a cord or a cable sheath is torn, an electric shock will occur.

When installing the unit:

- **At the time of installation, avoid such a place as is damp or dusty, or is exposed to greasy fumes or steam.**
  An electric shock will occur. Please avoid putting it near a cooking table or a humidifier.

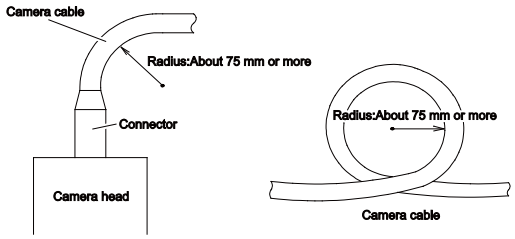
- **Prevent it from toppling by a sudden earthquake, shock, etc.**
  If this machine topples, injury may occur; for safety, therefore, you should take the measures against toppling.

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

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

About Camera Cable

Note the following.
- While removing the camera cable from the camera head or the CCU, hold the connector (plug), without pulling the cable by any means.
- Do not crush the cable.
- While the power is on, do not plug or unplug the camera cable.
- Since the allowable bending radius of the camera cable is about 10 times the outside diameter of the cable (for φ7.5 mm cable, about 75 mm), do not forcibly bend it any more. If it is bent forcibly, wires inside the cable may break.



- When anchoring the camera head to a turntable etc., clamp the camera cable so that the cable may not be strained even when moved. Take care not to form a kink (a twist or an undulation). If the kinky one is used, wires inside the cable may break.
- Before use, make sure that the cable and bundled wires are not damaged or deteriorated.

About Engagement of Conversion Lens or ND Filter

Note the following.
- When using a conversion lens or an ND filter at the front of the lens, thrust that firmly in and engage with this.
- Before use, check that they are fully engaged with each other. If the engagement is not complete, it may drop during use.

About Care

Before care, for safety, turn off the power switch, and remove the power plug. An electric shock will occur.

We recommend the “periodic checkup” so that the lasting and stable performance may be retained. For information about the periodic checkup, please consult our sales representative.

Since there are high-voltage parts in the inside, those who have the knowledge about such products should conduct checkups, maintenance, and repairs. An electric shock will occur.

When before and after each use, dirt can be seen, wipe the dirt/dust off the camera using a dry, soft cloth

About Disposal

This product should be disposed of in accordance with the municipal ordinance or regulation.
For details, please contact the local government。

The MKC-230HD is authorized UL60601 Class I
The MKC-230HD is not AP･APG equipment.

Guidance and manufacturer's declaration - electromagnetic emissions		
The Model MKC-230HD is intended for use in the electromagnetic environment specified below. The customer or the user of the Model MKC-230HD should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic
RF emissions CISPR 11	Group 1	The Model MKC-230HD uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Model MKC-230HD is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
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-230HD requires continued operation during power mains interruptions, It is recommended that the MODEL MKC-230HD 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 Ut is the a.c.mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic emissions			
The Model MKC-230HD is intended for use in the electromagnetic environment specified below. The customer or the user of the Model MKC-230HD 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 Radiated RF IEC61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/m 80 MHz to 2.5 GHz	3Vrms 3V/m	Portable and mobile RF communications should be used no closer to any part of the MODELMKC-230HD, 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 lnwatts (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:
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-230HD Is used exceeds the applicable RF compliance level above, the MODEL MKC-230HD 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-230HD. *[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

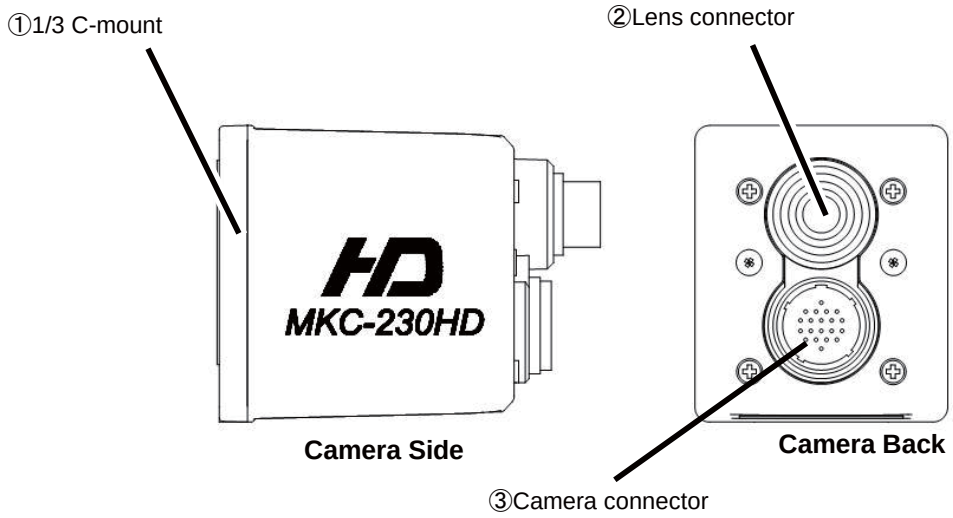
Contents

1. Feature

MKC-230HD 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. It performs 1920x1080 Full HDTV format with 1000TV lines horizontal resolution, F10/2000lx of sensitivity, S/N ratio with 54dB. MKC-230HD realizes miniaturization both camera head and CCU. The output of HD-SDI, DVI, and NTSC/PAL system is available.

2. Names and Functions of Each Part

2.1. Camera Head



① 1/3 C-mount
This is the mount for attaching the lens.
Allows mounting of various C-mount lens and microscope adapters.

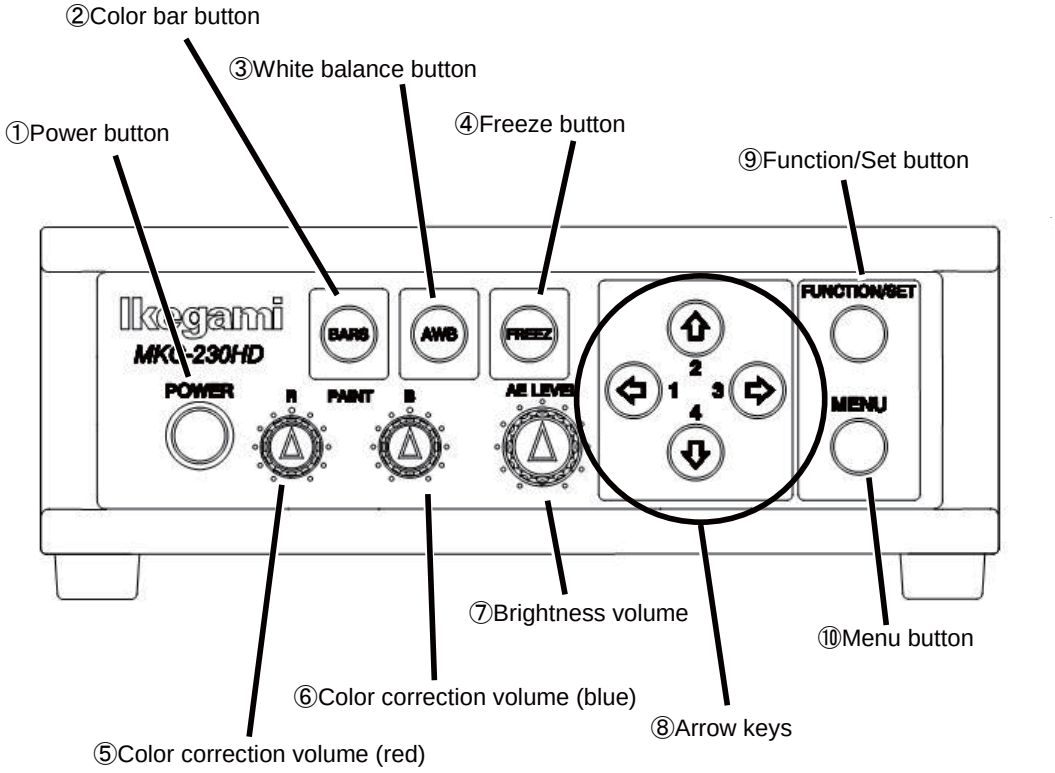
② Lens connector
The dedicated microscope adapter or the IRIS cable of a C-mount lens is connected here.

LENS connector (HR10A-7R-4S)	
1	+12V
2	GND
3	IRIS
4	N.C

HR10A-7R -4S PIN assignment
Iris Cable side: HR10A-7P-4P
(4-pin female plug) or Equivalent.

③ Camera connector
Connects the camera connector of special camera cables.
Be aware that the size of the camera connector differs on the camera head side and CCU side.

2.2. Front Panel of Camera Control Unit (CCU)



① Power button

This is the power button of the MKC-230HD.

② 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. (Page 18)

③ White balance button

This executes the automatic white balance function. (Page 15)

④ Freeze button

Possible to freeze the screen image. (See page 17)

⑤ Color correction volume (red)

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

⑥ Color correction volume (blue)

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

⑦ Brightness volume

This can adjust the brightness of a video.

⑧ Arrow keys

Used to select scene files or operate the menu.

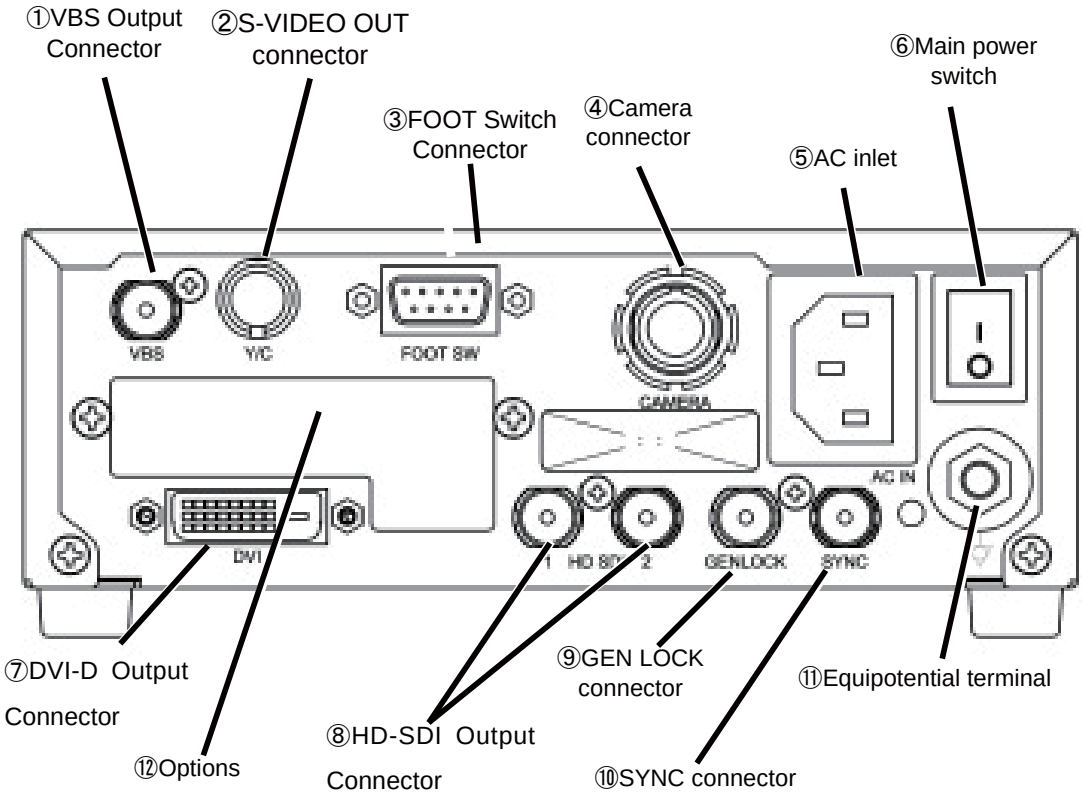
⑨ Function/Set button

Press to determine the item you wish to set with the menu displayed. Refer to “Menu Operation”.

⑩ Menu button

To display the menu that the user can set as desired on the monitor.
Select an item you want to set with ⑧ Arrow key and define it with ⑨ FUNCTION/SET button for menu items you can set. Refer to “Menu Operation” (Page 20) for further detailed operations.

2.3. Rear Panel of Camera Control Unit (CCU)



1. **VBS Output connector(SD)**
   Connects with VBS input monitor, etc. A VIDEO cable (optional) is required for connection.
2. **S-VIDEO Output connector(SD)**
   Connects with S-VIDEO input monitor, etc. An S-VIDEO cable (optional) is required for connection.
3. **FOOT Switch connector**
   To connect the FOOT SW (option) cable extension from the foot switch. When using the FOOT SW, you must install the ferrite core to the cable. Contact us if you use FOOT SW .
4. **Camera connector**
   Connects with camera connector of the special camera cable.
   Be aware that the size of the camera connector differs on the camera head side and CCU side.

5. AC inlet

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

6. Main power switch

This is a main power switch.

7. DVI-D Output connector

Connects with DVI-D input monitor, etc. A DVI-D cable (optional) is required for connection.

8. HD-SDI Output connector (2 lines)

Connects with HD-SDI input monitor, etc. The same imege is outputted to 2 lines. When connecting use a coaxial cable with a characteristic impedance of 75 Ohms.

9. GEN LOCK connector

When using while synchronized with the phase of another system's image, inputs synchronizing signals from the other system. Equivalent to Tri-Level SYNC (HD).

10. SYNC connector

When using while synchronized with the phase of another system's image, outputs synchronizing signals to the other system. Equivalent to Tri-Level SYNC (HD).

* This connector can be used only in synchronization for other MKC-230HD. We cannot guarantee the synchronization with our competitor's product.

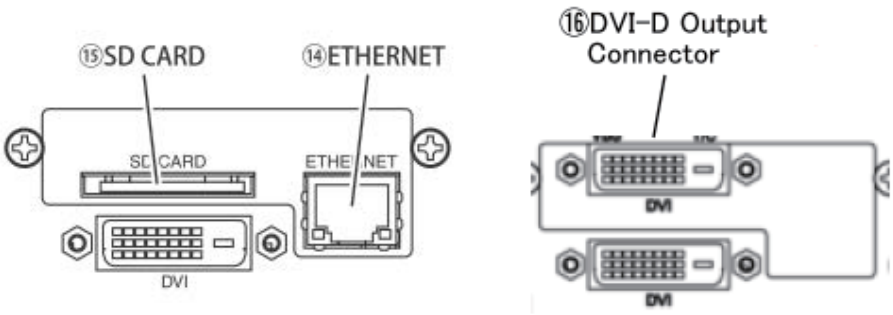
11. Equipotential terminal

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

12. Options

It is possible to mount the two types of optional modules listed below.

- IP ENCODER module
- DVI module



13. ETHERNET connector (RJ45)

Can be used with Ethernet 10Base-T/100Base-TX.
For connection with other devices, please connect a cable of category 5 or higher.

14. SD CARD

This is the insertion port for the SD card.

* The SD card is not included in the equipment spec.

*SDXC is not supported.

15. DVI-D Output connector

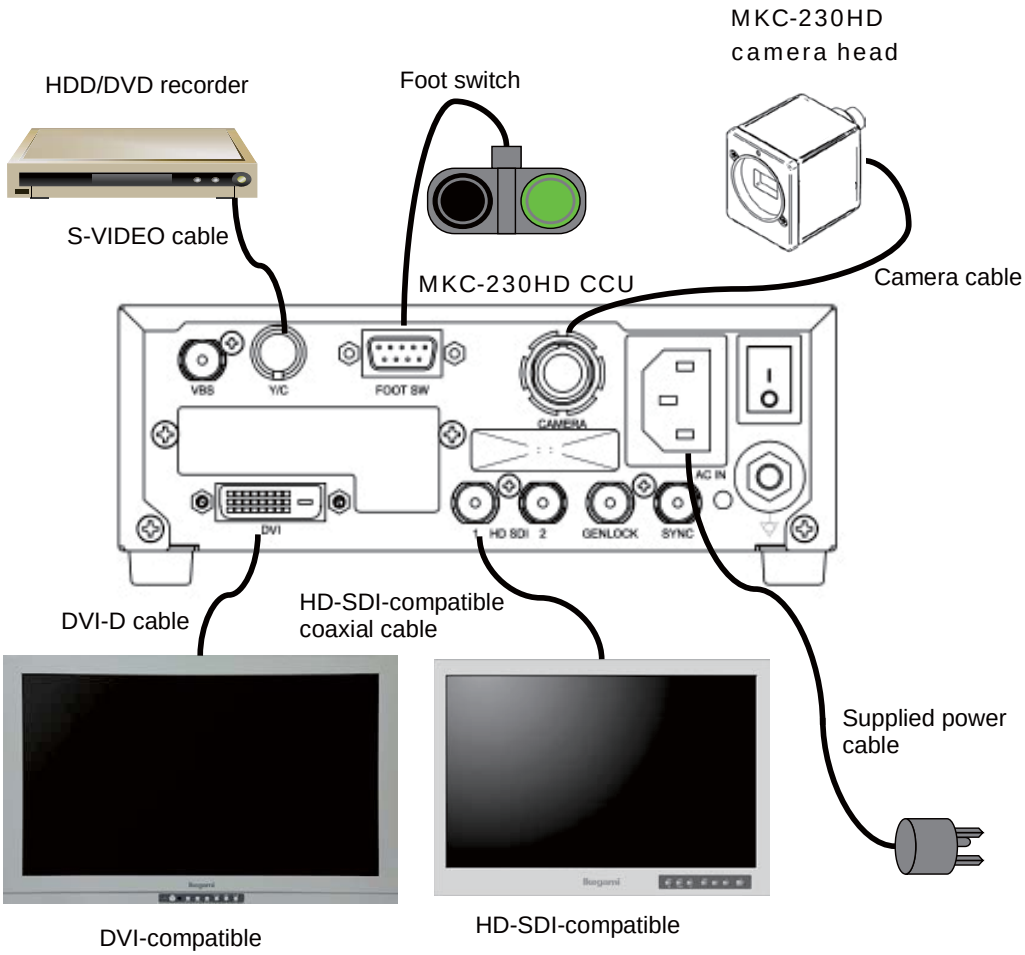
Connects with DVI-D input monitor,etc. A DVI-D cable (option) is required for connection.

Note

* Please note we assume no responsibility for warranty when videos are not saved due to any failure of this machine and SD card.
* Although in the following cases, saved data may be damaged (lost), please note we assume no responsibility for damage and so on caused by data corruption and so on:
  - ● When an SD card is used improperly.
  - ● When an SD card is not properly inserted into the equipment.
  - ● When an SD card is subject to electronic and mechanical shock or force.
  - ● When an SD card is removed or power is turned off during access to the SD card.

3. Operation

3.1. Connection Example



∗Terminate the output from VIDEO OUT at 75ohms on the receiver side.
∗For connection of the power supply, be sure to use the supplied power cable.

Caution at connection

- Turn off the Power of all the equipment before making connections.
- For exclusive camera head connection goods. Using heads other than that specified may result in failure
- The operator must not touch a connector simultaneously with a patient.

3.2. Electrical Connection

1. **Before turning on the power, confirm that the external devices (camera head, monitor, etc.) are correctly connected.**
2. **Turn on power supply to the monitor and other external equipment.**
3. **Turn on power supply (**main power switch**) of 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 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, the CCU and the camera head will be initialized automatically. During this time, a monitor screen is unstable; however, this is not a failure.
4. **The video image from the camera is output under the same setting condition with the last use.**
   - When power is turned off in the state of still screen picture, that state will not be held even if power is turned on again, and MKC-230HD is set to the normal shooting state.

* When moving the CCU, be sure to turn off the POWER, disconnect the power plug and remove the connecting cable between equipment beforehand.
* If the cable comes loose during use, repeat the steps described above.

CAUTION:

Caution for Camera cable connection and disconnection

Turn off the power of MKC-230HD when you connect or disconnect the camera cable. If the CCU is turned on, it may cause the fault of MKC-230HD.

NOTE: Phenomenon on video image

MKC-230HD may happen following phenomenon on its video image.
It is not failure but it is because of employing CMOS sensor.

When its sensitivity gain is going up, it may appear high lighting dots.
In case under high temperature condition, it may be remarkable.

It may appear horizontal stripe pattern or flicker on a video image under the fluorescent lighting. In this case, please use manual electrical shutter of 1/100 (50Hz area). It will be reduce, but please note that it will not disappear at all.

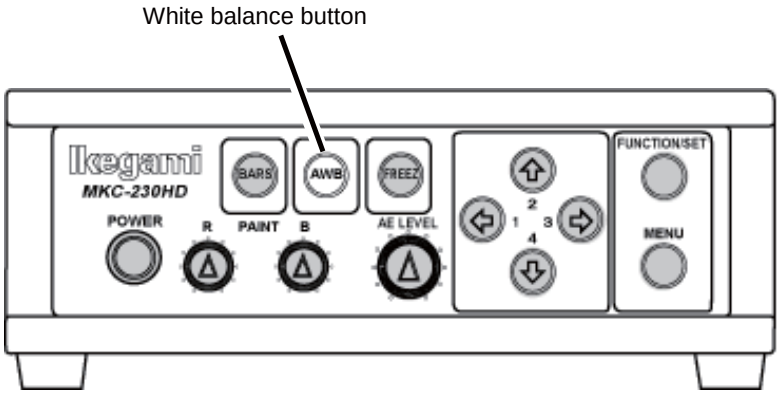
In case of fast moving object on a video image, it may appear distortions.

3.3. Setting White Balance

When using MKC-230HD 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 is lit in green.



   - If “AWB” is displayed on the monitor screen and it ends normally, “AWB COMPLETED” is displayed.

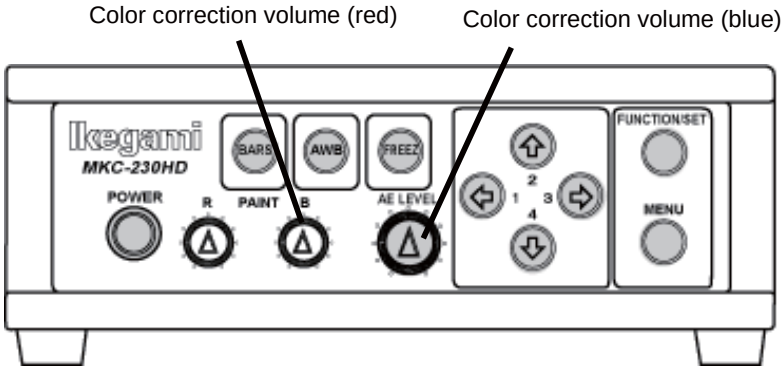
   - If “AWB ERROR” is displayed, AWB adjustment was not carried out for the following reasons. “Recheck the image pickup conditions (a white subject, brightness, etc.), and readjust the white balance.
   - If the image level is too low.
   - If the image level is too high.

2. When automatic adjustment finishes, the AWB button extinguishes automatically.

3.4. Adjustment PAINT

After white balance adjustment it is possible with the MKC-230HD to carry out fine adjustment of the red level and blue level to adjust the desired tint.

<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.
2. Adjust the Red color level/density of picture with R. PAINT adjuster.
   - Clockwise for adjuster: Darker red color on picture is appeared

   Counterclockwise for adjuster: Lighter red color on picture is appeared.
3. Adjust the Blue color level/density of picture with B. PAINT adjuster.
   - Clockwise for adjuster: Darker blue color on picture is appeared

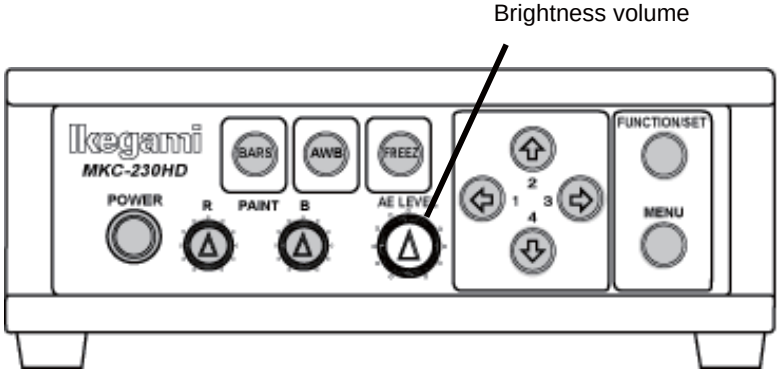
   Counterclockwise for adjuster :Lighter blue color on picture is appeared.
4. The picture color condition is relatively changed above Red and Blue color level by adjustment.

3.5. Adjustment AE Level

It is possible with the MKC-230HD to automatically adjust the shutter speed, gain, and iris according to the exposure level. By increasing the level when the screen is too dark and decreasing the level when the screen is too bright, the screen will be easier to view.
This function is enabled when GAIN/SHUTTER is AUTO.

<Operation>

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

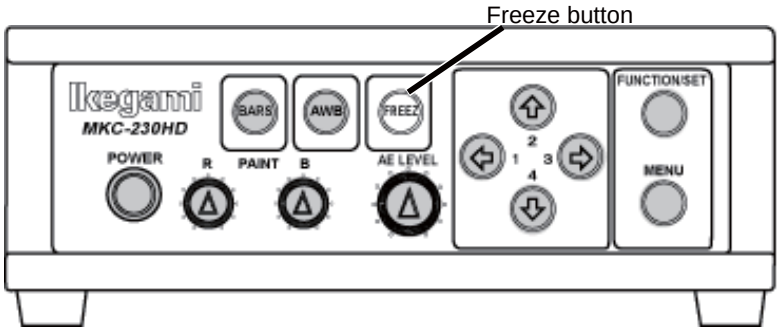


3.6. Freeze output

It is possible with the MKC-230HD to temporarily stop moving image output and switch to freeze frame output.

<Operation>

1. Press Freeze button.
   - Immediately switches to freeze frame output.
   - During freeze frame output, the freeze button is lit green.



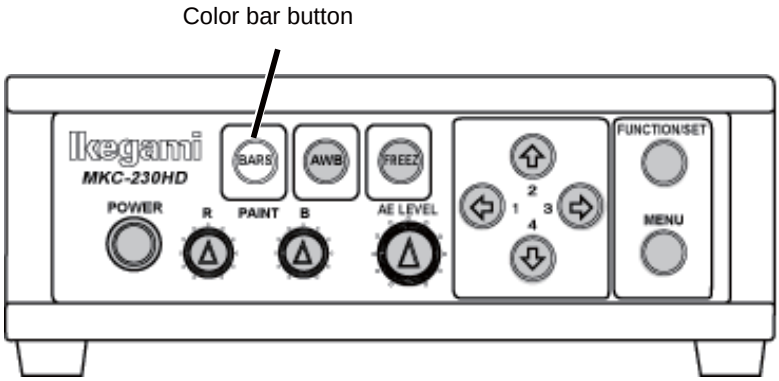
2. To return to moving image output, press the freeze button again.
   - The freeze button extinguishes.

3.7. Color Bar output

It is possible with the MKC-230HD to output a color bar.
This is used when adjusting the color monitor brightness, contrast, etc.

<Operation>

① Press the color bar button.
- Immediately changes to color bar output.
- During color bars output, the color bar button is lit green.



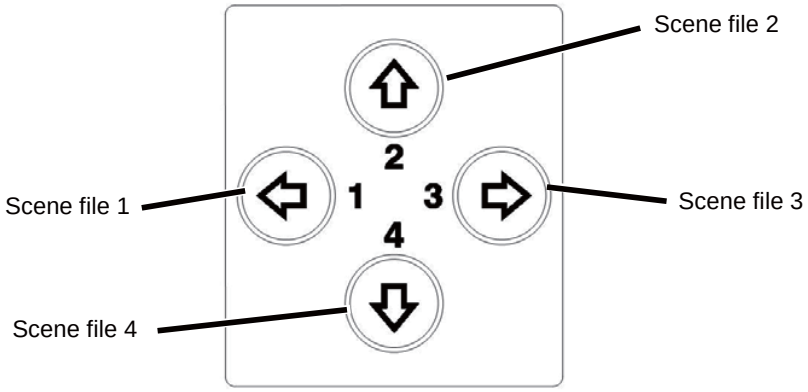
② To return to camera images, press the color bar button again.
- The light of the color bar button extinguishes.

3.8. Scene File Selection

By storing settings often used on the MKC230HD beforehand in a scene file, it is possible to read them at any time. A maximum of four scene files can be stored.

<Readout operation>

1. The arrow key is lit that corresponds to the presently selected scene file.
2. Use the arrow keys to select the scene files.
   - The numerical value displayed next to the arrow keys is the number of the scene file.
   - The arrow key is lit that corresponds to the selected scene file.
   - The scene file setting is immediately reflected.



4. Menu Operation

The MKC-230HD has various useful and practical functions. The user can select and set these functions on the menu. The basic operation is as follows.

4.1. Operation Method

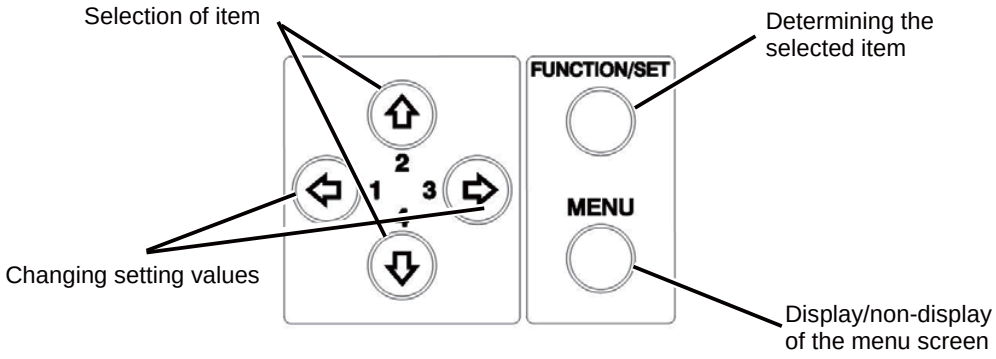
1. Pressing the Menu switch on the front panel of CCU displays a menu on the monitoring screen on which various camera functions can be set.

```
Setup Menu

Video Adjust
AE Mode
Detail
Video Setting
Picture Setting
Scene File
Foot Switch
White Balance
Iris Setting
IP-ENC Setting*1
Miscellaneous
Version Information
```

*1: The IP-ENC item is only displayed if the optional module is mounted.

2. Use the ↑/↓ keys on the front of the CCU to select the item and then press the SET button to enter the submenu screen. The setting values of the setting items can be changed with the ←/→ keys.



* If the Menu button on the front of the CCU is pressed during display of the menu screen, the settings are stored and the menu screen stops.

4.2. Video Adjust

Used to adjust the level of black, red and blue of video picture.

```
            Video Adjust

      Quit
      Pedestal              0
      Video Level           0
      Gain Offset Red       0
      Gain Offset Blue      0
      White shading         OFF
      Auto white shading    READY
      D-range Expansion     NORMAL
      Flare Control         17
```

Item	Setting	Description
Pedestal		Adjusts the black level. Normally not used.
	-96 to 96	If the value is increased, the black sections become brighter.
Video Level		Adjusts the image signal level. Normally not used.
	-64 to 63	Increasing the value produces a bright image. Decreasing the value produces a dark image.
Gain Offset Red		Adjusts the red level. This is the same function as paint adjustment volume on the front of the CCU.
	-128 to 127	Increasing the value causes red to be displayed more vividly.
Gain Offset Blue		Adjusts the blue level. This is the same function as paint adjustment volume on the front of the CCU.
	-128 to 127	Increasing the value causes blue to be displayed more vividly.
White shading		White shading function setting.
	ON	Carries out white shading correction.
	OFF	Does not carry out white shading correction.
Auto white shading		White shading is adjusted automatically. When it is not a uniform screen, it is not adjusted normally.
D-Range Expansion		D-Range Expansion function setting.
	NORMAL	Does not carry out D-Range Expansion.
	EXPAND	It is easy to look at a bright place and the dark place.
Flare		Flare function setting.
	0 to 32	If the value is increased, the flare function become stronger.

4.3. AE Mode

Used to adjust the electronic shutter and automatic sensitivity settings.

```
                AE Mode

      Quit
      Shutter control          AUTO
      Manual shutter           OFF
      Auto shutter Limit       1/10000
      AE Level                 15
      AE Speed                 MID
      Peak Ratio               -20
      Area Select              MID
      Gain Control             AUTO
      AGC Gain Range           9 dB
      Normal Gain              -9 dB
      High Sensitivity         OFF
      Line Mix                 ON
```

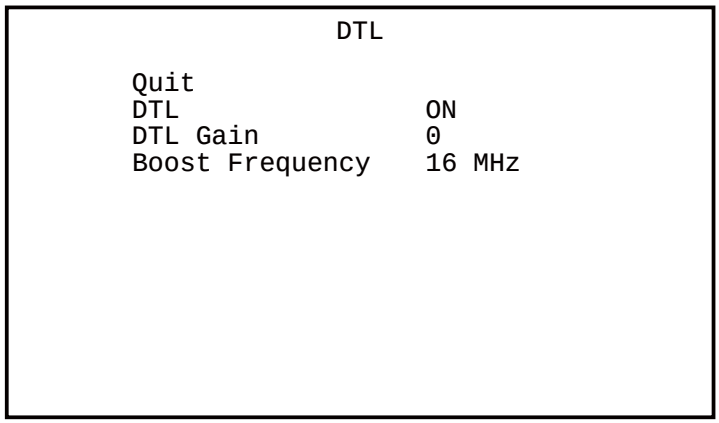
Item	Setting	Description
Shutter Control		This item concerns automatic adjustment of the shutter speed. When you make a shutter speed higher, brightness will change according to the speed. Under the lighting of a discharge lamp, such as a fluorescent lamp, much flicker may appear.
	AUTO	Automatically adjusts to the ideal shutter speed in relation to image brightness.
	FIX	Set to the shutter speed always set by the user. The shutter speed is carried out in the item entitled Manual Shutter.
Manual Shutter		The shutter speed when Shutter Control is FIX is set here (If set to AUTO, it is ignored). It is usually used in the OFF setting.
	OFF	The shutter speed set at about 1/60 seconds.
	1/100 to 1/10000	The shutter speed is constantly set to a fixed value ranging between 1/100 sec and 1/10000 sec.
Auto shutter Limit	1/100 to 1/10000	If the Shutter Control or Gain Control is AUTO, it is possible to set the upper limit of the shutter speed.

AE Level	-128 to 127	If the Shutter Control or Gain Control is in AUTO, it is possible to make fine adjustment of the shutter speed in relation to the level set here. If the screen is too dark, the value is increased, and if the screen is too bright the value is decreased.
AE Speed		Set the control speed if the Shutter Control or Gain Control is in AUTO.
	MID	Adjusts to the standard speed.
	SLOW	Adjusts more slowly than MID.
	FAST	Adjusts more quickly than MID.
Peak Ratio	-128 to 127	When Shutter Control or Gain Control is AUTO, you can adjust a metering scheme. +127 is peak metering, and -128 is average metering. When most of the background is dark and also a subject is bright, set it toward peak metering. When there are few changes in brightness on the entire screen, set it toward average metering.
Area Select		Possible to adjust the extent of a metering area. Carries out automatic adjustment of the shutter and gain, etc. based on the image in the frame displayed in the screen.
	MID	About 40% of the screen center is a metering area.
	WIDE	About 60% of the screen center is a metering area.
	FULL	The entire screen is a metering area.
	NARROW	About 10% of the screen center is a metering area.
	USER..	Allows arbitrary setting of the photometry area. Press the SET button to enter the setting screen. *For details on settings, see Section 5.2 “Manual setting of photometry frame”.
Gain Control		This item concerns automatic adjustment of gain. If a dark subject has been photographed, it is possible to adjust the brightness.
	AUTO	The gain is adjusted automatically in relation to the brightness of the image input so that the output level constantly remains a set value.
	FIX	Automatic adjustment of gain is not carried out.
AGC Gain Range	3 dB to 18 dB	Setting of maximum gain with Gain Control in AUTO.

Normal Gain		-6 dB to 6 dB	Normal gain setting. This setting is always used regardless of the Gain Control setting. The higher the value the brighter the image, although noise can more readily increase.
High Sensitivity			It is used when you want to increase the sensitivity. Although the sensitivity will increase by a factor of two, horizontal resolution will be slightly lower.
		ON	Carries out increase the sensitivity.
		OFF	Does not carry out increase the sensitivity.
Line Mix			It is used when you want to increase the sensitivity. Although the sensitivity will increase by a factor of two, vertical resolution will be slightly lower.
		ON	Carries out increase the sensitivity.
		OFF	Does not carry out increase the sensitivity.

4.4. Detail

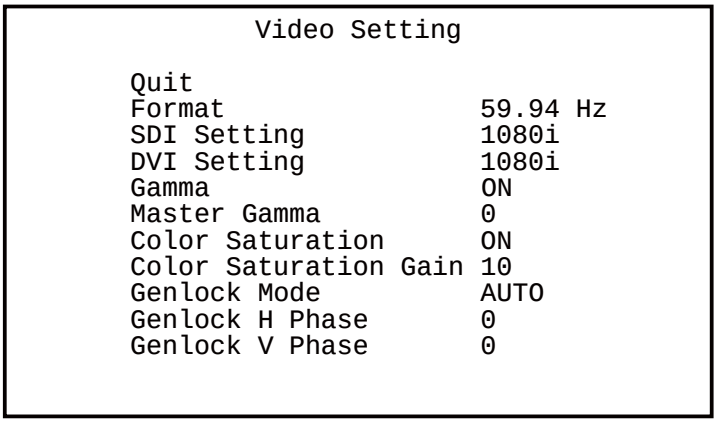
Used to adjust detail enhancement.



Item	Setting	Description
DTL		Sets the contour enhancement. If contour enhancement is carried out, the image is clearer and easier to view. Set it to ON usually.
	ON	Carried out contour enhancement.
	OFF	Does not carried out contour enhancement.
DTL Gain		To adjust the detail enhancement level.
	-128 to 127	Increasing the value results in a sharper image.
Boost Frequency		Set the boost frequency for contour enhancement.
	2 MHz to 28 MHz	The lower the value, the easier it is to carry out contour enhancement on the entire screen.

4.5. Video Setting

Set the video signal.

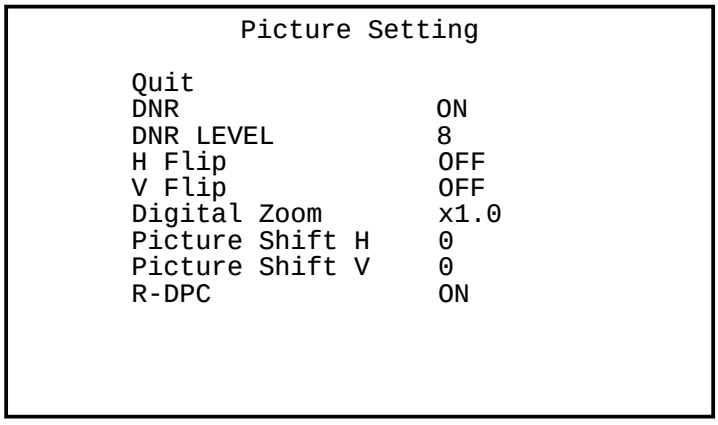


Item	Setting	Description
Format		Selects the output signals of HD SDI, DVI, VBS, and Y/C (Not possible to change them individually). With VBS output, the signal method is also changed.
	59.94 Hz	Output at 59.94 Hz. VBS is output with the NTSC method.
	50 Hz	Output at 50 Hz. VBS is output with the PAL method.
SDI Setting		Select the SDI output signal output format.
	1080p	Output the progressive signal.
	1080i	Output the interlace signal.
DVI Setting		Select the DVI output signal output format.
	1080p	Output the progressive signal.
	1080i	Output the interlace signal.
Gamma		If gamma correction is carried out, it is possible to cause the caused the dark sections of the image to be displayed brightly. Normally this is used in an ON setting.
	ON	Carries out gamma correction.
	OFF	Does not carry out gamma correction.

Master Gamma		Adjust the degree of gamma correction. With a setting value of 0, the value is γ = 0.45.
	-128 to 127	The lower the value, the brighter the dark parts of the image become.
Color Saturation		Set the color intensity.
	ON	Adjusts the intensity of color set with Color Saturation Gain.
	OFF	Does not adjust the color intensity (normal color image).
Color Saturation Gain		Adjusts the color intensity.
	-64 to 63	The higher the value, the more intense the color. The lower the value the more faded the color. With -64 it is monochrome.
Genlock Mode		Select the Genlock mode.
	Auto	When GENLOCK signal was input, It is automatically replaced.
	OFF	Does not carry out Genlock function.
Genlock H Phase	-128 to 127	Adjusts the horizontal phase for Genlock input.
Genlock V Phase	-128 to 127	Adjusts the vertical phase for Genlock input.

4.6. Picture Setting

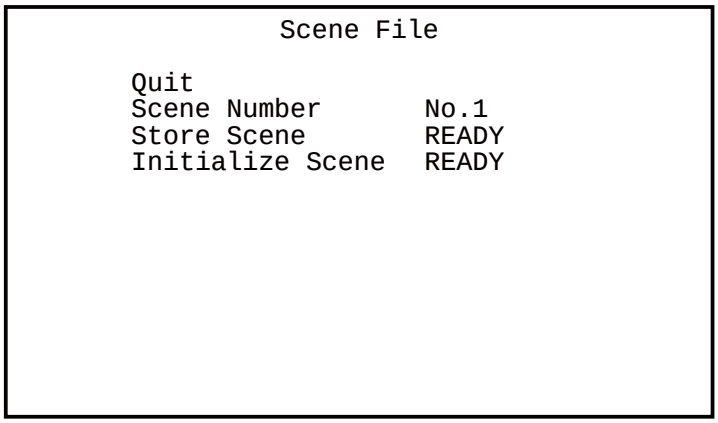
Setting for noise reduction, image inversion, electronic zoom, and display positions.



Item	Setting	Description
DNR		Noise reduction function setting.
	ON	The noise reduction strength will be adjusted to the one that is set at DNR Level.
	OFF	Noise reduction is not carried out.
DNR Level		Adjust the noise reduction strength.
	0 to 32	A larger value reduces more noise, but deteriorates resolution.
H Flip		Sets the horizontal inversion of the image.
	ON	Inverts to a horizontal direction for output.
	OFF	The horizontal direction become the normal rotation output.
V Flip		Sets the vertical inversion of the image.
	ON	Inverts to a vertical direction for output.
	OFF	The vertical direction becomes the normal rotation output.
Digital Zoom		Magnification setting for electronic zoom.
	x1.0 to x4.0	The center of the screen is zoomed up in units of 0.1 power.
Picture Shift H	-32 to 32	The horizontal display position of the screen is adjusted in 1 pixel units.
Picture Shift V	-8 to 8	The vertical display position of the screen is adjusted in 1 pixel units.
R-DPC		R-DPC function setting.
	ON	Carries out R-DPC correction.
	OFF	Does not carry out R-DPC correction.

4.7. Scene File

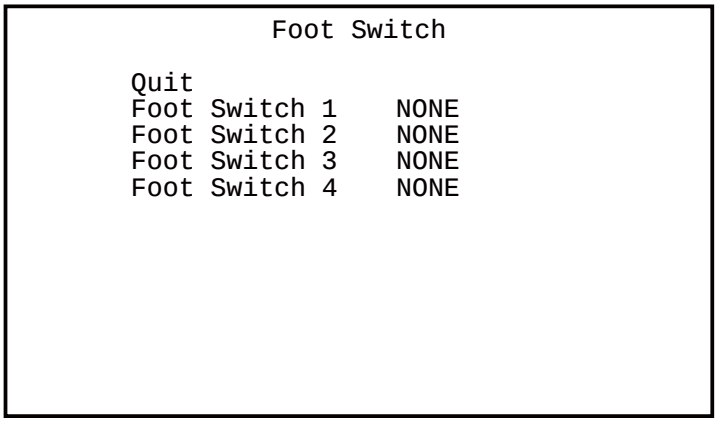
Possible to store and read the setting value information as a scene file. Possible to create a maximum of 3 scene files.
* For details of the setting, see Section 4.4 “Detail”.



Item	Setting	Description
Scene Number	-	Select and read the set scene file.
Store Scene	-	Store the set condition in the scene file. Select the scene file you wish to set and press the SET button.
Initialize Scene	-	Select the scene file you wish to initialize and press the SET button. If you select ALL, all scene files will be initialized.

4.8. Foot Switch

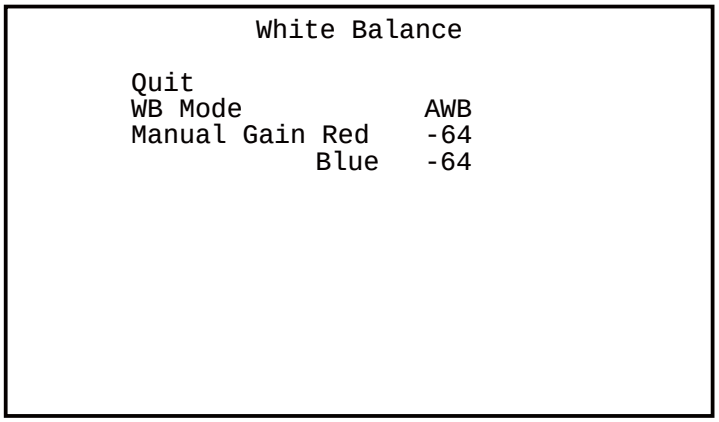
Set the operation when controlling the foot switch.



Item	Setting	Description
Foot Switch		Carries out setting of operations when the foot switch is operated. Foot switch operation responds up to 4, allowing separate operation settings for each other one.
	NONE	Nothing is carried out, even when the foot switch is operated.
	FREEZE	Outputs still images. Operate the foot switch again to return to moving images.
	SCENE FILE	Switches the scene file selection.
	H FLIP	Outputs a horizontally inverted image.
	V FLIP	Outputs a vertically inverted image.
	ROTATE	Outputs an image inverted 180 degrees.
	ZOOM IN	Carries out electronic zoom-in.
	ZOOM OUT	Carries out electronic zoom-out.
	SNAPSHOT	Inserts still images on SD card with IP encoder (optical).
	SHUT CONT	Switch the shutter control (AUTO/FIX).
	GAIN CONT	Switch the gain control (AUTO/FIX).
	IRIS CONT	Switch the iris control (AUTO/FIX).

4.9. White Balance

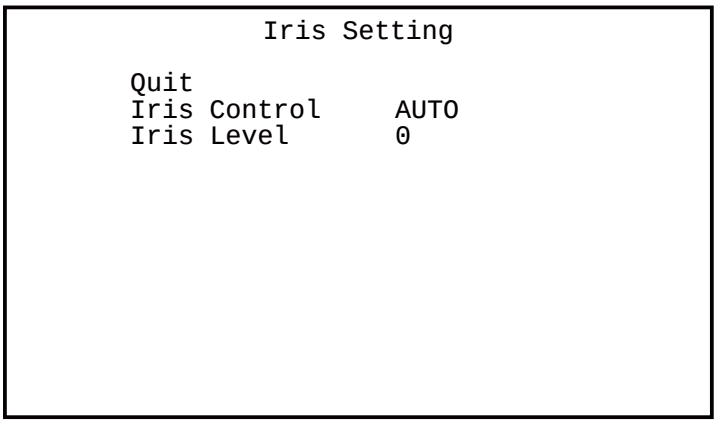
Automatic adjustment of white balance and manual adjustment setting.



Item	Setting	Description
WB Mode		Sets white balance operation.
	AWB	The white balance is adjusted automatically. Press the SET button when this item is selected.
	MANUAL	Manual adjustment of white balance. Adjustment is carried out with Manual Gain Red/Blue.
	ATW	Automatically adjusts to the white balance in relation to pickup conditions.
Manual Gain Red		Adjusts the red gain.
	-128 to 127	Increasing the value causes red to be displayed more vividly.
Manual Gain Blue		Adjusts the blue gain.
	-128 to 127	Increasing the value causes blue to be displayed more vividly.

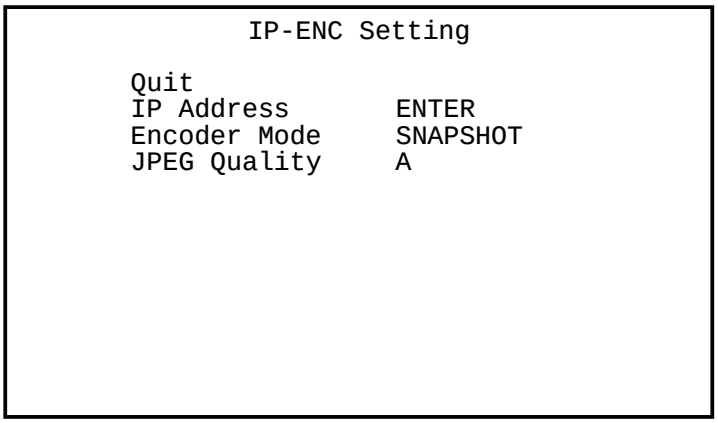
4.10.Iris Setting

Used to adjust detail lens iris.

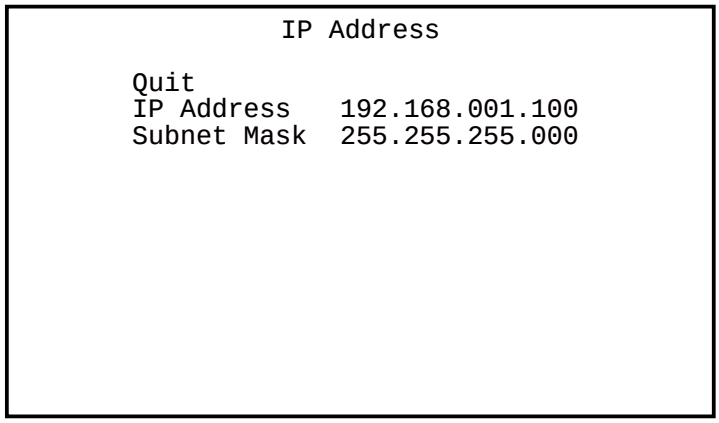


Item	Setting	Description
Iris Control		Sets lens iris operation. When you use a fixed iris, please set to FIX. When it sets to Auto, operation of a shutter or gain control may become slow.
	AUTO	Automatically adjusts to the ideal lens iris value in relation to image brightness.
	FIX	The lens iris value that a user has set will always take effect. An iris value is adjusted at the item Iris Level.
Iris Level		Adjust the iris level.
	-128 to 127	The higher the value, the brighter it. The lower the value, the darker it.

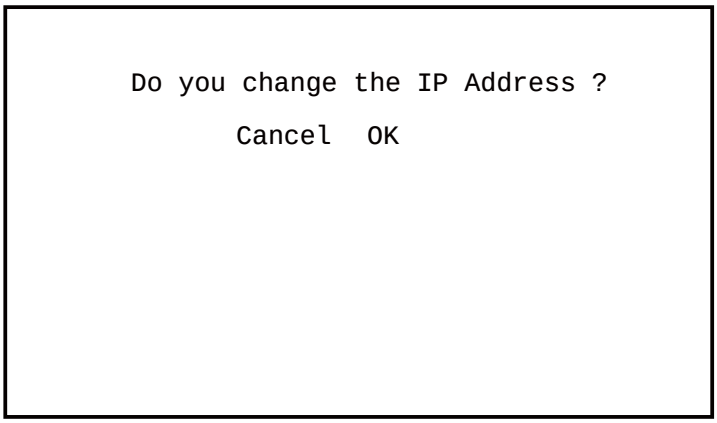
4.11.IP-ENC Setting (Enabled Only with Optional Board Installed)



Item	Setting	Description
IP Address		Displays the sub menu.
Encoder Mode		Select the image compression method.
	SNAPSHOT	Compress with JPEG method and record on the SD card.
	STREAMING	Compress with the H.264 method and distribute the image
JPEG Quality		Sets the image quality if the compression method is set to JPEG.
	A to E	Five steps from A (highest image quality) to E (lowest image quality).



Item	Setting	Description
IP Address		Set the IP Address.
Subnet Mask		Set the Subnet Mask.



A message appears on the screen asking for confirmation.
For a scene that can be changed select [OK]. To stop, press [Cancel] and then press the Set button.
* Only displayed if the IP address is changed.

Note
- The Setting values such as IP address and sub-net mask will vary according to the network environment of the customer. Please consult with the network manager.

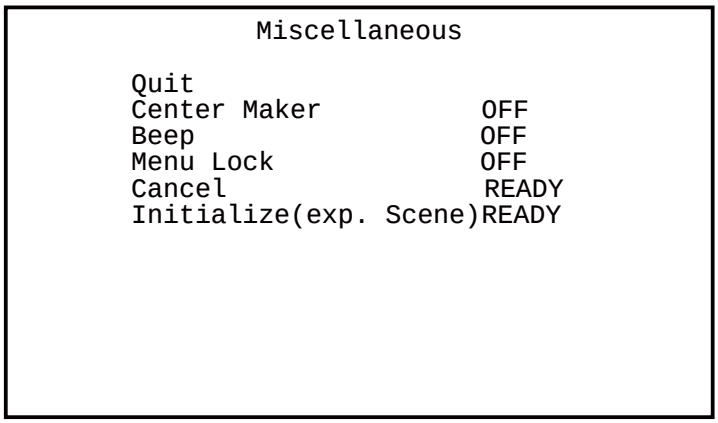
Caution at Network Connection

The IP ENCODER module (option) is for use in connection with a network.
To protect the system from harm specific to the network connection, please conduct sufficient security measures under your own responsibility.
Network-specific harm includes leak/flow of information obtain by this device, disruption due to unauthorized access, system halt and so on.
The messages include the following, but please implement sufficient other measures under your own responsibility.

- Do not install in any place where cables can be easily moved/replaced.
- Maintain network safety. (Firewall and so on)
- Conduct regular anti-virus checks on all PCs to be connected to the network.
- Restrict the number of users connecting via PCs (e.g. Password setting)
- Take care not to leak the authentication information.

4.12.Miscellaneous

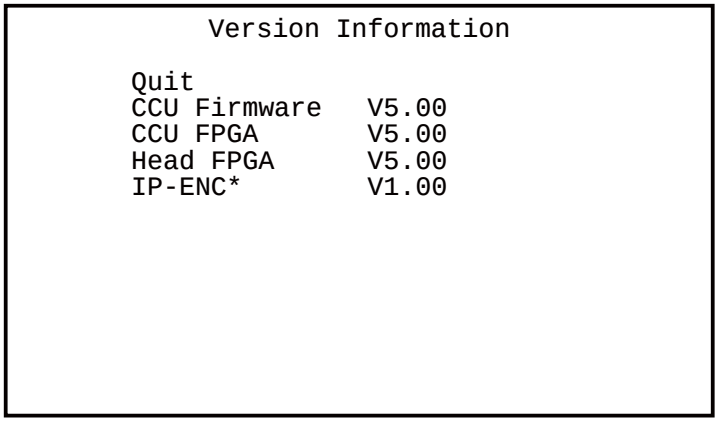
Adjustment screen for other functions.



Item	Setting	Description
Center Marker		Center marker display setting.
	ON	Center marker is displayed on the screen.
	OFF	Center marker is not displayed.
Beep		Switch beep.
	ON	When operating a switch, you will hear a beep.
	OFF	When operating a switch, you will hear nothing.
Menu Lock		Menu lock.
	ON	Sets a state in which no settings other than Menu Lock can be changed. During MENU LOCK, a red lock mark is displayed in the upper right of the menu screen.
	OFF	Sets to a state in which all menu item setting can be changed.
Cancel		Press [READY]→[START]→[SET]. The last saved menu items will be restored.
Initialize (ex.Scene)	-	Press [READY]→[START]→[SET]. All the settings other than those for scene files will be initialized.

4.13. Version Information

To display the software version of this camera.



* Only displayed if IP-ENC module is mounted.

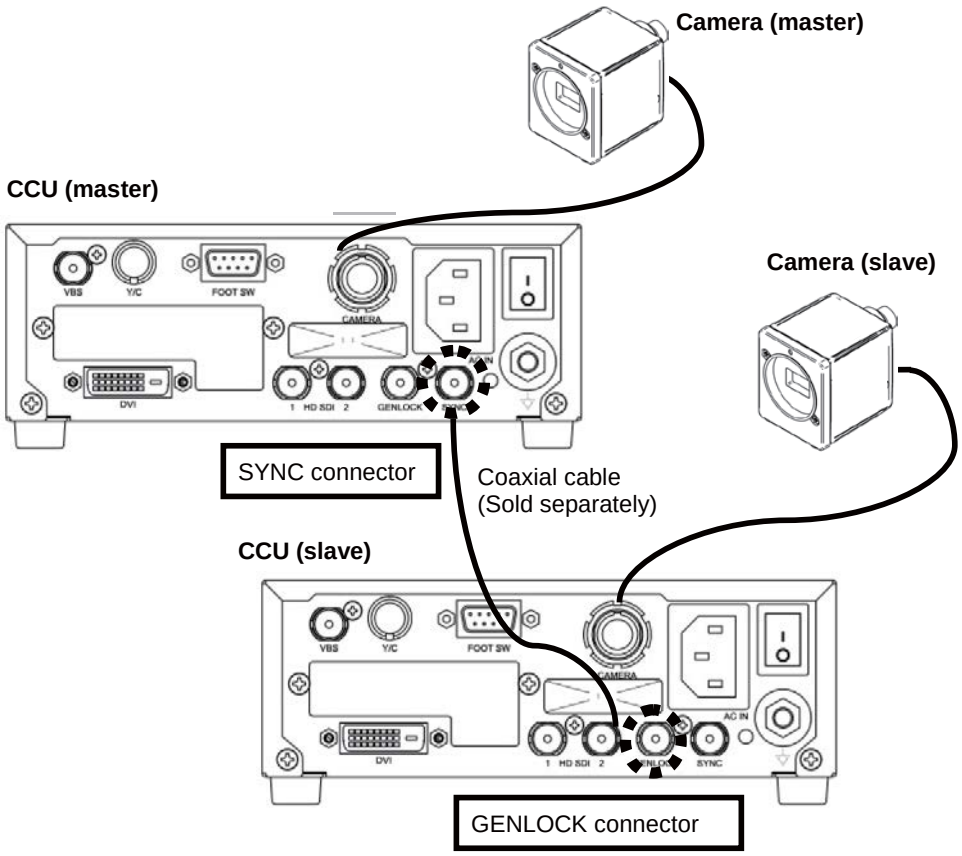
5. Advanced Usage Methods

5.1. External Synchronization

If this equipment is used with external synchronization, SYNC is input to the GENLOCK connector on the back of the CCU. If SYNC is input to the GENLOCK connector, the camera automatically switches from internal synchronization to external synchronization.
SYNC input conditions: Tri-Level SYNC: 0.6 Vp-p / 75 ohms

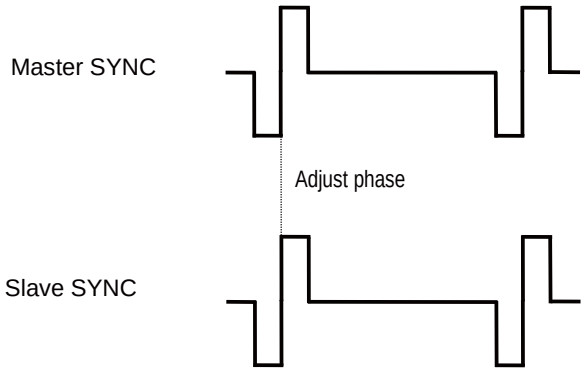
5.1.1 Wiring connection example

Prepare two sets of CCU and camera for MKC-230HD. Connect the SYNC connector of CCU (Master) and the GENLOCK connector of CCU (Slave) with the coaxial cable.



5.1.2 Setting

Measure the SYNC output waveforms of the CCU master and slave and adjust the PHASE so that the H/V phases match. When adjusting, adjust the slave side (side on which the GENLOCK connector is connected). Phase adjustment is not required on the Master side.

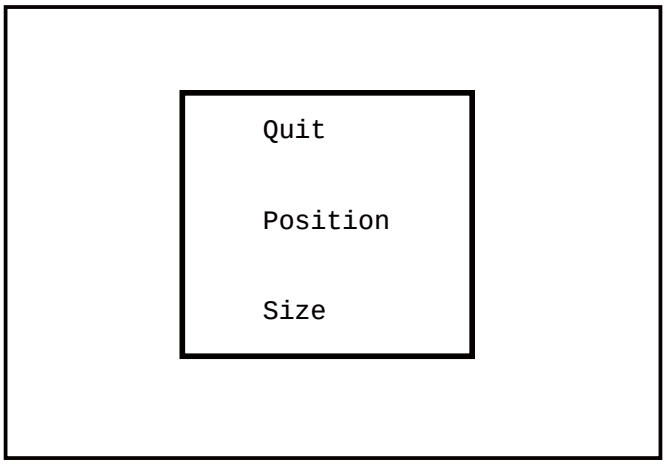


5.2. Manual Setting a Metering Frame

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

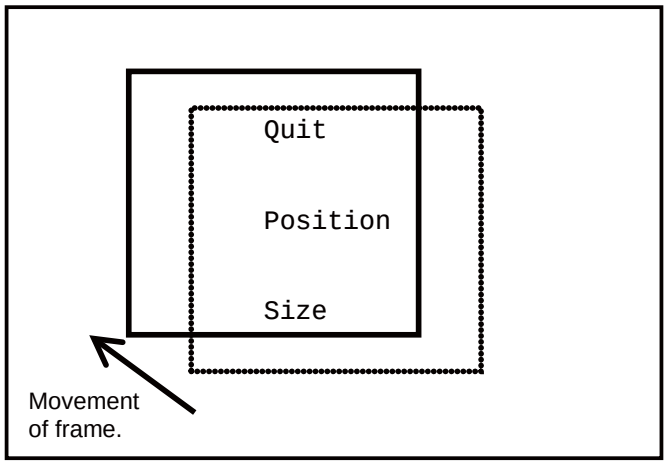
Select [AE Mode]→[Area Select]→[USER..] from the menu and press the SET button. The system goes to the manual setting screen for a metering frame.



Possible to set the position and size of the metering frame. When setting is finished, select QUIT and press the SET button to finish setting.

Position Setting

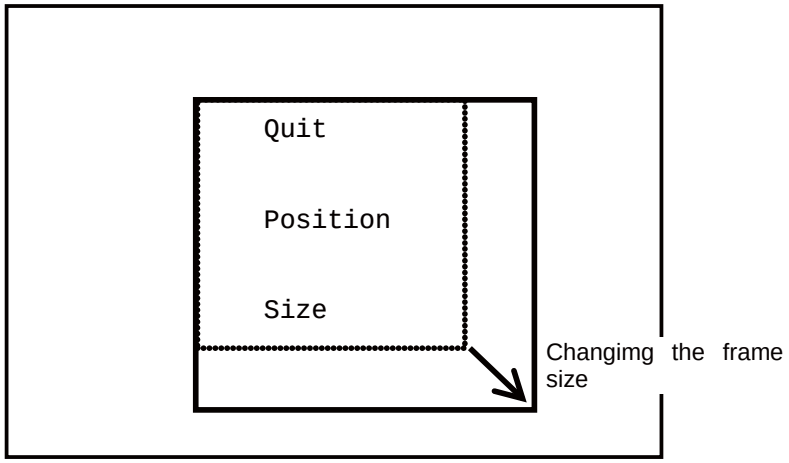
Select Position and press the SET button to adjust the position of a metering frame. The frame size is not changed.



Use the ⇧/⇨/⇩/⇦keys to adjust the position. When adjustment is finished, press the SET button to complete adjustment.

Size Setting

Select Size and press the SET button to adjust the size of a metering frame. The upper left corner of the frame is fixed. The lower right corner can be moved for adjustment.



Use the ⇧/⇨/⇩/⇦keys to adjust the size of the frame. When adjustment is finished, press the SET button to complete adjustment

5.3. Scene File

This device allows setting of up to three scene files chosen according to photographic conditions. It is also possible to return to the condition at the time of shipment from the factory.

5.3.1 Storage of Scene File

The scene file can be created from the menu. Because the present setting is stored in the scene fi le, adjust beforehand to the setting you wish to store.
At [Scene File] on a menu, select one of the alternatives: [Store Scene 1] to [Store Scene 3], and then press the SET button. The settings will be saved immediately to the scene file.
(Please see 3.8 Scene File.)

5.3.2 Initialization of Scene File

At [Scene File] on a menu, select a file to initialize from the alternatives: [Initialize Scene 1] to [Initialize Scene 3], and then press the SET button. The selected scene is immediately initialized.

5.3.3 Setting of Scene File

To use the stored scene file operate the front panel (See page 18) or the foot switch (See page 30) or the menu [Scene File] (See page 29)

5.4 Snapshot (requires optional module)

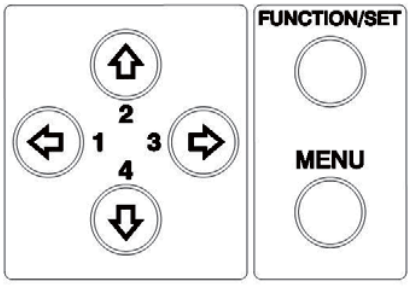
Possible to record still images (JPEG) to SD card. The picture quality setting can be changed with [JPEG Quality] from [IP-ENC setting] on the menu.
* The SD card is not included.

5.4.1 SD Card Recording

Possible with the following two operations to record to the SD card.

●Operation of foot switch
For setting, select [SNAPSHOT] with [FOOT Switch] on the menu.

●Operation from CCU front panel
① Press the function button.
② Press the ⇦key to store the still image to the SD card.



5.4.2 For cards on which recording is finished

It is possible to view the recorded images on a PC.

* This device does not include a function for displaying images.

A PC is required to view images.

6 Default Settings

MENU-1	MENUE-2	Default
Video Adjust		
	Master Pedestal	0
	Video Level	0
	Gain Offset Red	0
	Gain Offset Blue	0
	White Shading	OFF
	Auto White Shading	READY
	D-Range Expansion	NORMAL
	Flare Control	17
AE Mode		
	Shutter Control	AUTO
	Manual Shutter	OFF
	Auto Shutter Limit	1/10000
	AE Level	15
	AE Speed	MID
	Peak Ratio	-20
	Area Select	MID
	Gain Control	AUTO
	AGC Gain Range	9 dB
	Normal Gain	-9 dB
	High Sensitivity	OFF
	Line Mix	ON
DTL Set		
	Detail	ON
	Detail Gain	0
	Boost Frequency	16 MHz
Video Setting		
	Format	59.94Hz
	SDI Setting	1080i
	DVI Setting	1080i
	Gamma	ON
	Master Gamma	0
	Color Saturation	ON
	Color Saturation Gain	10
	Genlock Mode	AUTO
	GenLock H Phase	0
	GenLock V Phase	0

MENU-1	MENUE-2	Default
Picture Setting		
	DNR	ON
	DNR LEVEL	8
	H Flip	OFF
	V Flip	OFF
	Digital Zoom	x1.0
	Picture Shift H	0
	Picture Shift V	0
	R-DPC	ON
Scene File		
	Scene Number	No.1
	Store Scene	READY
	Initialize Scene	READY
Foot Switch		
	Foot Switch 1	FREEZE
	Foot Switch 2	ROTATE
	Foot Switch 3	FREEZE
	Foot Switch 4	FREEZE
Iris Setting		
	Iris Control	AUTO
	Iris Level	0
White Balance		
	WB Mode	AWB
	Manual Gain Red	-64
	Manual Gain Blue	-64
Iris Setting		
	Iris Control	AUTO
	Iris Level	0
IP-ENC Setting		
	IP Address	192.168.001.100
	Subnet Mask	255.255.255.0
	Encoder Mode	SNAPSHOT
	JPEG Quality	A
Miscellaneous		
	Center Marker	OFF
	Menu Lock	OFF
	Cancel	READY
	Initialize (ex. Scene)	READY

7 Specification

7.1 Ratings

(1)	Lens mount	C-mount
(2)	Optical system	RGB prism
(3)	Image Pickup Device	1/3-inch CMOS sensor x 3 (rolling shutter) Effective pixels: 1920 x 1080
(4)	Scanning System	Progressive scan
(5)	Aspect ratio	H16 : V9
(6)	External sync	Tri-Level SYNC: 0.6 Vp-p / 75 Ω Note: The color frame in down-conversion will not be locked.
(7)	Output Video Signal	
	HD output	HD-SDI (2 lines): 0.8 Vp-p / 75 Ω DVI (1 line):1920 x 1080P 59.94/50 Hz 1920 x 1080I 59.94/50 Hz
	SD output	SD-VBS (1 line): 1.0 Vp-p / 75 Ω SD-Y/C (1 line): Y 1.0 Vp-p / 75 Ω C 0.286 Vp-p / 75 Ω
(8)	Camera Cable	5m single,7m single or 5+10m combination cable
(9)	Input Control Signal	FOOT SW (1 line), 9-pin D-Sub, female
(10)	Power Requirement	AC100 - 240 V ± 10%
(11)	Rating current	0.5A-0.3A
(12)	Operating Temperature	0°C - +40°C
(13)	Storage temperature	-20°C - +70°C
(14)	Dimensions/Weight	Camera head: W34 x H40 x D40 mm / 100 g or less CCU: W170 x H58 x D270 mm / 2 kg or less
(15)	Accessories	Operation Manual

7.2 Performance

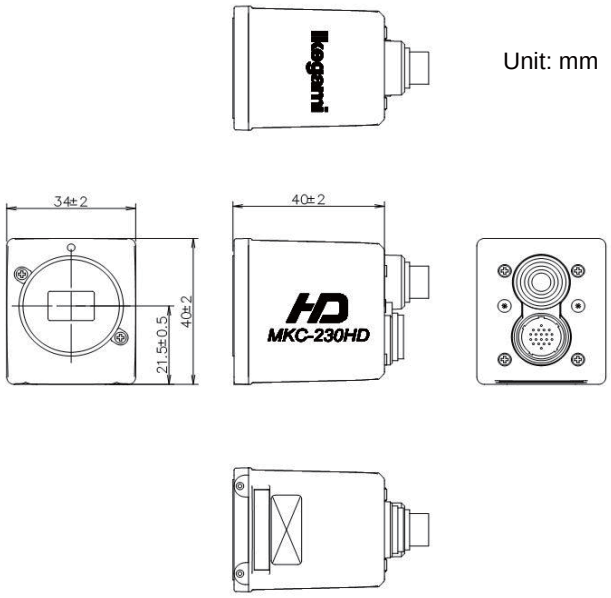
(1)	Resolution	Horizontal: 1000 TV lines (1080I 59.94/50)
(2)	S/N ratio	54 dB targeted (γ and detail OFF)
(3)	Sensitivity	Standard: 2000 lux f14 / 3200 K or more

7.3 Functions

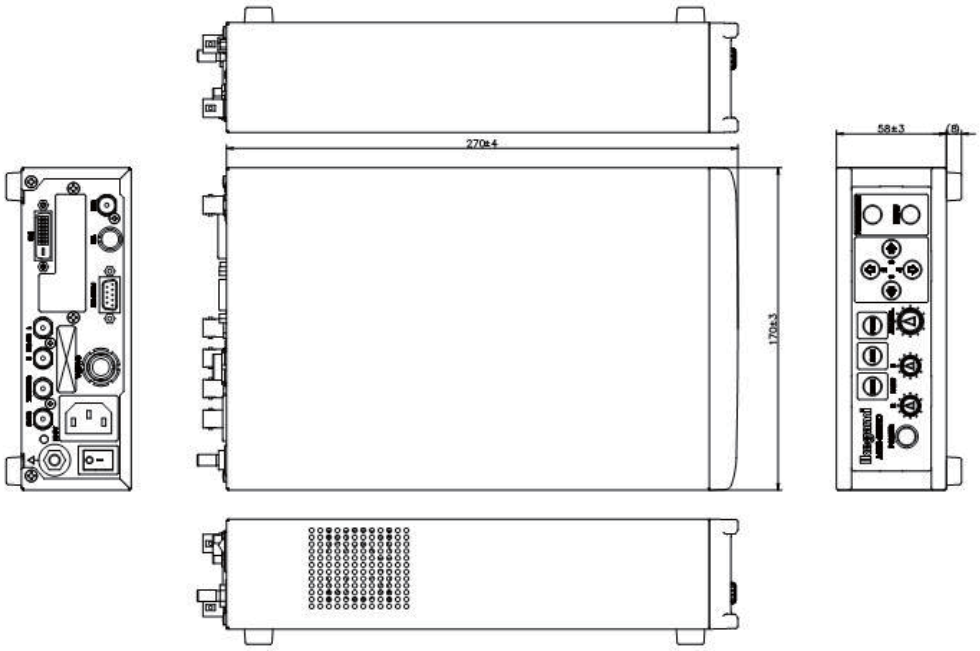
(1) Gain Control function (AUTO/FIX) Up to 18 dB
(2) White Balance function (AWB/MANUAL/ATW)
(3) Shutter Control function (AUTO/FIX)
(4) White Shading function
(5) D-Range function
(6) Flare Control function
(7) Photometry area variation function
(8) Picture freeze function
(9) Internal color bar
(10) Image flip function (horizontally, vertically, horizontally and vertically)
(11) Noise reduction function
(12) GENLOCK function
(13) Down converter function
(14) Electronic zoom function
(15) Scene File function

8 External Appearances

8.1Camera Head



8.2 CCU



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Ikegami

Ikegami Tsushinki Co., Ltd.

5-6-16, Ikegami, Ohta-ku, Tokyo, 146-8567, Japan
Phone : +81-(0)3-5700-4114 Fax : +81-(0)3-5748-2200
E-Mail : info_e@ikegami.co.jp
URL : http://www.ikegami.co.jp/en/

Ikegami Electronics (U.S.A.),Inc.

37 Brook Avenue, Maywood, New Jersey 07607, U.S.A.
Phone : +1-201-368-9171 Fax : +1-201-569-1626
E-Mail : engineering@ikegami.com, service@ikegami.com
URL : http://www.ikegami.com

Ikegami Electronics (Europe) GmbH

Ikegami Strasse 1, D-41460 Neuss, GERMANY
Phone : +49-(0)2131-123-0 Fax : +49-(0)2131-102820
E-Mail : info@ikegami.de
URL : http://www.ikegami.de

Ikegami Electronics (Europe) GmbH - UK

Unit E1, Cologne Court, Brooklands Close,
Sunbury-on-Thames, Middlesex, TW16 7EB, UK.
Phone : +44-(0)1932-76 97 00 Fax : +44-(0)1932-76 97 10
E-Mail : technical@ikegami.co.uk , sales@ikegami.co.uk

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