

AOHUA

**ENDOSCOPE IMAGING
PROCESSORS**

AQ-100

INSTRUCTIONS FOR USE



CE 0197

Important information — Please Read Before Use

- Before use, thoroughly review this manual.
- Please keep all instruction manuals in a safe, accessible place.
- Contact AOHUA for any questions or comments about this instruction manual.



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Important Information — Please Read Before Use

Intended use

The endoscope imaging processors AQ-100 is intended to be used with AOHUA endoscopes and light sources in endoscopy, endoscopic diagnosis and endoscopic treatment.

Do not use this instrument for any purpose other than its intended use.

Instruction Manual

This instruction manual should be kept in an accessible place. Before use, thoroughly review this manual which contains the most appropriate instructions regarding to the maintenance and operation of this endoscope imaging processors. Although the endoscope imaging processors itself is fine and precise, the malfunction rate could be significantly reduced by following the essentials in this manual during operation and maintenance, resulting in extended lifetime of the endoscope imaging processors.

Any questions about the information provided in this instruction manual or about the endoscope imaging processors operation and safety regards, contact AOHUA.

User qualifications

This instrument should be used by persons trained in the use of this instrument.

If there is an official standard on user qualification to perform endoscopy and endoscopic treatment that is defined by the medical administration or other official institutions, such as academic societies for endoscopy, follow that standard. If there is no official qualification standard, the operator of this instrument must be a physician approved by the medical safety manager of the healthcare facility or person in charge of the department (department of internal medicine, etc.).

This device must be operated by a medical practitioner capable of safely performing endoscopy after operation technique training. This user manual introduces the ideal preparation and inspection procedures. It is not the detailed instruction for clinical examination and does not intend to familiarize beginners with endoscopy techniques and medical knowledge.

Ancillary Equipment

The safety of the endoscope imaging processors does not only rely on the endoscope imaging processors itself, but also relies on its ancillary equipment. To guarantee the compatibility, only the ancillary equipment manufactured by AOHUA or confirmed by AOHUA is recommended to use.

AOHUA prepared the standard accessory and spares list. Please carefully check the items in the package according to the list provided in Section 1.1, "Checking the package contents list" after purchase. If any item is missing or damaged, contact AOHUA or distributor immediately. Prior to the first time use of a new endoscope imaging processor, carefully clean the endoscope imaging processors and accessories.

The endoscope imaging processors and other components should be stored according to the following Section 4.7.2, "Storage and disposal".

Instrument compatibility

Before use, please refer to "Ancillary Equipment" to confirm that this instrument is compatible with the ancillary equipment being used. Using incompatible equipment can result in patient or operator injury and/or equipment damage.

Spare equipment

Be sure to prepare another endoscope imaging processor to avoid interruptions during examination due to equipment failure or malfunction.

Repair and modification

This instrument does not contain any user-serviceable parts. Do not disassemble, modify or attempt to repair it; patient or operator injury and/or equipment damage and/or the failure to obtain the expected functionality may result. Refer to Chapter 5, "Troubleshooting" for solutions of some irregularities. This instrument should be repaired by AOHUA authorized personnel only.

Important Information — Please Read Before Use

Signal words

The following signal words are used throughout this manual:



: It indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



: It indicates a potentially hazardous situation, if not be avoided, could result in death or serious injury.



: It indicates a potentially hazardous situation, if not be avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices or potential equipment damage.



: It indicates additional helpful information.

Dangers, warnings and cautions

Follow the dangers, warnings and cautions below when handling this instrument. This information is to be supplemented by the dangers, warnings and cautions given in each chapter.



- Never apply this imaging processors connected with the endoscope to the heart or any area near the heart.
- Never apply an endo-therapy accessory or another endoscope applied to or near the heart to come in contact with the endoscope connected to this imaging processors.
- Strictly observe the following precautions. Failure to do so may put the patient and the medical personnel in danger.
 - When the instrument is used to examine a patient, do not allow metal parts of the endoscope or its accessories to touch metal parts of other system components.
 - Keep fluids away from all electrical equipment. If fluids are spill on or into the unit, stop operation immediately and contact AOHUA.
 - Avoid preparing, inspecting or using the instrument with wet hands.
- Never install and operate the endoscope imaging processors in location where:
 - The concentration of oxygen is high.
 - Oxidizing agent (such as nitrous oxide (N₂O)) or flammable anesthetics are present in the atmosphere.
 - Flammable liquids are near.

Important Information — Please Read Before Use

WARNING

















- This device must be operated by a medical practitioner capable of safely performing endoscopy after operation technique training. Do not use this instrument for any purpose other than its intended use.
- This product may interfere with other medical electronic equipment used in combination with it. Before use, please confirm the compatibility of the device with all equipment to be used.
- Do not use the instrument in any place where it is exposed to strong electromagnetic radiation. Otherwise, this may impair the performance of the instrument.
- Always set the brightness to the minimum required level, as strong light like xenon light may cause patient burns.
- Avoid observing in proximity to the mucosa for an extended period. It may cause patient burns.

CAUTION

- This instrument shall be used with auxiliary equipment or accessories complied with relevant EMC standards for safety reasons. Otherwise, performance of the imaging processors may be affected.
- Portable or mobile phones may cause radio interference to this instrument. Relocating the imaging processors or providing a shield to the location if the radio interference occurs.
- Do not connect or disconnect the endoscope connector while this instrument is turned ON. This action may destroy the instrument.
- When the instrument is used with other non-medical auxiliary equipment, such as video recorder and printer, the isolated transformer or insulating socket must be used to ensure safety.
- Do not use a sharp or hard object to press the buttons on the front panel. This may damage the buttons.
- Avoid applying excessive force to the connectors, as this may damage the instrument.

Important Information — Please Read Before Use

Labels and Symbols

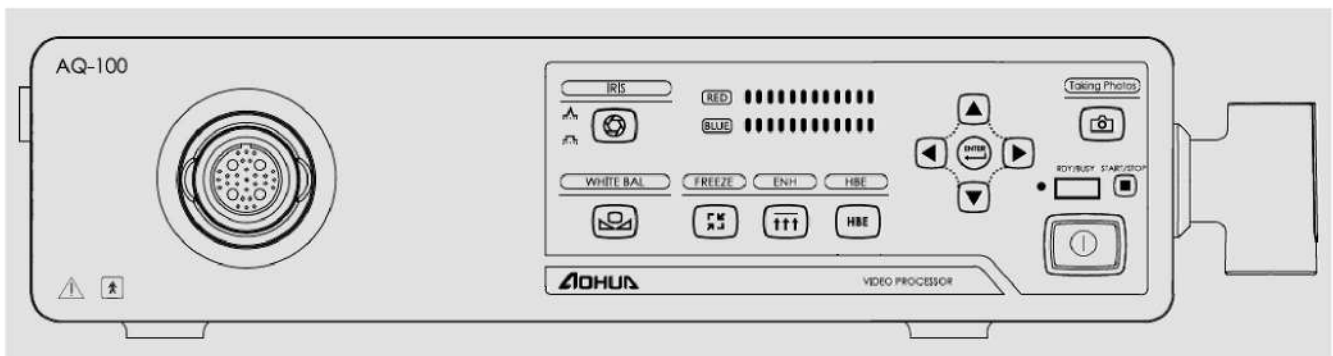
| | |
|---|---|
|  | Type BF applied part |
|  | Protective earth(ground) |
|  | Caution |
|  | Equipotentiality |
|  | Authorized representative in the European Community |
|  | Refer to instruction manual |
|  | Date of manufacture |
|  | Manufacturer |
|  | Keep dry |
|  | Use-by date |
|  | Keep away from sunlight |
|  | Serial Number |
|  | Fragile, handle with care |
|  | Stacking limit by number |
|  | Temperature limit |
|  | This way up |

01 Checking the Package Contents

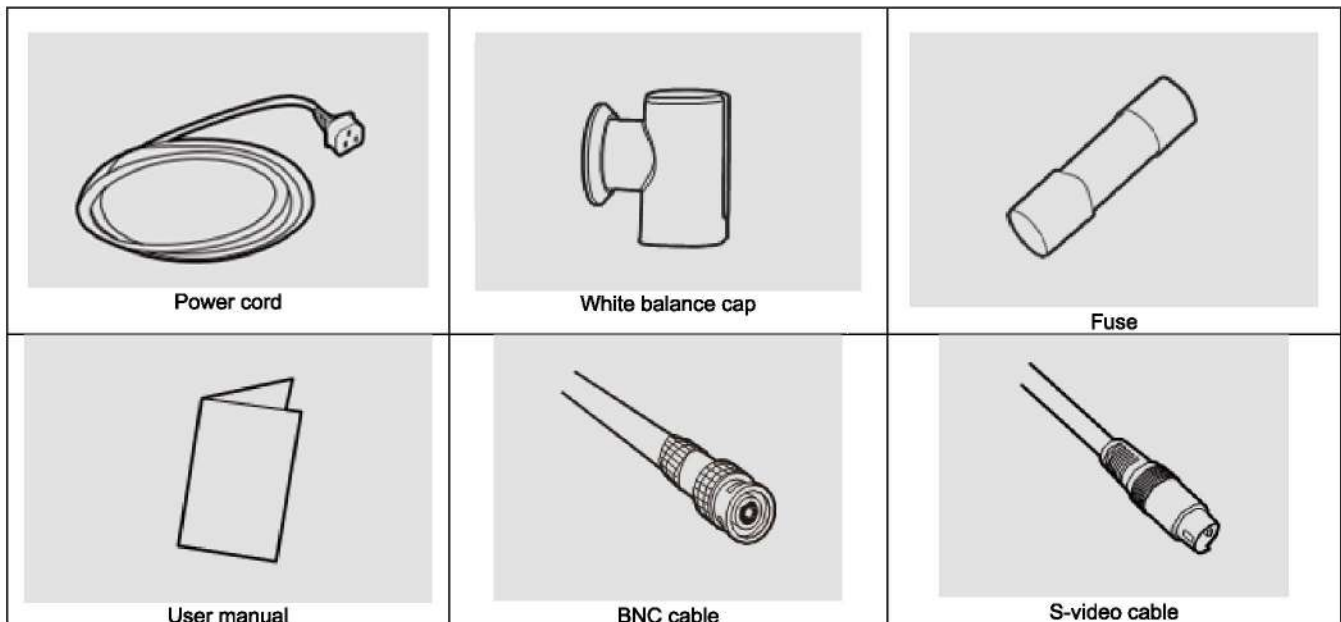
1.1 Checking the package contents list

! CAUTION

- Check all items in the package against the components listed below. If any component is missing or damaged, do not use the item; please contact AOHUA immediately. Accessories below in the list are only for the reference. Please refer to the packing list/ shipping list included in each shipment.



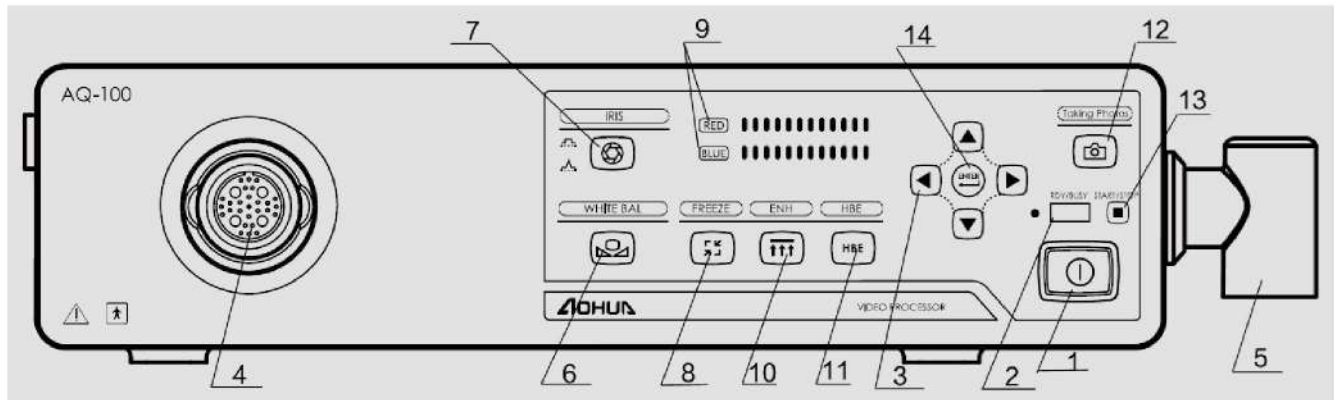
Endoscope imaging processors AQ-100



02 Nomenclature and Functions

2.1 Nomenclature and Functions

2.1.1 Front panel

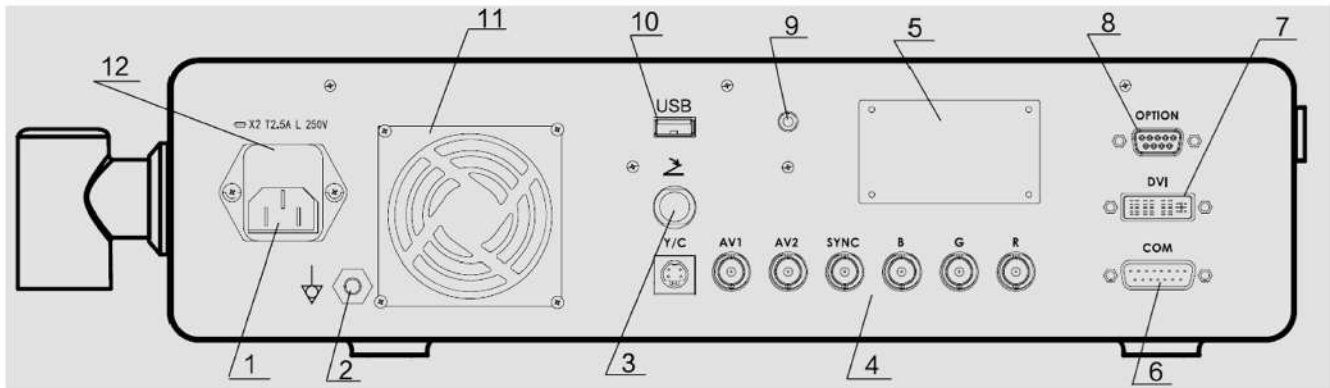


(Figure 2.1.1 Front panel)

| No. | Nomenclature | Description |
|-----|----------------------------------|--|
| 1 | Power Switch and indicator | Press to turn the endoscope imaging processors ON or OFF. |
| 2 | USB Port and indicator | Insert USB flash drive into this port, the indicator will be on as the flash drive is inserted |
| 3 | Functional buttons | Contains 4 buttons UP▲, DOWN▼, FORWARD▶ and BACK◀ Adjust the functions and parameters of AQ-100 image processors. |
| 4 | Video cable connector socket | Connect the compatible endoscope. |
| 5 | White Balance Cap | Insert the distal end of the endoscope to perform white balance adjustments. Warning: No objects are allowed to be hanged on the white balance cap. |
| 6 | White Balance Button | With the endoscope connected, press it for 2~4 seconds to perform white balance adjustment. |
| 7 | IRIS mode Button | Select average mode or peak mode by pressing the button. |
| 8 | FREEZE button | Freeze and defreeze the images |
| 9 | Color tone adjustment indicators | Press▲ and ▼ buttons to adjust the value of red or blue color component. |
| 10 | ENH button | Press to select the image enhancement mode. Long press the button to switch the structure enhancement or edge enhancement or non-enhancement state, and short press to switch the enhancement level. |
| 11 | HBE button | Perform image processing on the acquired images to enhance the display of vascular tissue. |
| 12 | Taking photos | Press to take photos and store in the USB.(The USB must be plugged into the RDY/BUSY) |
| 13 | Start/Stop Button | Press to start or stop video. (The USB must be plugged into the RDY/BUSY) |
| 14 | Enter Button | Select the red or blue component to adjust, adjust the value of the color component of the displayed image, or enter the digital zooming mode. |

02 Nomenclature and Functions

2.1.2 Rear panel



(Figure 2.1.2 Rear panel)





| No. | Nomenclature | Description |
|-----|-------------------------------------|--|
| 1 | Main power switch | Connects the power cord with the imaging processors through this socket to provide mains power supply. |
| 2 | Equipotential Equalization Terminal | This terminal is connected to a potential equalization terminal of the other equipment connected to the imaging processors. The electrical potential of the equipment are equalized. |
| 3 | Foot switch port | Connect with the foot switch |
| 4 | Video Output | Output AV, SYNC and RGB video signal. |
| 5 | Nameplate | Provides necessary relevant information of the imaging processors on the nameplate. |
| 6 | Communication terminal | Communicate the data between light sources and image processors |
| 7 | DVI Video Output Terminals | Connects equipment compatible with the DVI (Digital Visual Interface). Outputs DVI video. |
| 8 | Debugging socket | The socket is for repair only. |
| 9 | Remote Control interface | Connects for updates or controlling printer and other equipment. |
| 10 | USB port | Insert USB compatible device into this port |
| 11 | Air Outlet | The fan inside ventilate while the equipment is running. |
| 12 | Fuse Holder | This socket is used to install and store fuses that protect the imaging processors from electrical surges. |

02 Nomenclature and Functions

2.2 Main components

- 1 Three-pin plug and socket
- 2 Power switch
- 3 Axial fan
- 4 Switching Mode Power supply
- 5 Fuse (T 2.5 AL 250V)
- 6 Image processing circuit board
- 7 Video converter board
- 8 Control panel

2.3 Product characteristics

- 1 Type of protection against electric shock: class I
- 2 The ingress protection rating of the imaging processors is common device.
- 3 Manufacturer: Shanghai AOHUA Photoelectricity Endoscope Co., Ltd
- 4 Product name: Endoscope imaging processors; Model:AQ-100.
- 5 Operating mode: continuous running.
- 6 Protective earth. 
- 7 Caution! 
- 8 Equipotentiality. 
- 9 Power ON/OFF. 
- 10 Classified as non-AP device or APG device, according to the safety rating of performing in air and flammable anesthetic gas mixture; or oxygen/nitrous oxide and flammable anesthetic gas mixture
- 11 Internal battery model: CR1220

2.4 Performance characteristics

The AQ-100 is equipped with:

- 1 White balance function;
- 2 On screen display function
- 3 TWO automatic brightness adjustment: average automatic brightness adjustment, peak automatic brightness adjustment;
- 4 Hemoglobin enhancement function—— HBE BUTTON;
- 5 Two enhancement modes: Structure enhancement mode and Edge enhancement mode;

02 Nomenclature and Functions

- 6 Color customization function;
- 7 Digital magnification function;
- 8 Image Freezing and replaying function;
- 9 Automatic endoscope identification function;
- 10 USB storage function;
- 11 Various signal output methods, including DVI, AV, Y/C, component output (RGB, SYNC), etc.

2.5 Specifications

2.5.1. Operating environment

- Ambient temperature : +5°C ~ +40°C
- Relative humidity : 30% - 85%
- Atmospheric pressure : 700 - 1060hPa
- Power supply : 100-240 V AC, rated frequency 50/60Hz
- Input power : 60VA

2.5.2. Product Structural Composition

This product is composed of imaging processors, white balance cap, fuses and power cord.

2.5.3. Compatible devices

This endoscope is intended to be used with VME-98S/92S/1650S/1300S, VCC, VGT, VBC and VRL series endoscopes, and AQL-100, AQL-100L light sources manufactured by AOHUA, and other ancillary equipment that comply with relevant regulations and standards.

CAUTION

- All compatible devices shall comply with the relevant requirements for safety use.

- 1 Compatible Monitor : monitor with resolution ratio higher than 1080×720 pixels (the monitor should comply with the relevant standards).

2.5.4. Imaging processors specification

| | |
|-------------------------|--|
| Dimensions | 470(length) * 420(width) *105(height) mm |
| Weight | 8.59Kg |
| Software version | I6 |

03 Installation and Inspection

Prepare the endoscope imaging processors and compatible equipment before each use. Install and connect the equipment according to the procedures described in this chapter and the instruction manuals for ancillary equipment.

3.1 Endoscope imaging processors installation and connection

CAUTION

- Do not place any object on the top of the endoscope imaging processors. Otherwise, damage to the equipment may result.
- Do not cover or block the ventilation grills of the endoscope imaging processors. Ventilation grills blockage will overheat and cause damage to the device.
- Ensure reliable grounding. Power supply requirements:
 - Users need to provide 100-240V AC and 50/60 Hz power supply; if the voltage is not stable, automatically regulated power supply must be provided (over 1000W, residential used voltage regulator shall not be used.) Contact AOHUA for any questions. The same voltage regulator cannot be shared with other electrical products with large electricity consumption.
 - The user has to provide the power supply with reliable and safe grounding.
 - For frequent power outage regions, UPS (Uninterruptible power supply) is recommended to use to ensure the normal operation of this system. Connect the power cord of the endoscope imaging processors with the power supply input inlet of the UPS.
- Turn OFF all system components before connecting them. Otherwise, equipment may be damaged.

- 1 Inspect and ensure the reliable grounding is available, and the fuse is in good condition, and all ventilation grills are uncovered and unblocked.
- 2 Ensure that the power switches of the endoscope imaging processors are OFF.
- 3 Firmly align the video endoscope cable connector, one of which end is connected with the electrical connector of endoscopes, into the endoscope connector inlet of AQL-100 or AQL-100L. Firmly insert the light guide of endoscope into the light sources AQL-100 or AQL-100L, and as shown in Figure 3.1.

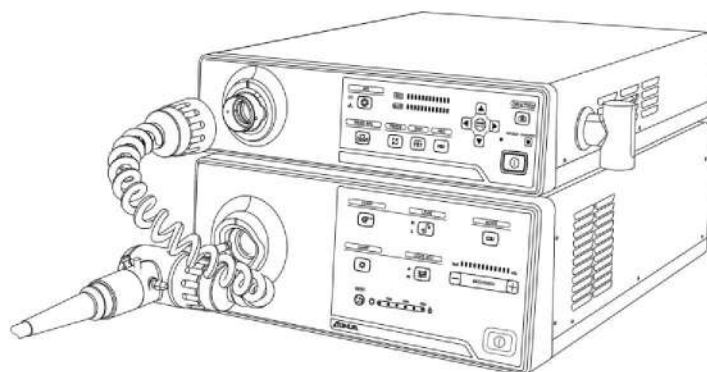


Figure 3.1 Connection of the endoscope and imaging processors

03 Installation and Inspection

WARNING

- The video endoscope cable should always be connected to the endoscope imaging processors before being connected to the video endoscope.
- Align the yellow mark on the videoscope cable with the yellow mark on the output socket of the endoscope imaging processors; insert the videoscope connector and rotate clockwise until it securely connected.
- Align the green mark on the videoscope cable with the green mark on endoscope connector; insert the videoscope connector and rotate clockwise until it securely connected.

- 4 Connect the monitor to the imaging processors using the BNC, S-VIDEO, and DVI cables, the ports and cables can't be altered.
 - Connect the video output terminal (AV1 or AV2) of the endoscope imaging processors with the video input terminal (CVBS IN) of the monitor using the BNC Cable;
 - Connect the video output terminal (SYNC/R/G/B) of the endoscope imaging processors with the input terminals (SYNC/R/G/B IN) using the BNC Cables;
 - Connect the video output terminal (Y/C) of the endoscope imaging processors with the input terminals (S-VIDEO IN) using the S-VIDEO Cable;
 - Connect the video output terminal (DVI) of the endoscope imaging processors with the input terminals (DVI IN) using the DVI Cable;

03 Installation and Inspection

CAUTION

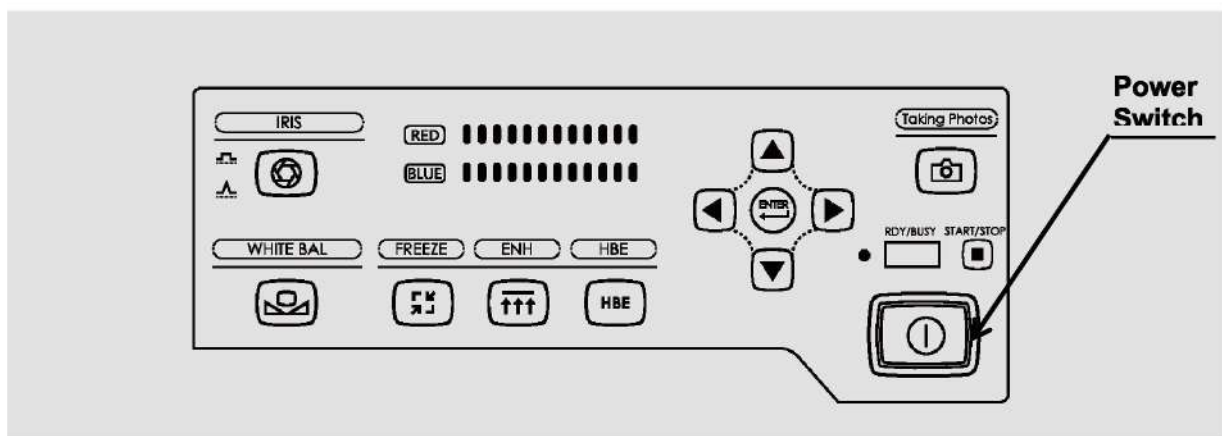
- For ancillary devices, such as recorders, printers, computer work stations etc., Consult AOHUA to confirm equipment compatibility. AOHUA is not responsible for any consequences caused by using of unapproved device.
- When install the imaging processors, keep it away from equipment with high energy and high power, or equipment emitting electromagnetic inference (such as CT equipment, X-ray equipment, microwave therapy apparatus, high frequency hyperthermia instrument, MRI equipment, radio communication device, etc.). Interruption of radio signals will appear on the display screen if the inference occurs, resulting in degradation on image quality. It is recommended to stay away from the inference sources if the noise occurs.
- Do not hit the terminals on the front and rear panels of the imaging processors with any hard or sharp objects. Otherwise, damage can result.
- Do not touch the electric connecting points in the output socket of AQ-100 endoscope imaging processors.
- It is prohibited to use this product in the environment of flammable gas, otherwise a fire or explosions may result.
- It is strictly prohibited to frequently press the power switch of the imaging processors. Wait for at least 8 seconds for next initiation.
- The monitor used must be approved by AOHUA and with resolution higher than 1080×720 pixels. Also, the monitor should comply with the relevant standards.
- Y/C terminal is used for connecting with the Y/C IN terminal of the compatible instrument. When connecting with the devices mentioned above, the Y/C video connection cable of the monitor can also be used, if more video connection cables are needed for connecting with other devices, purchase more cables or use the video cables of other devices.
- For the information of high frequency coagulation device compatible with this imaging processors, refer to the instruction manual of the endoscope. Using the device not introduced in the endoscope instruction manual may cause the monitor to produce high frequency sound, and cause the endoscopic image to distort and disappear.

03 Installation and Inspection

3.2 Inspection of the power supply

Confirm that the ventilation grills are not covered or blocked with dust or other materials, and that the imaging processors can be turned ON.

- 1 Confirm that the ventilation grills are not covered or blocked with dust, and that the endoscope imaging processors is turned ON.
- 2 Press the power switch of the endoscope imaging processors as shown in Figure 3.2. And the power indicator lights up.



(Figure 3.2)

- 3 Confirm that air is ventilated by holding hand in front of the ventilation grills.
- 4 If the equipment fails to be turned ON, turn the endoscope imaging processors OFF. Then, confirm that the power cord is firmly connected. Then, turn the endoscope imaging processors ON again. If the equipment still fails to be turned ON, contact AOHUA.

WARNING

- If air is not ventilated through the ventilation grills, do not use the imaging processors and contact AOHUA.

3.3 Inspection of color tone adjustment

The color tone of the endoscopic image can be adjusted using the color tone select button and color tone level adjustment buttons on the front panel. The color tone is adjusted in two colors (Red, Blue), and the color tone level indicators show the current color tone level of each color.

- 1 Press the “enter” button on the front panel to select the red or blue tone. The color tone adjustment indicators of the selected tone lights up.
- 2 Press the “▲” or “▼” to adjust the level of color tone.

03 Installation and Inspection

3.4 Inspection of the monitor display

CAUTION

- Before inspection, make sure that white balance adjustment is performed. See section 4.3, "Adjusting the white balance".

- 1 Turn ON the video monitor display to confirm that the endoscopic image is displayed properly.
- 2 Confirm that the text information is displayed on the monitor.
- 3 Confirm that the endoscope image is normal by observing any object such as your hand.

3.5 Inspection of the freeze and release function

WARNING

- Do not use the endoscope imaging processors when the live image cannot be displayed normally. Otherwise, patient injury may occur.

- 1 Press the freeze button as described in the section 4.4.7, "Freezing the image", to freeze image.
- 2 Confirm that the live image freezes.
- 3 Press the freeze button again to release the image.
- 4 Confirm that the frozen image returns to the live image.

3.6 Inspection of the digital magnification function

Confirm that the image can be enlarged by pressing the button and checking the displayed current zooming ratio on the monitor.

- 1 Press the enter button as described in the Section 4.4.6 "Digital magnification", confirm that the zooming mode is displayed, and the endoscopic image is enlarged to corresponding degree by pressing "▲" or "▼".

3.7 Inspection of the structure and edge enhancement function

Confirm that the image can be enhanced by pressing the button and checking the displayed current enhancement mode on the monitor.

- 1 Press the ENH button as described in the Section 4.4.4, "Structure and edge enhancement"; confirm that the indicator above the button lights up and the selected mode is displayed on the monitor for a few seconds.
- 2 Short press the "ENH" button to switch different level of image enhancement function.

03 Installation and Inspection

3.8 Inspection of the Hemoglobin enhancement function

Confirm that the hemoglobin can be enhanced in the endoscopic image by pressing the button and checking the displayed enhancement mode information on the monitor.

- 1 Confirm that the light sources is in the mode A.
- 2 Press HBE button as described in the Section 4.4.5, "Hemoglobin enhancement"; confirm that the OSD on the monitor indicates the present statue.
- 3 Press the "HBE" button to turn from the HBE mode to normal mode. The OSD on the monitor indicates the present statue.

3.9 Inspection of power OFF

- 1 Press the power switch of the endoscope imaging processors.
- 2 Confirm that the endoscope imaging processors is turned OFF and the power indicator dark.

WARNING

- If the power indicator remains illuminated after turning the endoscope imaging processors OFF, do not use it, unplug the power cord from the wall mains outlet and contact AOHUA.

04 Operation

The operator of the endoscope imaging processors must be a medical practitioner capable of safely performing endoscopy after operation technique training. This manual does not explain or discuss clinical endoscopic procedures. It only describes basic operation of the endoscope imaging processors. Before using the endoscope, ensure to perform preparation and inspection on the endoscope imaging processors as described in Chapter 3, "Installation and inspection".

4.1 Precautions

WARNING

- If any irregularity is observed, do not use the endoscope imaging processors. Electric shock may result.
- Do not hit the terminals of the front and rear panel of the endoscope imaging processors with sharp or hard objects. Otherwise, this instrument may be damaged.
- While operating the endoscope and performing the endoscopy, be sure to observe the live image. If operate the endoscope and perform the endoscopy while freezing or replaying the images, patient injury may occur.

CAUTION

- Before disconnecting the endoscope with the endoscope imaging processors, power supply must be turned OFF.
- Before disconnecting the light sources with the endoscope imaging processors, power supply must be turned OFF.
- It is prohibited to use the imaging processors in the environment of flammable gas, otherwise a fire or explosions may result.
- It is forbidden to frequently turn ON the power switch of the imaging processors. Wait for at least 8 seconds before turning the imaging processors ON after each shutdown.

4.2 Turning the endoscope imaging processors ON

- 1 Turn the ancillary equipment ON.
- 2 Press the power switch to turn the endoscope imaging processors ON. The power indicator lights up.
- 3 Switch ON the light sources according to the Instructions for Use of the connected light sources
- 4 Confirm that the endoscopic image shows on the monitor normally.

NOTE

- Also refer to instruction manuals of ancillary equipment for safe use.

04 Operation

4.3 Adjusting the white balance

The white balance adjustment is used to display the correct image color on the monitor. Always adjust the white balance in the following cases:

- Before observation
 - After exchanging the light sources
 - Any irregularities observed on the color of the image
- 1 Check if the color of the endoscope image on the monitor is normal. If there is color deviation, the color should be reset.
 - 2 Insert the distal end of the endoscope into white balance cap; press the white balance button as described in Section 4.4.3, "White balance adjustment". The system will automatically perform white balance adjustment. Dimmed white balance adjustment indicator and text information displayed on the monitor indicate successful adjustment.

WARNING

- Make sure that the endoscope and white balance cap are clean before adjustment.

CAUTION

- Do not turn OFF the endoscope imaging processors or disconnect the endoscope until the white balance adjustment is completed.
- Do not allow other light to enter the white balance cap when adjust the white balance.
- When adjust white balance, the distal end of the endoscope should be inserted into the white balance cap.

4.4 Panel operation

The panel buttons could realize the following functions:

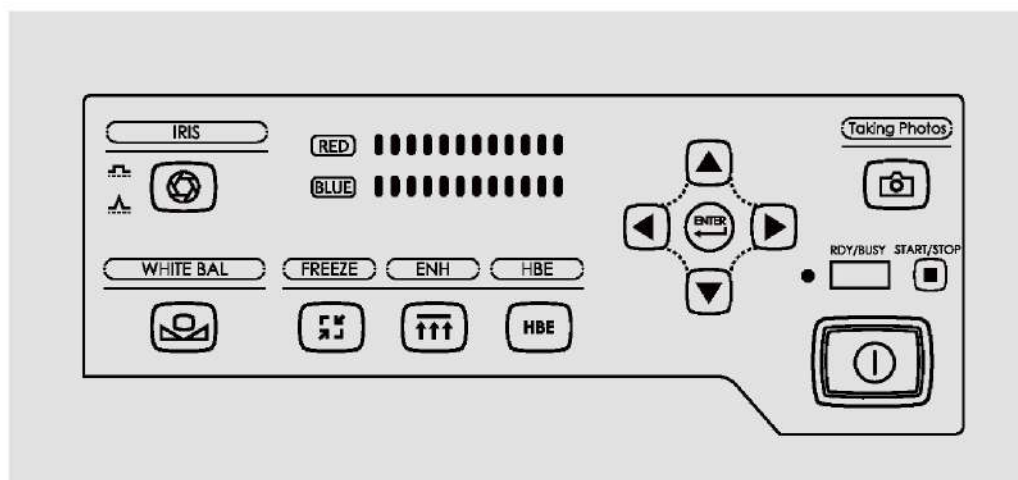
- Adjust the image display;
- Perform the "Edge Enhancement", "Structure Enhancement", "Red Enhancement" and other image processing functions (shown in the Section 4.4.2, "Button and icon functions" on Page 18);
- Freeze, replay and magnify image.

The displayed text information on the monitor shows the current status of the buttons.

4.4.1 Schematic diagram of panel

The schematic diagram of the panel button layout of AQ-100 imaging processors is shown in figure 4.4.1. Press the panel buttons to perform panel operations.

04 Operation



(Figure 4.4.1)

4.4.2 Button functions

The displayed text information shown in the table below indicate the current setting of the imaging processors.

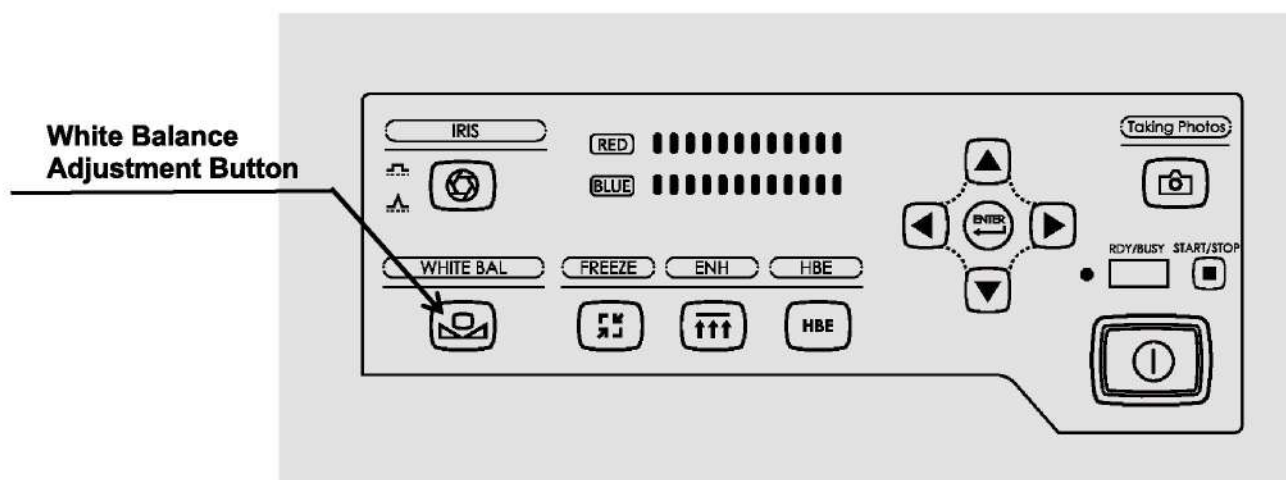
| Panel Button | Description |
|--------------|--|
| | Color adjustment and zooming function. The function shift sequence is: red color adjustment, blue color adjustment, zooming |
| | White Balance Adjustment |
| | Structure and Edge Enhancement |
| | Video Recording |
| | Image Freezing |
| | Hemoglobin Enhancement |
| | Photo taking |
| | IRIS Mode Setting |
| | BACKWARD |
| | FORWARD |
| | UP |
| | DOWN |

04 Operation

4.4.3 White balance adjustment

The system can automatically adjust the white balance of the endoscopic image.

- 1 Insert the distal end of the endoscope into the white balance cap of the imaging processors.
Press and hold the white balance adjustment button (See Figure 4.4.3.1), the white balance adjustment indicator illuminates. Automatic white balance adjustment will be performed.



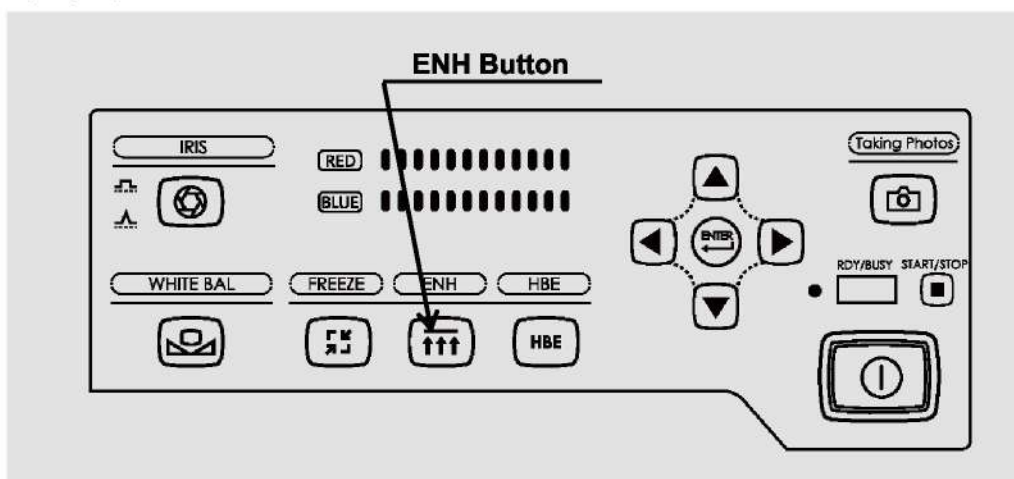
(See Figure 4.4.3.1)

- 2 Dimmed indicator and the displayed text information on the monitor indicate the successful adjustment.

4.4.4 Structure and edge enhancement

This operation changes the endoscopic image enhancement mode among structure enhancement, edge enhancement and no enhancement modes.

- 1 Press and hold the ENH button to activate or deactivate the structure or edge enhancement function. The default status is no enhancement. The enhancement function is changed as the sequence STRUCTURE ENHANCEMENT—EDGE ENHANCEMENT—NO ENHANCEMENT. The current enhancement status is shown in the monitor.



(Figure 4.4.4.1)

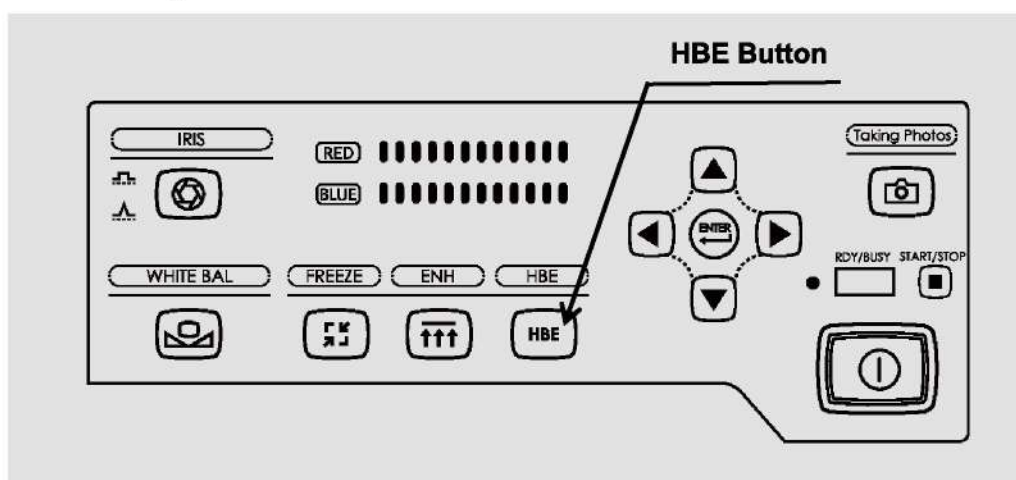
- 2 As the STRUCTURE ENHANCEMENT or EDGE ENHANCEMENT is activated, press the ENH button to select the enhancement level. The current enhancement status is shown in the monitor.

04 Operation

4.4.5 Hemoglobin enhancement

This operation can enhance the display of the blood vessels.

- 1 Press HBE button (See Figure 4.4.5.1) to activate the hemoglobin enhancement function. The OSD on the monitor indicates the present status.



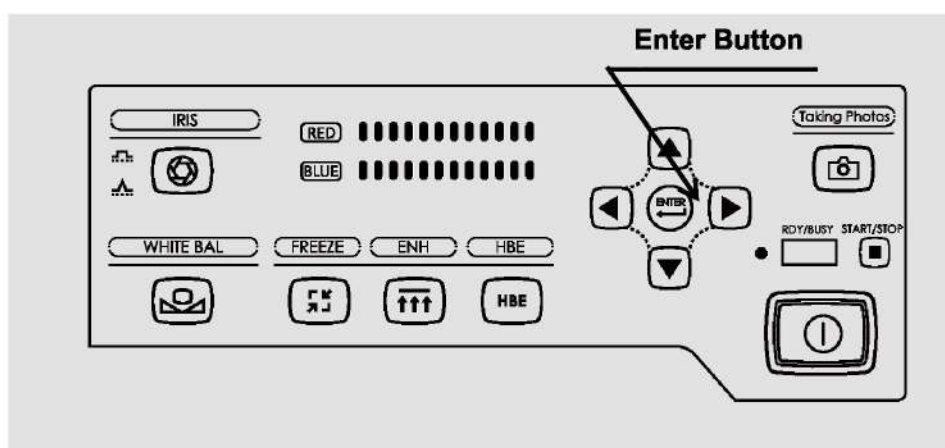
(Figure 4.4.5.1)

- 2 Press the HBE button again to turn from the HBE mode to normal mode. The OSD on the monitor indicates the present status.

4.4.6 Digital magnification

The content of the endoscopic image can be enlarged by the digital magnification function. The zoom ratios are "1.0x", "1.2x", "1.5x" and "2.0x".

- 1 Press enter button (See Figure 4.4.6.1) and switch to the zooming function.



(Figure 4.4.6.1)

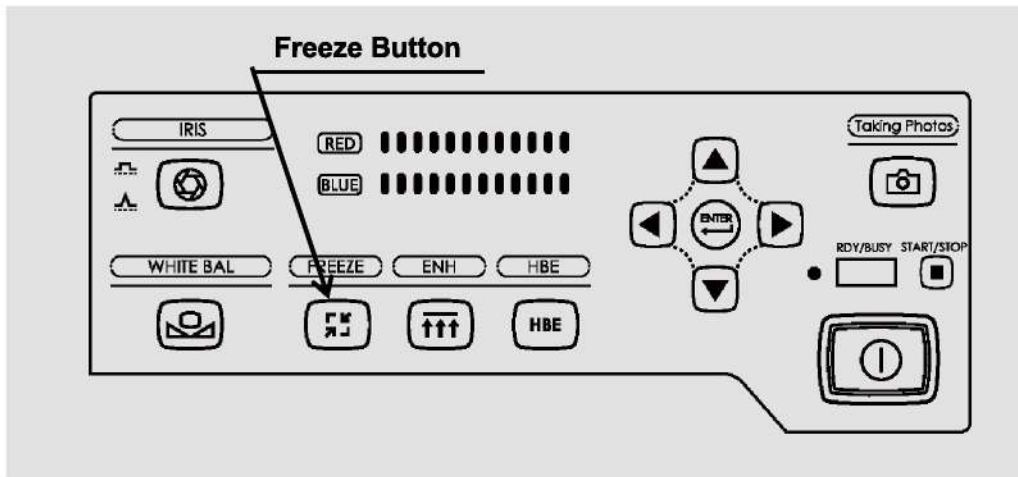
- 2 Press UP or DOWN button to select the zooming ratio among "1.0x", "1.2x", "1.5x" and "2.0x". The selected zooming ratio is indicated on the monitor. (See Figure 4.4.6.1)

04 Operation

4.4.7 Freezing the image

The endoscopic image can be frozen by this operation.

- 1 Press the freeze button (See Figure 4.4.7.1) to freeze image or release frozen image.



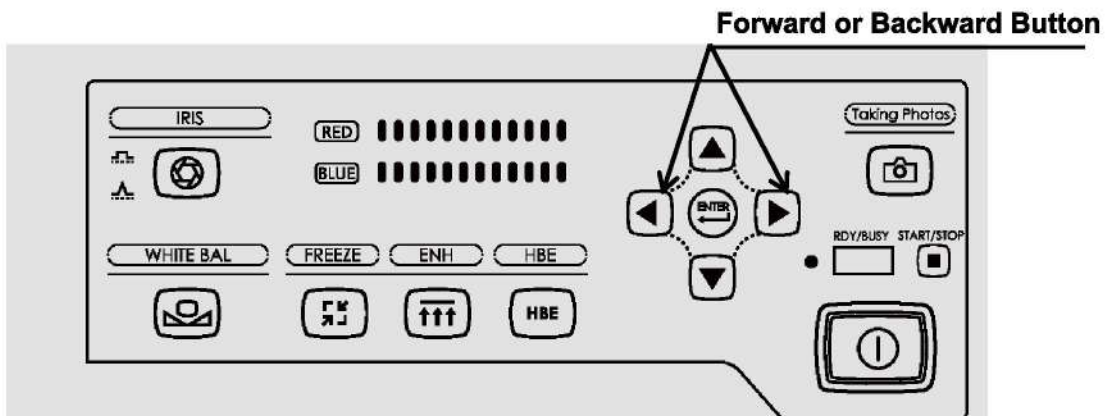
(Figure 4.4.7.1)

- 2 Press the freeze button on the handle or press both the FORWARD and BACKWARD button on the front panel again to restore the real-time image.

4.4.8 Image replaying

The frozen images can be replayed through this operation.

- 1 Press the FORWARD or BACKWARD button (See Figure 4.4.8.1) to view the frozen image.



(Figure 4.4.8.1)

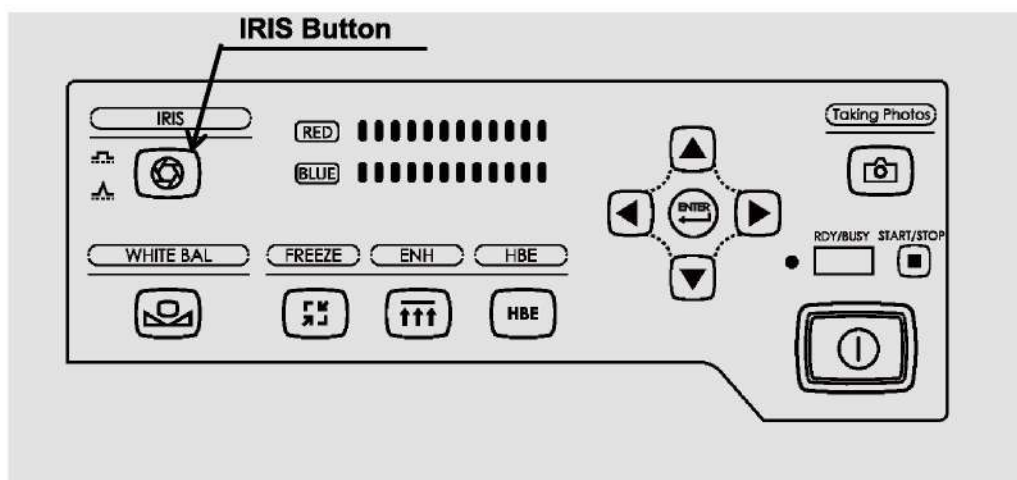
- 2 The information displayed on the monitor indicates the current page number of the replayed image

4.4.9 IRIS mode setting

This operation changes the IRIS mode between peak mode and average mode.

- 1 Press the IRIS button (See Figure 4.4.9.1) to switch the IRIS mode to peak mode or average mode. The IRIS indicator will indicate the present statue of the IRIS mode

04 Operation



(Figure 4.4.9.1)

4.4.10 Video recording

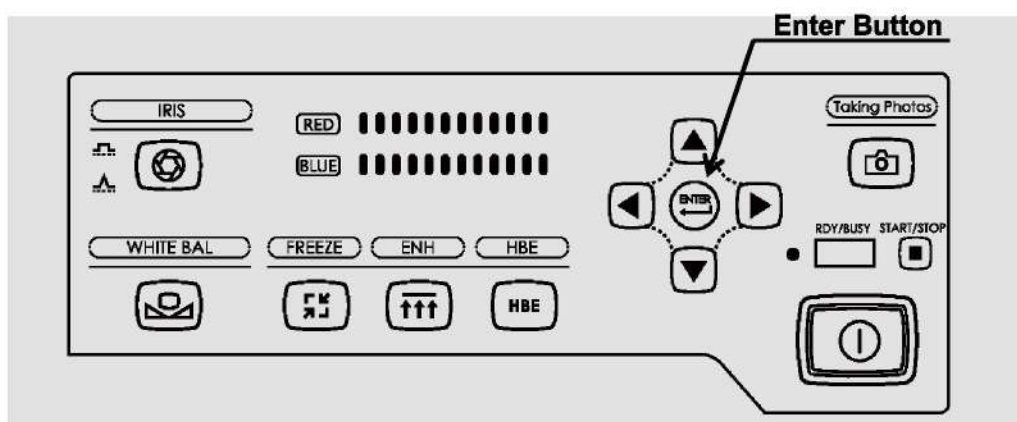
The captured video can be recorded by this operation.

- 1 Insert the USB flash drive. The USB indicator illuminates;
- 2 Press the START/STOP button to start the video recording.
- 3 Press the video button again, the recording is ended. The video captured will be automatically saved into portable storage device. (The portable storage device must be inserted into the USB port on the front panel of the imaging processors. Otherwise, this function is not available)

4.4.11 Color customization

The endoscopic image color can be customized by this operation.

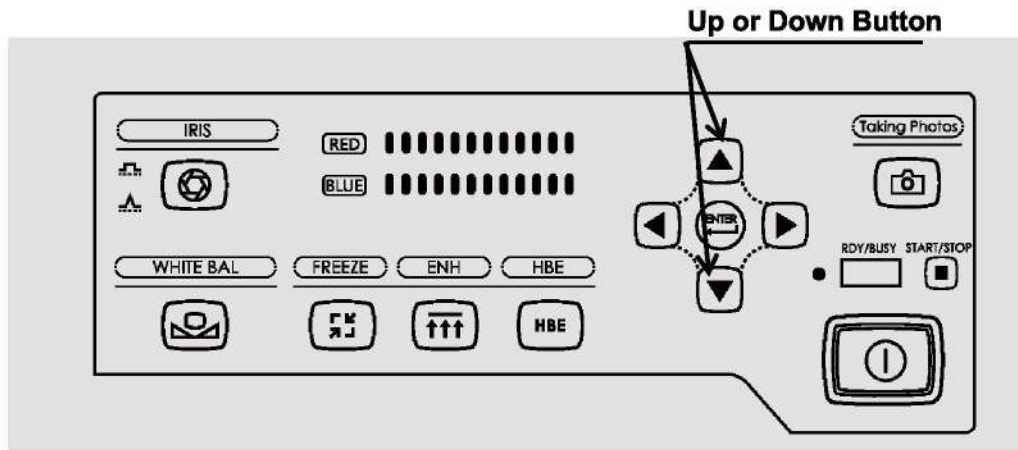
- 1 Press the "enter"(See Figure 4.4.11.1) until either RED or BLUE of the Color tone indicator is on.



(Figure 4.4.11.1)

- 2 Press UP or DOWN button (See Figure 4.4.11.2) to increase or decrease the component value of R(Red), or B(blue) component within 21 levels (from -10 to 10).

04 Operation



(Figure 4.4.11.2)

- 3 The displayed numbers indicate current color setting.

4.4.12 Taking photo

- 1 Insert the USB flash drive into the USB port. The USB indicator illuminates.
- 2 Press the "Taking Photos" button to automatically store the captured photo in the USB flash drive. (The portable storage device must be inserted into the USB port on the front panel of the imaging processors. Otherwise, this function is not available)

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4.5 Termination of the operation

CAUTION

- Before disconnecting the endoscope, ensure that the imaging processors is turned OFF. Otherwise, the sensor inside of the imaging processors may be damaged.

- 1 Press the power switch on the front panel to turn the imaging processors OFF.
- 2 Turn OFF other ancillary equipment.

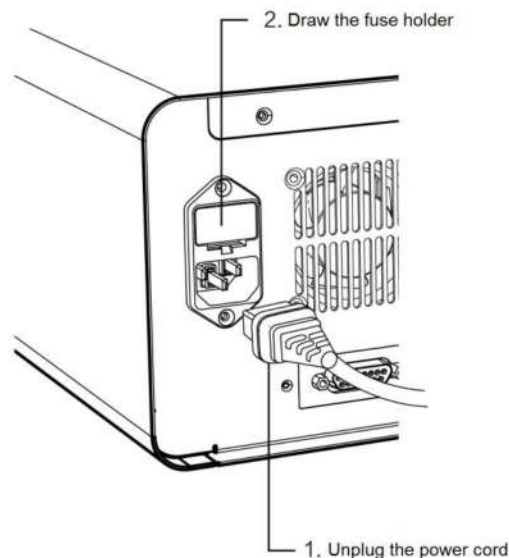
4.6 Fuse replacement

If the equipment fails to function normally when the power switch is ON, the fuse may be damaged and need to be replaced.

WARNING

- Confirm that the power cord is unplugged from the power inlet before fuse replacement to prevent electric shock.
- Never install a fuse that has not been approved by AOHUA or not fulfill the required specifications. Damage to the imaging processors, malfunction, electric shock or a fire may result.

- 1 Confirm that the power switch is turned OFF the power cord is unplugged from the wall mains outlet and the power inlet.
- 2 Press the cover on the fuse socket and draw the fuse holder out as shown in Figure 4.6.



(Figure 4.6)

04 Operation

- 3 If the fuse has been melted, replace it with a new one.
- 4 Connect the power cord and turn ON the power switch, if the fuse is damaged again, turn OFF the power switch, disconnect power cord, and contact AOHUA.

4.7 Maintenance, storage and disposal of the imaging processors

4.7.1. Maintenance

WARNING

- Prior to cleaning, pull out the power supply cord and make it sure.
- Ensure the power supply plug is dry to prevent electric shock accident from happening.
- Do not wipe the power inlet or other terminals, damage to the imaging processors like distortion or corrosion may result.
- This equipment should be stored away from the direct sunlight, X-ray, radioactive ray or strong electromagnetic radiation. Otherwise, damage to the imaging processors may result.

CAUTION

- If any spare parts or electronic components of the AQ-100 type medical endoscope imaging processors are broken, please be sure to use the spare parts or electronic components provided by AOHUA. AOHUA is not responsible for any damages caused by using spare parts or electronic components from the other companies.

AOHUA recommends that user and purchase unit conduct the maintenance activities to the imaging processors by following the methods below daily.

- 1 Turn the imaging processors OFF and disconnect the power cord from the wall mains outlet.
- 2 Only use dry gauze to wipe the power switch, otherwise the switch may be damaged and electric shock may result.
- 3 Use soft gauze moistened with diluted detergent to wipe the external of the equipment. When wiping the rear panel, do not wet the power inlet and the USB ports. When wiping the front panel, do not wet the USB port. Otherwise, damp circuit of the imaging may lead to electric shock and short circuit.
- 4 If the equipment is soiled with any liquid, wipe off all debris timely and dry it completely, especially the electric circuit connection terminals.

04 Operation

4.7.2. Storage and disposal

CAUTION

- Before storage, turn OFF the power switch, and disconnect the power cord from the imaging processors.
- The imaging processors should be stored in the cool and dry room with relative humidity no more than 95% and good ventilation and without corrosive gas, flammable and explosive gas, liquid contamination, or chemicals.

The storage environment shall fulfill the following requirements.

- 1 Ambient temperature : -40°C - +55°C
- 2 Relative humidity : 10% - 95%
- 3 Atmospheric pressure : 500hPa - 1060hPa

Comply with relevant waste disposition regulations to dispose the endoscope imaging processors and its internal components needed to be discarded.

CAUTION

- The three-pin plug and socket are necessary for the power supply of the suction pump and high frequency power supply device cooperatively used with endoscope imaging processors, and the power supply must have ground lead, any accidents, for instance electric shocks and burnings etc., resulted from not complying with the usage standard will be responsible by the users themselves.
- When using video endoscopes and endoscope imaging processors, it is recommended to connect with a voltage regulator of power over 1000W. The household power regulator is prohibited to use for video endoscopes and imaging processors.
- If the imaging processors has abnormal situations, please instantly stop using it, shut OFF the grid power supply and contact AOHUA.
- When this product and its internal components are scrapped, please handle them as per the relative national regulations of waste disposal.

05 Troubleshooting

5.1 Troubleshooting

WARNING

- If any irregularity is observed or suspected, stop using the endoscope imaging processors. Consult AOHUA. Otherwise, damages to the operator and/or the patient may result.

NOTE

- If an accessory of the endoscope imaging processors needs to be replaced, contact AOHUA to purchase a replacement.

If any of the following irregularities is observed, do not use the imaging processors and solve the problem as described in the following table.

If the problem is not included in this section or cannot be resolved by the provided countermeasures, contact AOHUA.

| Irregularity description | Cause Analysis | Solution | Remarks |
|--|--|--|---|
| No power supply available for the medical endoscope imaging processors | Undesirable contact with power inlet. | Ensure the firm connection between the power cord and the power supply socket. | N/A |
| | Mains power supply outage. | Inspect the mains power supply. | N/A |
| | Fuse has been melted. | Replace with a new fuse. | Ensure the power supply has been cut OFF. |
| Failure in image display on the monitor | No connection between the imaging processors and the monitor through video output cable. | Connect the monitor and the imaging processors through the video output cable. | N/A |
| The endoscopic image is too dim or too bright. | Inappropriate IRIS mode setup. | Select appropriate IRIS mode. | N/A |
| | Malfunctions of the light sources. | Contact the distributor or AOHUA. | N/A |
| Achromatic endoscopic image or abnormal image color | White balance adjustment has not been implemented. | Conduct white balance adjustment. | N/A |
| | Inappropriate color setup. | Reset the color. | N/A |
| | Inappropriate chromaticity settings of the monitor. | Set appropriate chromaticity of the monitor. | N/A |

05 Troubleshooting

| Irregularity description | Cause Analysis | Solution | Remarks |
|---|--|--|---------|
| Still Endoscopic image | The frozen image is not released. | Press the freeze button again, resume real-time image. | N/A |
| Jitter, drift and interference ripples on image | Inappropriate monitor signal system is chosen. | Set the correct signal system. | N/A |
| | Interference sources presents nearby. | Relocate the working space away from the interference sources. | N/A |

5.2 Returning the imaging processors for repair

CAUTION

- AOHUA is not responsible for any injuries to the human or damages to the imaging processors resulted from repair activities attempted by non-AOHUA personnel.
- If any spare part or electronic component of the AQ-100 imaging processors is damaged, only use the spare parts or electronic components provided by AOHUA. AOHUA is not responsible for any damages caused by using unapproved spare parts or electronic components.
- Take a backup of the picture information inside this product, patient data, and user setting before returning to repair. These pieces of information are eliminated in the case of repair. Moreover, remove a portable memory.

When returning the imaging processors for repair, send the imaging processors with a description of the malfunction or damage and the name and telephone number of the individual at your site who is the most familiar with the problem. Also, include the warranty card.

06 Other Information

6.1 Manufacture date and service life

- 1 Manufacture date: refer to the product nameplate.
- 2 Service life: 5 years

CAUTION

- Before operation, inspect this instrument daily to ensure all technical requirements are fulfilled. If any nonconformity or damage is observed, contact AOHUA.

NOTE

- The warranty period of the imaging processors is 1 year. After replacement, fuse and other consumables can function normally.

Appendix

The EMC information and the warranty card of product are provided in this appendix.

Appendix I - EMC Information

EMI Compliance Table

● Table 1 - Emission

| Phenomenon | Compliance | Electromagnetic environment |
|----------------------------------|------------------------------|--|
| RF(Radio frequency) emissions | CISPR 11 Group 1, Class A | Professional healthcare facility environment |
| Harmonic distortion | IEC 61000-3-2 Class A | Professional healthcare facility environment |
| Voltage fluctuations and flicker | IEC 61000-3-3 Compliance | Professional healthcare facility environment |

NOTE

- The emission characteristics of this equipment make it suitable for using in industrial environment and hospitals (CISPR 11 class A). If it is used in a residential environment (which CISPR 11 class B is normally required), this equipment may not perform adequate protection to radio-frequency communication services. The user may need to take mitigation measures, such as relocating or re-orienting the equipment.

EMS Compliance Table

NOTE

- Electromagnetic propagation is affected by absorption and reflection from structures, objects and people. An electromagnetic site survey should be considered to assess the electromagnetic environment. If the measured field strength in the location in which this model is used exceeds the applicable RF compliance level above, this model should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating this model.
- Electromagnetic interference may occur in the vicinity of high-frequency electrosurgical equipment and/or other equipment marked with the following symbol:



Appendix I - EMC Information

● Table 2 - Enclosure Port

| Phenomenon | Basic EMC standard | Immunity test levels |
|--|--------------------|--|
| | | Professional healthcare facility environment |
| Electrostatic Discharge | IEC 61000-4-2 | ±8 kV contact ±2kV, ±4kV, ±8kV, ±15kV air |
| Radiated RF EM field | IEC 61000-4-3 | 3V/m 80MHz-2.7GHz 80% AM at 1kHz |
| Proximity fields from RF wireless communications equipment | IEC 61000-4-3 | Refer to table 3 |
| Rated power frequency magnetic fields | IEC 61000-4-8 | 30A/m 50Hz or 60Hz |

● Table 3 - Proximity fields from RF wireless communications equipment

| Test frequency (MHz) | Band (MHz) | Immunity test levels |
|----------------------|------------|--|
| | | Professional healthcare facility environment |
| 385 | 380-390 | Pulse modulation 18Hz, 27V/m |
| 450 | 430-470 | FM, ±5kHz deviation, 1kHz sine, 28V/m |
| 710 | 704-787 | Pulse modulation 217Hz, 9V/m |
| 745 | | |
| 780 | | |
| 810 | 800-960 | Pulse modulation 18Hz, 28V/m |
| 870 | | |
| 930 | | |
| 1720 | 1700-1990 | Pulse modulation 217Hz, 28V/m |
| 1845 | | |
| 1970 | | |
| 2450 | 2400-2570 | Pulse modulation 217Hz, 28V/m |
| 5240 | 5100-5800 | Pulse modulation 217Hz, 9V/m |
| 5500 | | |
| 5785 | | |

Appendix I - EMC Information

● Table 4 – Input a.c. power Port

| Phenomenon | Basic EMC standard | Immunity test levels |
|---|--------------------|--|
| | | Professional healthcare facility environment |
| Electrical fast transients/burst | IEC 61000-4-4 | ±2 kV 100kHz repetition frequency |
| Surges Line-to-line | IEC 61000-4-5 | ±0.5 kV, ±1 kV |
| Surges Line-to-ground | IEC 61000-4-5 | ±0.5 kV, ±1 kV, ±2 kV |
| Conducted disturbances induced by RF fields | IEC 61000-4-6 | 3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz |
| Voltage dips | IEC 61000-4-11 | 0% U _T ; 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° |
| | | 0% U _T ; 1 cycle and 70% U _T ; 25/30 cycles Single phase: at 0° |
| Voltage interruptions | IEC 61000-4-11 | 0% U _T ; 250/300 cycles |

● Table 5 – Signal input/output parts Port

| Phenomenon | Basic EMC standard | Immunity test levels |
|---|--------------------|---|
| | | Professional healthcare facility environment |
| Electrical fast transients/burst | IEC 61000-4-4 | ±1 kV 100kHz repetition frequency |
| Conducted disturbances induced by RF fields | IEC 61000-4-6 | 3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz |

● Table 6 – Patient Coupling Port

| Phenomenon | Basic EMC standard | Immunity test levels |
|---|--------------------|---|
| | | Professional healthcare facility environment |
| Electrostatic Discharge | IEC 61000-4-2 | ±8 kV contact ±2kV, ±4kV, ±8kV, ±15kV air |
| Conducted disturbances induced by RF fields | IEC 61000-4-6 | 3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz |

Appendix I - EMC Information

WARNING

- The installation and operation procedures of this device shall strictly follow the EMC (Electromagnetic Compatibility) information provided by this instruction:
 - The essential performance of AQ-100 is:
 - live endoscopic image can be observed when the image frozen function is not activated;
 - the endoscopic image can be shown with correct orientation when the equipment works together with endoscopes and light sources;
 - When the instructions for this device are strictly followed, the emitted light after connection with the endoscope imaging processors shall be photobiological safe.
 - The use of this device with other non-affirmed electrical equipment is prohibited, in order to avoid causing electromagnetic interference to this device.
 - Use of this equipment adjacent to or stacked with other equipment should be avoided; improper operation may result. If it cannot be avoided, normal use should be observed, verified and ensured.
 - It is prohibited to place and use this device together with equipment which has serious effect on patient' life or treatment, low current measuring or treatment equipment, and life-supporting equipment in a same room.
 - It is prohibited or should be avoided to use this device in the proximity of portable devices and mobile communication devices. It may interfere the normal operation of the AQ-100 device.
 - Use of accessories, transducers and cables which are not affirmed by the manufacturer may cause degradation of electromagnetic immunity due to the increase of electromagnetic emissions.
 - The power cord of the AQ-100 is a 1.5 meters long cable without shield and magnetic rings.

WARNING

- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) away any part of the AQ-100, including cables specified by the manufacturer. Otherwise, degradation of the equipment performance may result.
- The AQ-100 is intended for use in professional healthcare facility environment.

Warranty Card of Product

● **User's Information (fill out it in detail)**

| | | | |
|------------------|--|---------------|--|
| User's Name | | | |
| Specific Address | | Zip Code | |
| Product Name | | Product No. | |
| Purchase Place | | Purchase Date | |
| Invoice No. | | Telephone | |

The warranty card must be sent back to our company within one month after purchase of this product.

Shanghai AOHUA Photoelectricity Endoscope Co., Ltd.

Warranty policy:

Provide the original invoice (or copy) of the product and contact AOHUA. Be sure to send the warranty card of the product within one month after purchasing this product.

Warranty conditions:

Within half year after purchasing, any quality failure of this product is warranted by AOHUA free of charge.

The following cases are not covered by the warranty:

1. Any damage caused by the improper operation or storage of the user.
2. Any damage caused by the unauthorized disassembly of the user.

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