SONY®

3CCD Color Video Camera

Instructions for Use

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

DXC-390P

CE

Owner's Record

The model and serial numbers are located on the side. Record these numbers in the spaces provided below.
Refer to these numbers whenever you call upon your Sony dealer regarding this product.

Model No. _____ Serial No. _____

WARNING

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

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

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

For the customers in the U.S.A.

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

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

All interface cables used to connect peripherals must be shielded in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For the customers in Canada

This Class A digital apparatus complies with Canadian ICES-003.

For the customers in Europe

This product with the CE marking complies with the EMC Directive issued by the Commission of the European Community. Compliance with this directive implies conformity to the following European standards:
• EN55103-1: Electromagnetic Interference (Emission)
• EN55103-2: Electromagnetic Susceptibility (Immunity)
This product is intended for use in the following Electromagnetic Environments: E1 (residential), E2 (commercial and light industrial), E3 (urban outdoors), E4 (controlled EMC environment, ex. TV studio).

For the customers in Europe

The manufacturer of this product is Sony Corporation, 1-7-1 Konan, Minato-ku, Tokyo, Japan.
The Authorized Representative for EMC, medical devices, and product safety is Sony Deutschland GmbH, Hedelfinger Strasse 61, 70327 Stuttgart, Germany; TEL: (0)711 5858 0; FAX: (0)711 5858 235.
For any service or guarantee matters please refer to the addresses given in separate service or guarantee documents.

Important safeguards/notices for use in the medical environments

1. All the equipments connected to this unit shall be certified according to Standard IEC60601-1, IEC60950-1, IEC60065 or other IEC/ISO Standards applicable to the equipments.
2. Furthermore all configurations shall comply with the system standard IEC60601-1-1. Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore, responsible that the system complies with the requirements of the system standard IEC60601-1-1. If in doubt, consult the qualified service personnel.

This unit can not be used in the patient environment.

* Patient Environment.
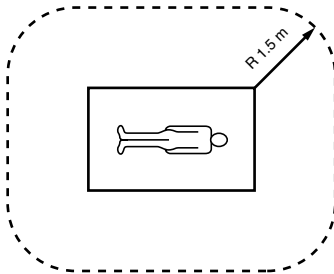
3. Do not touch the patient simultaneously while you are contacting with this equipment.
4. For this particular equipment, all accessory equipment connected as noted above, must be connected to mains via an additional isolation transformer conforming with the construction requirements of IEC60601-1 and providing at least Basic Insulation.
5. The leakage current could increase when connected to other equipment.
6. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to other equipment. If this unit causes interference (which can be determined by unplugging the power cord from the unit), try these measures: Relocate the unit with respect to the susceptible equipment. Plug this unit and the susceptible equipment into different branch circuit.

Consult your dealer. (According to standard EN60601-1-2 and CISPR11, Class B, Group 1)

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

Important EMC notices for use in the medical environments

• The DXC-390P needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this instructions for use.
• The portable and mobile RF communications equipment such as cellular phones can affect the DXC-390P.

Warning

The use of accessories and cables other than those specified, with the exception of replacement parts sold by Sony Corporation, may result in increased emissions or decreased immunity of the DXC-390P.

Guidance and manufacturer's declaration-electromagnetic emissions		
The DXC-390P is intended for use in the electromagnetic environment specified below. The customer or the user of the DXC-390P should assure that it is used in such an environment.		
Emission test	Compliance	Electromagnetic environment-guidance
RF emissions CISPR 11	Group 1	The DXC-390P 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 B	The DXC-390P is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Warning

If the DXC-390P should be used adjacent to or stacked with other equipment, it should be observed to verify normal operation in the configuration in which it will be used.

Guidance and manufacturer's declaration - electromagnetic immunity			
The DXC-390P is intended for use in the electromagnetic environment specified below. The customer or the user of the DXC-390P should assure that it is used in such as environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV 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 IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5% U_T (> 95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles < 5% U_T (> 95% dip in U_T) for 5 sec	< 5% U_T (> 95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles < 5% U_T (> 95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DXC-390P requires continued operation during power mains interruptions, it is recommended that the DXC-390P be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at least characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The DXC-390P is intended for use in the electromagnetic environment specified below. The customer or the user of the DXC-390P should assure that it is used in such as environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the DXC-390P, including cables, than the recommended separation distance calculated from the equation appliance to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with following symbol: $\left(\left(\left(\cdot\right)\right)\right)$
NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the DXC-390P is used exceeds the applicable RF compliance level above, the DXC-390P should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the DXC-390P. b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

Recommended separation distances between portable and mobile RF communications equipment and the DXC-390P

The DXC-390P is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the DXC-390P can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (Transmitters) and the DXC-390P as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2 \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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

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

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

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Features

High-quality images

- The high density 1/3 type, three-chip Exwave HAD[TM1] CCD[2], containing some 430,000 effective picture elements (pixels), offers superior picture quality: 800 TV lines of high horizontal resolution, high sensitivity of F8 at 2,000 lx, an excellent signal-to-noise ratio of 61 dB and a low smear level.
- The adoption of the LSI digital signal processing technology reproduces a finer, more detailed picture.
- DynaLatitude processing enables you to adjust contrast finely according to the luminance signal level of each picture element.
- The DCC+ (Dynamic Contrast Control plus) function minimizes the phenomena whereby the whole screen turns white or a part of the image becomes colorless when shooting a very bright object.
- The Partial Enhance function enables you to adjust the sharpness and tint of only a specified color.
  1) Exwave HAD[TM]: Exwave Hole-Accumulated Diode "Exwave HAD[TM]" is a trademark of Sony Corporation.
  2) CCD: Charge-Coupled Device

Wide Range of Exposure Control

The AGC (Auto Gain Control) function and CCD IRIS[TM3] function automatically adjust a wide range of incoming light levels. When the lighting condition is poor, the AGC function automatically increases the gain up to 16 times. When incoming light is excessive, the CCD IRIS function automatically adjusts shutter speed to cut exposure to the equivalent of up to 10 aperture stops. When using the video camera in a fixed location or for a microscope system, the AGC, CCD IRIS and auto-iris controls automatically adjust a wide range of incoming light levels. The desired AE window can be set by using the AE AREA MANUAL function.
  3) "CCD IRIS[TM]" is a trademark of Sony Corporation.

Wide range of electronic shutter modes

The wide range of speeds for the electronic shutter minimizes blurring in fast-moving objects and produces acceptably bright still images of objects shot in poor light.
- Flickerless mode: This mode allows you to obtain flickerless images shot even under fluorescent light.
- Clear scan mode: This mode reduces horizontal bands appearing in computer displays when shooting the display with the conventional video camera.

Versatile use with external equipment

- The video camera is equipped with three types of outputs: composite, Y/C and RGB outputs. The camera offers a high-quality picture on a connected monitor or VCR.
- The camera can be remotely controlled with the RM-C950 remote control unit (not supplied).

RS-232C interface

The camera can be controlled from a computer via the RS-232C interface. For details, contact your authorized Sony dealer.

Compact and lightweight

The camera is compact ($56 \times 50 \times 128$ mm ($2 \, ^1/4 \times 2 \times 5 \, ^1/8$ inches)) and very light (approx. 370 g (13 oz)), allowing easy installation even where space is a problem. Following are some sample applications:
- As a permanent fixture in theaters, concert halls, etc.
- As a bird's-eye view camera for special events
- As a video conference system camera
- As a camera for microscopes
- As a rooftop weather-monitoring camera
- As a laboratory monitor camera

Location and Functions of Parts and Controls

Front Panel/Top Panel/ Bottom Panel
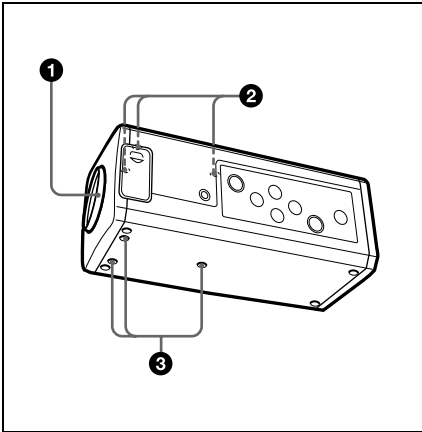
a Lens Mount (C-mount)

Attach a C-mount lens or microscope adaptor.

Note

Be sure to use a lens whose projected part from the lens mount surface is less than 4.3 mm. Mounting the lens with a projected part greater than 4.3 mm may damage the internal mechanism of the camera.

b Screw holes

Use these holes (M3, depth: 4 mm (3/16 inches)) to attach the supplied tripod adaptor to the camera for mounting the camera on a wall, ceiling or tripod.

For how to install the tripod adaptor, see "Mounting on a Tripod" on page 35.

Right Side Panel (Control Panel)
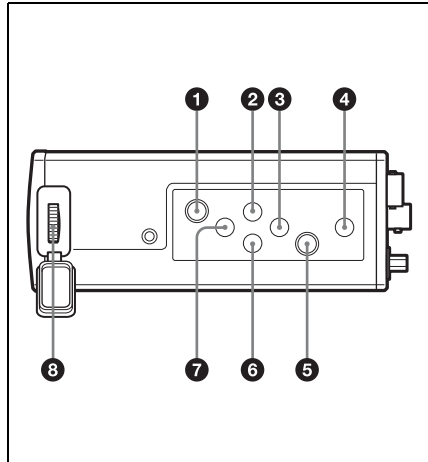
a MENU button

Displays the MAIN menu on a monitor screen. Press again to exit the menu. When a setting menu is displayed, press this button to return to the MAIN menu.

For menu operations, see "Operation through Menus" on page 15.

b ▲/BLACK (black balance) button

While the menu is displayed: Moves the menu cursor upward. Also use this button for an AE window setting, etc.
While the normal screen is displayed: Activates the automatic black balance adjustment.

c ▶/◿ WHITE (white balance) button

While the menu is displayed: Increases the setting value or changes the setting. Also use this button for an AE window setting, etc.
While the normal screen is displayed: Activates the automatic white balance adjustment when MODE is set to AWB in WHITE BALANCE menu.

❹ BARS (color bars output) button

Outputs the color bar signal. Press again to revert to video signal output.

For monitor adjustment, contact your authorized Sony dealer.

❺ ENTER button

Selects a setting menu in the MAIN menu. Also use this button for an AE window setting, etc.

❻ ↓ button

Moves the menu cursor downward. Also use this button for an AE window setting, etc.

❼ ◄/FILE SELECT button

While the menu is displayed:
Decreases the setting value or changes the setting. Also use this button for an AE window setting, etc.
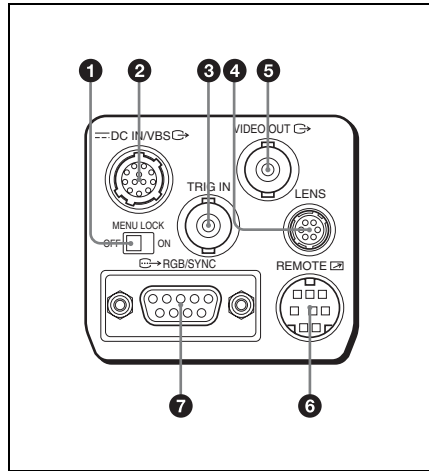**While the normal screen is displayed:**
Switches the user preset file between A and B.

❽ FLANGE BACK (flange focal length) adjustment ring

Adjusts the flange focal length of a lens which is not equipped with this function.

For details on flange focal length adjustment, see "Adjusting the Flange Focal Length" on page 31.

Rear Panel

❶ MENU LOCK ON/OFF switch

When this switch is set to ON, the menu is not displayed on the screen even if you press the MENU button.

❷ ⎓ DC IN/VBS ↪ (DC input/ video signal output) connector (12-pin)

Connects to the CMA-D2CE[*]/ D2MDCE/D3CE[*] camera adaptor. Inputs the DC power and outputs the video signal.
* CMA-D2CE/D3CE are intended for general purpose use. They are not intended for medical use.

❸ TRIG IN connector (BNC type)

Connects to a commercially available slave unit by converting to BNC type in strobe mode.

❹ LENS connector (6-pin)

Connects to a lens control cable when attaching the zoom lens.

❺ VIDEO OUT ↪ connector (BNC type)

Outputs a composite video signal.

6 REMOTE ⇗ connector (mini DIN 8-pin)

Connects to the RM-C950 remote control unit (not supplied).

7 ⸬→ RGB/SYNC connector (D-sub 9-pin)

Outputs RGB signals and their respective sync signals.
Use the CCXC-9DBS/CCXC-9DD/CCMC-9DS connecting cable for the connection with the CMA-D2CE[*]/D2MDCE camera adaptor.
For connection with the CMA-D3CE[*] camera adaptor, use the CCMC-3MZ[*] connecting cable.

* CMA-D2CE/D3CE/CCMC-3MZ are intended for general purpose use. They are not intended for medical use.

About on-screen menus

Camera operational settings can be changed through simple adjustment of the settings on the on-screen menus. Settings can be adjusted to get the best possible results for the given shooting conditions or to enhance the image with special effects.
This section explains how to read the on-screen menu before starting menu operation.

Note

Before starting menu operation, make sure that the MENU LOCK ON/OFF switch on the rear panel is set to OFF.
To display a menu, press the MENU button on the right side panel. The MAIN menu is displayed on the monitor screen.
The setting menu will be displayed by selecting the desired setting menu item with the ♠ or ♥ button and pressing the ENTER button.

Main Menu
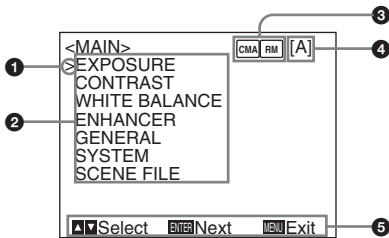
❶ Cursor

Selects a setting menu or setting item. Move the cursor up or down using the ♠ or ♥ button.

❷ Setting menu items

When you select the desired item with the ♠ or ♥ button and press the ENTER button, the setting menu for adjustment and setting is displayed.

❸ Connecting conditions

The indicator changes according to the equipment which is connected to the REMOTE connector on the camera.
⟨RM⟩ : when the RM-C950 remote control unit is connected
⟨CMA⟩ : when the CMA-D3CE* camera adaptor is connected via the CCMC-3MZ* connecting cable
⟨CMA⟩ ⟨RM⟩ : when the CMA-D3CE* camera adaptor is connected to the REMOTE connector on the camera via the CCMC-3MZ* connecting cable, and the RM-C950 remote control unit is connected to the REMOTE connector on the CMA-D3CE*

* CMA-D3CE/CCMC-3MZ are intended for general purpose use. They are not intended for medical use.
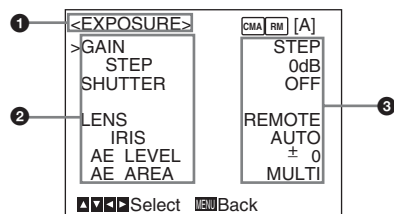
❹ User preset file

You can store two types of preset adjustments into files A and B. Indicates the currently selected preset file (A or B).

❺ Operational message

Indicates how to operate the currently displayed menu.

Setting Menu

❶ Setting menu

Indicates the currently selected setting menu.

❷ Setting items

Indicates the items that can be adjusted in each setting menu.
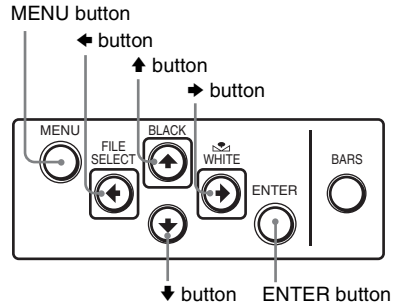Select the item by moving the cursor beside it with the ♠ or ♥ button.

c **Set values**

The currently set values are displayed.
Change the values using the ◀ or ▶
button.

Operation through Menus

Menu operation buttons

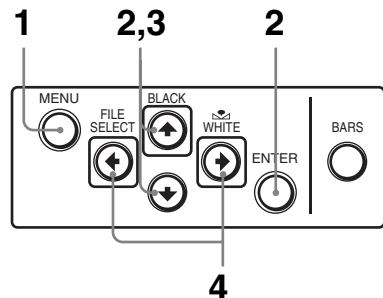Operate the menu with the buttons on the
right side panel.

MENU button

◀ button

▲ button

▶ button

↓ button   ENTER button

The following table shows the functions of
the buttons.

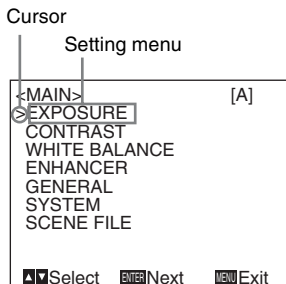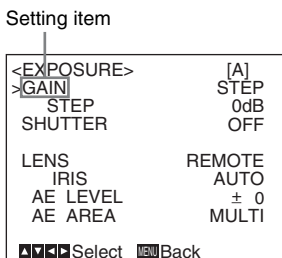| Button	Function
MENU	Displays the MAIN menu.
▲ button	Moves the cursor upward.
↓ button	Moves the cursor downward.
◀ button	Changes the setting/decreases the value.
▶ button	Changes the setting/increases the value.

Menu operation procedure
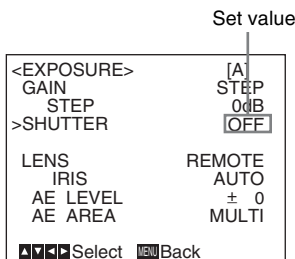
To change the settings on the menu, proceed
as follows.

1   **2,3**   **2**

4

1 Press the MENU button.

The MAIN menu appears.

Cursor

Setting menu

```
<MAIN>                    [A]
◇EXPOSURE
  CONTRAST
  WHITE BALANCE
  ENHANCER
  GENERAL
  SYSTEM
  SCENE FILE


 ▲▼Select   ENTERNext   MENUExit
```

2 Move the cursor to the menu item to be set by pressing the ▲ or ▼ button, then press the ENTER button.

The setting menu is displayed.

Setting item

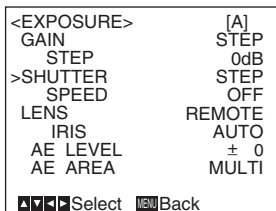```
<EXPOSURE>   [A]
>GAIN   STEP
   STEP   0dB
 SHUTTER   OFF

 LENS   REMOTE
   IRIS   AUTO
   AE LEVEL   ± 0
   AE AREA   MULTI

 ▲▼◀▶Select   MENUBack
```

**3** Move the cursor to the item to be adjusted by pressing the ▲ or ▼ button.

Set value

```
<EXPOSURE>                [A]
 GAIN                    STEP
   STEP                   0dB
>SHUTTER                  OFF

 LENS                  REMOTE
   IRIS                  AUTO
   AE LEVEL              ± 0
   AE AREA              MULTI

 ▲▼◀▶Select   MENUBack
```

4 Change the value by pressing the ◀ or ▶ button.

Holding down the button changes the value quickly.

```
<EXPOSURE>                [A]
 GAIN                    STEP
   STEP                   0dB
>SHUTTER                 STEP
   SPEED                  OFF
 LENS                  REMOTE
   IRIS                  AUTO
   AE LEVEL              ± 0
   AE AREA              MULTI

 ▲▼◀▶Select   MENUBack
```

To reset to the initial set value

Select the item to be reset, then press the ◀ and ▶ buttons simultaneously.

For the initial set value on each item, see "Initial Setting of the Menus" on page 30.
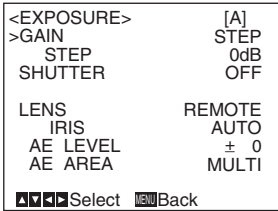
To return to the normal screen

Press the MENU button while the MAIN menu is displayed.

While each setting menu is displayed, press the MENU button to return to the MAIN menu, then press it again to return to the normal screen.

EXPOSURE menu

Adjusts the items relating to exposure, such as gain and shutter mode.

```
<EXPOSURE>              [A]
>GAIN                  STEP
   STEP                 0dB
 SHUTTER                OFF

 LENS                 REMOTE
   IRIS                AUTO
  AE  LEVEL            ±  0
  AE  AREA             MULTI

 ▲▼◄►Select   BACK Back
```

Setting items on the EXPOSURE menu

Setting item	Contents of setting	Ref. page
GAIN	Adjusts video gain.	17
STEP	Sets gain level.	17
SHUTTER	Sets the modes for the electronic shutter.	17
LENS	Sets the iris mode.	19
IRIS	Adjusts the iris automatically or manually.	19
AE LEVEL	Finely adjusts the focusing point of auto exposure adjustment.	19
AE AREA	Sets the AE window in AGC, CCD IRIS or auto iris adjustment mode.	19

GAIN

Adjusts the video gain.

STEP

Sets the video gain to the desired level. Use this setting for shooting in an extremely dark place where even fully opening the lens iris still does not produce an acceptably bright image. The gain level can be set in the range from 0 to 24 dB in units of 1 dB.

AGC

Automatic gain control. Automatically adjusts the gain according to the brightness of the object to be shot. This setting is useful for shooting when lighting conditions may change.
You can select the maximum gain level to be adjusted to 6, 12, 18 or 24 dB with the LIMIT setting.

HYPER

Increases the video gain to about 30 dB. This setting is useful when the lighting condition is very dark.

SHUTTER (electronic shutter)

Selects the electronic shutter modes.
This function enables you to obtain blur-free images of fast-moving objects and acceptably bright still images of objects shot in poor lighting conditions.

OFF

Any electronic shutter mode does not function.

STEP

Sets the shutter speed to any of 15 steps in long-exposure mode and 11 steps in high-speed mode.

Select SPEED and set the shutter speed from among the following values:
Long-exposure mode:
0.1, 0.2, 0.3, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 7.0, and 8.0 sec.
To set the speed, display OFF by pressing the ◄ and ► buttons simultaneously, then select the desired value by pressing the ► button. Each press changes the speed in the order as shown above.
High-speed mode:
FL (flickerless), 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/20000, 1/40000, 1/100000

To set the speed, display OFF by pressing the ◄ and ► buttons simultaneously, then select the desired value by pressing the ◄ button. Each press changes the speed in the order as shown above.

When using the camera in a 60 Hz lighting area, the FL setting offers flickerless images even under fluorescent light.

VARIABLE

Use for fine adjustment of the video output level in long exposure mode (low-speed mode) or in clear scan mode (high-speed mode).

Long exposure mode

You can set the SPEED value in units of 1 frame.

For example, if you set to 50 frames (about 1.7 seconds), the video signal produced during this set time is output in the form of one complete frame at intervals of about 1.7 seconds. These pictures, which contain 50 frames of video information, are much brighter than normal one-frame images. This mode is useful for shooting a poorly illuminated object in a dark place.

To set the shutter speed

1 Display OFF by pressing the ◄ and ► buttons simultaneously.
2 Select the SPEED value by pressing the ► button. Each time you press the button, the value changes in units of 1 frame.

To convert the value into the shutter speed

Example: When the value is set to 5 frames
$5 \times 1/25 = 0.2000$ seconds

> **Notes**
> - Do not use AGC, CCD-IRIS, ATW, DCC+ and DYNALATITUDE functions in long exposure mode.
> - When you set the shutter speed to 1 second or higher, set the gain level to 0 dB.

Clear scan mode

You can set the shutter speed in units of 1H (horizontal scanning time: 64.00 μs. Select SPEED, then select the value from 1/625H to 312/625H. This mode can be used for shooting computer displays with reduced

horizontal bands appearing across the display screen.

To set the shutter speed

1 Display OFF by pressing the ◄ and ► buttons simultaneously.
2 Select the SPEED value by pressing the ► button while observing the noise on the monitor screen so that you can obtain the image with minimum noise. Each time you press the button, the value changes in units of 1H.

To convert the value into the shutter speed

Example: When the value is set to 250H
250×64.00 μs (1H) + 35.0 μs (constant)
= 16035.0 μs = Approx. 0.016 seconds

CCD-IRIS

Automatically adjusts the luminance level for optimum output level. When incoming light is excessive, this function automatically adjusts the shutter speed to cut exposure equivalent to up to 10 aperture stops.

For example, this function is useful for microscope applications. When shooting with a microscope not equipped with the auto-iris lens, the luminance level that is just right for the human eye is often too bright for the video camera.

When CCD-IRIS is selected, the electronic shutter automatically decreases excessive incident light to an appropriate level for the video camera. This function is also useful for cutting out excessive incident light that is not cut out by the auto-iris lens in scenes containing very bright patches (such as snow, or sea water reflecting sunlight).

You can select the highest limit value of the variable range of the shutter speed. Select LIMIT, then set the speed to 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/20000,1/40000 or 1/100000.

> **Note**
> You cannot use CCD-IRIS mode when using a lens that automatically adjusts the iris control according to the video signal input.

LENS

Selects the iris mode.

VIDEO

Select when you use a lens that automatically adjusts the iris according to the input video signal.
Select AE LEVEL, then adjust the auto exposure focusing point in the range from –127 to +127.

REMOTE

Select when you use a lens that adjusts the iris according to the DC power supplied.

IRIS

Appears when you set LENS to REMOTE. Selects how to adjust the iris. You can select AUTO or MANUAL.
AUTO: Adjusts the iris automatically.
MANUAL: Adjusts the iris with the IRIS control on the RM-C950 remote control unit.

AE LEVEL

Sets auto exposure focusing point in the range from –127 to +127.

AE AREA

Sets the AE (Auto Exposure) window when the camera is set to AGC, CCD IRIS or auto-iris control mode.
MULTI: Divides the screen into 9 sections and adjusts auto exposure according to the luminance level in each section. Normally set to this position.
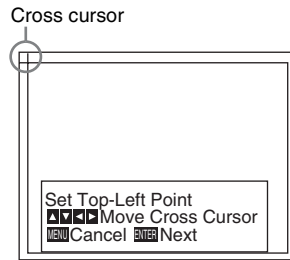
LARGE, MID, SPOT and SLIT:
Displays the following AE windows and adjusts auto exposure according to the luminance level in each area.
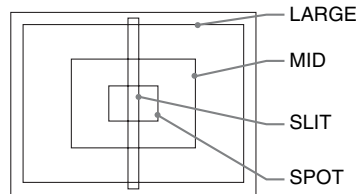

MANUAL: Sets the AE window with the desired size and position on the screen. Follow the steps below.

1 Select MANUAL and press the ENTER button.

Cross cursor

Set Top-Left Point
▲▼◀▶ Move Cross Cursor
MENU Cancel ENTER Next

2 Move the cross cursor appearing at the left top corner with the ◀, ▶, ▲ or ▼ button to set the upper and left side size, then press the ENTER button.

Set Bottom-Right Point
▲▼◀▶ Move Cross Cursor
MENU Cancel ENTER Next BARS Back
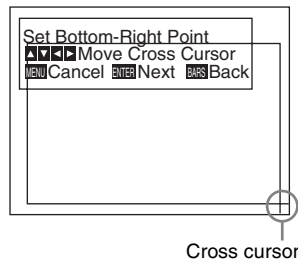
Cross cursor

3 Move the cross cursor appearing at the right bottom corner with the ◀, ▶, ▲ or ▼ button to set the lower and right side size, then press the ENTER button.

```
          +

Move Window
▲▼◀▶Move Cross Cursor
MENU Cancel ENTER Fix BARS Back
```
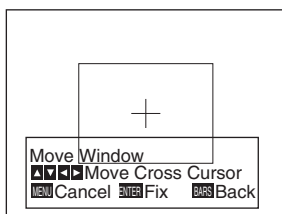
4 Move the AE window to the desired position with the ◀, ▶, ▲ or ▼ button, then press the ENTER button.

Note

To cancel the setting before completing the procedure, press the MENU button.

AE SPEED

Sets auto exposure focusing speed in AGC, CCD IRIS or auto-iris control mode. Selects from MID (normal speed), FAST (fast speed) and SLOW (slow speed).

Note

If lens hunting occurs, adjust with AE SPEED.

AE DETECT

Selects the detection method of the luminance level of the selected AE window.
AVERAGE: Selects to detect the average luminance level of the whole AE window.
PEAK: Selects to detect the part with the highest luminance level.

CONTRAST menu

Adjusts the contrast of the image.

```
<CONTRAST>          [A]
>EFFECT         MANUAL
   KNEE  POINT      MID
   BLACK STRETCH  ±  0
 GAMMA             ON
   LEVEL          ±  0
 MASTER PEDESTAL  ±  0
   R. PEDESTAL    ±  0
   B. PEDESTAL    ±  0

▲▼◀▶Select   MENU Back
```

Setting items in the CONTRAST menu

Setting item	Contents of setting	Ref. page
EFFECT	Adjusts the picture contrast in accordance with the incident luminance level.	20
KNEE POINT	Sets the knee point.	21
BLACK STRETCH	Adjusts the luminance of a dark portion of the screen.	21
GAMMA	Activates gamma compensation.	21
LEVEL	Adjusts the gamma level.	21
MASTER PEDESTAL	Sets the pedestal level of the output signal.	21
R./B. PEDESTAL	Finely adjust the pedestal level.	21

EFFECT

Selects the setting suitable for the incident luminance levels.

MANUAL

Selects KNEE POINT setting or BLACK STRETCH.

KNEE POINT

Sets the knee point according to the incoming light levels.

OFF: Knee processing does not function.
HIGH: Sets the knee point to the highest level.
MID: Normally, select this position.
LOW: Sets the knee point to the lowest level.

BLACK STRETCH

Adjusts the luminance of the dark portion of the screen.
You can set the value within the range from –10 to +10. The higher the setting, the brighter the screen.

DCC+

When shooting a very bright object, the whole screen may white out or a part of the image may be colorless. This setting minimizes these phenomena.

DYNA-LATITUDE

Adjusts the contrast according to the luminance level of each picture element. The setting is useful for shooting scenes mixed with bright and dark parts.
You can set the level within the range from –10 to +10.

GAMMA

Activates gamma compensation.

OFF

Outputs the video signal linearly without gamma compensation. Use this setting when you want to produce images for image processing or image analysis.

ON

Compensates the reproduction characteristics of a cathode-ray tube of a monitor to produce natural-tone image. Select LEVEL, then adjust so that you can obtain natural-tone image. Adjustable range is from –10 to +10.

MASTER PEDESTAL

The pedestal levels of the G, B and R output signals can be adjusted simultaneously. Adjusts the darkness level of the black part of the image. Use this function to bring out details in heavily shaded areas. The adjustable range is from –127 to +127. Normally set to ±0.
Use of a waveform monitor allows easier adjustment.

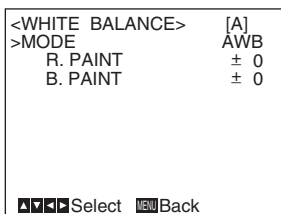**+:** The whole screen becomes whiter.
−: The whole screen becomes blacker.

R. (red) PEDESTAL, B. (blue) PEDESTAL

Use these items to finely adjust the pedestal level of each color. Adjust while watching the monitor screen. The items can be finely adjusted within the range from –127 to +127.

WHITE BALANCE menu

Adjusts the white balance.

```
<WHITE BALANCE>        [A]
>MODE                  AWB
   R. PAINT            ± 0
   B. PAINT            ± 0




▲▼◄►Select  MENU Back
```

Setting items in the WHITE BALANCE menu

Setting item	Contents of setting	Ref. page
MODE	Selects the white balance modes.	22
R./B. PAINT	Finely adjusts the white balance (AWB, ATW).	22

MODE

Selects the white balance modes.

AWB

Adjusts the white balance automatically (auto white balance).
When this item is selected, R. PAINT and B. PAINT are displayed. Use these items for fine adjustment. Adjust them while watching the monitor screen.
R. PAINT: Finely adjusts the red in the range from –100 to +100.
B. PAINT: Finely adjusts the blue in the range from –100 to +100.

For details, see "Adjusting the White Balance" on page 32.

ATW NORMAL or ATW WIDE

Activates auto-tracing white balance. This mode is suitable for shooting when the light source changes.
The white balance is automatically adjusted as the color temperature changes.
Normally, set to ATW NORMAL.
The ATW WIDE setting can cope with a wider range of color temperature changes.
When these items are selected, R. PAINT, B. PAINT, AREA and SPEED are displayed. Use these items for fine adjustment. Adjust them while watching the monitor screen.
The adjusted values are stored in memory other than AWB values.
R. PAINT: Finely adjusts the red in the range from –10 to +10.
B. PAINT: Finely adjusts the blue in the range from –10 to +10.
AREA: A detecting window appears on the monitor screen. Normally set to NORMAL to detect the average luminance level on the whole screen. If you want to display the desired window, set to MANUAL and follow the steps below.
1 Press the ENTER button.
2 Move the left top cross cursor with the ◄, ►, ▲ or ▼ button to set the upper and left side size, and press the ENTER button.
3 Move the right bottom cross cursor with the ◄, ►, ▲ or ▼ button to set the lower and right side size, and press the ENTER button.
4 Move the window to the desired position on the screen with the ◄, ►, ▲ or ▼ button, and press the ENTER button.
SPEED: Sets the focusing speed. You can select SLOW (slow speed), MID (normal speed) or FAST (fast speed).

MANUAL

Use for manual adjustment of white balance. When this item is selected, R. GAIN and B. GAIN are displayed. Adjust them while watching the monitor screen.
R. GAIN: Finely adjusts the red gain in the range from –127 to +127.
B. GAIN: Finely adjusts the blue gain in the range from –127 to +127.
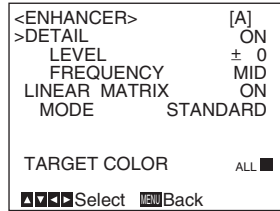
3200K

Selects for indoor shooting. (Color temperature: 3200K)

5600K

Selects for outdoor shooting. (Color temperature: 5600K)

ENHANCER menu

Adjusts the sharpness of the image outline and the color tone (hue).

```
<ENHANCER>            [A]
>DETAIL               ON
   LEVEL             ±  0
   FREQUENCY          MID
 LINEAR  MATRIX        ON
   MODE         STANDARD


 TARGET COLOR         ALL ■

 ▲▼◄►Select  MENU Back
```

Setting items in the ENHANCER menu

Setting item	Contents of setting	Ref. page
DETAIL	Enables or disables to adjust the sharpness of the image outline.	23
LEVEL	Adjusts the sharpness of the image outline.	24
FREQUENCY	Adjusts the sharpness of the detailed image outline.	24
LINEAR MATRIX	Enables or disables processing of a color matrix.	24
MODE	Finely adjusts the color tone.	24
TARGET COLOR	Specifies the color for DETAIL or LINEAR MATRIX adjustments.	24

DETAIL

Enables or disables adjustment of the sharpness of the image outline.

ON

Enables adjustment of the sharpness of the image outline.

OFF

Disables adjustment of the sharpness of the image outline.

When you set DETAIL to ON, LEVEL and FREQUENCY are displayed.
Adjust the sharpness of the image outline in accordance with your shooting purpose and your taste.

LEVEL

Adjusts the level in the range from –127 to +127.
The lower level decreases the sharpness of the image outline and makes the image softer.
The higher level increases the sharpness of the image outline and makes the image sharper.

FREQUENCY

Selects the frequency level with which the image outline is adjusted from LOW (lower frequency level), MID (middle frequency level) or HIGH (higher frequency level).
Higher setting provides a sharper outline of detailed images.

LINEAR MATRIX

Processes an image with a color matrix to change the chroma saturation and hue in order to reproduce natural color.

ON

Corrects the color to reproduce natural color.

OFF

Color correction does not function. Use when you want to process the image.

When you set LINEAR MATRIX to ON, MODE is displayed. You can adjust the color suitable for an object.

When you set MODE to MANUAL, R. PAINT, G. PAINT and B. PAINT appear.

STANDARD: Normally, select this setting.
R ENHANCE: Enhances the red.
B ENHANCE: Enhances the blue.
G ENHANCE: Enhances the green.
MANUAL: Adjusts each color finely.
  R. PAINT: Finely adjusts the red in the range from –30 to +30.
  G. PAINT: Finely adjusts the green in the range from –30 to +30.
  B. PAINT: Finely adjusts the blue in the range from –30 to +30.

TARGET COLOR

Select when adjusting DETAIL or LINEAR MATRIX for a specific color.

ALL

Adjusts DETAIL or LINEAR MATRIX for the whole image. Normally, set to this position.

IN

Adjusts DETAIL or LINEAR MATRIX for a specific color.
With the RANGE setting you can finely adjust the area in the range from –10 to +10.

OUT

Adjusts DETAIL or LINEAR MATRIX for colors other than a specified one.
With the RANGE setting you can finely adjust the area in the range from –10 to +10.

How to specify a color

1 Select IN or OUT and press the ENTER button.
2 Move the cross cursor (⊞) appearing in the center of the screen to the desired color with the ◄, ►, ▲ or ▼ button so that the cross cursor square covers the desired color, then press the ENTER button.
When you select IN, you can adjust the color indicated by the cross cursor (⊞).
When you select OUT, you can adjust colors other than that with the cross cursor.

GENERAL menu

Sets the general items.

```
<GENERAL>              [A]
>CCD MODE              FIELD
 SHADING COMP.         OFF

 TRIGGER               OFF

 NEGA                  OFF
 FLICKER CANCELLER     OFF

 ▲▼◄►Select  ⒷⓌBack
```

Setting items in the GENERAL menu

Setting item	Contents of setting	Ref. page
CCD MODE	Selects the CCD read-out mode.	25
SHADING COMP.	Eliminates color at the top and bottom of the screen.	25
TRIGGER	Sets the polarity when connecting a slave unit to synchronize with a stroboscope.	25
NEGA	Reverses the output image to negative.	26
FLICKER CANCELLER	Reduces flicker when SHUTTER is set to CCD IRIS or OFF.	26

CCD MODE

Selects the CCD read-out mode.

FIELD

Accumulates charges in field units. Use to shoot a moving object.

FRAME

Accumulates charges in frame units. Provides the image with the highest possible vertical resolution. Use to shoot a still object.

SHADING COMP. (Shading compensation)

Eliminates green or magenta color which may appear at the top or bottom of the screen, when the camera is used with an optical instrument.

OFF

Color elimination does not function.

ON

If green or magenta color appears at the top or bottom of the screen when the camera is attached to a microscope, etc., select this setting.

When SHADING COMP. is set to ON, LEVEL is displayed. Adjust while watching the screen so that the color is eliminated. Adjustable range is from –127 to +127.
  +: Green at the top and magenta at the bottom will be eliminated.
  –: Magenta at the top and green at the bottom will be eliminated.

TRIGGER

Set when you use a slave unit connected to the TRIG IN connector and synchronize the camera with a stroboscope.

OFF

Select when you do not connect a slave unit.

ON

Select when you connect a slave unit. Select POLARITY, and set it to the same polarity as the input pulse signal.
  ↰ : Falling edge
  ↰ : Rising edge

NEGA

Reverses the output image to negative/positive.

OFF

Outputs the image normally.

ON

Outputs the image reversed to negative/positive.

FLICKER CANCELLER

When using the camera in a 60 Hz lighting area, you can obtain images with less flicker under fluorescent light even when SHUTTER is set to CCD IRIS or OFF. Set this item to OFF when you want to set NEGA to ON.

### OFF

Disables the FLICKER CANCELLER function.

ON

Reduces flicker.

SYSTEM menu

Sets the items relating to the system of the camera and selection of output signals.

```
<SYSTEM>              [A]
>BAUD RATE           9600
 D-SUB VIDEO          VBS
 D-SUB SYNC         C.SYNC

 RGB SYNC              G
 12P CONNECTOR         IN


 ▲▼◄►Select  MENUBack
```

Setting items in the SYSTEM menu

| Setting item	Contents of setting	Ref. page
BAUD RATE	Selects the baud rate.	27
D-SUB VIDEO	Switches the video signal output from the ⬚→ RGB/SYNC connector (D-sub 9-pin).	27
D-SUB SYNC	Switches the sync signal output from the ⬚→ RGB/SYNC connector (D-sub 9-pin).	27
RGB SYNC	Adds a sync signal to the RGB output.	27
12P CONNECTOR	Switches the input and output of the ⎓ DC IN/VBS ⟿ connector and selects the output signal.	28
(VBS lock) H. PHASE* SC. PHASE ROUGH* SC. PHASE FINE*	Adjusts the horizontal phase and SC (subcarrier) phase during external synchronization (with VBS signal input).	28

Setting item	Contents of setting	Ref. page
(HD/VD lock) H. PHASE*	Adjusts the horizontal phase during external synchronization (with HD/VD signal input).	28

* Displayed only when an external sync signal is input.

BAUD RATE

Switches the baud rate of the REMOTE ⤧ connector at the rear panel.
Sets to any of 19200, 9600, 4800, 2400 and 1200.
Normally, set to 9600 when the RM-C950 remote control unit is connected to the REMOTE ⤧ connector.

Note

When the CMA-D3CE* is connected to the camera using the CCMC-3MZ* connecting cable, "CMA-D3" will appear and you cannot select the baud rate.
* CMA-D3CE/CCMC-3MZ are intended for general purpose use. They are not intended for medical use.

D-SUB VIDEO

Switches the video signal output from the ⋯⇥ RGB/SYNC connector (D-sub 9-pin) at the rear panel.

VBS

Outputs VBS signal.

Y/C

Outputs Y/C signal.

Note

When the CMA-D3CE* is connected to the camera with the CCMC-3MZ* connecting cable, the item does not function.
* CMA-D3CE/CCMC-3MZ are intended for general purpose use. They are not intended for medical use.

D-SUB SYNC

Switches the sync signal output from the ⋯⇥ RGB/SYNC connector (D-sub 9-pin) at the rear panel.

C.SYNC

Outputs the composite sync signal.

WEN

Outputs the WEN signal. When connecting peripheral equipment, the signal is used as trigger pulse output to the equipment.
Select the polarity of the WEN signal with the POLARITY setting.
 ⊓ : Negative
  ⊔ : Positive

Note

When the CMA-D3CE* is connected to the camera with the CCMC-3MZ* connecting cable, this item is fixed to WEN.
* CMA-D3CE/CCMC-3MZ are intended for general purpose use. They are not intended for medical use.

RGB SYNC

Adds a sync signal to the G signal or R, G and B signals output from the ⋯⇥ RGB/SYNC connector.

OFF

No sync signal is added to an output signal.

G

Adds a sync signal to the G signal output from the ⋯⇥ RGB/SYNC connector.

RGB

Adds sync signals added to the G, B and R signals output from the ⋯⇥ RGB/SYNC connector.

12P CONNECTOR

Switches the input and output of the $\overline{\cdots}$ DC IN/VBS $\rightarrow$ connector (12-pin). Selects the output signal from this connector when OUT is selected.

IN

Functions as the input connector.

OUT

Functions as the output connector.
Select the output signal with the SIGNAL setting.
HD/VD: Outputs the HD/VD signal.
C. SYNC: Outputs the composite sync signal.

Note

When the CMA-D3CE[*] is connected to the camera with the CCMC-3MZ[*] connecting cable, you cannot set this item. Switch between input and output with the IN/OUT switch on the CMA-D3CE[*] camera adaptor.

For details, refer to the operating instructions of the CMA-D3CE[*].

* CMA-D3CE/CCMC-3MZ are intended for general purpose use. They are not intended for medical use.

VBS lock

Appears only when an external reference sync signal (VBS signal) is input. Adjusts the horizontal phase and SC (subcarrier) phase to synchronize the camera operation with the reference signal.

H.PHASE

Adjusts the horizontal phase within the range from –20 to +127.

SC.PHASE ROUGH

Roughly adjusts the subcarrier phase by setting to 0° or 180°.

SC.PHASE FINE

Finely adjusts the subcarrier phase within the range from –127 to +127.

HD/VD lock

Appears only when an external reference sync signal (HD/VD signal) is input. Adjusts the horizontal phase to synchronize the camera operation with the reference signal. Select H.PHASE, then adjust the level within the range from –20 to +127.

SCENE FILE menu

Sets the preset menu settings.
The camera has two memory files (A or B) for storing the menu settings. You can store a different type of setting into each file, and switch to the file most suitable for the shooting conditions quickly. The currently selected memory file is shown in the upper right corner of the on-screen menu.

```
<SCENE FILE>            [A]
>FILE SELECT             A
 LOAD




 ▲▼◄►Select  ▥Back
```
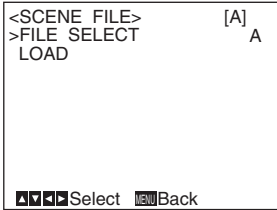
Setting items in the SCENE FILE menu

Setting item	Contents of setting	Ref. page
FILE SELECT	Selects the file into which you store the setting.	29
LOAD	Selects the type of setting to be stored, and loads it.	29

FILE SELECT

Selects the file A or B.

LOAD

Sets the setting to be stored into the file which you select with FILE SELECT, and stores the setting.

STANDARD: Suitable for a camera used as a permanent fixture.
MICROSCOPE: Suitable for a camera for a microscope.
FULL AUTO: Automatically adjusts settings.

STROBE: Suitable for stroboscopic shooting.
FILE B (or A): When copying the settings between two files.

Storing the setting

1 Select A or B into which the setting is stored in the FILE SELECT setting.
2 Press the ▲ or ▼ button to select LOAD.
3 Press the ◄ or ► button to select the desired setting to be stored, and press the ENTER button.
  "Overwrite OK?" appears.
4 Press the ENTER button.
  If you do not want to store the setting, press the MENU button.

Initial Setting of the Menus

If you want to reset the settings and values to the initial settings, press the ← and → buttons simultaneously.

Setting menu	Setting item	Initial setting
EXPOSURE	GAIN	STEP
	STEP	0 dB
	SHUTTER	OFF
	STEP	OFF
	LENS	REMOTE
	IRIS	MANUAL
	AE LEVEL	± 0
	AE AREA	MULTI
CONTRAST	EFFECT	MANUAL
	KNEE POINT	MID
	BLACK STRETCH	± 0
	GAMMA	ON
	LEVEL	± 0
	MASTER PEDESTAL	± 0
	R. PEDESTAL	± 0
	B. PEDESTAL	± 0
WHITE BALANCE	MODE	AWB
	R. PAINT	± 0
	B. PAINT	± 0

Setting menu	Setting item	Initial setting
ENHANCER	DETAIL	ON
	LEVEL	± 0
	FREQUENCY	MID
	LINEAR MATRIX	ON
	MODE	STANDARD
	TARGET COLOR	ALL
GENERAL	CCD MODE	FIELD
	SHADING COMP.	OFF
	TRIGGER	OFF
	NEGA	OFF
	FLICKER CANCELLER	OFF
SYSTEM	BAUD RATE	9600
	D-SUB VIDEO	VBS
	D-SUB SYNC	C.SYNC
	RGB SYNC	G
	12P CONNECTOR	IN
	H. PHASE*	± 0
	SC PHASE ROUGH*	0°
	SC PHASE FINE*	± 0

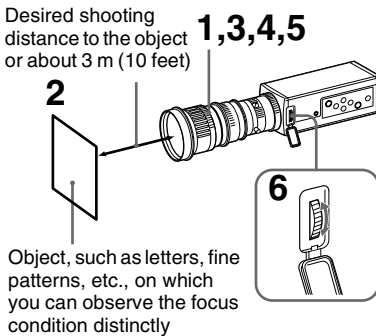* Displayed only when an external sync signal is input.

Shooting

Adjusting the Flange Focal Length

This section explains how to adjust the flange focal length (distance from the lens mounting plane to an object). Adjustment method varies with the lens you use.

When you use a zoom lens not equipped with the flange focal length adjustment function

Adjust the flange focal length using the FLANGE BACK (flange focal length) adjustment ring on the camera.

Desired shooting distance to the object or about 3 m (10 feet)

1,3,4,5

2

6

Object, such as letters, fine patterns, etc., on which you can observe the focus condition distinctly

1 Set the iris fully open if the lens is equipped with the iris ring.
If you use the auto iris lens, illuminate the object appropriately so that the iris is open.

2 Point the camera to an object at the desired shooting distance or about 3 m (10 feet) away.

3 Turn the zoom ring to TELE (telephoto) as far as it goes.

4 Adjust the focus on the object used in step 2 by turning the focus lens on the lens.

5 Turn the zoom ring to WIDE (wide-angle) as far as it goes.

6 Adjust the focus on the object used in step 2 by turning the FLANGE BACK (flange focal length) adjustment ring on the camera.
Do not turn the focus ring on the lens during adjustment.

7 Repeat steps 3 to 6 until you achieve sharp focus both in the telephoto and wide-angle positions.

Now the flange focal length adjustment is completed.
You do not need to readjust the flange focal length unless you replace the lens.

Basic Shooting Procedure

2

3   **4,5**
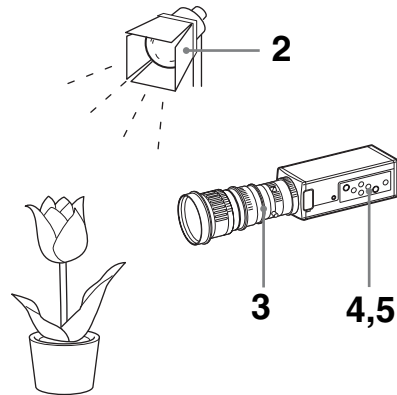
1 Turn on the power of the camera and all connected devices.

2 Illuminate an object with proper lighting.

3 Point the camera at the object and adjust the iris, focus and zoom.

Operation

Shooting | 31

4 Adjust the white balance.

For details, see "Adjusting the White Balance" on page 32.

5 Adjust the settings as required.

For details, see "Adjusting and Setting with Menus" on page 14.

6 Start shooting.

Adjusting the Black Balance

Adjust the black balance first, after you turn on the power of your camera.
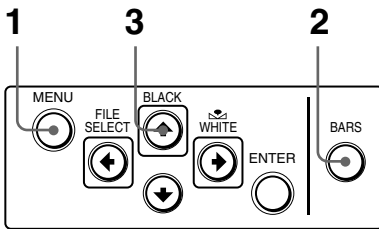
Operation procedure

1 If any menu is displayed on the screen, press the MENU button to remove it.

2 If a color bar signal is displayed on the screen, press the BARS button to remove it.

3 Press the BLACK button.
The lens iris control is automatically closed, and the black balance is adjusted. If you use a manual-iris lens, close the iris then press the BLACK button. While adjusting, the bars are displayed. When the adjustment is completed, the message "BLACK: OK" appears on the screen.

Black balance adjustment errors

If the black balance adjustment is not successful, the message "BLACK: NG" appears on the screen. If this happens, take the necessary measures and perform steps 1 through 3 again.

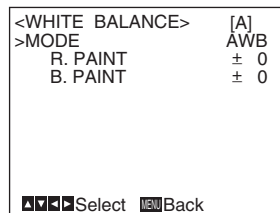*For details, see "List of Messages" on page 47.*

Adjusting the White Balance

Each time the lighting condition changes, be sure to adjust the white balance so that optimum color reproduction is obtained.
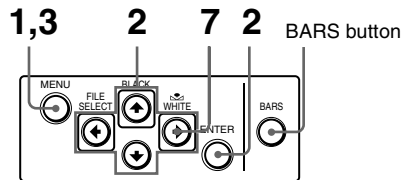
Operation procedure

1 Press the MENU button to display the MAIN menu.

2 Select the WHITE BALANCE menu, and set MODE to AWB.

```
<WHITE  BALANCE>      [A]
>MODE                 AWB
   R. PAINT           ±  0
   B. PAINT           ±  0



 ▲▼◄►Select   MENUBack
```

For menu operation, see "Operation through Menus (Menu operation procedure)" on page 15.

3 Press the MENU button twice to remove the menu.

4 Display the camera image on the monitor screen.
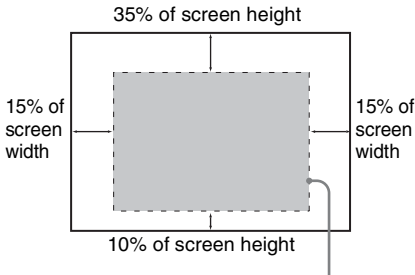
Note

If a color bar signal is displayed on the screen, press the BARS button to turn it off.

5 Set the lens iris control as follows:
When using an auto-iris lens: Set to auto-iris control.
When using a manual-iris lens: Set to an appropriate iris opening value.

6 Place a white object (white pattern, white cloth, etc.) in the same light as that falling on the object to be shot, then zoom in on the white object to fill the screen as follows.

35% of screen height

15% of screen width   15% of screen width

10% of screen height

The white object must fill a rectangle of this size. (Avoid very bright highlights within the rectangle.)

The white object can be a white wall near the object to be shot.

Notes

• Do not include highly reflective objects in the picture.
• Always shoot the image under suitable lighting conditions.

7 Press the ⤲ WHITE button.
During adjustment the bars appear. The message "WHITE: OK" appears on the screen when the adjustment is done. The adjusted white level is automatically stored in memory and remains even if the camera's power is turned off.

To shoot under the same conditions, the stored white balance is recalled by setting MODE to AWB in the WHITE BALANCE menu.

White balance adjustment errors

If the auto white balance adjustment is not successful, an error message appears on the screen. If this happens, take the necessary measures and perform steps 1 through 7 again.

For more details, see "List of Messages" on page 47.

⤲ WHITE: NG
XXXXX

Error message
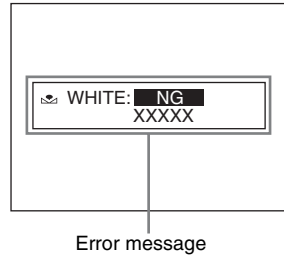
Adjusting the Picture Tone in a Multi-Camera System

When configuring a multi-camera system, adjust all cameras to prevent camera-to-camera variations in picture tone.
Before making the adjustments outlined below, input the same sync signal to all cameras.

For connections, see "Connecting Two or More Cameras — Multi-Camera System" on page 39.

Connecting the cameras to video equipment with phase indication capability

When connecting to a special-effects generator, a chroma-key unit, or other video equipment with phase indication capability, the basic adjustment procedure is as follows:

1 Turn on the phase indication capability of the connected video equipment.

2 Adjust the horizontal phase using the menu.

Select H. PHASE from the SYSTEM menu.

For more details, see "Operation through Menus" on page 15.

3 Adjust the subcarrier phase using the menu.

Select SC. PHASE from the SYSTEM menu.

First adjust the subcarrier phase roughly with SC. PHASE ROUGH by setting to between 0° and 180°, then adjust it finely using SC. PHASE FINE.

For more details, refer to the instruction manual of the connected video equipment with phase indication capability.

Connecting the cameras to video equipment without phase indication capability

Use one of the cameras as a reference camera and adjust the other cameras to the reference camera one by one.

1 Adjust the horizontal phase. Select H. PHASE from the SYSTEM menu, and adjust so that the reference video signal and the output signal have the same horizontal sync phase. Use a waveform monitor or an oscilloscope to check the phase.

2 Adjust the subcarrier phase. Select SC. PHASE from the SYSTEM menu.

First adjust the subcarrier phase roughly with SC. PHASE ROUGH by setting to between 0° and 180°, then adjust it finely using SC. PHASE FINE so that the reference video signal and the output video signal have the same subcarrier phase. Use a vectorscope or the wiping function of a special-effects generator to display the images of both the reference camera and the camera to be adjusted simultaneously on the screen.

Installation

Applicable Lens

C-mount lenses with the following lens mount surface can be attached to the camera.
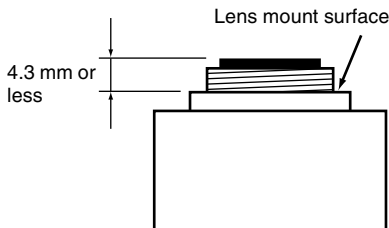
Lens mount surface

4.3 mm or less

Note

Be sure to use a lens whose projected part from the lens mount surface is less than 4.3 mm. Mounting the lens with a projected part greater than 4.3 mm may damage the internal mechanism of the camera.

Mounting a Microscope Adaptor

To attach the camera to a microscope, an operating microscope, etc., it is necessary to mount an appropriate adaptor. The method for mounting the adaptor is the same as for the lens.

For details, refer to the instruction manual for each adaptor.
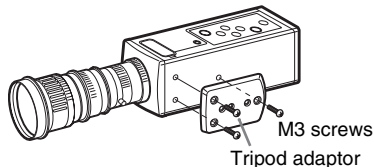
Mounting on a Tripod

Install the supplied tripod adaptor using the three screw holes (M3) on the top or bottom panel. Then attach the tripod to the adaptor using the following mounting screws:

U1/4″, 20 UNC
ℓ = 4.5 mm ± 0.2 mm
(ISO standard)
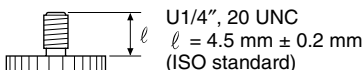
Attaching the supplied tripod adaptor

Following is an example of attaching the tripod adaptor to the bottom panel of the camera. You can also attach the tripod adaptor to the top panel of the camera.
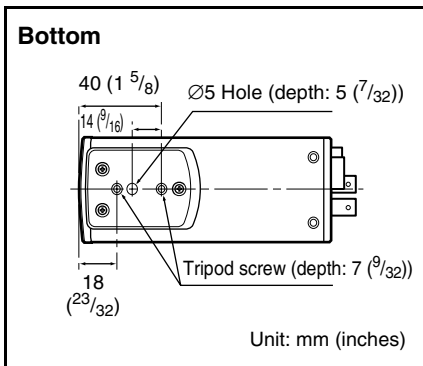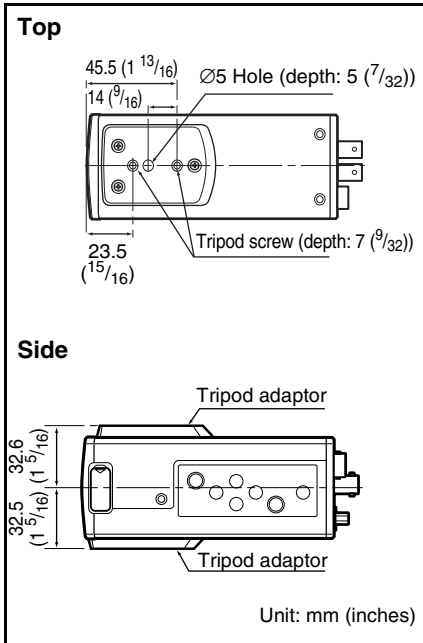
e.g. Attaching on the bottom panel

M3 screws
Tripod adaptor

Mounting to a Wall or Ceiling

Attach the camera with the tripod adaptor to the mounting bracket or suspension bracket using the appropriate screws (U1/4", 20 UNC) that fit the tripod holes of the adaptor.

Installation and Connections

Installation | 35

Reference dimensions for attaching a tripod

Top

45.5 (1 $^{13}/_{16}$)
14 ($^9/_{16}$)
∅5 Hole (depth: 5 ($^7/_{32}$))
23.5 ($^{15}/_{16}$)
Tripod screw (depth: 7 ($^9/_{32}$))

Side

Tripod adaptor
32.6 (1 $^5/_{16}$)
32.5 (1 $^5/_{16}$)
Tripod adaptor

Unit: mm (inches)

Bottom

40 (1 $^5/_8$)
14 ($^9/_{16}$)
∅5 Hole (depth: 5 ($^7/_{32}$))
18 ($^{23}/_{32}$)
Tripod screw (depth: 7 ($^9/_{32}$))

Unit: mm (inches)

Basic System Connection

To supply power to the camera, use the CMA-D2CE*/D2MDCE/D3CE* camera adaptor.

Note on connections

Be sure to turn off the power supply for all equipment before making any connections.
* CMA-D2CE/D3CE are intended for general purpose use. They are not intended for medical use.

Using the CMA-D2CE*/D2MDCE camera adaptor

There are two methods for connecting the camera and the camera adaptor.
- Using the CCDC cable which only supplies power to the camera (*For connecting method, see page 37.*)
- Using the CCXC cable which supplies power to the camera and transmits video signals to the camera adaptor (*For connecting method, see page 37.*)

Note

Be sure to use one camera adaptor for each DXC-390P unit.
Although the CMA-D2CE*/D2MDCE camera adaptor has two CAMERA connectors (4-pin and 12-pin), the power consumption of the camera is such that two camera units cannot be connected at the same time.
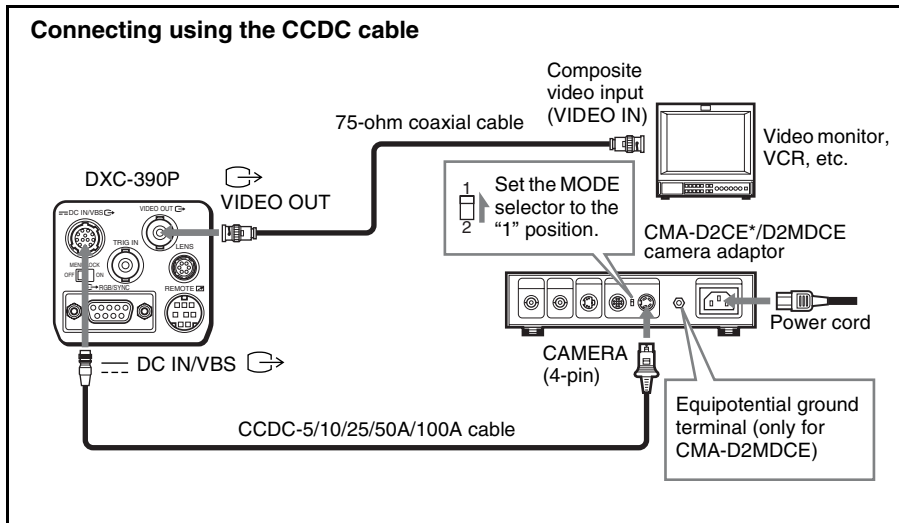* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Using the CMA-D3CE* camera adaptor

The connections using the CMA-D3CE* camera adaptor supply power to the camera and transmit video signals to the camera adaptor. (*For connecting method, see page 40.*)
* CMA-D3CE is intended for general purpose use. It is not intended for medical use.
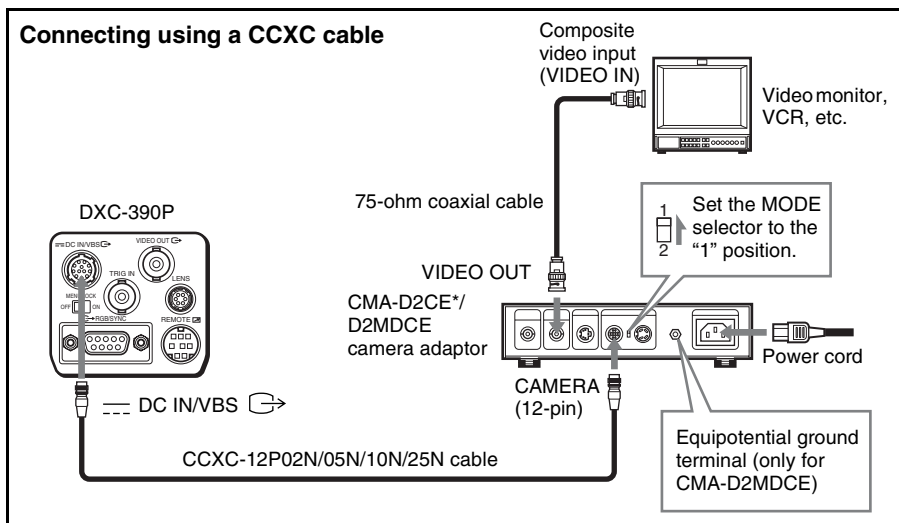
Connecting to Video Equipment with Composite Video Input Connectors

Setup using a CCDC cable (for supplying power only)
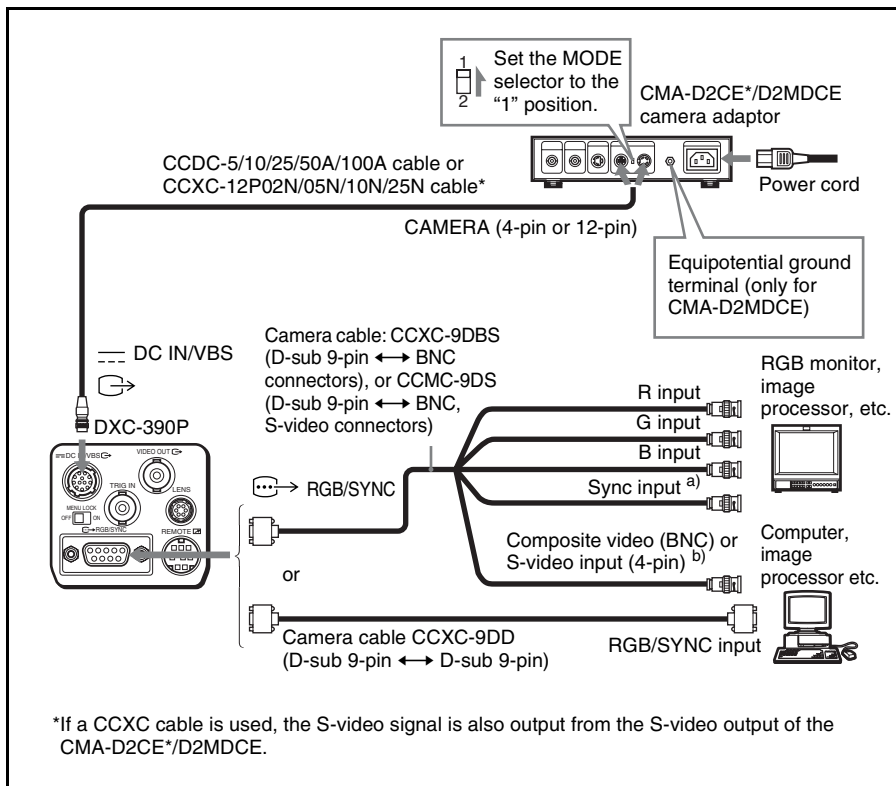
Connecting using the CCDC cable

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Setup using a CCXC cable (for supplying power to camera and video signals to the camera adapter)

Connecting using a CCXC cable

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Connecting to Video Equipment with RGB or S-Video Inputs

If a CCXC cable is used, the S-video signal is also output from the S-video output of the CMA-D2CE/D2MDCE.

a) When using a video monitor without a sync signal input connector, the camera can be set to output a sync signal with the G signal or RGB signals.

For details, see "SYSTEM menu" on page 26.

b) This setup is for connecting to a composite video (VBS) connector. To output separated Y/C signals to the S-video input of video equipment, use a CCMC-9DS camera cable.

For details on switching camera output between VBS (composite video) and Y/C, see "SYSTEM menu" on page 26.

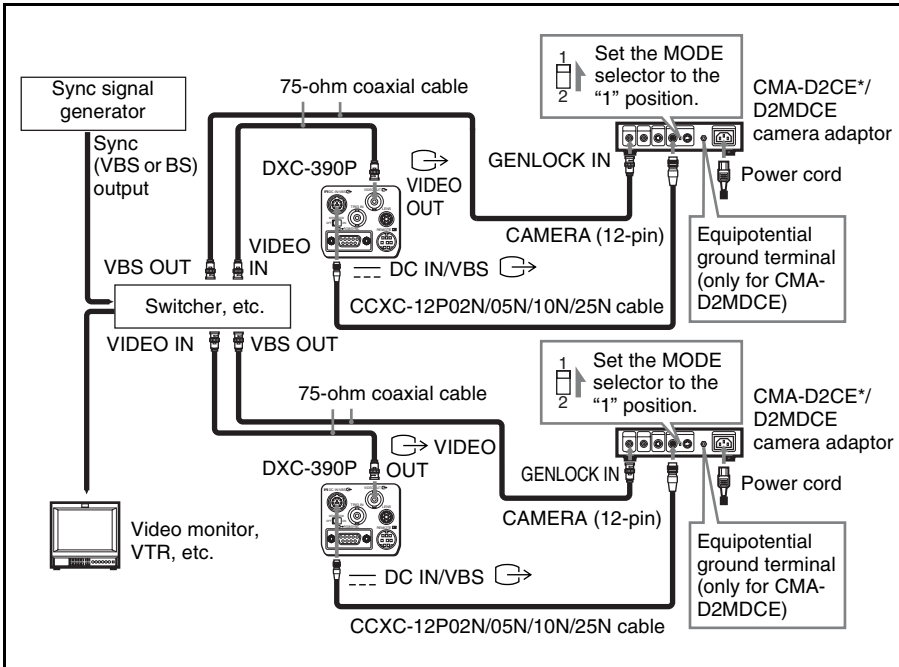* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Connecting Two or More Cameras — Multi-Camera System

Notes on multi-camera system

Perform the following to prevent flicker when switching between two or more cameras connected to a video switcher:

- Supply the same sync signal to the GENLOCK IN connectors on each camera adaptor (see below).
- Adjust the subcarrier and horizontal synchronization phases for all cameras.

For more details, see "Adjusting the Picture Tone in a Multi-Camera System" on page 33.

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Connecting to the CMA-D3CE* Camera Adaptor
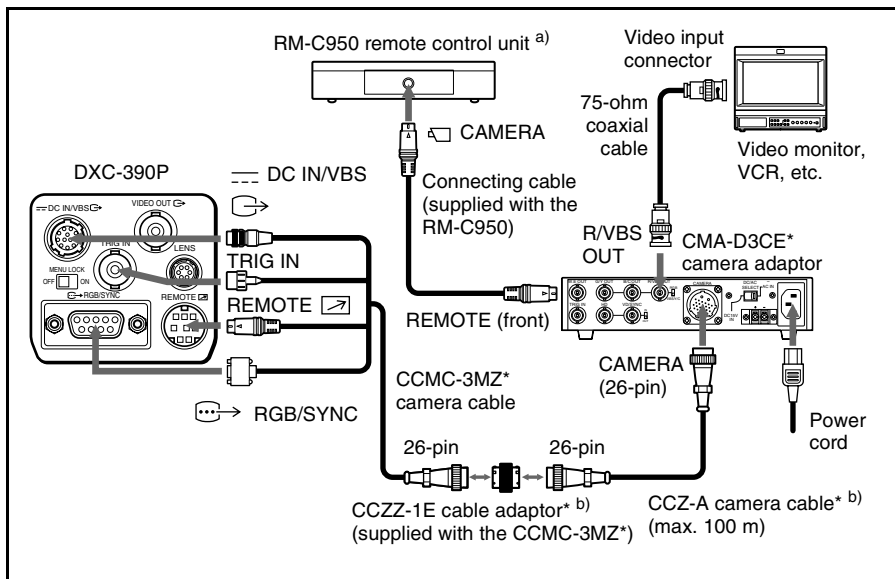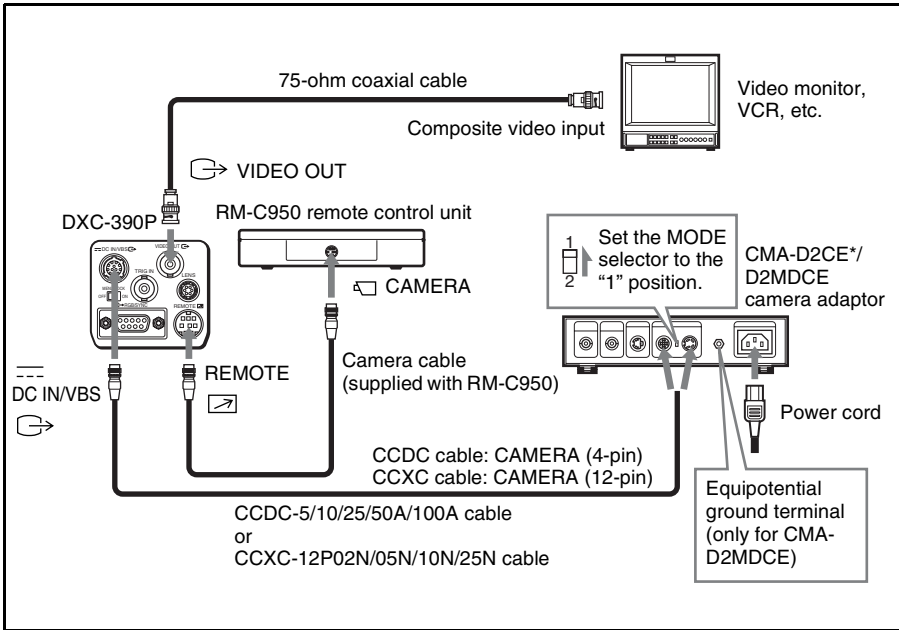

a) In this case, connect the RM-C950 remote control unit to the CMA-D3CE*
camera adaptor.

b) To extend the cable, connect the CCMC-3MZ* camera cable to the CCZ-A*
camera cable using the cable adaptor supplied with the CCMC-3MZ*.

* CMA-D3CE/CCMC-3MZ/CCZ-A camera cable/CCZZ-1E cable adapter are intended for general
purpose use. They are not intended for medical use.

Connecting to a Remote Control Unit

You can connect the RM-C950 remote control unit.

75-ohm coaxial cable

Composite video input

Video monitor, VCR, etc.

→ VIDEO OUT

DXC-390P

RM-C950 remote control unit

⊑ CAMERA

Set the MODE selector to the "1" position.

CMA-D2CE*/ D2MDCE camera adaptor

DC IN/VBS

→

REMOTE

↗

Camera cable (supplied with RM-C950)

Power cord

CCDC cable: CAMERA (4-pin)
CCXC cable: CAMERA (12-pin)

Equipotential ground terminal (only for CMA-D2MDCE)

CCDC-5/10/25/50A/100A cable
or
CCXC-12P02N/05N/10N/25N cable

Operating the Camera with the RM-C950 Remote Control Unit

When the RM-C950 remote control unit is used with this camera, the names and functions of the PRINT, FLASH, LONG EXPOSURE and FUNCTION buttons and the GAIN control change as follows, in accordance with the functions of the camera.

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Installation and Connections

Functions of the PRINT, FLASH, LONG EXPOSURE and FUNCTION buttons and GAIN control on the RM-C950

| Buttons/ control on the RM-C950	Button/control names when used with the camera	Function
PRINT ▭	ENTER	Use when displaying the setting menu selected in the MAIN menu, or use to set the AE window, etc. manually in the menus.
FLASH ⚡	FILE SELECT	Use to switch a preset file between A and B.
LONG EXPOSURE ⇧ ⇩	SHUTTER SPEED	Use to set the shutter speed without displaying the menu when SHUTTER is set to STEP or VARIABLE in the menu.
GAIN ◿	GAIN	Use to change the variable range of gain levels to 0-24 dB.
FUNCTION ⇧	BLACK	Use to start the auto black balance adjustment.

Attaching the supplied name sheet

The sheet for the button names when the camera is used with the remote control unit is supplied with the camera. Attach the name sheet to the control panel of the RM-C950.

1 Before attaching, clean the control panel of the RM-C950.

2 Peel off the adhesive sheet at the back of the name sheet and attach the name sheet to the panel.

Connecting to a Computer

System for controlling the camera with a computer using an RS-232C command
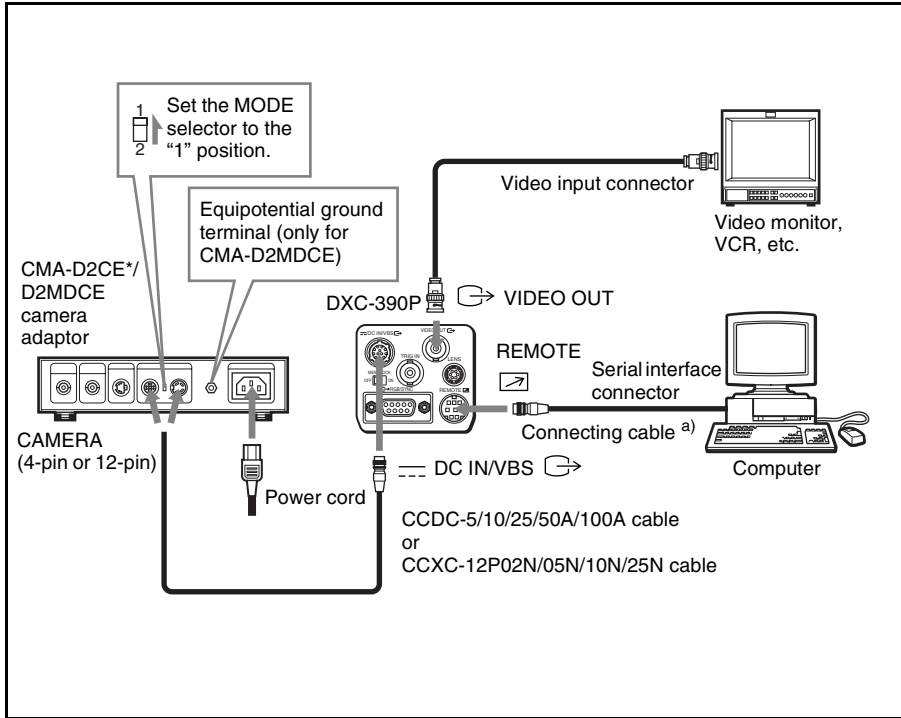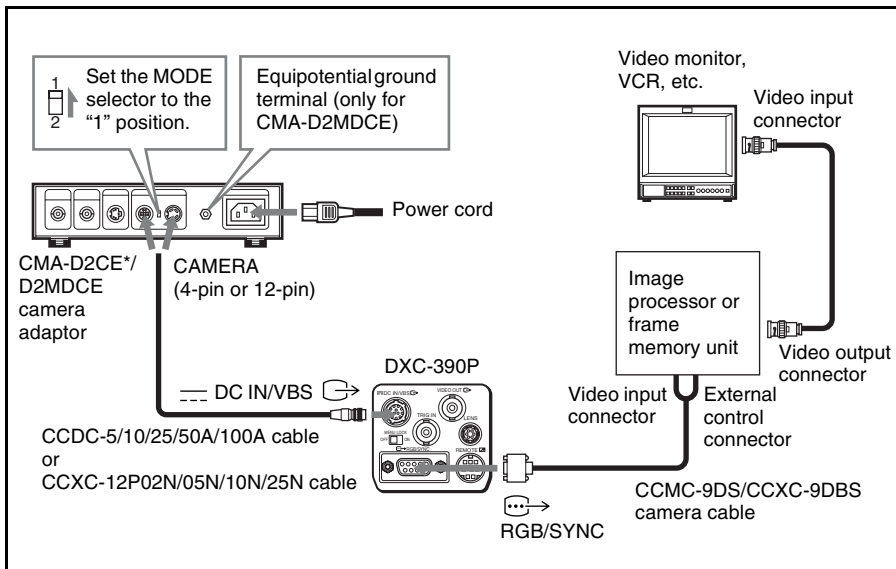

a) Use the shielded connecting cable for connecting to a computer.

For more details on RS-232C protocols and cables for connection to a computer, contact your authorized Sony dealer.

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Connections for Long Exposure Shooting

System for shooting using long exposure in VARIABLE mode for electronic shutter

Set the MODE selector to the "1" position.

Equipotential ground terminal (only for CMA-D2MDCE)

Power cord

Video monitor, VCR, etc.

Video input connector

CMA-D2CE*/ D2MDCE camera adaptor

CAMERA (4-pin or 12-pin)

Image processor or frame memory unit

Video output connector

DC IN/VBS

DXC-390P

Video input connector

External control connector

CCDC-5/10/25/50A/100A cable or CCXC-12P02N/05N/10N/25N cable
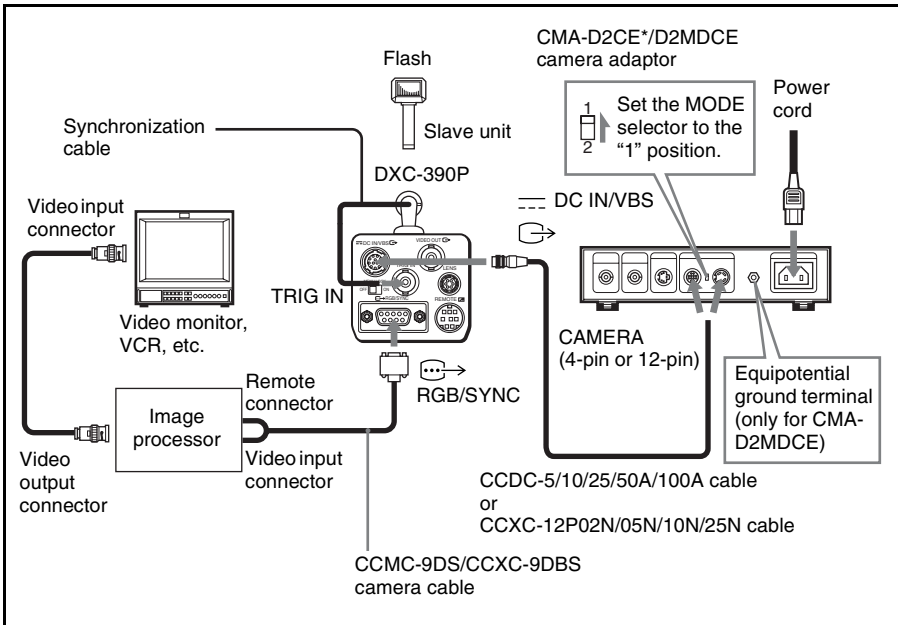
RGB/SYNC

CCMC-9DS/CCXC-9DBS camera cable

Note

When shooting with long exposure, set D-SUB SYNC to WEN and RGB SYNC to G (or RGB) in the SYSTEM menu *(pages 26)*.

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Connections for Shooting Using a Flash

Note

When connecting a flash unit, set TRIGGER to ON in the GENERAL menu *(pages 25)* and D-SUB SYNC to WEN in the SYSTEM menu *(pages 26)*.

* CMA-D2CE is intended for general purpose use. It is not intended for medical use.

Precautions

Operating or storage location

Operating or storing the camera in the following locations may cause damage to the camera:
• Extremely hot or cold places (operating temperature: –5 °C to +45 °C [23 °F to 113 °F]). For details, see "General" of "Specifications" on page 48.
• Exposed in direct sunlight for a long time, or close to heating equipment (e.g., near heaters)
• Close to sources of strong magnetism
• Close to sources of powerful electromagnetic radiation, such as radios or TV transmitters
• Locations subject to strong vibration or shock

Ventilation

To prevent heat buildup, do not block air circulation around the camera.

Transportation

When transporting the camera, repack it as originally packed at the factory or in materials equal in quality.
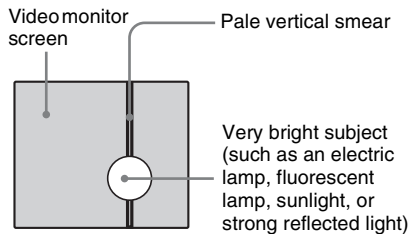
Cleaning

• Use a blower to remove dust from the lens or optical filter.
• Use a soft, dry cloth to clean the external surfaces of the camera. Stubborn stains can be removed using a soft cloth dampened with a small quantity of detergent solution, then wipe dry.
• Do not use volatile solvents such as alcohol, benzene or thinners as they may damage the surface finishes.

Typical CCD Phenomena

The following phenomena may appear on the monitor screen while you are using the DXC-390P color video camera. These phenomena stem from the high sensitivity of the CCD image sensors, and do not indicate a fault within the camera.

Vertical smear

A "smear" may appear to extend vertically from very bright subjects, as shown below.

Video monitor screen — Pale vertical smear

Very bright subject (such as an electric lamp, fluorescent lamp, sunlight, or strong reflected light)

This phenomenon is common to CCD imaging elements using an interline transfer system, and is caused when electric charge induced by infrared radiation deep within the photo sensor is transferred to the resistors.

Aliasing

When shooting fine stripes, straight lines or similar patterns, the lines may become slightly jagged.

Blemishes

A CCD image sensor consists of an array of individual picture elements (pixels). A malfunctioning sensor element will show up as a single pixel blemish in the image. This is generally not a problem.

White speckles

When you shoot a poorly illuminated object at a high temperature, small white dots may appear all over the entire screen image.

List of Messages

The following messages may appear on the screen. Take the necessary measures shown below.

Messages while adjusting the white balance automatically

Message	Meaning/remedies
WHITE: OK	Automatic white balance adjustment has succeeded.
WHITE: NG LEVEL LOW	The video level of the image is too low. • Increase the illumination. • Widen the iris opening. • Increase the video gain. Take the measures above, then press the ⊿ WHITE button.
WHITE: NG LEVEL HIGH	The video level of the image is too high. • Remove any brightly illuminated objects. • Decrease the illumination. • Close the iris opening. • Decrease the video gain. Take the measures above, then press the ⊿ WHITE button.
WHITE: NG TEMP LOW	Color temperature is too low. Change the color temperature of the object to the appropriate level.
WHITE: NG TEMP HIGH	Color temperature is too high. Change the color temperature of the object to the appropriate level.
WHITE: NG TRY AGAIN	The camera has failed to adjust the white balance. Add white part to the object shot. Take the measures above, then try again. If the message appears even if you repeat adjustment, the camera needs to be checked. Consult your authorized Sony dealer.

Messages while adjusting the black balance automatically

Message	Meaning/remedies
BLACK: OK	Automatic black balance adjustment has succeeded.
BLACK: NG IRIS close?	The camera has failed to adjust the black balance. Close the iris opening, than press the BLACK button.
BLACK: NG	The camera has failed to adjust the black balance. Check the camera, then press the BLACK button. If the message appears even if you repeat adjustment, the inside of the camera needs to be checked. Consult your authorized Sony dealer.

Specifications

Image system/optical system

Image device
        1/3 type CCD, interline transfer type
Effective picture elements
        752 (horizontal) × 582 (vertical)
Lens mount   C-mount

Video system

Synchronization
        Internal/external synchronization (VBS, HD/VD), switched automatically
Signal format
        PAL standard format (CCIR standard)
Scanning   625 lines, 2:1 interlace
Scanning frequency
        15.625 kHz (horizontal), 50.00 Hz (vertical)

Functions/performance

Horizontal resolution
        800 TV lines
Sensitivity   2000 lux (F8, 3,200K)
Signal-to-noise ratio
        61 dB
Gain control   AGC: Automatic Gain Control
        STEP: 0-24 dB (in units of 1 dB)
        HYPER
White balance
        AWB: R. PAINT, B. PAINT
        MANUAL: R. GAIN, B. GAIN
        ATW: R. PAINT, B. PAINT
        3200K
        5600K
Electronic shutter speed
        Adjustable in the range from 1/100000 to about 8.0 sec. (adjustable with CCD IRIS)
Linear matrix
        ON/OFF switchable
Gamma compensation
        ON/OFF switchable
Charge accumulation mode
        Switchable between field and frame mode

Inputs/outputs

Video input/output signals
        Composite video: 1 Vp-p (75 ohms)
        R/G/B: 1.0 Vp-p (75 ohms at R/G/B on Sync)
        Y: 1 Vp-p (75 ohms)
        Y/C: 1 Vp-p, same level as VBS chroma, 75 ohms
        SYNC: 2 Vp-p, 75 ohms
External sync input
        VBS/BS, HD/VD (VBS 1 Vp-p or Burst 0.3 Vp-p, SYNC 0.3 Vp-p or HD/VD 4.0 Vp-p, 75 ohms)
Input/output connectors
        VIDEO OUT: BNC, 75 ohms, unbalanced
        DC IN/VBS: 12-pin
        REMOTE: mini DIN 18-pin
        TRIG IN: BNC, TTL
        RGB/SYNC: D-sub 9-pin
        LENS: 6-pin connector for the zoom lens especially designed for this camera

General

Power supply
        12 V DC
Power consumption
        Approx. 7.6 W
Operating temperature
        –5 °C to +45 °C (23 °F to +113 °F)
Storage and transport temperature
        –20 °C to +60 °C (–4 °F to +140 °F)
Operating humidity
        20% to 80% (free of condensation)
Storage and transport humidity
        20% to 90% (free of condensation)
Operating pressure
        700 hPa to 1,060 hPa
Storage and transport pressure
        700 hPa to 1,060 hPa
Dimensions   56 × 50 × 128 mm (2 $^1/_4$ × 2 × 5 $^1/_8$ inches) (w/h/d) (not including the projecting parts)
Mass   Approx. 370 g (13 oz)
Supplied accessories
        Lens mount cap (1)
        Tripod adaptor (1)
        Name sheet for the buttons on the RM-C950 (1)
        Instructions for Use (1)
        Before Using This Unit (1)
        CD-ROM (Manuals for 3CCD Color Video Camera) (1)

Medical Specifications

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

Optional Accessories

Camera adaptor

CMA-D2CE* camera adaptor
CMA-D2MDCE camera adaptor
CMA-D3CE* camera adaptor

Remote control unit

RM-C950 remote control unit (connecting cable
supplied)

Power supply cable (Camera cable)

CCDC series (length: 5 m [16 ft], 10 m [32 ft], or
25 m [82 ft])
CCDC-A series (length: 50 m [164 ft], or 100 m
[328 ft])
CCXC series (length: 2 m [7 ft], 5 m [16 ft], 10 m
[32 ft], or 25 m [82 ft])
CCMC-3MZ* (length: 3 m [10 ft])
CCZ-A series* (length: 2 m [7 ft], 5 m [16 ft], 10
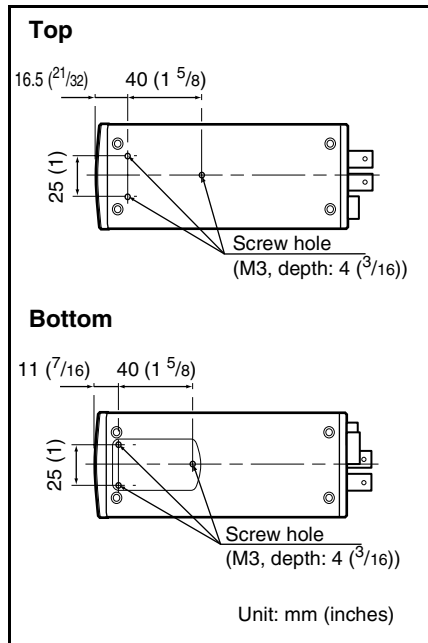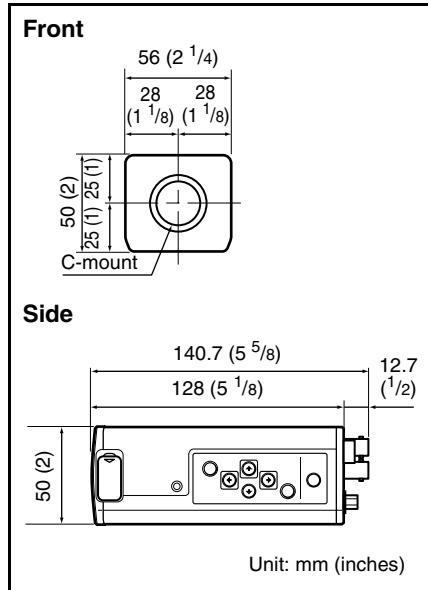m [32 ft], 25 m [82 ft], 50 m [164 ft] or 100 m
[330 ft])

Camera cable

CCXC-9DBS (D-sub ⟷ BNC × 5)
CCXC-9DD (D-sub ⟷ D-sub)
CCMC-9DS (D-sub ⟷ BNC × 4, S-video
connector)

* CMA-D2CE/D3CE/CCMC-3MZ/CCZ-A series are
intended for general purpose use. They are not intended
for medical use.

Demensions

Unit: mm (inches)

Unit: mm (inches)

Design and specifications are subject to change
without notice.

Note

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

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