

3CMOS COLOR CAMERA JCT-TF5G

INSTRUCTION MANUAL

For Customer Use

Enter below the Serial No. which is located on the bottom of the cabinet. Retain this information for future reference.

Model No.: JCT-TF5G _____

Serial No.: _____

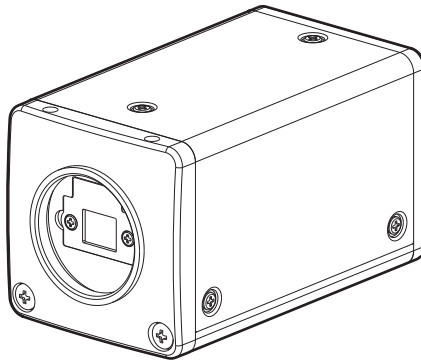


TABLE OF CONTENTS

REGULATORY INFORMATION	4
FCC INFORMATION.....	4
Following information is only for EU-member states.....	5
SAFETY PRECAUTIONS	6
1. CAUTIONS ON USE AND INSTALLATION	9
2. COMPONENTS	9
3. NAMES AND FUNCTIONS	10
4. CONNECTION	11
4.1 Standard Connection.....	11
4.2 Cautions on Connection.....	11
4.3 Connector Pin Assignments.....	11
5. OPERATION	12
5.1 White Balance.....	12
5.2 Gain.....	13
5.3 Shading Correction.....	13
6. ITEMS CONTROLLED BY THE SCREEN DISPLAY	14
7. MODE SETTING BY ON SCREEN DISPLAY	15
7.1 Using the Menus.....	15
7.2 Menus.....	15
(1) SHUTTER (Electronic shutter).....	16
(1.1) Changing the setting in MANU mode.....	17
(1.2) Changing the setting in SS (synchro. scan) mode.....	18
(1.3) Changing the setting in E.TRG mode.....	19
(1.3.1) Changing the setting in 1P SR mode.....	19
(1.3.2) Changing the setting in PW SR mode.....	20
(1.3.3) Changing the setting in RR mode.....	21
(1.4) Changing each setting in AUTO mode.....	21
(2) GAIN (Video gain).....	22
(2.1) Changing the setting in GAIN.....	22
(3) WHT BAL (White balance).....	23
(3.1) Changing the setting in AWB (Automatic White Balance) mode.....	23
(3.2) Changing the setting in MANU (Manual) mode.....	23
(4) PROCESS.....	24
(4.1) Changing gamma correction.....	24
(4.2) Changing master pedestal.....	24
(4.3) Changing R pedestal.....	24
(4.4) Changing B pedestal.....	24
(4.5) Changing noise reduction.....	24

(5) SHADING	25
(5.1) Changing V.SHAD. (Vertical Shading) correction mode.....	26
(5.2) Changing the manual V.SHAD. (Vertical Shading) correction setting	26
(5.3) Changing C.SHAD. (Corner Shading) correction mode.....	26
(5.4) Changing the manual C.SHAD. (Corner Shading) correction setting.....	26
(6) SYNC.....	27
(6.1) Adjusting horizontal phase.....	27
(7) OPTION.....	27
(7.1) Changing serial communication baud rate	27
(7.2) To change the frame rate	27
(8) Returning to factory settings	28
7.3 Synchro. Scan Operation	28
(1) Setting by 1H	28
(2) Setting by the frame.....	28
7.4 E. TRG (External trigger)	29
(1) 1P SR (1 Pulse Trigger SYNC-RESET)	29
(2) PW SR (Pulse width trigger SYNC-RESET).....	30
(3) RR (Reset restart).....	31
7.5 Partial Scanning.....	32
7.6 External Sync.....	33
(1) External sync signal polarity.....	33
(2) External sync frequency range	33
(3) Using the unit with external sync signal.....	33
(3.1) H (horizontal) phase adjustment.....	33
8. INPUT OUTPUT SIGNAL SPECIFICATIONS.....	34
9. OUTPUT WAVEFORM TIMING CHART.....	35
10. BEFORE MAKING A SERVICE CALL.....	36
11. SPECIFICATIONS.....	37
12. EXTERNAL APPEARANCE DIAGRAM.....	38

REGULATORY INFORMATION

FCC INFORMATION

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.

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 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.

USER-INSTALLER CAUTION: Your authority to operate this FCC verified equipment could be voided if you make changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules.

Following information is only for EU-member states

In residential areas this product may cause radio interference, therefore this product must not be used in residential areas.

The use of the symbol indicates that this product may not be treated as household waste.

By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about the take-back and recycling of this product, please contact your supplier where you purchased the product or consult.



SAFETY PRECAUTIONS

Safety icons

This manual contains safety instructions that must be observed in order to avoid potential hazards that could result in personal injuries, damage to your equipment, or loss of data.

These safety cautions have been classified according to the seriousness of the risk, and the icons highlight these instructions as follows:

▲ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

▲ CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

▲ WARNING **Stop operation immediately if any abnormality or defect occurs.**
Use during an abnormal condition; such as emitting smoke, burning odors, damage from dropping, invasion of foreign objects, etc. may result in fire and/or electric shock. Immediately disconnect the power source and contact your dealer.

▲ WARNING **Avoid installing in a shower room or a bathroom.**
This may result in fire and/or electric shock.

▲ WARNING **Do not operate in places where the product may get wet.**
This may result in fire and/or electric shock.

▲ WARNING **Do not repair, disassemble and/or modify by yourself.**
This may result in fire and/or electric shock. Always be sure to contact your dealer for internal repair, inspection and cleaning of the product.

▲ WARNING **Use the specified power supply.**
Otherwise, fire or electrical shock may occur.

▲ WARNING **Do not place anything on top of the unit.**
Introducing foreign materials, such as metals or liquids into the product may result in fire and/or electrical shock.

▲ WARNING **Do not put the product on an unstable, slanted or vibrating surface.**
If this product is dropped or falls, it may cause serious injury.

▲ WARNING **Do not touch the product or any connection cables during a thunderstorm.**
This may result in electrical shock.

▲ WARNING**Note the following instructions when installing.**

- Do not cover the product with any material.
- Do not place the product on any confined Inflammable material such as a carpet or blanket.
- Do not place the product in a narrow space, as this may cause heat to buildup inside the product.

Failure to follow the above cautions may result in fire.

▲ WARNING**Do not place the product in direct sunshine and/or high temperature.**

Temperature build up inside the product may result in fire.

▲ WARNING**Avoid placing in humid, smoky, vaporized or dusty places.**

This may result in fire and/or electric shock.

▲ WARNING**Ask your dealer to perform a periodical check and internal cleaning (approx. once every five years).**

Dust inside the product may result in fire. For inspection and cleaning cost, please consult your dealer.

▲ WARNING**Do not point the lens directly at the sun and/or intense light such as direct sunlight, etc.**

Focusing of the light may cause eye injury and/or fire.

Disclaimer

We disclaim any responsibility and shall not be responsible for any damages or losses incurred by the user in any of the following cases:

1. Fire, earthquake or any other act of God; acts by third parties; misuse by the user, whether intentional or accidental; use under extreme operating conditions.
2. Malfunction or non-function resulting in indirect, additional or consequential damages, including but not limited to loss of expected income and suspension of business activities.
3. Incorrect use not in compliance with instructions in this instruction manual.
4. Malfunctions resulting from misconnection to other equipment.
5. Repairs or modifications made by the user or caused to be made by the user and carried out by an unauthorized third party.

Notwithstanding the foregoing, CANON MEDICAL SYSTEMS CORPORATION's liabilities shall not, in any circumstances, exceed the purchase price of the product.

Copyright and Right of Portrait / Privacy

There may be a conflict with the Copyright Law and other laws when, you, the customer, uses, displays, distributes, or exhibits an image picked up by the camera without permission from the copyright holder. Please also note that transfer of an image or file covered by copyright is restricted to use within the scope permitted by the Copyright Law. In addition, Images taken by the camera that may reveal the picture or likeness of any individual person may be subject to laws governing publicity rights of portrait or rights of privacy. You are solely responsible for complying with all applicable laws related to copyright, publicity rights of portrait and rights of privacy.

Protection of Personal Information

Images taken by the camera that reveal the likeness of an individual person may be considered personal information. To disclose, exhibit or transmit those images over the internet or otherwise, consent from such individual person may be required. You are solely responsible to obtain such consent.

Limitation of Usage

The product is not designed for any “critical applications.” “Critical applications” means life support systems, exhaust or smoke extraction applications, medical applications, commercial aviation, mass transit applications, military applications, homeland security applications, nuclear facilities or systems or any other applications where product failure could lead to injury to persons or loss of life or catastrophic property damages. Accordingly, CANON MEDICAL SYSTEMS CORPORATION disclaims any and all liability arising out of the use of the product in any critical applications.

1. CAUTIONS ON USE AND INSTALLATION

- **Handling the unit.**

Do not drop, jolt, or vibrate, as this may result in damage to the unit and may cause problems. Treat the camera cables carefully to prevent cable problems, such as breaks in the cable and loose connections.

- **Install the camera in a location free from noise.**

If the camera or the cables are located near power utility lines or a TV, etc. undesirable noise may appear on the screen. In such a case, try to change the location of the camera or the cable wiring.

- **Operating ambient temperature and humidity.**

Do not use the camera in places where temperature and humidity exceed the specifications. Picture quality will deteriorate and internal parts may be damaged.

Be particularly careful when using in places exposed to direct sunlight. When shooting in hot environments, depending on the conditions of the object and the camera (when the gain is increased or at the long time exposure), noise in the form of vertical strips or white dots may occur. This is not a malfunction.

- **When not using the camera for extended periods of time.**

Switch the control unit off and disconnect the power supply.

This may result in fire and/or electric shock.

- **Avoid using or storing the camera in the following places:**

Places filled with highly flammable and corrosive gas.

Places near gasoline, benzene, or paint thinner.

Places subject to strong vibration.

This may result in fire and/or electric shock.

Places containing chemicals (such as pesticides), rubber or vinyl products for extended periods of time.

This may damage coating and printed letter.

- **This product is for indoor use only.**

This may result in fire and/or electric shock.

- **Do not shoot intense light.**

If a strong light is imaged, vertical stripes or traverse bands may appear on the screen but this is not a failure.

- **Moire**

A moire pattern is an interference pattern generated when two repetitive line patterns overlap. This is not a malfunction. Eliminating the repetitive line patterns, or aligning the two patterns, will eliminate the moire.

- **Handling of the protection cap.**

Keep the protection cap away from children as it poses a choking hazard.

The protection cap protects the image plane when the lens is removed from the camera; do not discard the protection cap.

- **When cleaning the camera.**

Unplug the power source before cleaning. Clean with a soft dry cloth only. Do not use chemicals or chemically treated cloths. Chemicals may damage coatings and printed letters. When cleaning the lens, use lens cleaning paper.

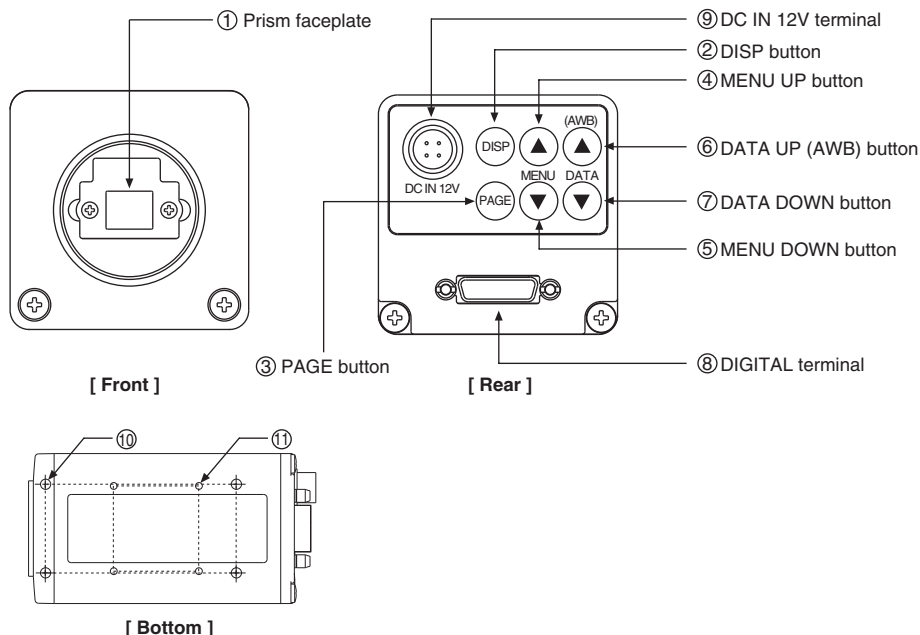
- **Installation without a tripod.**

Before installing the camera, make sure that the location can withstand the total weight of the camera. If this is not the case, reinforce the area to prevent the unit from dropping, which may result in damage to the unit or personal injury.

2. COMPONENTS

(1) Camera (with protection cap).....	1
(2) Accessories	
(a) Instruction manual	1

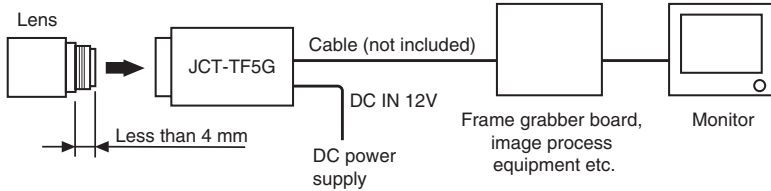
3. NAMES AND FUNCTIONS



- | | |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① Prism faceplate | The protection cap is attached on the lens mount portion. After removing the cap, mount the lens. Be careful not to scratch or touch the optical area. |
| ② DISP button | Used when switching the display. |
| ③ PAGE button | Used when switching to the menu and when selecting the menus. |
| ④ MENU UP button | Select the function to be confirmed or changed on the menu. |
| ⑤ MENU DOWN button | Select the function to be confirmed or changed on the menu. |
| ⑥ DATA UP (AWB) button | Changes the value of the function selected by the MENU (UP/DOWN) button. (Also used when using AWB.) |
| ⑦ DATA DOWN button | Changes the value of the function selected by the MENU (UP/DOWN) button. |
| ⑧ DIGITAL terminal | 8-bit RGB, digital signal, and sync signals are output in the Camera Link format. Trigger signal and external sync signal (HD, VD) are inputs. Mode switching signal for partial scanning is input. Accepts serial communication control signals and a DC power input (12V). |
| ⑨ DC IN 12V terminal | Accepts a DC power input (12V). |
| ⑩ Mounting holes M3 | Used to mount the camera. |
| ⑪ Mounting holes M2 | Used to mount the camera. |

4. CONNECTION

4.1 Standard Connection



4.2 Cautions on Connection

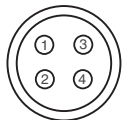
- When connecting the camera cables, be sure to unplug the power source of the camera and the other equipment connected to it.
 - We suggest using a C mount lens made for a 3CMOS color camera.
When using another lens, the best camera performance of this camera may not be obtained.
(For example, low resolution may occur, focus may be lost through the range of a zoom lens, and flare, ghost or shading may occur)
Furthermore, in order to avoid damaging the mounting portion of the camera head, use a lens which has projection dimension from the mounting base of less than 0.157"(4mm).
 - The camera may be powered in two ways:
 - Supplied to the DC IN 12V terminal
 - For DC power supply connecting to DC IN 12V terminal, use UL listed and/or CSA approved ungrounded type AC adaptor with the specifications described below.

Power supply voltage	: DC12V±10%
Current rating	: More than 830 mA
Ripple voltage	: Less than 50 mV(p-p)
Connector	: HR10A-7P-4S by HIROSE electronics Co. Ltd
	Pins 1, 2 : 12V
	Pins 3, 4 : GND
 - For DC power supply connecting to DC IN 12V terminal, use class II DC power supply approved according to EN60950-1 in Europe. or use UL listed and/or CSA approved ungrounded type AC adaptor with LPS and the specifications described below in U.S.A. or Canada.
 - Supplied to the DIGITAL terminal
 - Supply the DC power supply (DC10V-DC13V) to pins 1 and 26 of the cable (sold separately).
 - When using PoCL (power over camera link) to power the camera, use a standard PoCL cable.
- * Only use one power supply source at a time.

4.3 Connector Pin Assignments

DC IN 12V

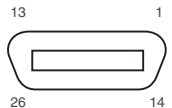
1	+12V
2	+12V
3	GND
4	GND



Connector used:
HR10A-7P-4PB
(HIROSE electronics
Co. Ltd) or equivalent.

DIGITAL

DIGITAL		Function		I/O
1	+12V	14	GND	-
2	X0-	15	X0+	O
3	X1-	16	X1+	O
4	X2-	17	X2+	O
5	Xclk-	18	Xclk+	O
6	X3-	19	X3+	O
7	SerTC+	20	SerTC-	Serial communication control (RXD) I
8	SerTFG-	21	SerTFG+	Serial communication control (TXD) O
9	CC1-	22	CC1+	Trigger pulse input I
10	CC2+	23	CC2-	Partial scanning control I
11	CC3-	24	CC3+	External HD input I
12	CC4+	25	CC4-	External VD input I
13	GND	26	+12V	-



Connector used:
12226-51000-00
(3M) or equivalent.

5. OPERATION

- ① Refer to the item "4. CONNECTION", connect each component correctly.
- ② Turn on the power source of the connected equipment and the camera.
- ③ Point the lens at the object, adjust the lens iris, focus, etc..
- ④ Refer to the item "5.1 White Balance", to do the adjustment.
- ⑤ Refer to the items "5.2 Gain, 7. MODE SETTING BY ON SCREEN DISPLAY", select the necessary items.

5.1 White Balance

For the white balance adjustment of this unit, AWB (Automatic White Balance) and MANU (Manual white balance) adjustments are provided. To select the desired mode, refer to the items "7.2 (3) WHT BAL (White balance)".

	AWB (Automatic White Balance)	MANU (Manual White Balance)
Outline	Adjust white balance by displaying the white object inside the area set by AWB menu and pressing the [DATA UP] button.	Adjust the white balance manually using the WHT BAL menu while shooting the white object.
Note	When the shutter mode is E.TRG, AWB is not available.	Adjustment is performed by confirming with a monitor etc.

- ① AWB (Automatic white balance)
 - Set the MODE to AWB on the WHT BAL menu.
Perform the C.TEMP (color temperature conversion) setting, if necessary.
(Refer to the item "7.2 (3) WHT BAL (White balance)")
3200 : Appropriate for shooting under halogen lamps or warm white type lighting.
5600P, 5600C : Appropriate for shooting under sunny daylight type lighting.
 - If the index menu/menu is displayed, press the [DISP] button to disable the character display on the menu.
 - Shoot a known white object that fills the screen and push [DATA UP] button for approx. 1 second.
 - The character AWB blinks on the screen when the AWB starts.
 - The character AWB stops blinking when the AWB finishes, and the result is displayed for approx. 1 second.

Result displayed	Meaning
AWB OK	Automatic white balance adjustment finished correctly.
AWB NG LEVEL LOW	Automatic white balance adjustment cannot be performed because the video level is too low. Set the video level properly.
AWB NG LEVEL HIGH	Automatic white balance adjustment cannot be performed because the video level is too high. Set the video level properly.
AWB NG C. TEMP LOW	Automatic white balance adjustment cannot be performed because the color temperature is too low. If the C.TEMP is set to 5600P, 5600C set to 3200. If the message appears with the C.TEMP set to 3200, change the illumination or use a color temperature conversion filter.
AWB NG C. TEMP HIGH	Automatic white balance adjustment cannot be performed because the color temperature is too high. If the C.TEMP is set to 3200, set to 5600P, 5600C. If the message appears with the C.TEMP set to 5600P, 5600C, change the illumination or use the color temperature conversion filter.
AWB NG NOT AVAILABLE	Automatic white balance adjustment cannot be performed because the shutter speed mode is in E.TRG mode.
AWB NG	Automatic white balance adjustment cannot be performed for other reasons. Such as no white area is included in an object, etc.

② MANU (Manual white balance)

- Set the MODE to MANU on the WHT BAL menu.
(Refer to the item “7.2 (3) WHT BAL (white balance)”.)
- Shoot a known white object, adjust the white balance adjusting the levels of R GAIN and B GAIN on the menu, confirming with a monitor etc.
(Refer to the item “7.2 (3) (3.2) Changing the setting in MANU (Manual) mode.”)

5.2 Gain

When shooting in dark locations, if the image is dark even if the lens iris is open, change the gain (video gain) to get the proper video level.

For the gain adjustment of the unit, MANU (Manual gain control) and OFF (0 dB) modes are provided. Select the mode on the GAIN menu. (Refer to the item “7.2 (2) GAIN (Video gain)”.)

① MANU (Manual gain)

Gain adjustment is performed on the GAIN menu. The adjustment range is from 0dB to 18dB in 1dB steps.
(Refer to the item “7.2 (2) (2.1) (a) Changing the gain in MANU mode”.)

② OFF

Gain is fixed at 0 dB.

5.3 Shading Correction

Due to the lens used or the environmental condition, vertical color shading may occur at the top and bottom of the screen and at the corners. In this case, the shading correction can decrease the color shading. For the shading correction of the unit, MANU (Manual shading correction) and OFF (no shading correction) modes for V.SHAD. (Vertical Shading) and C.SHAD. (Corner Shading) are provided. Select the mode on the SHADING menu. (Refer to the “7.2 (5) (5.2) Changing the manual V.SHAD. (Vertical Shading) correction setting” and “7.2 (5) (5.4) Changing the manual C.SHAD. (Corner Shading) correction setting”.)

① MANU (Manual Shading)

Adjust the correction amount on the SHADING menu by monitoring the output video on a monitor or waveform monitor.

② OFF

The status is no shading correction.

*** The shading correction is effective when the lens iris or zoom ratio is fixed. Use the unit by setting V.SHAD. and C.SHAD. to OFF.**

6. ITEMS CONTROLLED BY THE SCREEN DISPLAY

Item		Available selections	Preset value (Factory setting)	
Electronic shutter	MODE	MANU, SS, E. TRG, AUTO	MANU	
	E. TRG	1P SR, PW SR, RR	1P SR	
	MANUAL speed	OFF, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s, 1/24000s (NORMAL) / 1/27000s (FAST), 1/36000s (NORMAL) / 1/39000s (FAST)	OFF	
	Partial scanning (ROI : Region of interest)	PART - Partial scanning control	OFF, ON, EXT (partial scanning control by CC2)	OFF
		ROI VS - ROI, Vertical start position	0,2 to 534 (4 steps each) (However, total with ROI VW cannot exceed 540.)	0
		ROI VW - ROI, Vertical width	4 to 540 (4 steps each) (However, total with ROI VS cannot exceed 540.)	540
		ROI HS - ROI, Horizontal start position	4 to 460 (NORMAL) / 204 (FAST) (4 steps each) (However, total with ROI VH cannot exceed 720.)	0
		ROI HW - ROI, Horizontal width	260 to 720 (NORMAL) / 516 to 720 (FAST) (4 steps each) (However, total with ROI HS cannot exceed 720.)	720
	Synchro. scan.	When ROI VW = 540	1H/586H to 571H/586H, OFF, 2FRM to 120FRM	OFF
		When ROI VW < 540	1H/(ROI VW+42)H to (ROI VW+27)H/(ROI VW+42)H, OFF, 2FRM to 120FRM	OFF
	Trigger (1P SR)	POSI, NEGA	POSI	
	Trigger (PW SR)	POSI, NEGA	POSI	
	1P exposure time	0.03ms~16ms	16 ms	
	AUTO Level	-100~0~100	0	
	AUTO Peak/Average	00:10~05:05~10:00	05:05	
Gain	MODE	MANU, OFF	OFF	
	MANU	0dB~18dB	0dB	
White balance	MODE	AWB, MANU	AWB	
	Color temperature	3200, 5600P, 5600C	3200	
	MANUAL R GAIN	-100~0~100	0	
	MANUAL B GAIN	-100~0~100	0	
Process	GAMMA	ON, OFF	OFF	
	Master pedestal	-64~0~64	0	
	R pedestal	-64~0~64	0	
	B pedestal	-64~0~64	0	
	NR	ON, OFF	OFF	
Shading	V. Shading correction mode	MANU, OFF	MANU	
	V. Shading manual correction MANU	-128~0~127	0	
	C. Shading correction mode	MANU, OFF	MANU	
	C. Shading manual correction			
	MANUAL R SIZE	0~63	0	
	MANUAL R GAIN	-32~0~31	0	
	MANUAL R POSI	-32~0~31	0	
	MANUAL B SIZE	0~63	0	
MANUAL B GAIN	-32~0~31	0		
MANUAL B POSI	-32~0~31	0		
Sync	H phase adjustment	-100~0~100	0	
Option	Baud rate (bps)	9600, 19200	9600	
	Frame rate	NORMAL, FAST	NORMAL	

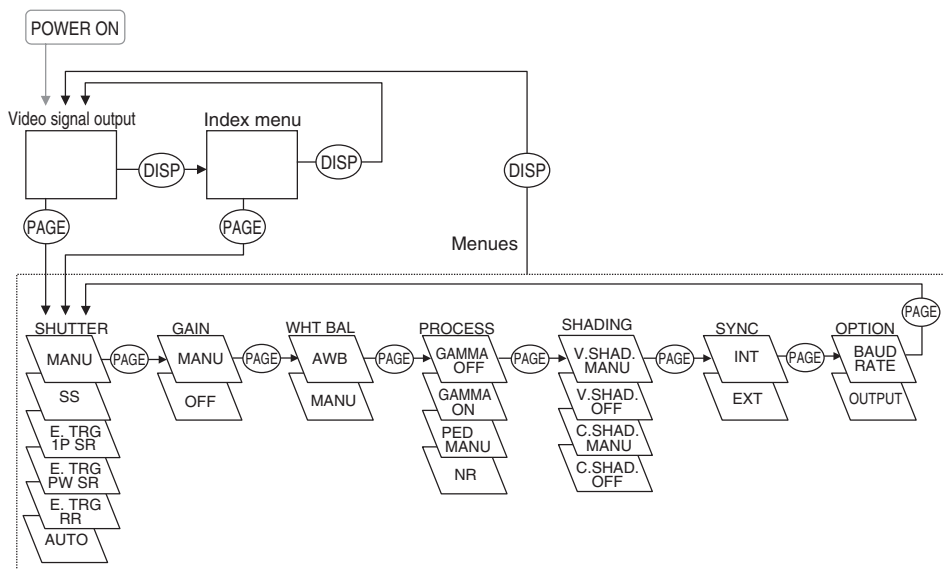
7. MODE SETTING BY ON SCREEN DISPLAY

Various settings can be controlled on the unit by using the on screen menu displayed on the monitor. The contents once set are memorized even if the power source is turned off, so it is unnecessary to set again when using the unit next time. When the setting is performed, select the menu of the item to be set. (Use a monitor that can display 720 x 540 pixels or higher.)

7.1 Using the Menus

When the power is turned on, the normal screen showing only the video signal appears. Change the output to each screen (video signal output, Index menu, and menus) by using the [DISP], [PAGE], [MENU UP], [MENU DOWN], [DATA UP], and [DATA DOWN] buttons.

* A menu is selected when pushing the [PAGE] button after moving the “→” on the screen by the [MENU UP], [MENU DOWN] button while the Index menu is displayed.



7.2 Menus

- Select the menu to change the setting by referring to the item “7.1 Using the Menus”
- When the [MENU UP], [MENU DOWN] buttons are pushed, the “→” on the screen moves up and down. Move the “→” to the item whose setting you wish to change.

Note:

When partial scanning (see page 29) is selected, if you open the content screen or setting screen, the signal changes to FVAL, LVAL, and DVAL, the same as for all pixels scanning.

When E.TRIG is selected, if you open the content screen or setting screen, the mode changes to internal sync.

When you close the screen display, and return to the video signal screen, operations are done in the set mode.

(1) SHUTTER (Electronic shutter)

The electronic shutter has four modes; MANU (Manual), SS (Synchro. Scan), E.TRG (External trigger), and AUTO (Auto Shutter).

Move the “→” to “MODE” and push [DATA UP], [DATA DOWN] button to select the desired mode among “MANU”, “SS”, “E.TRG”, and “AUTO”:

MANUAL : It is possible to select the exposure time from nine speed setting; OFF, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s, 1/24000s (NORMAL) or 1/27000s (FAST), 1/36000s (NORMAL) or 1/39000s (FAST).

When not using the electronic shutter, select OFF.

Note:

When setting a rapid shutter speed, sensitivity degrades according to the speed.

When a discharging light such as fluorescent lamp, etc. is used for the illumination, the flicker may be excessive.

SS : Shutter speed can be set by the horizontal scanning time (1H) unit or by the number of frames.

E.TRG : Exposure is performed and images are output by external trigger. E.TRG includes the three modes described below. (For details of specifications, refer to the item “7.4 E.TRG (External trigger)”)

- 1P SR (1 Pulse Sync Reset)

The charge begins to accumulate to each CMOS pixels after the trigger pulse is received.

Upon completion of accumulation the vertical sync signal is reset and 1 frame images are output.

The exposure/accumulation time can be set from 0.03 to 16 ms. The trigger signal timing can be set to either the rising or falling edge.

- PW SR (Pulse width trigger Sync Reset)

The charge begins to accumulate to each CMOS pixels after the trigger pulse is received.

Upon completion of accumulation the vertical sync signal is reset and 1 frame images are output.

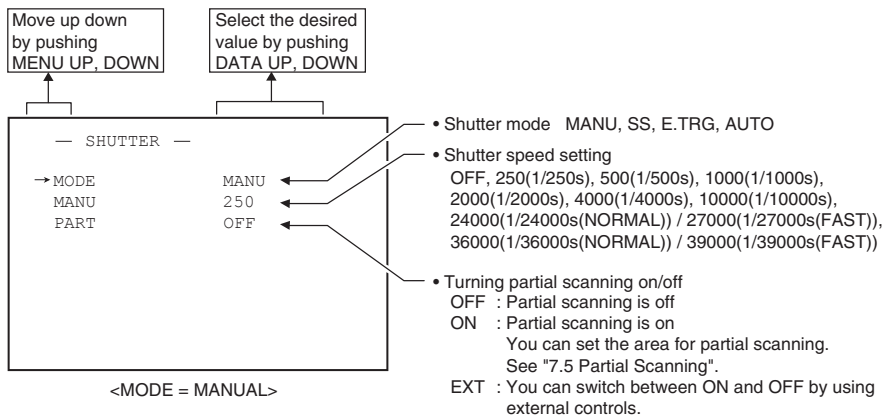
This is the mode to set the exposure period by the pulse width of the trigger.

The trigger signal polarity can be set to either the positive or negative polarity.

- RR (Reset restart)

Input of an external reset-restart signal permits one screen of information to be output at an arbitrary timing.

AUTO : Exposure time is automatically controlled to obtain the specified video level.

(1.1) Changing the setting in MANU mode

* When doing partial scanning, you cannot set a shutter speed that is slower than one vertical scan interval determined by the set vertical scan width (ROIVW).

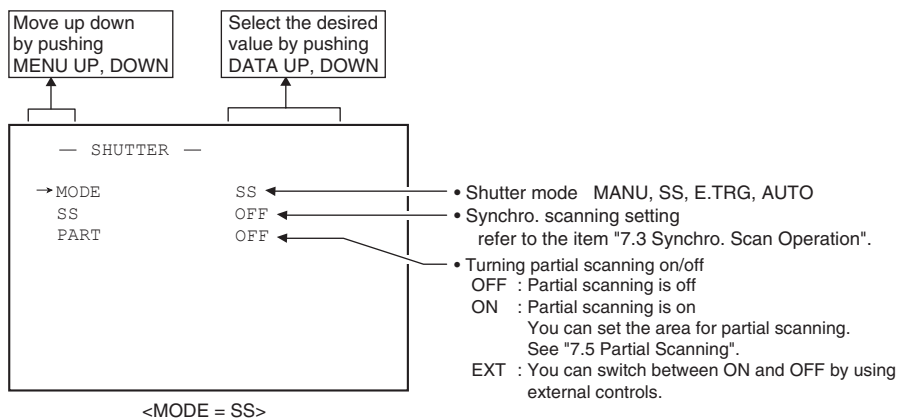
(a) Changing the shutter speed

- ① Move the "→" to MANU by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the shutter speed by pushing [DATA UP], [DATA DOWN] buttons.

(b) To change the settings for partial scanning

- ① Move the "→" to PART by pushing the [MENU UP] and [MENU DOWN] buttons.
- ② Select the mode you want by pushing the [DATA UP] and [DATA DOWN] buttons. (When ON or EXT is set)
- ③ Move the "→" to the setting item you want by pushing the [MENU UP] and [MENU DOWN] buttons.
- ④ Select the setting values you want by pushing the [DATA UP] and [DATA DOWN] buttons.

* If PART is set to OFF, the setting values for partial scanning are not shown.

(1.2) Changing the setting in SS (synchro. scan) mode**(a) Changing the shutter speed setting**

- ① Move the "→" to SS by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the shutter speed by pushing [DATA UP], [DATA DOWN] buttons.

(b) To change the settings for partial scanning

- ① Move the "→" to PART by pushing the [MENU UP] and [MENU DOWN] buttons.
- ② Select the mode you want by pushing the [DATA UP] and [DATA DOWN] buttons. (When ON or EXT is set)
- ③ Move the "→" to the setting item you want by pushing the [MENU UP] and [MENU DOWN] buttons.
- ④ Select the setting values you want by pushing the [DATA UP] and [DATA DOWN] buttons.

* If PART is set to OFF, the setting values for partial scanning are not shown.

Note:

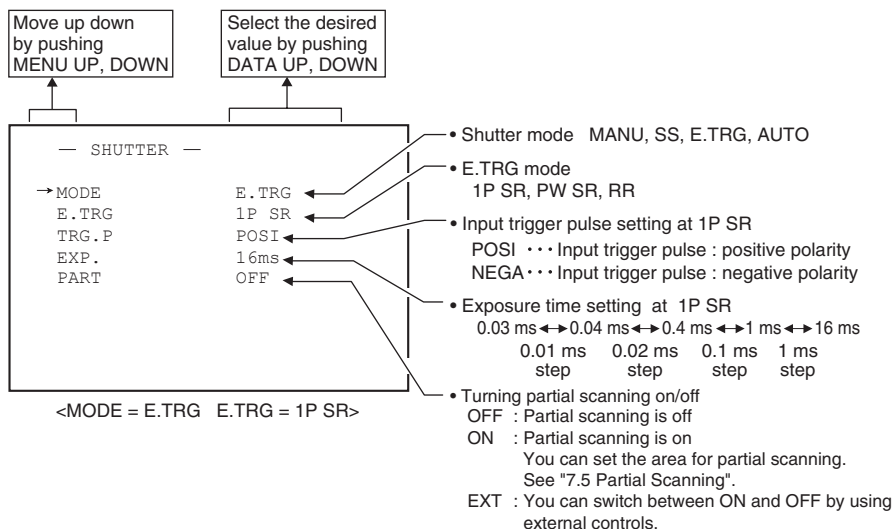
The slow shutter speed may increase the fixed pattern noise and/or the white pixels. This is not a symptom of malfunction.

(1.3) Changing the setting in E.TRG mode

The E.TRG has three modes; 1P SR, PW SR, RR.

First move the "→" to MODE and select E. TRG, then move the "→" to E.TRG and select the desired E.TRG mode.

(1.3.1) Changing the setting in 1P SR mode



(a) Changing the polarity of the input trigger pulse setting

- ① Move the "→" to TRG.P by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select either POSITIVE, NEGATIVE, by pushing [DATA UP], [DATA DOWN] buttons.

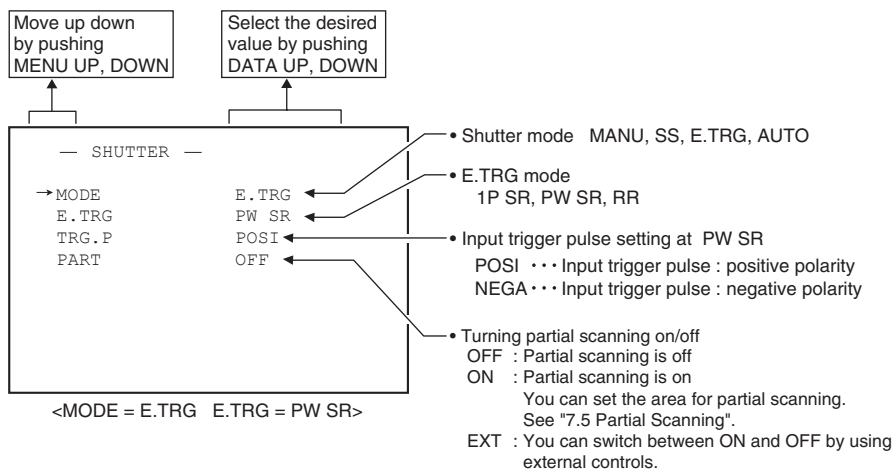
(b) Changing 1P SR exposure time setting

- ① Move the "→" to EXP. by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the exposure time by pushing [DATA UP], [DATA DOWN] buttons.

(c) To change the settings for partial scanning

- ① Move the "→" to PART by pushing the [MENU UP] and [MENU DOWN] buttons.
- ② Select the mode you want by pushing the [DATA UP] and [DATA DOWN] buttons. (When ON or EXT is set)
- ③ Move the "→" to the setting item you want by pushing the [MENU UP] and [MENU DOWN] buttons.
- ④ Select the setting values you want by pushing the [DATA UP] and [DATA DOWN] buttons.

* If PART is set to OFF, the setting values for partial scanning are not shown.

(1.3.2) Changing the setting in PW SR mode**(a) Changing the polarity of the input trigger pulse setting**

- ① Move the "→" to TRG.P by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select either POSI, NEGA by pushing [DATA UP], [DATA DOWN] buttons.

(b) To change the settings for partial scanning

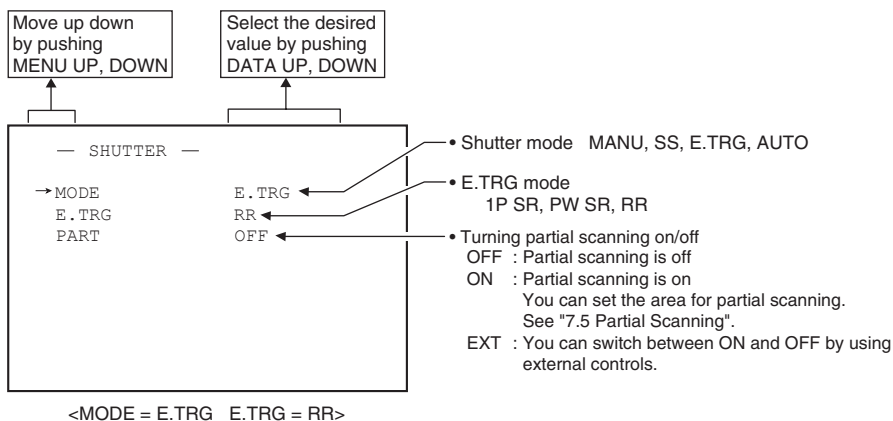
- ① Move the "→" to PART by pushing the [MENU UP] and [MENU DOWN] buttons.
- ② Select the mode you want by pushing the [DATA UP] and [DATA DOWN] buttons. (When ON or EXT is set)
- ③ Move the "→" to the setting item you want by pushing the [MENU UP] and [MENU DOWN] buttons.
- ④ Select the setting values you want by pushing the [DATA UP] and [DATA DOWN] buttons.

* If PART is set to OFF, the setting values for partial scanning are not shown.

Note:

The longer the storage time with extended exposures, the more visible certain characteristics of CMOS cameras become: fixed pattern noise, white pixels, etc.

(1.3.3) Changing the setting in RR mode



(a) To change the settings for partial scanning

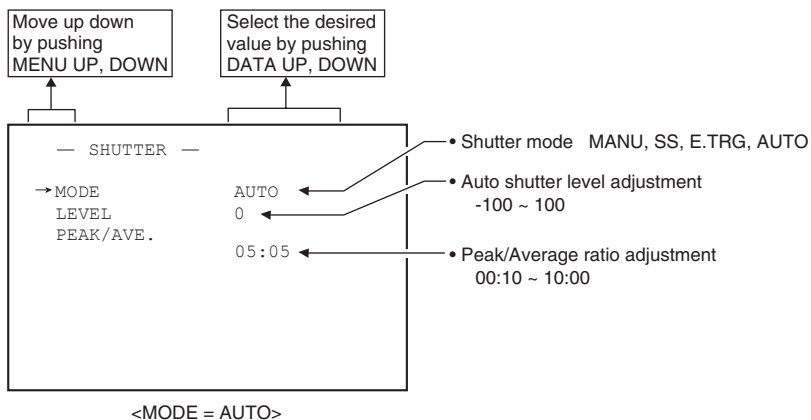
- ① Move the "→" to PART by pushing the [MENU UP] and [MENU DOWN] buttons.
- ② Select the mode you want by pushing the [DATA UP] and [DATA DOWN] buttons. (When ON or EXT is set)
- ③ Move the "→" to the setting item you want by pushing the [MENU UP] and [MENU DOWN] buttons.
- ④ Select the setting values you want by pushing the [DATA UP] and [DATA DOWN] buttons.

* If PART is set to OFF, the setting values for partial scanning are not shown.

Note:

The longer the storage time with extended exposures, the more visible certain characteristics of CMOS cameras become: fixed pattern noise, white pixels, etc.

(1.4) Changing each setting in AUTO mode



(a) Changing the AUTO shutter level

- ① Move the "→" to LEVEL by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the shutter level by pushing [DATA UP], [DATA DOWN] buttons.

(b) Changing the auto shutter detection (PEAK/AVE. ratio)

- ① Move the "→" to PEAK/AVE. by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the PEAK/AVE. ratio by pushing [DATA UP], [DATA DOWN] buttons.

(2) GAIN (Video gain)

When shooting in dark locations, if the image is dark even if the lens iris is open, change the gain (video gain) to get the proper video level.

① MANU (Manual gain)

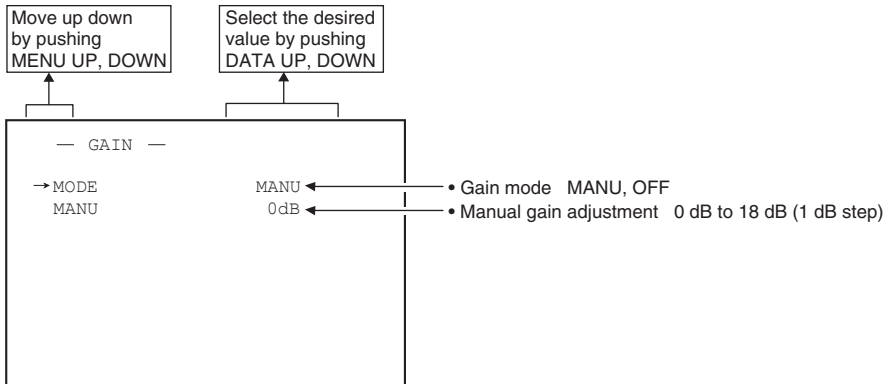
Gain adjustment is performed on the GAIN menu. The adjustment range is from 0dB to 18dB in 1dB steps.

② OFF

Gain is fixed at 0dB.

Move the “→” to MODE, push the [DATA UP], [DATA DOWN], and select one of the two modes between MANU and OFF.

(2.1) Changing the setting in GAIN



(a) Changing the gain in MANU mode

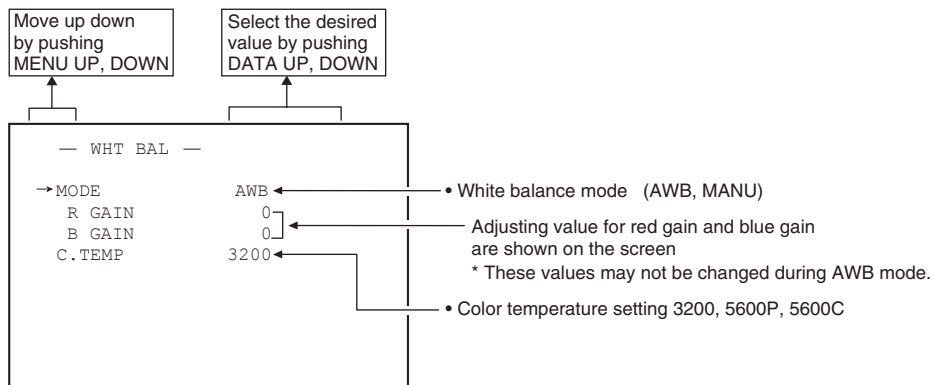
- ① Move the “→” to MANU by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the manual gain by pushing [DATA UP], [DATA DOWN] buttons.

(3) WHT BAL (White balance)

WHT BAL has two modes; AWB, MANU.

Move the “→” to MODE, push the [DATA UP], [DATA DOWN], and select one of the two modes between AWB and MANU.

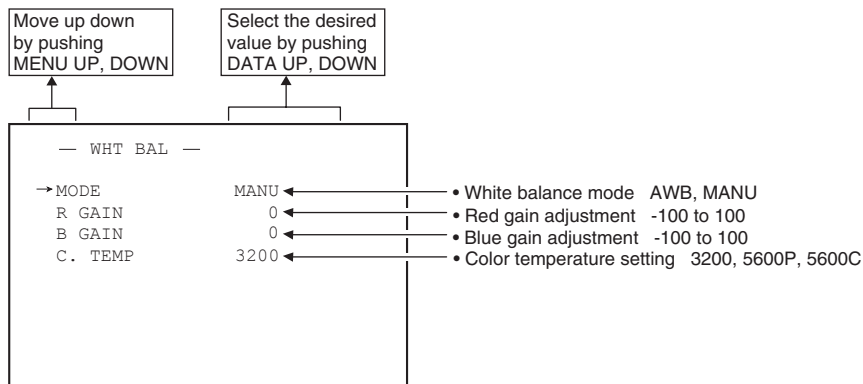
(3.1) Changing the setting in AWB (Automatic White Balance) mode



(a) Changing color temperature setting

- ① Move the “→” to C.TEMP by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select either 3200, 5600P or 5600C by pushing [DATA UP], [DATA DOWN] buttons.

(3.2) Changing the setting in MANU (Manual) mode



(a) Changing the red gain

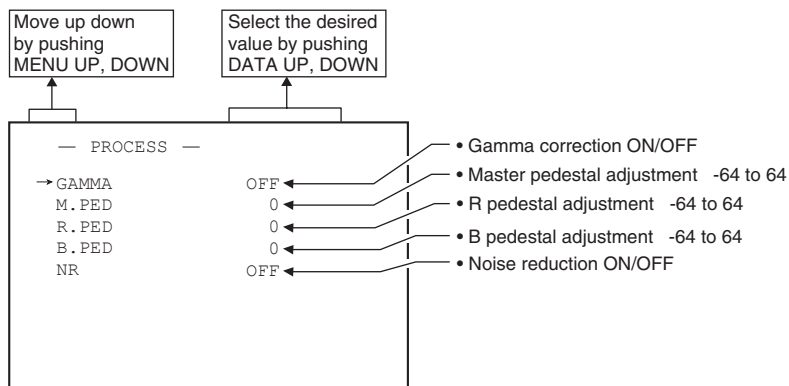
- ① Move the “→” to R GAIN by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the red gain by pushing [DATA UP], [DATA DOWN] buttons.

(b) Changing the blue gain

- ① Move the “→” to B GAIN by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the blue gain by pushing [DATA UP], [DATA DOWN] buttons.

(4) PROCESS

- Gamma Correction (GAMMA)
Select either OFF or ON of Gamma Correction.
- Master Pedestal (M. PED)
Adjust the Pedestal level of each RGB.
- R Pedestal (R. PED)
Adjust the Pedestal level of Red.
- B Pedestal (B. PED)
Adjust the Pedestal level of Blue.
- Noise Reduction
Select either OFF or ON of Noise Reduction.



(4.1) Changing gamma correction

- ① Move the "→" to GAMMA by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the gamma correction by pushing [DATA UP], [DATA DOWN] buttons.

(4.2) Changing master pedestal

- ① Move the "→" to M. PED by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the master pedestal by pushing [DATA UP], [DATA DOWN] buttons.

(4.3) Changing R pedestal

- ① Move the "→" to R. PED by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the R pedestal by pushing [DATA UP], [DATA DOWN] buttons.

(4.4) Changing B pedestal

- ① Move the "→" to B. PED by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the B pedestal by pushing [DATA UP], [DATA DOWN] buttons.

(4.5) Changing noise reduction

- ① Move the "→" to NR by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the noise reduction by pushing [DATA UP], [DATA DOWN] buttons.

(5) SHADING

Due to the lens used or the environmental condition, vertical color shading may occur at the top and bottom of the screen and at the corners. In this case, the shading correction can decrease the color shading. For the shading correction of the unit, you can select among MANU (Manual shading correction) or OFF (no shading correction) for V.SHAD. (Vertical Shading) and C.SHAD. (Corner Shading).

① MANU (Manual Shading correction)

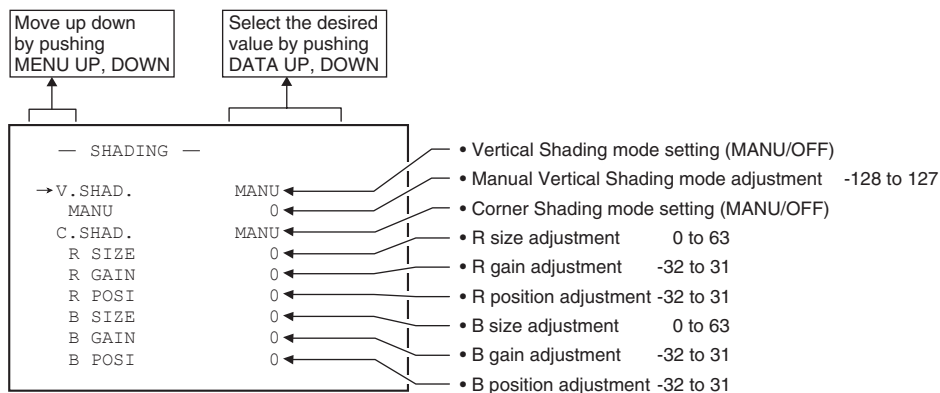
Adjust the correction amount on the SHADING menu by confirming with a monitor or a waveform monitor.

- R size (R SIZE) 0 ↔ 63 (small ↔ large)
Adjust the red correction area of the corner.
- R gain (R GAIN) -32 ↔ 0 ↔ 31 (low ↔ high)
Adjust the red correction level.
- R position (R POSI) -32 ↔ 0 ↔ 31 (Left area compression ↔ Right area compression)
Adjust the red correction area on left and right side.
- B size (B SIZE) 0 ↔ 63 (small ↔ large)
Adjust the blue correction area of the corner.
- B gain (B GAIN) -32 ↔ 0 ↔ 31 (low ↔ high)
Adjust the blue correction level.
- B position (B POSI) -32 ↔ 0 ↔ 31 (Left area compression ↔ Right area compression)
Adjust the blue correction area on left and right side.

② OFF

The status is no shading correction.

***The shading correction is effective when the lens iris or zoom ratio is fixed. Use the unit by setting V.SHAD and C.SHAD. to OFF.**



(5.1) Changing V.SHAD. (Vertical Shading) correction mode

- ① Move the “→” to V.SHAD by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the V.SHAD. mode setting by pushing [DATA UP], [DATA DOWN] buttons.

Note:

The alignment value for vertical shading is fixed to “0” when selecting V.SHAD. OFF. MANU is not displayed in the menu.

(5.2) Changing the manual V.SHAD. (Vertical Shading) correction setting

- ① Move the “→” to MANU by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the MANU V.SHAD. by pushing [DATA UP], [DATA DOWN] buttons.

(5.3) Changing C.SHAD. (Corner Shading) correction mode

- ① Move the “→” to C.SHAD by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select the C.SHAD. mode setting by pushing [DATA UP], [DATA DOWN] buttons.

Note:

The alignment value for corner shading is fixed to “0” when selecting C.SHAD. OFF. MANU is not displayed in the menu.

(5.4) Changing the manual C.SHAD. (Corner Shading) correction setting**(a) Changing the red size setting**

- ① Move the “→” to R SIZE by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the R size by pushing [DATA UP], [DATA DOWN] buttons.

(b) Changing the red gain setting

- ① Move the “→” to R GAIN by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the R gain by pushing [DATA UP], [DATA DOWN] buttons.

(c) Changing red position setting

- ① Move the “→” to R POSI by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the R position by pushing [DATA UP], [DATA DOWN] buttons.

(d) Changing blue size setting

- ① Move the “→” to B SIZE by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the B size by pushing [DATA UP], [DATA DOWN] buttons.

(e) Changing blue gain setting

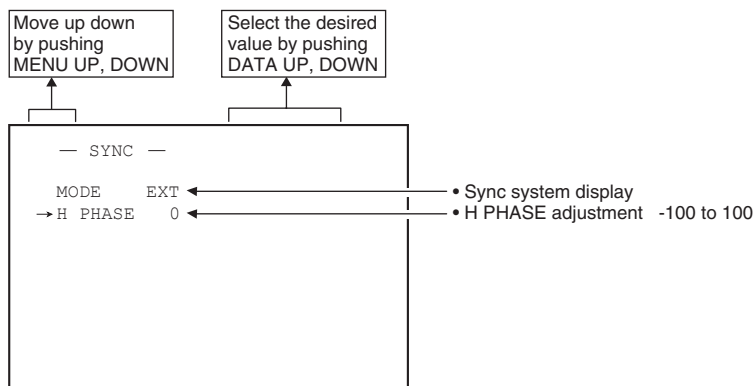
- ① Move the “→” to B GAIN by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the B gain by pushing [DATA UP], [DATA DOWN] buttons.

(f) Changing blue position setting

- ① Move the “→” to B POSI by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the B position by pushing [DATA UP], [DATA DOWN] buttons.

(6) SYNC

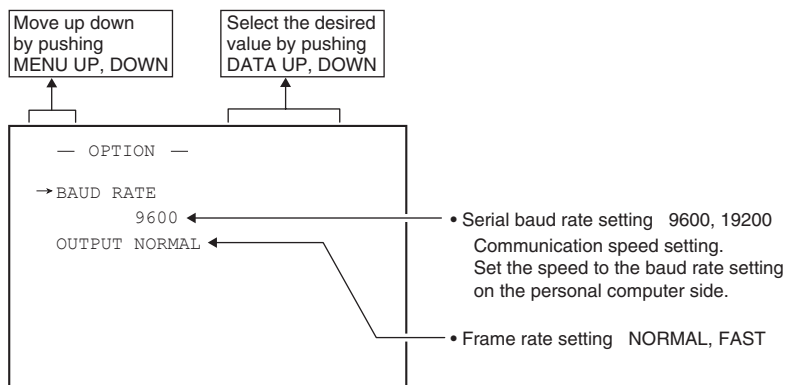
When an external sync signal is input, the display menu changes from INT (internal sync) to EXT (external sync) automatically.



(6.1) Adjusting horizontal phase

- ① Move the “→” to H PHASE by pushing [MENU UP], [MENU DOWN] buttons.
- ② Adjust the horizontal phase by pushing [DATA UP], [DATA DOWN] buttons.

(7) OPTION



(7.1) Changing serial communication baud rate

- ① Move the “→” to BAUD RATE by pushing [MENU UP], [MENU DOWN] buttons.
- ② Select either 9600 or 19200 by pushing [DATA UP], [DATA DOWN] buttons.

(7.2) To change the frame rate

- ① Move the “→” to OUTPUT by pushing the [MENU UP] and [MENU DOWN] buttons.
- ② Select NORMAL or FAST by pushing the [DATA UP] and [DATA DOWN] buttons.

(8) Returning to factory settings

All the settings can be returned to the factory default status (preset status).

- (1) If characters are displayed on the screen, press the [DISP] button to disable the character display.
- (2) Push [MENU DOWN] and [DATA DOWN] buttons simultaneously for approx. 1 second.
- (3) The preset operation starts. When the preset operation finishes, the character PRESET OK is displayed for approx. 1 second.

7.3 Synchro. Scan Operation

The shutter speed can be set by the horizontal scanning period (1H) or by the number of frames.

(1) Setting by 1H

You can set the shutter speed in increments of 1H (NORMAL: 13.74 μ s/FAST: 11.31 μ s).

You can set the following values.

Partial Scanning OFF 1H/586H to 571H/586H

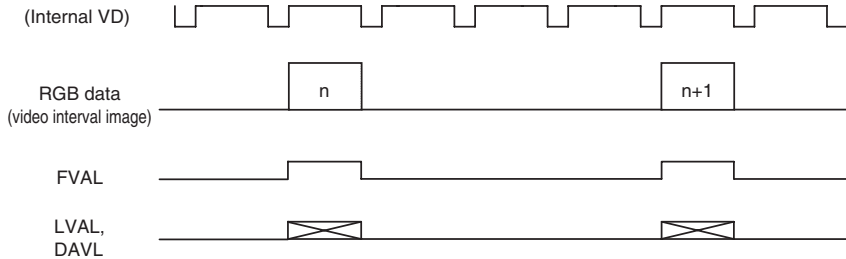
Partial Scanning ON 1H/(ROIVW+42)H to (ROIVW+27)H/(ROIVW+42)H

* ROIVW is the value set for vertical width in partial scanning.

(2) Setting by the frame

2FRM to 120FRM stand for the setting (long period exposure) by the frame.

The video signal stored during the frame period set is output as 1 frame video image at a frame interval specified.



(4FRM setting)

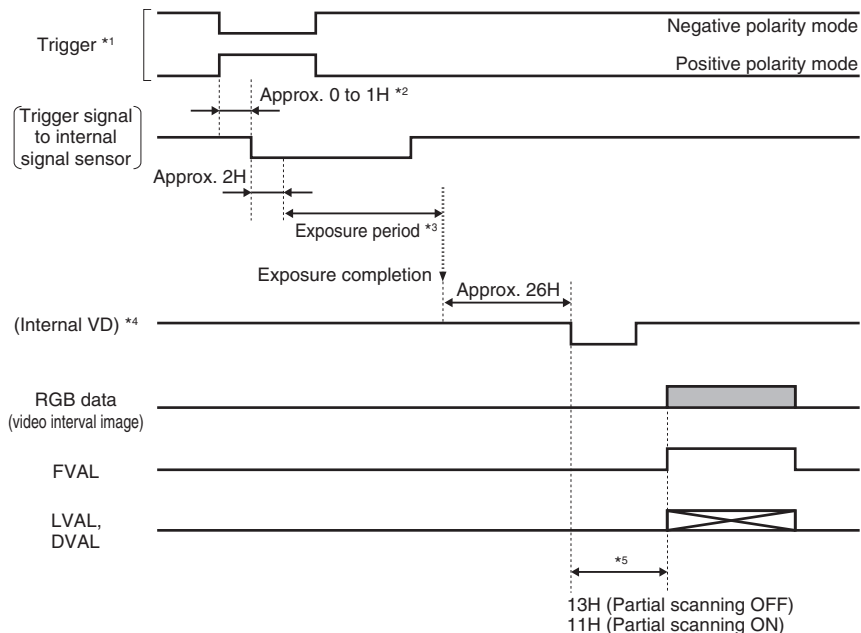
7.4 E. TRG (External trigger)

Charge begins to accumulate after the trigger input to CC1 of the DIGITAL terminal, and 1 frame images are output. There are two modes: 1P SR, PW SR.

(1) 1P SR (1 Pulse Trigger SYNC-RESET)

Charge begins to accumulate after the trigger input to CC1 of the DIGITAL terminal, the vertical sync signal is reset and frame images are output.

· 1 Pulse Trigger SYNC-RESET Picture Output Timing



*1: External input signal

*2: Frame rate NORMAL mode: 1H = 13.74 μ s / FAST mode: 1H = 11.31 μ s

*3: Exposure time is determined by the EXP setting on the menu. (See page 16)

*4: VD is generated after about 26H following the completion of the exposure period, and the video is synchronized to this and output.

*5: When NR is set to ON, 1H is increased.

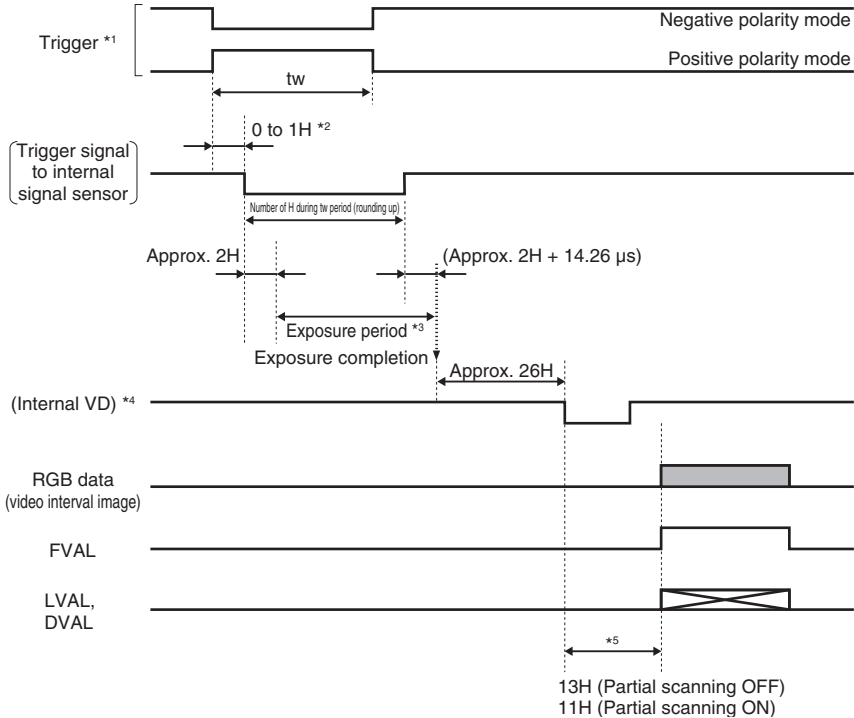
Note:

When the next trigger is input before completion of the output of the video corresponding to the trigger, there will be an effect on the video.

(2) PW SR (Pulse width trigger SYNC-RESET)

The trigger input to the CC1 of the DIGITAL terminal develops 1 frame images.

· 1 Pulse Width Trigger SYNC-RESET Picture Output Timing



*1: External input signal

*2: Frame rate NORMAL mode: $1H = 13.74 \mu s$ / FAST mode: $1H = 11.31 \mu s$

*3: Exposure period = Pulse width of trigger signal to sensor (in 1H units) + $14.26 \mu s$.

Pulse width of trigger signal (t_w) is rounded to 1H units as shown below.

$n-1 < t_w \leq n$ ($n = \text{whole number greater than } 1$)

*4: VD is generated after about 26H following the completion of the exposure period, and the video is synchronized to this and output.

*5: When NR is set to ON, 1H is increased.

Note:

When the next trigger is input before completion of the output of the video corresponding to the trigger, there will be an effect on the video.

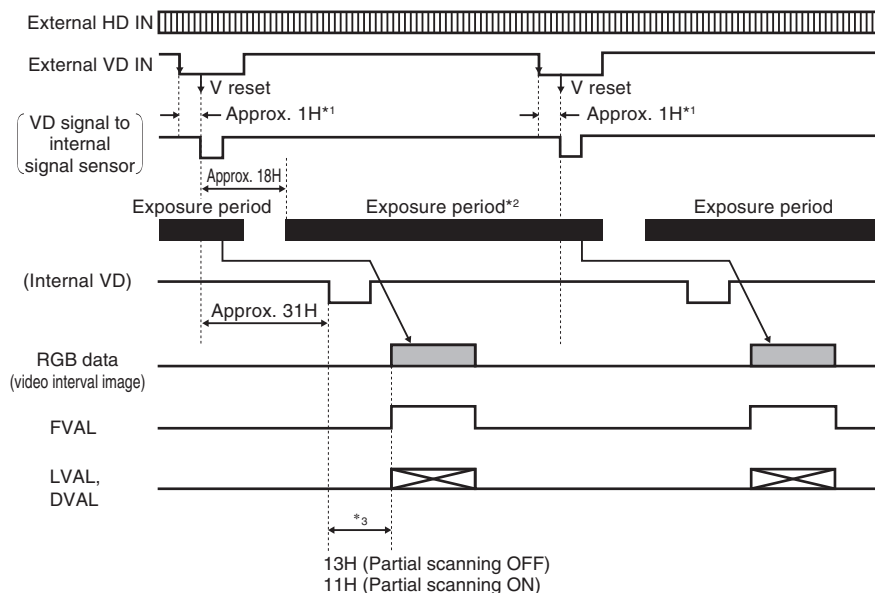
(3) RR (Reset restart)

Input of an external reset-restart signal (CC4 of the DIGITAL terminal: External VD input) permits one screen of information to be output at an arbitrary timing.

Long Term Exposure

When sufficient sensitivity is not obtained under normal operating conditions or capturing the trail of a moving object is desired, the reset-restart function allows high-sensitivity images by extending the exposure time. To achieve this, please input (from an external source) a VD signal that has an expanded VD pulse and VD pulse interval.

Reset Restart Picture Output Timing



*1: Frame rate NORMAL mode: 1H = 13.74 μ s/FAST mode: 1H = 11.31 μ s

*2: Exposure period = (Pulse width of VD signal to sensor (in 1H units) - 14 H) + 14.26 μ s.

*3: When NR is set to ON, 1H is increased.

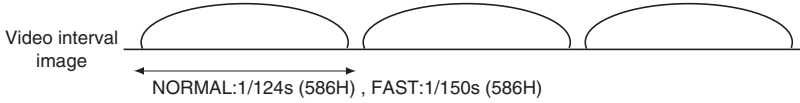
Note:

External VD interval: more than 1 frame

7.5 Partial Scanning

Partial Scanning OFF (All pixels scanning)

The independent signals of all pixels are output from DIGITAL connector.



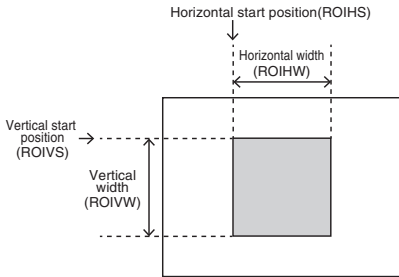
Partial Scanning ON

The pixel signal of the specified area is output from the DIGITAL terminal.

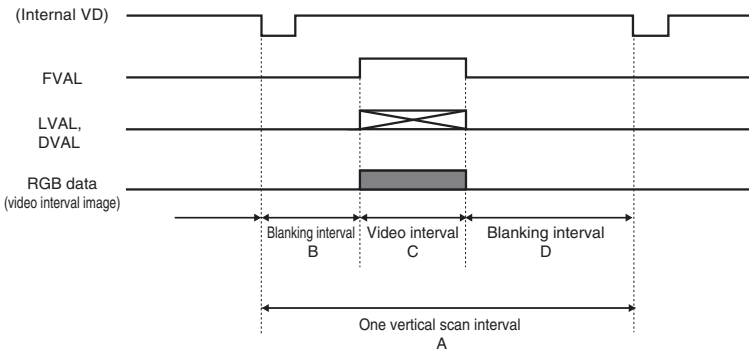
In the PART EXT mode, the partial scanning and all the pixels scanning can be switched by the DIGITAL terminal (CC2: partial scanning control signal).

CC2	Scanning mode
'L'	Partial scanning
'H'	All pixels scanning

You can set the specified area by using 4 parameters.



Video Timing



Mode	One vertical scan interval A	Blanking interval B	Video interval C	Blanking interval D
Vertical partial scanning ON	ROIWV+42H	11H	ROIWV	31H
Vertical partial scanning OFF	586H	13H	540H	33H

* ROIWV: The value set for vertical width in partial scanning.

7.6 External Sync

When using the unit with an external sync signal, input HD and VD to CC3 and CC4 of the DIGITAL terminal. When the external sync signal is input, the camera automatically switches its sync from the internal sync to the external sync.

The operation is as shown below, depending on the unit's status and how external sync signals are input.

Shutter mode	HD input	VD input	Note
At time of SYNC-RESET mode	N	*	Internal sync mode. The presence of VD is ignored, and after a specified time after a trigger input, V reset is applied.
	Y	*	HD is synchronized to external. The presence of VD is ignored, and after a specified time after a trigger input, V reset is applied.
At time of reset restart	Y	Y	HD is synchronized to external. Video is output due to VD input.
	N	Y	HD is synchronized to the inside of the camera. Video is output due to VD input.
	*	N	Video is not output because there is no VD input. Normally not used.
At time of manual shutter	N	N	Internal sync mode
	Y	Y	External sync mode
	Y	N	HD is synchronized to external. Normally not used.
	N	Y	Disabled

* Either Y or N is permitted.

(1) External sync signal polarity

HD: Negative

VD: Negative

(2) External sync frequency range

(External sync with HD, VD)

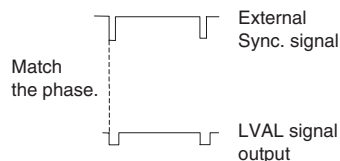
Within $\pm 1\%$ of horizontal synchronization frequency (NORMAL: 88.393 kHz/FAST: 72.794 kHz).

(3) Using the unit with external sync signal

When adjusting H (horizontal) phase refer to the item "7.2 (6) (6.1) Adjusting horizontal phase".

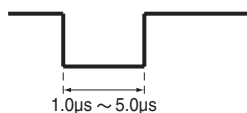
(3.1) H (horizontal) phase adjustment

Observe the external sync signal and the LVAL signal output waveform of the unit with a dual trace oscilloscope, and adjust H phase so that the H phases match.

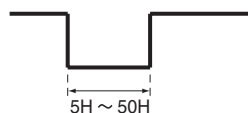


8. INPUT OUTPUT SIGNAL SPECIFICATIONS

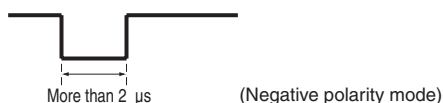
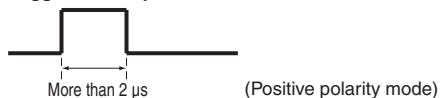
HD Input Specifications



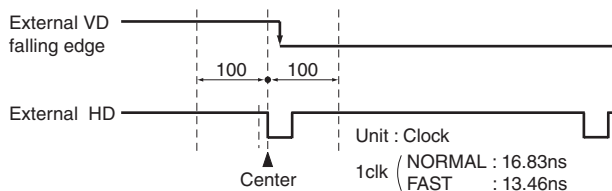
VD Input Specifications



Trigger Pulse Specifications



External HD/VD Input Phase Specifications



The phase relationship of the external HD and VD should correspond to the center phase (i.e., the external HD falling edge) as illustrated in the above diagram.

External VD falling edge:

Please input within about 100 clock cycles of the standard center phase.

Note that V sync of the video is output with a delay of about 2H from the external VD at the time of reset-restart and the external trigger mode.

Other than for reset-restart or external trigger mode:

Continuously with the HD cycle (NORMAL: 13.74 μs / FAST: 11.31 μs).

Continuously with the VD cycle (NORMAL: 8.05 ms / FAST: 6.63 ms) (partial scanning is NORMAL: $(72.794 \text{ kHz} \times 1000) / (\text{ROI VW} + 42\text{H})$ FAST: $(88.393 \text{ kHz} \times 1000) / (\text{ROI VW} + 42\text{H})$).

Phase timing shown in above diagram (with only the falling edge applicable).

At reset-restart:

Continuously with the HD cycle (NORMAL: 13.74 μs / FAST: 11.31 μs).

VD (reset) is at an arbitrary timing with the phase of HD being within the standard of the above diagram.

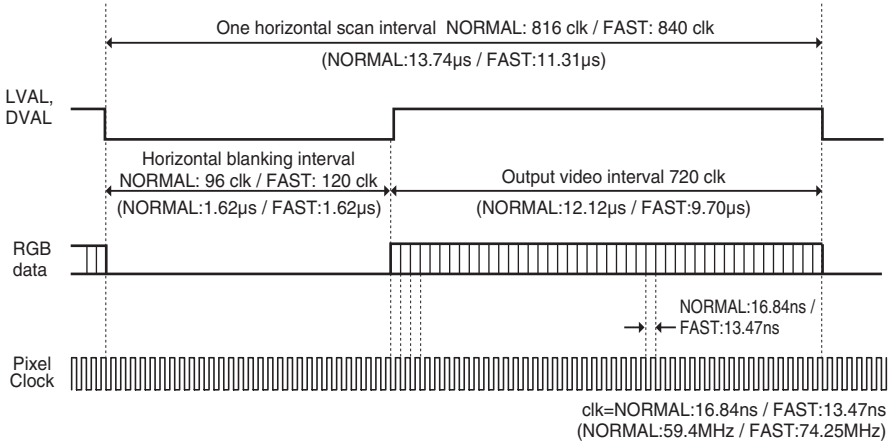
In external trigger mode:

Continuously with the HD cycle (NORMAL: 13.74 μs / FAST: 11.31 μs).

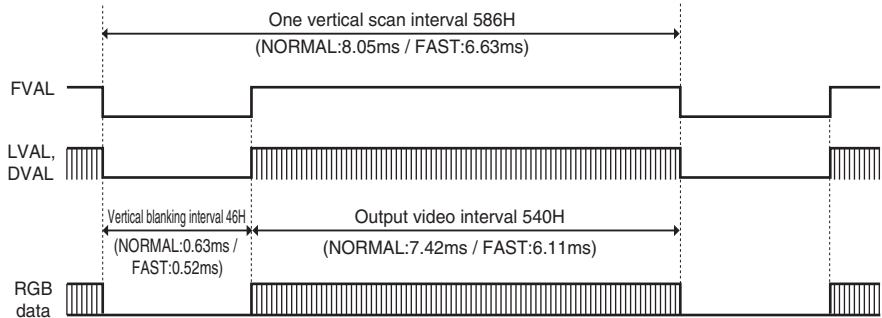
The presence of VD is ignored.

9. OUTPUT WAVEFORM TIMING CHART

Horizontal Output Waveform Timing Chart



Vertical Output Waveform Timing Chart



10. BEFORE MAKING A SERVICE CALL

Symptom	Items to be checked
No image	<ul style="list-style-type: none"> • Is power supplied correctly? • Is the lens iris adjusted correctly? • Are the camera and video cables connected correctly? • Is the shutter mode set correctly? • Is the monitor on, and in working condition? • Is the image signal output mode set correctly? • Is the image process equipment set correctly?
Poor color	<ul style="list-style-type: none"> • Is the monitor adjusted correctly? • Is the white balance of the camera adjusted correctly? • Is the illumination sufficient?
Noise appears	<ul style="list-style-type: none"> • Is the camera cable connected securely? • Are the camera and video cables connected correctly?

11. SPECIFICATIONS

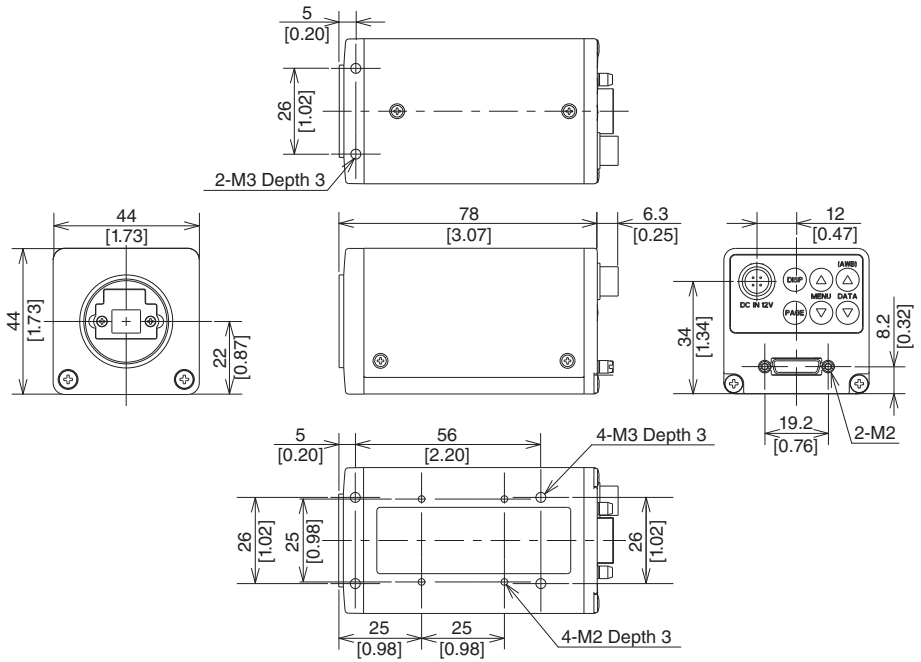
Power supply	DC 12V \pm 10%
Power consumption	Approx. 3.6 W
Pick-up system	RGB, 3CMOS
Image sensor	1/2.9 type CMOS sensor (global shutter)
Video output pixels	Horizontal: 720 pixels, Vertical: 540 pixels
Pixel clock frequency	NORMAL mode: 59.4 MHz FAST mode: 74.25 MHz
Sync signal frequency	NORMAL mode Horizontal: 72.794 kHz, Vertical: 124.22 Hz FAST mode Horizontal: 88.393 kHz, Vertical: 150.84 Hz
Sync system	Internal/External (Automatic switching)
Sensitivity	F7.5 standard (2000 lx, 3100 K, NORMAL mode) F6.8 standard (2000 lx, 3100 K, FAST mode)
Minimum illumination	11 lx standard (F2.2 GAIN 18 dB, 3100 K, NORMAL mode) 13 lx standard (F2.2 GAIN 18 dB, 3100 K, FAST mode)
Lens mount	C mount
Ambient temperature	0°C to 40°C (32 to 104°F)
Ambient humidity	90% or less (no condensation)
Weight	Approx. 160 g (0.353 lbs)
External dimension (except for protruded portion)	44 (W) x 44 (H) x 78 (D) mm (1.73" (W) x 1.73" (H) x 3.07" (D))
White balance	AWB (Automatic white balance), MANUAL (Manual)
Gain	MANUAL (Manual), OFF (0 dB)
Partial scanning	ON, OFF, EXT (external control)
Frame rate conversion	NORMAL, FAST
Output signal	8-bit RGB, Digital output (Camera Link format)
Sync signal output	FVAL, LVAL, DVAL (Positive polarity) Pixel Clock
External sync input	HD: CC3 (LVDS input) Negative polarity VD: CC4 (LVDS input) Negative polarity
External trigger input	CC1 (LVDS input), More than 2 μ s pulse width
Partial scanning control signal input	CC2 (LVDS input)
Interface	Serial data interface: Ser TC (RXD), Ser TFG (TXD)

The designs and specifications are subject to change without notice.

If any change occurs, we will revise the manual, etc.

12. EXTERNAL APPEARANCE DIAGRAM

Unit : mm [inch]



* inch=mm/25.4

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