



SPINE®  
CONCEPTS

# ENDOSCOPIC CAMERA SYSTEM

USER MANUAL



# ENDOSCOPIC CAMERA SYSTEM

## USER MANUAL

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## 1. Installation instructions

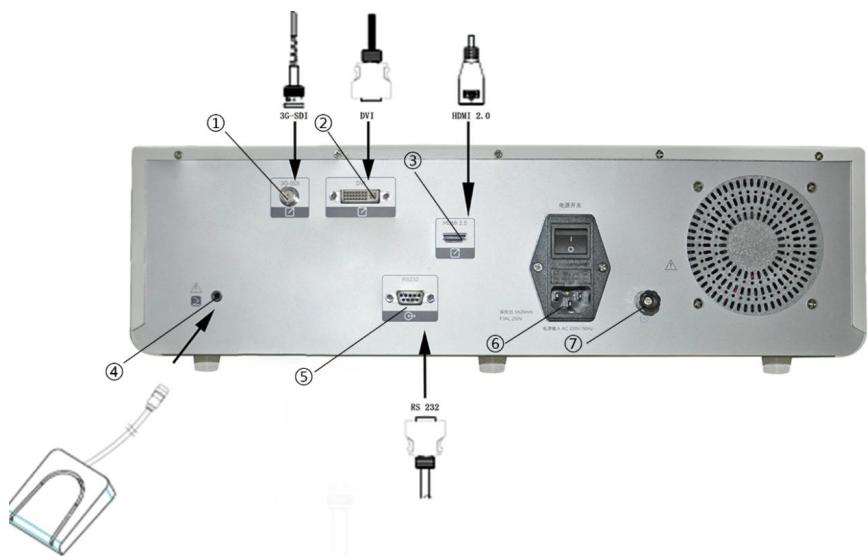
This product is mainly composed of two components, namely the video processor and the camera head. The product supports the processing, display and transmission of 3840×2160 resolution images.

Plasma electrosurgical device shall be used with disposable plasma electrosurgical bipolar electrodes under the condition of normal saline (conductive solution). There are two operation modes available on the device as follows:

### 1.1. Product connection

#### 1.1.1. Back panel connection

First, connect the power cable and equipotential line, and then connect the corresponding cable according to the selected monitor type, that is, insert the cable into the following corresponding output port (3G-SDI / DVI /HDMI 2.0), and switch the monitor to the appropriate display mode.



Introduction to Data Transmission Interface

Serial number	Interface name	Introduction
1	3G-SDI output interface	3G-SDI output interface for HD signal output connection
2	DVI output interface	DVI output interface for HD signal output connection
3	HDMI 2.0 output interface	HDMI 2.0 output interface for 4K signal output connection
4	Foot switch interface	For connecting a foot switch
5	RS-232 interface	Communication control for upper computer
6	Power interface	For connecting the power cable, turning on the power cable
7	Protective earth connection	Used to connect this product with other equipment to form a good equipotential body

### Attention

- Before the formal installation, please check whether the connecting cables and related parts are the supporting components of the machine to avoid the subsequent connection of cables from other manufacturers;
- Before formal installation, please check whether the connecting cable and relevant parts are aging and worn. If there is aging, please stop using;
- After the equipment is connected and started, if the display does not plot, it may be that the cable wiring is not firm, or the display does not switch to the appropriate display mode;

### Installation instructions

This product is mainly composed of two components, namely the video processor and the camera head. The product supports the processing, display and transmission of 3840×2160 resolution images.

Plasma electrosurgical device shall be used with disposable plasma electrosurgical bipolar electrodes under the condition of normal saline (conductive solution). There are two operation modes available on the device as follows:

#### 1.1.2. Camera handle connection

The camera is mainly used to collect and transmit images in the field of view. The schematic diagram of the camera handle of this product is as follows:

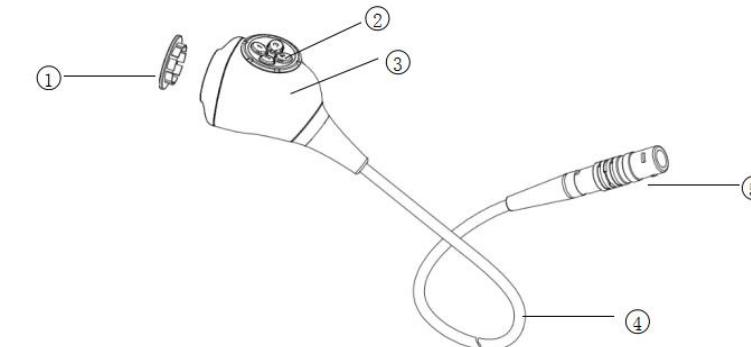
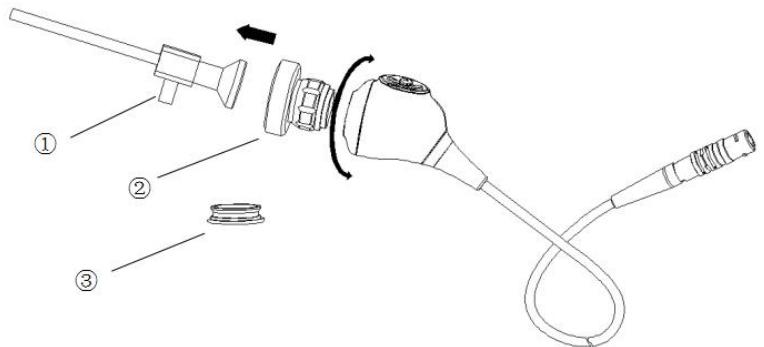


Figure 1-2  
Schematic diagram of camera handle

### Description

1 lens protection cover/dust cover; 2 Camera button; 3 Camera; 4 Cable; 5 Handle connector;

CAMERA interface, insert it straight into the camera handle connector, and then take the optical adapter and endoscope (select the appropriate lens type according to the scene). Refer to the following figure for installation:



**Figure 1-3**  
Installation diagram of camera handle

#### Description

- 1 Endoscope;
- 2 Optical adapter (or lens);
- 3 Lens protective cover/dust cover;



**Figure 1-4**  
Installation diagram of connector waterproof cap

#### Attention

1. Before formal connection, please check the handle cable for aging and damage, and stop using it immediately if any;
2. The thread bayonet of the optical adapter should be aligned with the optical bayonet of the handle, and then rotated clockwise to tighten it. In case of dislocation, it will not be able to correctly rotate;
3. When the camera handle is not used, please take off the endoscope and optical adapter in time and place them properly. At the same time, cover the camera with a lens protection cover and screw on a waterproof cap at the connector.

##### 1.1.3. Optical fiber connection

Connect one end of the light guide fiber to the corresponding “” jack and firmly, and screw the other end to the optical adapter (or lens).

## 1.2. Product connection

After the above connection is completed, touch the power switch on the front panel of the main unit, and the system starts to start. At this time, please set the white balance first. This can be done by:

- 1.3. (1) Aim the lens at the white object (but do not touch the object), and click the “AWB” button on the front panel;
- 1.4. (2) Click the “MENU” button on the front panel, enter the OSD interface - shortcut menu page, select the “White Balance” item, point the lens at the white object (but do not touch the object), switch to AWB mode, at this time The system realizes the white balance state;
- 1.5. (3) Aim the lens at the white object (but do not touch the object), click the handle button 1, the system realizes automatic white balance;

#### Attention

Before the formal observation, it is recommended that the user adjust the hue and saturation to the appropriate one in advance for normal observation;

## 1.3 Operating instructions of camera handle

- 1.3. The camera handle of this model contains four keys, which are marked with “1, 2, 3, and 4” respectively. The default configuration functions of the system are:
- 1.4. Key 1: AWB; Key 2: video recording; key 3: zoom out; Key 4: Zoom in;
- 1.5. The handle buttons support configuration of various functions (see the table below for details). Users can set them according to their usage habits and scene needs. Open the 3-common settings page of the OSD interface to complete the settings. After setting, press the “OK” button to confirm the operation.

**Table 4-2**

Description of button function configuration

No.	Configuration function item	Illustrate
1	AWB	One-click automatic white balance
2	Video	Click to start recording/stop recording
3	Zoom out	Adjustment range: X0.5-X1.0 times, the value will cycle after reaching the threshold
4	Enlarge	Adjustment range: X1.0-X5.0 times, the value will cycle after reaching the threshold
5	Snapshot	Capture with a single click
6	Light source brightness+	Realize the brightness adjustment of the light source, the adjustment range: 25%-100%
7	Light source brightness-	Realize the brightness adjustment of the light source, the adjustment range: 25%-100%
8	Freeze	Screen freeze function, a single click to freeze the screen, and a second click to cancel the freeze
9	Tone	Enables fast cycling between Standard, Hue 1, Hue 2, Hue 3 and Hue 4 modes
10	Noise reduction	
11	Dark area improvement	Enables fast cycling between low, high and off modes
12	Flip	Cyclic switching between horizontal flip, vertical flip, mirror and off modes
13	Gain	The adjustment range is OFF, +10, after reaching the threshold, the value will cycle
14	Sharpness	The adjustment range is l+10, and the value will cycle after reaching the threshold
15	Saturation	The adjustment range is l+10, and the value will cycle after reaching the threshold
16	Contrast	The adjustment range is l+10, and the value will cycle after reaching the threshold
17	Anti-moire	Fast cycling between mode 1, mode 2, mode 3 and off mode
18	Highlight suppression	Enables fast cycling between low, mid, high and off modes

**Attention**

1. The function configuration items on the buttons cannot be set repeatedly. For example, if AWB is configured for button 1 , buttons 2 , 3 and 4 will no longer be allowed to configure the AWB function;
2. The prerequisites for the button to support the configuration of the “light source brightness +/- “ function: in the operation scenario, the camera system host is connected to the company's supporting light source equipment; otherwise, the function cannot take effect after the button is configured;

**1.4. Product connection**

This product completes the parameter setting on the OSD menu by operating the keys distributed on the front panel of the host, thus realizing the system function. The schematic diagram of the front panel is as follows:

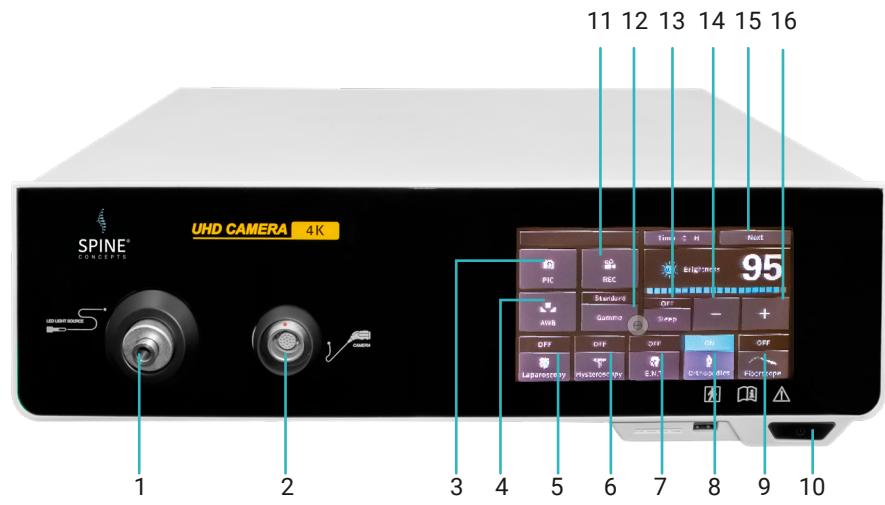


Figure 1-5

Schematic diagram of front panel of Intra-view 4K

Table 1-3

Description of buttons and interfaces on the front panel of Intra-view 4K

Serial number	Introduction
1	Light source output
2	4K camera input
3	White balance button (AWB), after which the system automatically adjusts the balance
4	Image taking (USB 3.0)
5	Laparoscopic mode
6	Hysteroscope mode
7	Otolaryngoscope mode
8	USB interface
9	Orthopaedic mode
10	Fiberscope mode
11	Power switch to control the startup and shutdown of the CCU
12	Recording button (REC)
13	Gamma
14	Light source sleep (minimum brightness)/return to normal
15	Light source brightness decreases
16	Parameter setting interface
17	Light source brightness increases

#### Attention

1) Light source sleep Set the light source to the lowest brightness state, and press to restore the original brightness value again to end sleep;

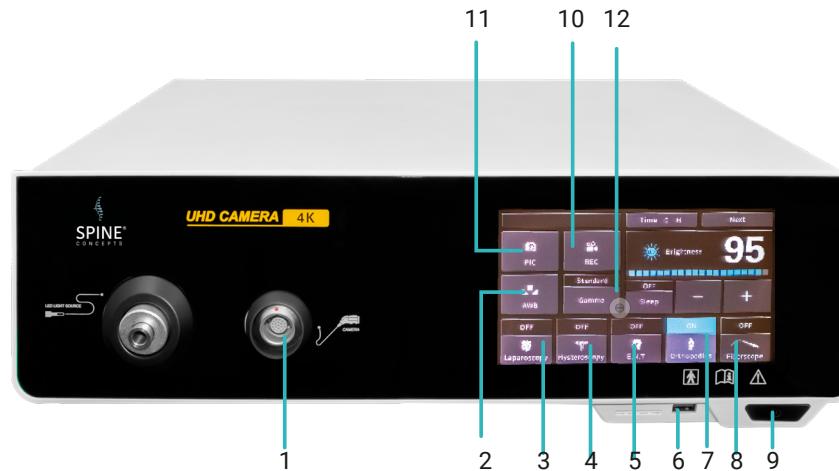


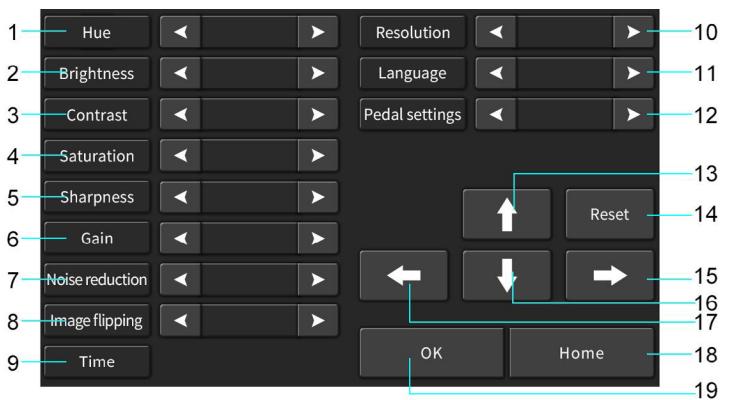
Figure 1-6

Schematic diagram of front panel of Intra-view 4K

Table 1-4

Description of Intra-view 4K host front panel and interfaces

Serial number	Introduction
1	4K camera input
2	White balance button (AWB), after which the system automatically adjusts the balance
3	Laparoscopic mode
4	Hysteroscope mode
5	Otolaryngoscope mode
6	USB video interface
7	Orthopaedic model
8	Fiberscope mode
9	Power switch to control the startup and shutdown
10	Recording button (REC)
11	Image taking (USB 3.0)
12	GAMMA



**Figure 1-7**  
Schematic diagram of parameter setting interface

**Table 1-5**  
Description of host parameter setting interface

Instructions	
1	Hue
2	Brightness
3	Contrast
4	Saturation
5	Sharpness
6	Gain
7	Noise Reduction
8	Image Flipping
9	Time
10	Resolution
11	Language
12	Pedal Settings
13	UP
14	Reset
15	Right
16	Down
17	Left
18	Home
19	OK

### 1.5. OSD menu parameter setting

After the above connection is completed, touch the power switch on the front panel, and the system starts to start. Click the “MENU” button on the front panel to enter the OSD interface - shortcut menu page. “Left”, “Right” and “OK” keys to set the mode or value (after reaching the threshold, each mode/value starts to cycle); During operation, the OSD interface has a prompt function, and the prompt information appears in “status bar position 1” (left side) and “status bar position 2” (right side): the user can proceed to the next step according to the prompt; (1) “Status bar position 1”: When setting the function sub in “Quick Menu”, “1- Basic Image” function, “2-Advanced Image”function, “3-CommonSettings”, “4-OtherSettings” item, and after the operation is executed, the operation precautions will be prompted here, and the setting status of the current function will be prompted; For example: 1. When setting “Key 1 Configuration”, it will prompt: Please press OK to confirm the setting! 2. Immediately after setting “Digital Noise Reduction”, it will prompt: Digital Noise Reduction is in progress (2) “Status bar position 2”: When the “Advanced Image” function sub-item setting is executed, the current setting status will be prompted here, for example: Gamma setting is transparent

### Notice

1. The OSD menu interface is still (no operation occurs) for 30 seconds, and the interface disappears automatically;
2. After the interface disappears, the prompt content of “Status bar position 1” will remain for 5 seconds and then disappear;
3. Before the official use, please enter the 4-Other page of the OSD interface (check the operation method of the “Settings” item in the shortcut menu), and configure the date and time items as the current date and time; otherwise, when performing the recording or snapshot function, The date marked in the saved videos and pictures is not the real date of the operation;

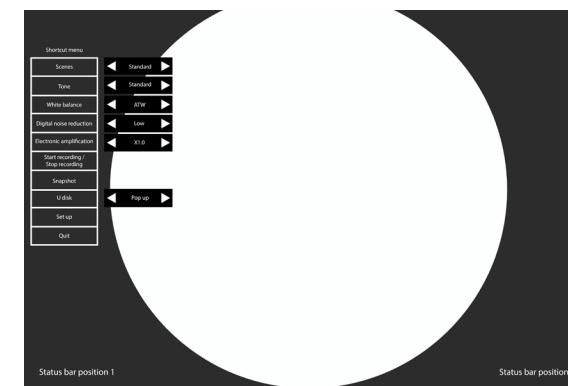
During the operation, when the user sets the function sub-items in the menu, after the OSD menu disappears automatically, the system automatically saves the current setting content; when the device restarts, the parameters in the OSD menu are displayed after the user's setting. (premise: the user did not restore the factory settings before restarting the device).

### Notice

1. The color bar item is set by the user, and the default value is restored after the system restarts;
2. The parameters of white balance, hue, color bar, resolution and frame rate set by the user remain unchanged after scene switching;

#### 1.5.1. OSD interface - shortcut menu

Press and hold the "Confirm" button on the touch screen parameter setting interface on the host panel for 2 seconds to hear the continuous prompt tone of the buzzer. The OSD menu page will first appear on the display interface to set the functional parameters in this menu. The OSD interface - shortcut menu is as follows:



**Figure 1-6**  
OSD interface - shortcut menu

When opening the OSD interface - shortcut menu, the cursor stays on the "Scene" function sub-item by default, and the "Down" or "Up" button in the operation panel can select other function sub-items;

When moving to the function sub-item to be set, a sub-menu bar will appear on the right side, displaying the content of the system default settings; you can touch the "left" and "right" buttons to set the mode or value of the function sub-item (After reaching the threshold, the set mode/value starts to cycle):

(1) Scene: There are five scenes to choose from. After the scene is selected, you need to press the "OK" button to confirm the configuration parameters of the user-defined scene mode;

#### Notice

1. The "users" of user 1, user 2, etc. here can be extended to the meaning of departments, that is, representing ENT department, rectal examination department, etc.;
2. After confirmation, the status bar position 1 will prompt: scene switching is complete; 3. After the user scene is switched, it will not affect the parameter settings of other scenes;

(2) Hue: It is used to adjust the tone of the image (that is, the brightness of the three primary colors of red, green, and blue). There are five modes: Standard, Hue 1, Hue 2, Hue 3, and Hue 4. Choose the appropriate mode according to the needs of the scene, the system default mode is standard mode;

(3) White balance: It is used to adjust the color temperature of the color balance point of the image. There are two modes: AWB and ATW. The system default mode is ATW mode;

#### Notice

1. Please place the white object near the endoscope lens, and then perform the AWB function;
2. The user use is set to AWB mode, and after restarting the program system, the default is AWB mode;

(4) Digital noise reduction: It is used to eliminate noise and shadows in dynamic images and make the image display softer and more delicate. There are four adjustment modes: off, low, medium and high. The system defaults to low-level noise reduction;

(5) Electronic magnification: used for image magnification adjustment, the adjustment range is X1.0~X5.0, and it is incremented by 0.1 size. The adjustment range is X0.5~X1.0, decreasing by 0.1, and the system defaults to X1.0;

#### Notice

After executing the electronic zoom-in or zoom-out function, a prompt message will also appear at position 2 of the status bar, such as "electronic zoom X1.1";

(6) Start recording/stop recording: Use the recording and stop recording functions. Before executing this function, the system will display "Start recording" by default. Select "Start recording" and click the "OK" button on the panel to confirm. After confirmation, it will enter "Recording" status, at this time the content of the sub-item is automatically updated to "Stop recording", select "Stop recording" and click the "OK" button, the function will take effect;

#### Notice

1. The system enters the "recording" state, the status bar position 1 prompts: "During recording, please do not plug in or unplug the U disk!", and the status bar position 2 prompts: "recording";
2. When the recording stops, the status bar position 1 prompts: "The video is being saved, please do not plug in or unplug the U disk!"; at the same time, the status bar position 2 prompts "recording" content disappears;
3. Wait for 10 seconds, after the storage is completed, the status bar position 1 prompts: "The video has been saved, and the U disk can be ejected!";

#### Warning

1. Do not insert or unplug the U disk during the recording process! If the operator does not follow the prompt information, the video file will be damaged or lost!
2. When the status bar position 1 prompts "The video has been saved, the U disk can be ejected!", the user can choose to eject the U disk in the "U disk" item, and then pull out the U disk.

(7) Snapshot: means to capture the current screen, select the "Snapshot" item and click the "OK" button on the panel, the snapshot function will take effect;

#### Notice

After the snapshot function is executed, the status bar position 1 prompts: "The picture has been saved!"

(8) U Disk: It is used to execute the "Eject" and "Format" commands to the U disk, select "Eject" and click the "OK" button to take effect, select "Format" and click the "OK" button to take effect;

#### Notice

1. After the device recognizes the U disk, the status bar position 2 will prompt the remaining memory capacity of the U disk, for example: "Remaining space XX GB";
2. After executing the "eject" function, wait for 1 second, the status bar position 1 prompts: "The U disk has been ejected!"; at this time, the U disk can be pulled out;
3. During video recording/recording saving, the U disk is not allowed to be ejected, even if the "eject" function is operated, the function is not allowed to take effect;

(9) Settings: It is used to enter the next page of the OSD interface, but it needs to be combined with other keys to take effect. The specific operation sequence: select the "Settings" sub-item - click the "OK" button - click "Left" key to enter the "1-Basic Image" interface;

**Notice**

1. When the "Settings" sub-item is selected; the status bar position 1 prompts: "Please press the key combination to enter the settings, then operate in sequence:
2. After the operator clicks the "OK" button and stays for more than 2 seconds, and then clicks the "Left" button again, the system cannot enter the next page;
3. You must follow the above combination sequence, otherwise you will not be able to enter the next page;

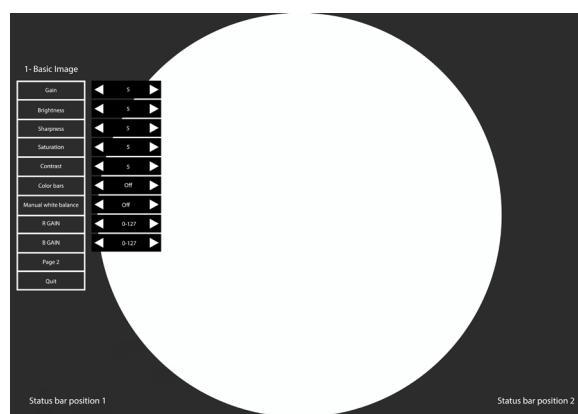
(10) Exit: Use the function of exiting the OSD interface, select it and click the "OK" button on the panel to take effect;

**Notice**

The OSD menu interface is still (no operation occurs) for 30 seconds, and the system will automatically exit the interface page;

#### 1.5.2. OSD interface 1 - basic image

After operating the above key combination, the system will jump to the OSD interface 1 - Basic image page. At this time, the following function items can be set. The specific parameter setting method is synchronized with step 1:



**Figure 1-7**  
OSD interface 1 - Basic image

(1) Gain: used to adjust the maximum allowable image gain, the adjustment range is 1~10 and off, the larger the value, the higher the upper limit of the image gain, the system defaults to 5;

(2) Brightness: used to adjust the desired brightness of the image, the adjustment range is 1~10, the larger the value, the greater the expected brightness, the default setting value is 5;

**Notice**

1. When the brightness of the image is dark, it is recommended that the user adjust the brightness : of the light source upward; when the light source is not adjustable or is at the maximum value, the image is still dark, and it is recommended to adjust the brightness of the image upward; if the adjustment effect of the first two methods is not obvious, it is recommended to Finally adjust the gain upwards;
2. When the brightness of the image is bright, it is recommended that the user adjust the brightness of the light source downward; when the light source is not adjustable or is at the minimum value, the image is still bright, and it is recommended to adjust the brightness of the image downward;

(3) Sharpness: used to adjust the sharpness of the edge of the image, the adjustment range is 1~10, the larger the value, the stronger the sharpness effect, the default value of the system is 5;

(4) Saturation: used to adjust the density of the image color, the adjustment range is 1~10, the larger the value, the stronger the saturation effect, the default value of the system is 5;

(5) Contrast: used to adjust the contrast of the image, that is, the brightness level between the brightest white and the darkest black in the light and dark areas of the image), the adjustment range is 1~10, the larger the value, the stronger the contrast effect, the system default setting The value is 5;

(6) Color bar: used to test the transmission quality of the video channel, there are two options of "on" and "off", the default setting of the system is off;

**Notice**

It is only used during maintenance and debugging by after-sales engineers, and users should not : open it easily;

(7) Manual white balance: that is, the manual white balance mode, there are two modes: off and on, the default mode is off; when manual white balance is turned on, you can adjust the "R GAIN" and "B GAIN" in the next function sub-item , set the R and B parameters;

(8) R GAIN: When the manual white balance is turned on, the R parameter can be set, and the adjustment range is 0~127. The larger the value, the redder the image color;

(9) B GAIN: When the manual white balance is turned on, the B parameter can be set, and the adjustment range is 0~127. The larger the value, the bluer the image color;

**Notice**

1. When manual white balance is enabled, the system will set the R value to 52 by default and the B value to 70 by default;
2. After the device restarts, the manual white balance R and B parameters will be lost, and the system will automatically switch back to ATW automatic white balance mode;

Select "Page 2" and press the "OK" key, the system will jump to the OSD interface 2-Advanced Image page; select "Exit" and press the "OK" key to exit the OSD interface.

### 1.5.3. OSD interface 2 - Advanced image

Enter the OSD interface 2-Advanced image, you can set the relevant advanced image parameters, the interface is presented as follows, the user can set the mode of the function sub-item according to the needs:

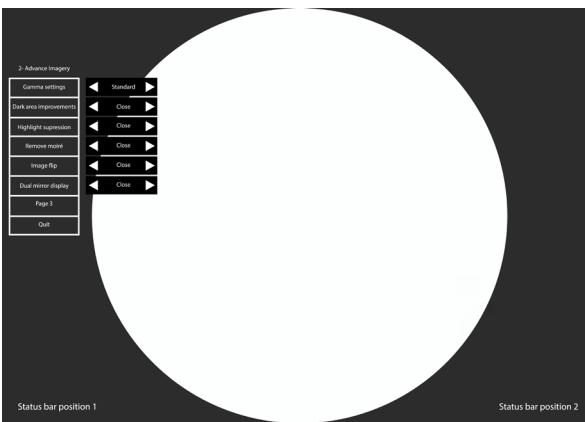


Figure 1-8

OSD interface 2 - Advanced image OSD Interface 2 - Advanced Image

(1) Gamma setting: It is used to perform gamma correction on the image, that is, perform nonlinear mapping on the image to improve the brightness of the image. There are three adjustment modes: transparency, standard, and soft. The system defaults to the standard mode;

(2) Dark area improvement: It is used to adjust the brightness of the dark area of the image. There are three adjustment modes: off, low and high. The default setting of the system is off;

(3) Highlight suppression: It is used to adjust the reflection phenomenon caused by the brighter scene in use, and suppress the partial overexposed image. There are four adjustment modes: off, low, medium and high. The default setting of the system is off. It is mutually exclusive with the “Dark Area Improvement” function, and only one of the functions can be turned on, that is, when the Dark Area Improvement function is turned on, the highlight suppression function.

### Notice

The moiré removal function is applicable to the fiberscope scene mode;

(5) Image flip: used to flip the image, there are four modes: off, horizontal flip, vertical flip and mirror, the system default setting is off;

### 1.5.4. OSD Interface 3 - Common Settings

Enter the OSD interface 3-Common settings page, you can set relevant parameters, the interface is as follows, the user can set according to the needs, press the “OK” button to confirm, the settings will take effect:

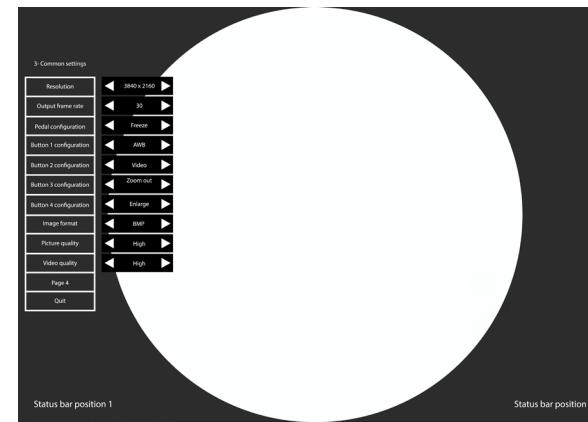


Figure 1-14

OSD interface 3-Common settings

(1) Resolution: Only the output resolution of HDMI is configured here, and the resolution of other image interfaces does not change; there are two resolutions: 3840×2160 and 1920×1080, and the system default setting is 3840×2160;

### Notice

- When the resolution is configured as 3840×2160, please use the HDMI2.0 video output interface! Also, make sure your display and cables support the HDMI 2.0 specification!
- This series of products is not recommended to be set to 1920×1080;

(2) Output frame rate: Support four output frame rates, namely 60Hz, 50Hz, 30Hz and 25Hz, the default setting is 30 Hz, users can choose the appropriate output frame rate according to the needs of the scene;

### Notice

When the output frame rate is configured as 60Hz or 50Hz, when the user performs the capture or video recording function and operates the electronic zoom, the saved picture will not include the electronic zoom content and the content of the OSD menu;

(3) Foot configuration: Supports the connection of a foot switch device. The foot device can be configured with a shortcut function. The default setting is freeze. The configuration functions for selection are as follows:

No.	Configuration function item	Illustrate
1	AWB	One-click automatic white balance
2	Video	Click to start recording/stop recording
3	Zoom out	Adjustment range: X0.5-X1.0 times, the value will cycle after reaching the threshold
4	Enlarge	Adjustment range: X1.0-X5.0 times, the value will cycle after reaching the threshold
5	Snapshot	Capture with a single click
6	Light source brightness+	Realize the brightness adjustment of the light source, the adjustment range: 5%-100%
7	Light source brightness-	Realize the brightness adjustment of the light source, the adjustment range: 5%-100%
8	Freeze	Screen freeze function, a single click to freeze the screen, and a second click to cancel the freeze
9	Tone	Enables fast cycling between Standard, Hue 1, Hue 2, Hue 3 and Hue 4 modes
10	Noise reduction	Enables fast cycling between low, medium, high and off noise reduction modes
11	Dark area improvement	Enables fast cycling between low, high and off modes
12	Flip	Cyclic switching between horizontal flip, vertical flip, mirror and off modes
13	Gain	The adjustment range is OFF, 1-10, after reaching the threshold, the value will cycle
14	Sharpness	The adjustment range is 1-10, and the value will cycle after reaching the threshold
15	Saturation	The adjustment range is 1-10, and the value will cycle after reaching the threshold
16	Contrast	The adjustment range is 1-10, and the value will cycle after reaching the threshold
17	Go moiré	Fast cycling between mode 1, mode 2, mode 3 and off mode
18	Highlight suppression	Enables fast cycling between low, mid, high and off modes

#### Notice

- If the user needs to connect the foot switch for use, please purchase the foot switch by yourself. It is recommended to choose a foot switch with a waterproof rating of IPX7 or higher;
- After the freeze function is executed, if the user operates the electronic zoom function under the current screen freeze, the image preview will not take effect. Therefore, it is recommended that the user operate this function before freezing;

#### 1.3. Camera Head Operation Instructions

- (1) Button configuration: The handle provided with the product has 4 buttons, which can be configured with shortcut functions respectively
- (2) Image format: JPEG and BMP image formats are available. The default setting is BMP format. You can select the appropriate image format as needed;
- (3) Image quality: There are four image quality modes: low, medium, high, and best. The default setting is high. You can select the appropriate image quality to render according to the needs of the scene;
- (4) Video quality: There are four video quality modes: low, medium, high and best. The default setting is high mode. You can select the appropriate video quality presentation according to the size of the storage medium and the clear demand for video quality; Select “Page 4” and press “OK”, and the system will jump to the OSD interface 4 - other pages; Select “Exit” and press “OK” to exit the OSD interface.

#### 1.5.5. OSD interface 4 - others

Enter the OSD interface 4 - Other pages to set the date and time. The interface appears as follows. After setting, press the “OK” key to confirm and the setting will take effect:

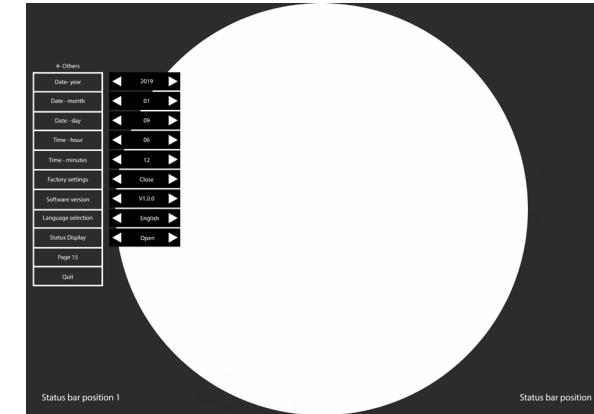


Figure 1-15  
OSD Interface 4 - Others

Time setting: the time can be set. In the “Time hour” (0~23), “Time minute” (0~59) columns, select the number in turn to complete the setting;

#### Notice

The date and time set by default by the system may not match the current date and time of the user (because the device is not connected to the Internet, the latest date cannot be obtained), and the user needs to configure it before use;

- (3) Factory setting: the system can be factory set. The default setting is off. The factory setting can be restored by pressing one button as required;
- (4) Software version: displays the current software version in V1.0.0 format;
- (5) Language selection: the system supports English and Chinese
- (6) Status display: users can choose whether to display the prompt message of “Status bar position 2”; There are two modes: on and off. When “off” is selected, the display box in the lower right corner of the display disappears, and the default setting is on;  
After completing all settings, select “Page 1” and press “OK”, and the system will jump to the OSD interface 1 - Basic image setting page; Select “Exit” and press “OK” to exit the OSD interface.

### 1.6. Equipment shutdown

After use, please turn off the power supply in time, remove the power cable, remove the endoscope at the same time, pull out the connecting cables on the rear panel, and restore the equipment to its original state. Finally, store the equipment in a flat, clean and dry place.

### Notice

After the endoscope is used for a long time, the surface temperature is high, avoid direct contact with the skin to prevent burns;

## 2. Precautions

1. This instrument is only used for this system and cannot be used for other purposes. Otherwise, the damage to the instrument caused by this is not covered by our company's warranty.
2. The instrument should be placed in a clean and ventilated room for use. Before using the product, please reserve a gap of at least 5 cm around the device for ventilation; the device or system should not be used close to or stacked with other devices. If used, it should be observed to verify that it works properly in the configuration it uses.
3. The installation and commissioning of the equipment can only be completed by medical technicians who have undergone formal training and have operational qualifications.
4. During the installation process of the product, please place the machine on a flat surface to avoid product malfunction caused by falling;
5. Please keep the supporting cables of this product properly, strictly follow the instructions during use, make correct connections, and then turn on the power after confirming that the connections are correct. It is strictly forbidden to plug and unplug the supporting cables with power on; Do not twist the cables too much during the operation, and avoid the cables being crushed by heavy objects (medical equipment, instrument carts, operating beds, operators, etc.), otherwise the equipment may function abnormally; do not pull the camera handle cable, Do not rub, squeeze/bend the camera cable connection;
6. Do not hit the product strongly, so as not to cause product malfunction; in the case of power-on, do not move or shake the instrument, and do not connect or disassemble any parts of the instrument.
7. Under abnormal use, please do not intentionally rotate the handle connector, which may cause circuit failure, resulting in the failure of drawing;
8. When the light source is working, do not look directly at the light source to avoid damage to the eyes.
9. After using the device, please turn off the power first, and then remove the supporting cable. Note: After 2 minutes of power failure, remove the optical fiber from the device to avoid burns caused by the high temperature of the light source outlet of the device.
10. Before each use, the endoscope and endoscope accessories must be checked for safety hazards: such as rough surfaces, sharp edges or protrusions.
11. When the surface temperature of the applied part of the instrument exceeds 41°C, stop using it and let it cool before continuing to use it to avoid burns.
12. Do not suddenly move the product from a cold place to a warm place (temperature difference  $\geq 10^{\circ}\text{C}$ ), or do not suddenly increase the indoor temperature, otherwise water vapor may form on the outer surface and inside of the host (ie, condensation). ; If the product is condensed, please turn off the power in time, and wait until the condensation disappears before re-operating the product; if the device is operated in the condensing state, it may cause equipment failure or damage.
13. After the camera handle is used, please remove the mirror and optical adapter in time, and cover the handle protection cover;
14. The surface of the instrument is easy to absorb dust due to static electricity. Please disconnect the power supply first when wiping; wipe with softer absorbent cotton to avoid scratches on the surface.
15. When there is dust on the surface of the camera lens, wipe it with absorbent cotton and alcohol.

16. The instrument should avoid frequent switching, otherwise it will be easily damaged. When the instrument is not in use, the power supply should be turned off, the external power supply should be unplugged, and the cover should be closed. (Generally run once every other month)
17. The instrument is packaged in a carton/wooden box. It should be avoided damp, collided and squeezed during transportation. It can be transported by air, road and rail.
18. For the replacement of instrument accessories such as fuse consumables, only the model provided by this supplier can be used: F3AL 250V.
19. When replacing the lighting LED light source, professionals must be responsible for the replacement. Non-professionals are prohibited from operating. Only the model provided by this supplier can be used: M102, input: DC12V, current  $\leq 6.6\text{A}$ , output power:  $\leq 80\text{VA}$ .
20. When the endoscope equipment fails to function, it is forbidden to open the casing by itself, and the company should be contacted for maintenance; the manufacturer can provide the circuit diagram of the instrument, the list of instrument components, legends, and calibration rules according to the user's requirements to help qualified technicians Repair, information necessary for repairable parts of equipment designated by the manufacturer.
21. The EMC of the 4K medical endoscope camera system requires special precautions, and its installation and use must comply with the requirements of the instructions.
22. Portable and mobile RF communication equipment may affect 4K medical endoscopy camera systems.
23. This product can be interconnected with a rigid endoscope whose eyepiece cover size conforms to YY0068.2 through the objective lens adapter; the signal output interface type can be interconnected with a compatible monitor.
24. In order to achieve the intended surgical purpose, this device may be used together with other medical electrical equipment. In order to avoid potential safety hazards, it is recommended to strictly implement various surgical operation guidelines and master the performance, use and safety of various surgical instruments. Use precautions.
25. If the function of this equipment fails, a plan should be made for the protection of its safety hazards, such as preparing another set of equipment with the same function or implementing another backup operation plan.

### 3. Fault Analysis and Removal

Before confirming the failure, please check the following items. If the current problem cannot be solved after checking the following items, please contact our company's after-sales service center.

Serial Number	Question	Reason	Solution
1	Power does not turn on	The power cable is not properly connected	Securely insert the cable into the socket
		The power cable is not the matching cable of the machine	Find the mating cable and connect it
2	The temperature of the product case rises abnormally	The heat dissipation holes are blocked and the product cannot dissipate heat	Remove coverings and leave at least 5 cm of clearance around the device for ventilation
		The camera surface is covered with cleaning and disinfection residues or biological residues	Re-clean and disinfect the camera surface
3	Image is blurry	Improper image sharpness level setting	If the edge is blurred, you can increase the sharpening level to a comfortable level for human eyes; If the edge is ghosted, you can reduce the sharpening level to a comfortable level for human eyes
		The current image resolution is set to \(1920 \times 1080\)	Set the output resolution to \((3840 \times 2160)\)
		The cables connecting the signals are aged and worn	Replace with new adapter cable
4	The image is disturbed (a lot of noise, many interference fringes)	Noise reduction level is set incorrectly or not turned on	If noise reduction is not turned on, turn on the noise reduction function
		The gain configuration is too high	If the gain is too high, you can turn off the gain and increase the brightness of the light source as much as possible to improve the brightness of the image. If the noise reduction level is too low, adjust to a higher noise reduction level
		Camera sensor aging prematurely / equipment reaching end of life	Replacement with new sensor accessories / replacement with new equipment

Serial Number	Question	Reason	Solution
5	Image cast	Improper white balance setting Improper tint setting Aging and deterioration of camera circuit components	Reset the white balance Reset hue mode Replace the corresponding accessories
6	The display does not display the picture	Interface connection error Display cable does not fit Display does not fit Light source not connected Light source brightness is too low	Find the correct interface location and reconnect Use the included SDI and HDMI cables Replacing a suitable monitor Correctly connect the light guide to the mirror Increase light source brightness
7	Image brightness is low	Gain not turned on The scene is too dark	Turn on manual gain and adjust the gain level to a comfortable level for human eyes (but the noise may increase) Turn on the dark area improvement function, first turn on the low-end dark area improvement, and then enable the high-end dark area improvement when the brightness is not enough
8	Image brightness is too high	Improper setting of dark area improvement mode Improper brightness level setting	Adjust to the appropriate dark area improvement mode Adjust to brightness level the appropriate
9	Abnormal saturation	Incorrect saturation level setting	Adjust saturation to appropriate level
10	Low image transparency	Improper image contrast level setting Improper image gamma setting	Adjust the contrast to the appropriate level Adjust the gamma settings to get the right image transparency effect

Serial Number	Question	Reason	Solution
11	Image smears	Brightness is too low Improper noise reduction level setting The sharpening level is set too high	Increase image brightness Adjust the noise reduction intensity to the appropriate mode Decrease sharpening strength
12	Snapshot image is blurry	Improper capture quality settings	Settings mode for adjusting picture quality
13	Video recording is blurry	Improper video quality settings	Settings mode for adjusting video quality
14	Image field of view is too small	Electronic amplification level is too large Improper setting of moiré removal mode	Decrease the electronic amplification level or turn off the electronic amplification Turn off moiré removal
15	HDMI interface output no picture	3840 × 2160, 60/50Hz output mode, no HDMI2.0 cable is used 3840 × 2160, 60/50Hz output mode, the monitor does not support HDMI2.0	3840 × 2160, 60/50Hz output mode, replace HDMI2.0 high-speed cable Reduce the output frame rate to 30/25Hz, or replace the monitor that supports HDMI2.0

#### 4. Cleaning and Disinfection

Before confirming the failure, please check the following items. If the current problem cannot be solved after checking the following items, please contact our company's after-sales service center.

##### 4.1. Cleaning and disinfection of the host shell

- Please use a soft dry cloth to gently wipe the dust on the surface of the product; for stubborn dirt, you can use a cloth dipped in neutral detergent to wipe off the dirt, and then wipe it with a dry cloth;
- 2 times with absorbent cotton dipped in 75% medical alcohol, and the action time is 3min ;

##### 4.2. Cleaning and disinfection of the camera

- When there is debris or biological residue on the surface of the camera, please clean it with a soft brush first;
- Please use absorbent cotton dipped in 75% medical alcohol to clean the surface of the camera twice for 3 minutes ;
- Then use the special lens cleaning paper to wipe it thoroughly to ensure that there are no residual stains on the lens.

##### 4.3. Cleaning and disinfection of cables

- Thoroughly clean the cable with a soft cloth or surgical gauze. If necessary, dip an appropriate amount of neutral detergent to wipe it off, and finally wipe off the residual water with a dry cloth;
- Please use absorbent cotton dipped in 75% medical alcohol to clean the surface of the cable twice for 3 minutes.

#### Notice

- Before cleaning the equipment, be sure to disconnect the power supply and unplug the power plug;
- Do not use benzene, thinner, pesticides or other volatile solvents for cleaning, they may cause the equipment coating to deteriorate and peel;
- When dipping neutral detergent, isopropyl alcohol or ethanol, avoid taking too much liquid, which may leak into the gap of the camera handle or the device interface;
- Do not wipe with detergents and disinfectants.

#### 5. Care and Maintenance

In order to ensure the safe use of the product, be sure to check the product before use. If any problems are found during the inspection process and cannot be corrected, please contact the company's after-sales service center.

##### 5.1. Daily inspection and maintenance

- Cable: Make sure the cable is not damaged and the cable sleeve is not damaged; wrap the cable into a circle about 10 cm in diameter for storage to avoid kinks or messy winding;
- Host: Make sure there is no dust or foreign matter on the rear panel interface; make sure there are no loose screws on the housing;
- Turn on the power: perform a power-on test to see if the device can run normally; whether the buttons on the front panel of the host can be touched.

##### 5.2. Routine inspection and maintenance

- Monthly inspection: Make sure there are no loose screws or damaged parts; make sure that there is no dust or foreign matter on the rear panel interface; clean the surface of the casing, the camera and the cable twice with absorbent cotton dipped in 75% medical alcohol for 3 minutes . (Generally, it is maintained once a month, and the camera connection is prohibited from soaking)
- Annual inspection: After the product is turned on, conduct a comprehensive test of its function and performance.

## 6. After-sales service

1. The warranty period of the products sold by the company is 18 months. During the warranty period, the fault caused by the manufacturing quality will be repaired free of charge by the company. Lifetime maintenance outside the warranty period.
2. The spare parts sold by the company belong to the agents or customers who are responsible for their own configuration and installation, and no on-site service is provided during the warranty period; the quality problems of the parts sold by the company are responsible for timely repair.
3. Failures caused by the following reasons are not covered by the warranty:
  - Faults caused by unauthorized disassembly and modification of this product.
  - Failures caused by accidental beating and falling during use.
  - Failures caused by lack of reasonable maintenance or failure to meet the requirements of the operating environment.
  - Failure caused by operation not in accordance with the requirements of this manual.
  - Failures caused by self-repair without the permission of the company.
  - Failures caused by repairing accessories not provided by the company's designated dealer.
  - Failure caused by improper operation by non-medical technicians.
  - Failure caused by the company's sterilization method.
4. Random gifts are not guaranteed.
5. Consumables and wearing parts are not guaranteed.
6. If the company's random warranty cannot be presented, the company will not provide warranty.
7. If you purchase the instrument from the agent of our company, please contact the agent first.
8. If the equipment exceeds the period of use, the warranty will not be granted.

## 7. Warning

1. To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. Operators are strictly prohibited from installing and operating the product with wet hands!
2. Do not connect connectors for peripheral device wiring that may have excessive voltage to the product interface!
3. For the sake of safety, please use the accessories such as the power cable provided with this product, or select the power cable provided by the regular manufacturer according to the parameter identification on the cable, otherwise it may cause fire or electric shock!
4. It is strictly forbidden to maliciously pull, bend, bundle the supporting cables of the product, or damage the insulating casing of the cables, otherwise it may cause fire or electric shock!
5. It is strictly forbidden to disassemble the screws and casing by yourself, and it is strictly forbidden to replace the internal parts of the product by yourself!
6. During use, it is strictly forbidden to block the air outlet of the device to avoid dangers such as fire!
7. When the cable is damaged or aged, please stop using it immediately to avoid dangers such as electric shock!
8. Installation, operation and storage of the product in any of the locations listed below is strictly prohibited as doing so may result in fire, personal injury or equipment failure:
  - Where flammable chemicals or items such as alcohol, thinner, benzene are stored
  - Near liquids or places prone to rain
  - direct sunlight
  - Near the air outlet of air conditioning or ventilation equipment
  - Near a heat source, such as near a heater
  - Where the power supply is unstable
  - Highly salty or sulphurous environments
  - extremely cold or hot environments
  - Extremely humid or dusty environments
  - Areas prone to mechanical vibration or instability
  - Near strong magnetic field sources
  - Near strong electromagnetic sources, such as televisions, radios

## Appendix A: Product Electromagnetic Environment Description

### Warning

Be aware of the electromagnetic environment at the site, as the product may be affected by the electromagnetic field at the site. Product installation and use should be kept away from products or facilities that emit strong electromagnetic waves, such as radio signal transmission towers, high-frequency electric knives, nuclear magnetic resonance equipment, etc. This product may also cause certain electromagnetic field interference to other electrical equipment on site, but this product meets the requirements of electromagnetic compatibility standards, and its electromagnetic environment usage instructions are shown in Table 1-Table 4;

### Warning

Portable and mobile RF communications equipment may affect the use of this product.

### Warning

The pins of connectors marked with the electrostatic discharge caution symbol should not be touched, and connections should not be made with these connectors unless electrostatic discharge precautions are used.

### Regulations regarding electrostatic discharge precautions:

The human body or object is charged with different electrostatic voltages due to charge transfer; since the electrostatic discharge is completed within the time of the order of ns or  $\mu$ s, the peak current can reach tens of amperes, and the instantaneous power is very huge. The pulse energy is enough to damage sensitive components in electronic components; because the rise time of the current waveform is very short, that is, the rate of change of the current ( $d/dV$ ) is very large, so a high potential of several hundred volts or even thousands of volts can be induced, thereby A strong electric field is generated to break down the sensitive element. To prevent damage to the instrument, the following measures should be taken:

1. Ensure the ambient humidity;
2. Lay anti-static floor or carpet;
3. The operator should wear an anti-static wrist strap on the wrist, which should have good grounding performance, and this measure is the most effective.
4. It is recommended that all relevant employees be trained in the interpretation of electrostatic discharge warning symbols and electrostatic discharge preventive measures.

### Warning

Except for cables sold by the company as spare parts for internal components, the use of unspecified accessories and cables can result in increased emissions or decreased immunity of equipment or systems.

Serial Number	Name	Cable length (m)
1	4K camera host POWER CABLE	1.8
2	4K CAMERA CABLE	3
3	HDMI 2.0 CABLE	2

### Warning

This equipment should not be used near or stacked with other equipment, if it must be used near or stacked, it should be observed to verify that it operates normally in the configuration in which it is used.

### Warning

Basic performance description during EMC testing:

- a. Intra-view 4K video recording mode, in the interference state, the image display is normal, the light source brightness output is normal, the pedal function is normal, and the video recording function is normal.
- b. Intra-view 4K video recording mode, in the interference state, the image display is normal, the pedal function is normal, and the video recording function is normal.

### ANNEX 1.

Guidelines and Manufacturer's Statement - Electromagnetic Emissions

### Guidance and Manufacturer's Declaration - Electromagnetic Emissions

This product is intended to be used in the electromagnetic environment specified below, and the purchaser or user should ensure that he is used in this electromagnetic environment:

Launch test	Compliance	Compliance
RF emission GB 4824	1 set	RF energy for its internal functions. Therefore, its RF emissions are low and the potential to cause interference to nearby electronic equipment is low.
RF emission GB 4824 RF emission Harmonic emission GB 17625.1 4824 Voltage fluctuation / flicker emission GB 17625.2	Class A Not applicable Not applicable	The equipment is suitable for use in all installations that are not domestic and not directly connected to the domestic residential public low-voltage supply network.

**ANNEX 2.**  
Safety distance

**Recommended separation distance between portable and mobile RF communication equipment and this product**

This product is intended for use in an electromagnetic environment where radio frequency radiated disturbances are controlled. The purchaser or user can prevent electromagnetic interference by maintaining the minimum distance between portable and mobile RF communication equipment (transmitters) and this product as recommended below, according to the maximum rated output power of the communication equipment.

The maximum rated output power of the transmitter in W	Isolation distance corresponding to different frequencies of the transmitter /m 150kHz-80MHz d=1.2 √(P)    80MHz-800MHz d=1.2 √(P)    800MHz-2.5GHz d=2.3 √(P)
0.01	0.12
0.1	0.38
1	1.2
10	3.8
100	12
	0.12    0.38    1.2    3.8    12    0.23    0.73    2.3    7.3    23

For transmitter maximum rated output power not listed in the table above, recommended isolation d, in meters (m), can be determined using the formula in the corresponding transmitter frequency column, where P is the transmitter maximum supplied by the transmitter manufacturer Rated output power in watts (W).

Note 1: At 80MHz and 800MHz, the formula for the higher frequency band is used.

Note 2: These guidelines may not be suitable for all situations where electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

**ANNEX 3.**  
Electromagnetic Immunity 1 Guidance and Manufacturer's Declaration Electromagnetic Immunity

**Guidelines and Manufacturer's Declaration - Electromagnetic Immunity**

This product is intended to be used in the electromagnetic environment specified below, and the purchaser or user should ensure that he is used in this electromagnetic environment

Anti-interference test	IEC 60601 Test Levels	Match level	Electromagnetic Environment - Guidelines
Electrostatic discharge GB/T 17626.2	± 6 kV contact discharge ± 8 kV air discharge	± 6kV contact ± 8kV air	Floors should be wood, concrete or tile, and if covered with synthetic materials, the relative humidity should be at least 30%
Electrical fast transient burst GB/T 17626.4	± 2 kV to power line ± 1 kV on input / output lines	± 2kV to power line ± 1kV on input / output lines	Mains power should be of typical quality used in a commercial or hospital environment
surge GB/T 17626.5	± 1 kV line to line ± 2 kV line to ground	± 1kV line to line ± 2kV line to ground	Mains power should be of typical quality used in a commercial or hospital environment
Voltage clips, short interruptions, and voltage variations on power input lines GB/T 17626.11	< 5% UT for 0.5 cycles (>95% dip on UT) 40% UT for 5 cycles (60% dip on UT) 70% UT for 25 cycles (30% dip on UT) < 5% UT for 5s (>95 % dip on UT)	< 5% UT for 0.5 cycles (>95% dip on UT) 40% UT for 5 cycles (60 % dip on UT) 70% UT for 25 cycles (30 % dip on UT) < 5% UT for 5s (on UT,>95% dip)	Mains power should be of the quality used in a typical commercial or hospital environment. If the user of the device requires continuous operation during power interruptions, it is recommended that the device be powered by an uninterruptible power supply or battery.
Power frequency magnetic field (50Hz) GB/T 17626.8	3 A/m	3 A/m	The power frequency magnetic field should have the power frequency magnetic field level characteristics of a typical location in a typical commercial or hospital environment

**Note**

U T refers to the AC mains voltage before applying the test voltage

**ANNEX 4.**

Electromagnetic Immunity2 Guidelines and Manufacturer's Declaration - Electromagnetic Immunity

**Guidelines and Manufacturer's Declaration - Electromagnetic Immunity**

This product is intended to be used in the electromagnetic environment specified below, and the purchaser or user should ensure that he is used in this electromagnetic environment

Anti-interference test	IEC 60601 Test Levels	Match level	Electromagnetic Environment - Guidelines
RF conduction GB/T 17626.6 radio frequency radiation GB/T 17626.3	3V (rms) 150kHz -80MHz 3 V/m 80MHz -2.5GHz	3 V (rms) 3 V/m	<p>Portable and mobile RF communications equipment should not be used closer than the recommended separation distance to any part of this product, including cables. This distance should be calculated by a formula corresponding to the frequency of the transmitter. Recommended isolation distance <math>d = d = 80 \text{ MHz to } 800 \text{ MHz } d = 800 \text{ MHz to } 2.5 \text{ GHz}</math> where: P — maximum rated output power of the transmitter according to the transmitter manufacturer, in watts (W); d — Recommended separation distance in meters (m)</p> <p>The field strength of fixed radio frequency transmitters is determined by surveying the electromagnetic site a, and in each frequency range b should be lower than the compliance level. Interference may occur in the vicinity of equipment marked as follows.</p>

Note 1: At 80MHz and 800MHz, the formula for the higher frequency band is used.

Note 2: These guidelines may not be suitable for all situations where electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a) Fixed transmitters, such as base stations for wireless (cellular, cordless) telephones and land mobile radios, amateur radios, AM and FM radio broadcasts, and TV broadcasts, whose field strengths cannot theoretically be accurately predicted. To assess the electromagnetic environment of fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location where this product is located is above the applicable RF compliance level above, the product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the product.

b) In the whole frequency range of 150kHz-80MHz, the field strength should be lower than 3V/m.

# ENDOSCOPIC CAMERA SYSTEM

USER MANUAL



07/2025 110011 REV.1.0

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