

Epsilon 4K pro

INGENIOUS

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01

4K camera system
Product introduction



- System Composition



CCU

- 10 kinds of scenes can be customized.
- Smart exposure.
- Optional hue.
- Various advanced image algorithms.
- Light source linkage.
- Dual-endoscope display (dual-endoscope images can be recorded).
- 4K video and pictures can be stored via USB3.0 interface.

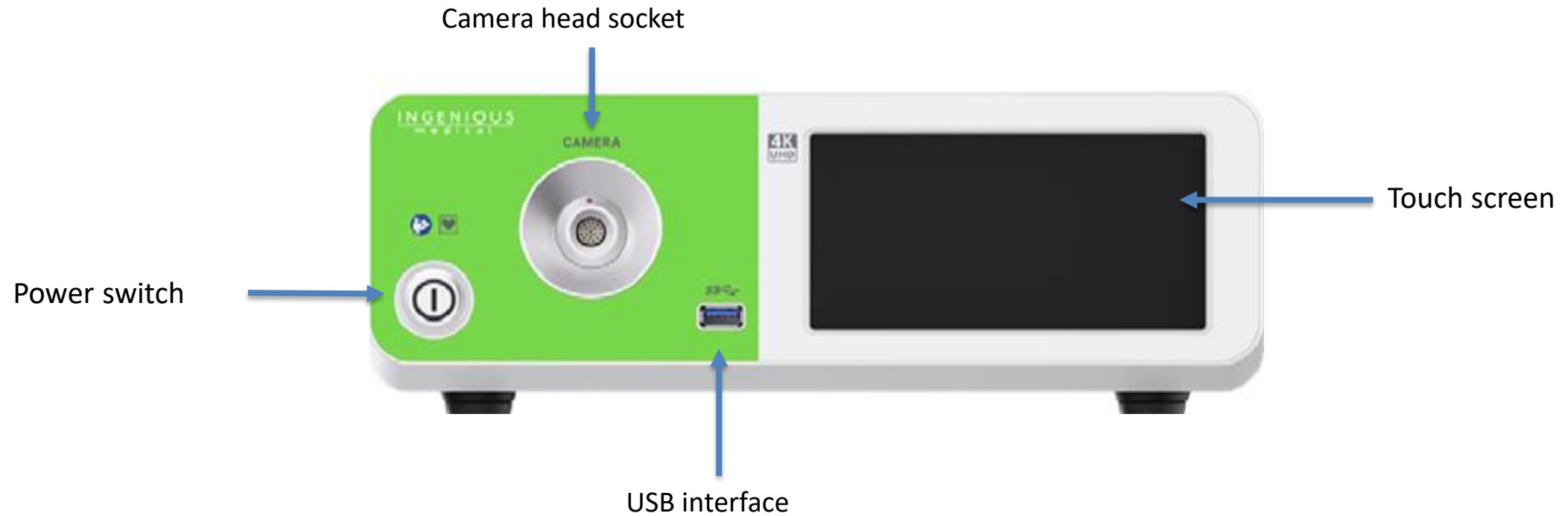
- System Composition



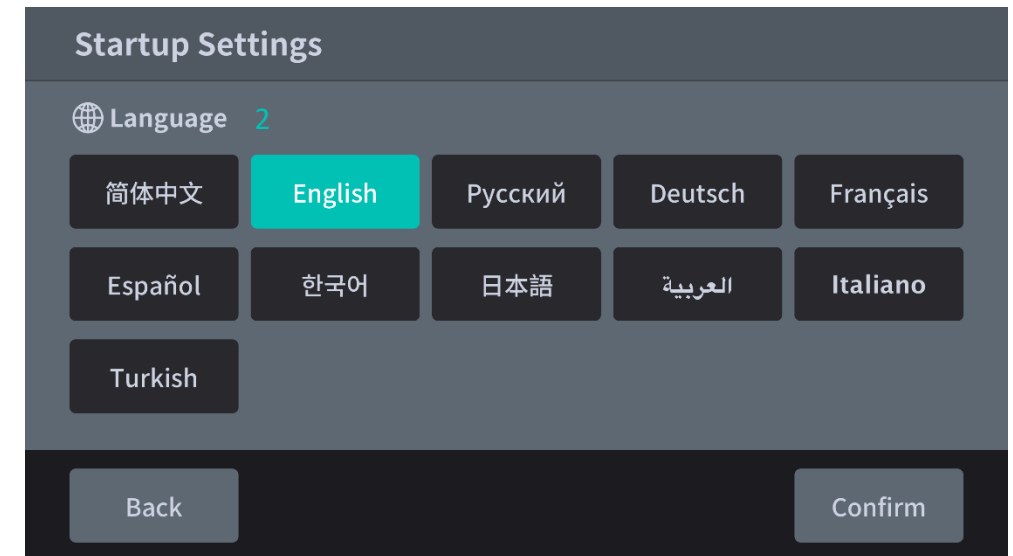
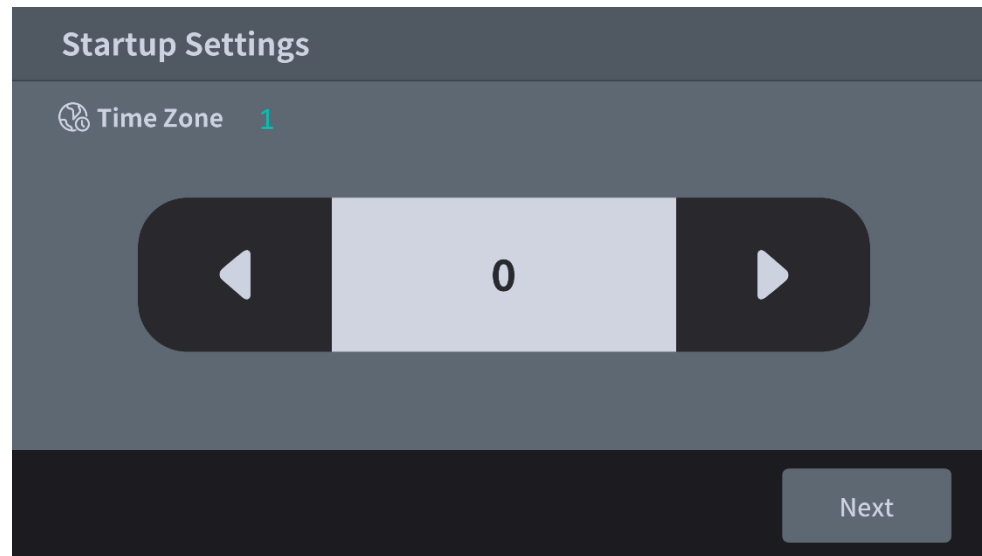
Camera - Auto focus

- Exmor BSI 4K sensor.
- Resolution: 3840x2160 pixels, 8.29 million pixels.
- 3 button functions fully customizable.
- IPX8 waterproof level, support immersion disinfection, low-temperature plasma and ethylene oxide disinfection.
- Low-temperature heat-up design, the temperature felt by hands does not exceed 37°.
- One-piece design without the requirement of a coupler.
- Achieve auto focus in 0.5s.

- Front Panel Introduction

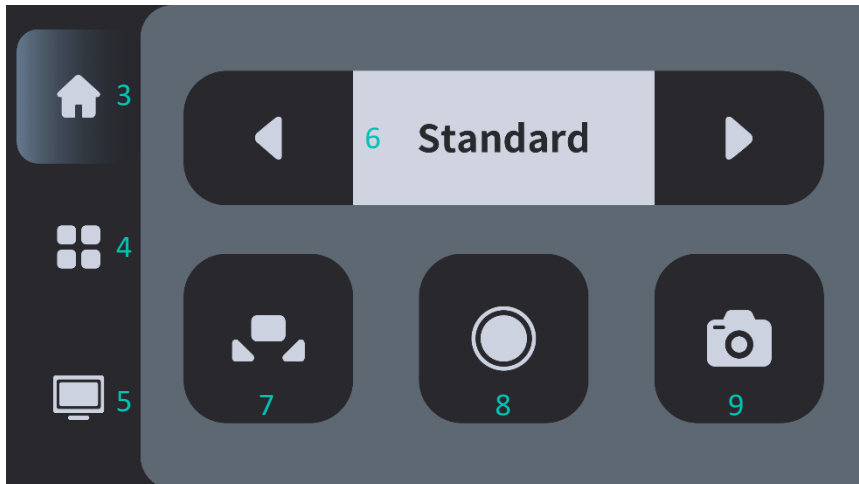


- **Front Panel Introduction**
- **Touch Screen 1**



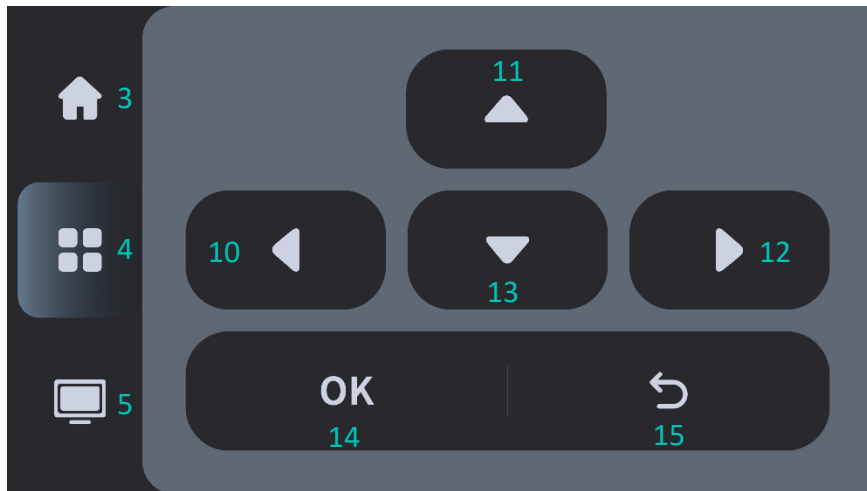
No	Functional description
1	Select time zone according to user's country
2	Set language as user preferred

- **Front Panel Introduction**
- **Touch Screen 1**



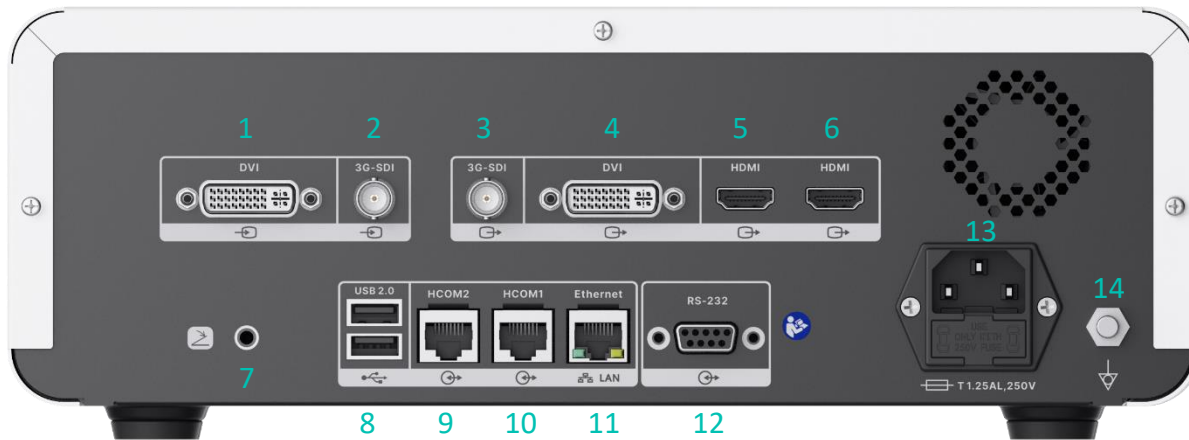
No	Functional description
3	Home page selection key (Home key), click to display the home page of the touch screen menu.
4	Set options, click to display the shortcut setting option of the touch screen menu.
5	Real-time screen, displaying screen image in real time. Tap any position of the touch screen to return to the current menu.
6	Scene, there are 10 scenes selectable, click the left and right buttons to switch.
7	White balance button (AWB), the system automatically conducts the white balance after pressing the button.
8	Click to start recording/stop recording.
9	Capture with a single click.

- **Front Panel Introduction**
- Touch Screen 2



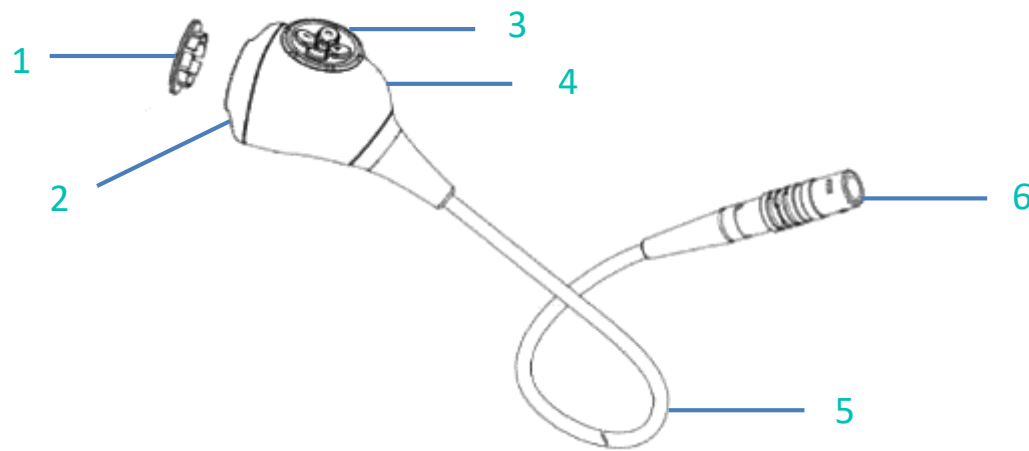
No	Functional description
10	Left key
11	Up key
12	Right key
13	Down key
14	OK key, indicating the action of confirming the operation
15	Back key, used to return to the previous OSD interface; operate this key on the shortcut menu page, and the menu will exit.

- Rear panel introduction



No	Name	No	Name
1	DVI input interface	8	USB2.0 data interface
2	3G-SDI input interface	9	Centralized control interface (HCOM2)
3	3G-SDI output interface	10	Cold light source control interface (HCOM1)
4	DVI output interface	11	Ethernet network interface
5	HDMI 2.0 output interface	12	Upper computer communication interface
6	HDMI 2.0 output interface	13	Power interface
7	Foot switch interface	14	Equipotential interface

- Camera head introduction



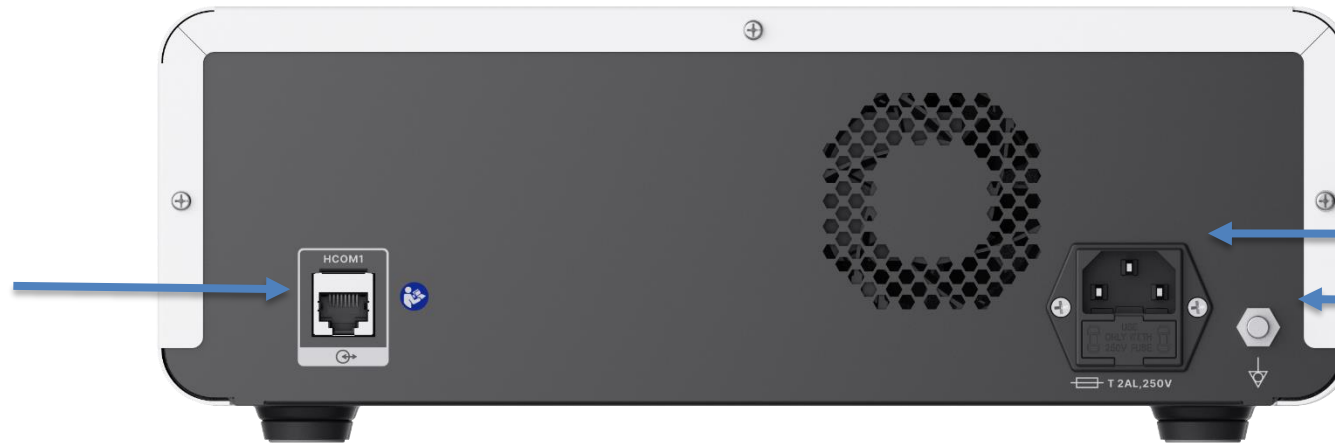
No	Functional description
1	Protection cap
2	Optical interface
3	Handle button
4	Camera head
5	Camera head cable
6	Connector for camera head

- Front Panel Introduction



- Rear panel introduction

Cold light source control interface (connected to the CCU)



Power interface

Equipotential terminal

02

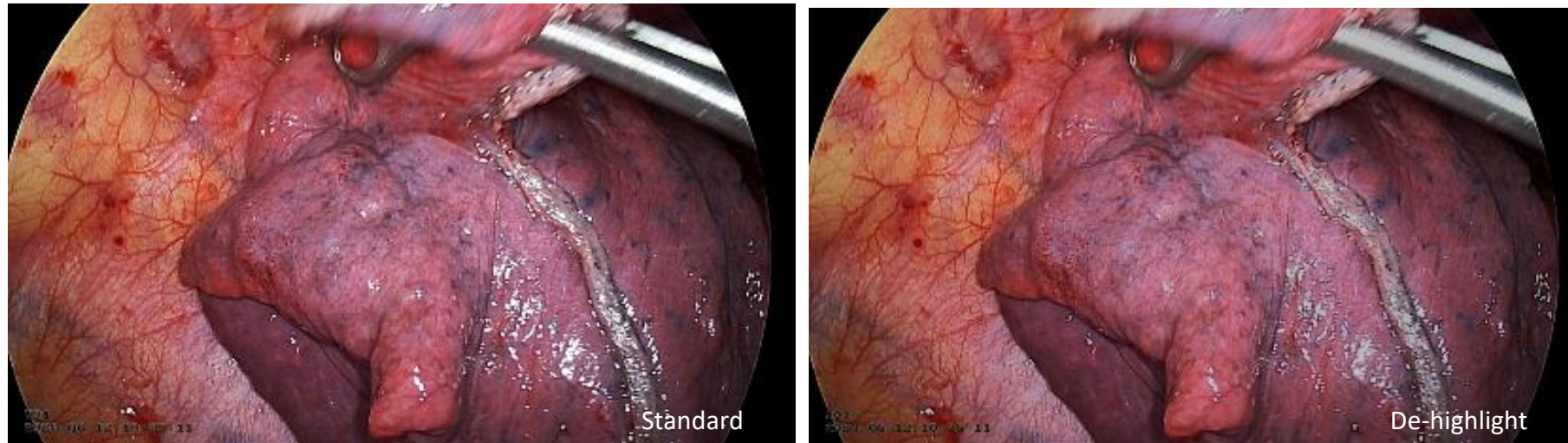
Special functions

- Dark-Improv



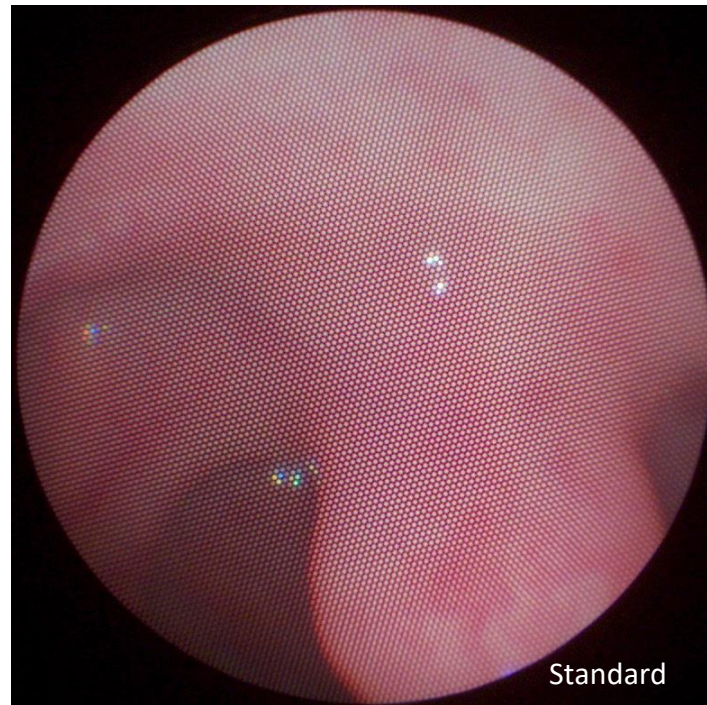
In the case of uneven lighting, it can automatically identify the dark area of the field of view and brighten the dark area, making the entire field of view more transparent and the details of the dark area fully visible.

- De-highlight



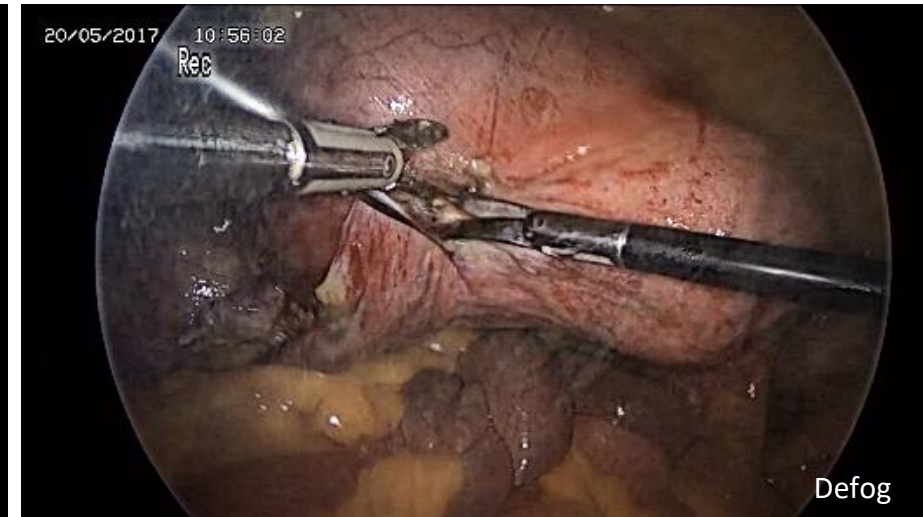
When equipment and water spot reflections cause overexposure, the overexposure area is automatically identified and the brightness is suppressed to make the entire field of view softer. Relieve the operator's visual fatigue caused by looking directly at the overexposed area.

- De-moiré(fiberscope)



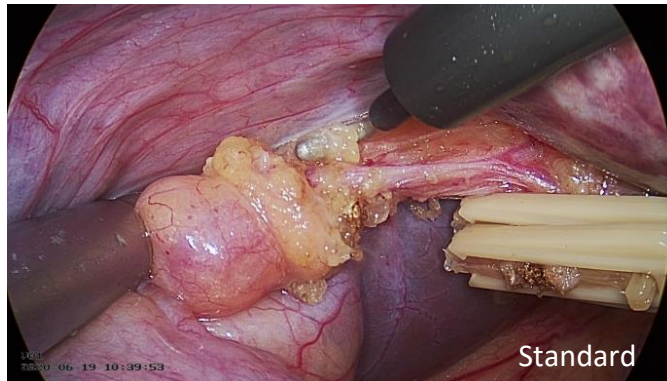
The unique adaptive grid search algorithm can intelligently identify moiré interference, repair the loss of details, and restore the image to a high degree, so that the surgical field is pure and the target is highlighted.

- Defog

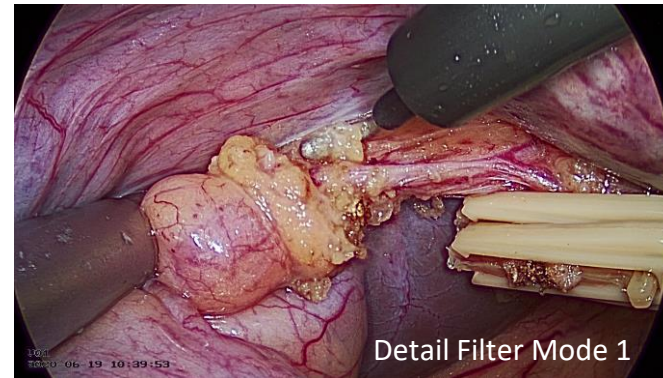


The smoke elimination algorithm is specially developed for minimally invasive surgery scenarios and the unique smoke recognition algorithm can lift the "veil" in the surgical field in real-time and improve the operator's smoke troubles.

- Detail filter (vessel enhancement)



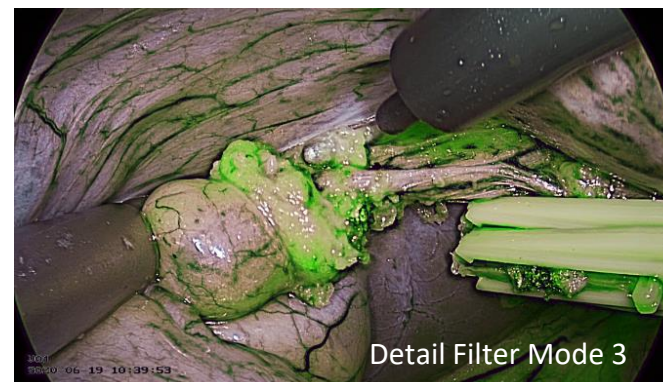
Standard



Detail Filter Mode 1



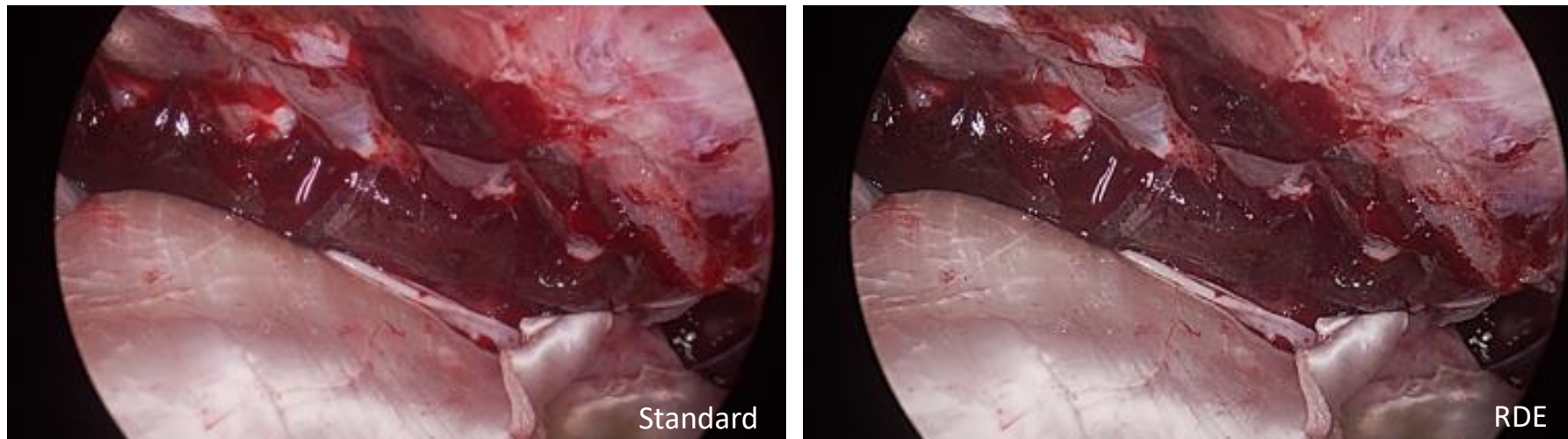
Detail Filter Mode 2



Detail Filter Mode 3

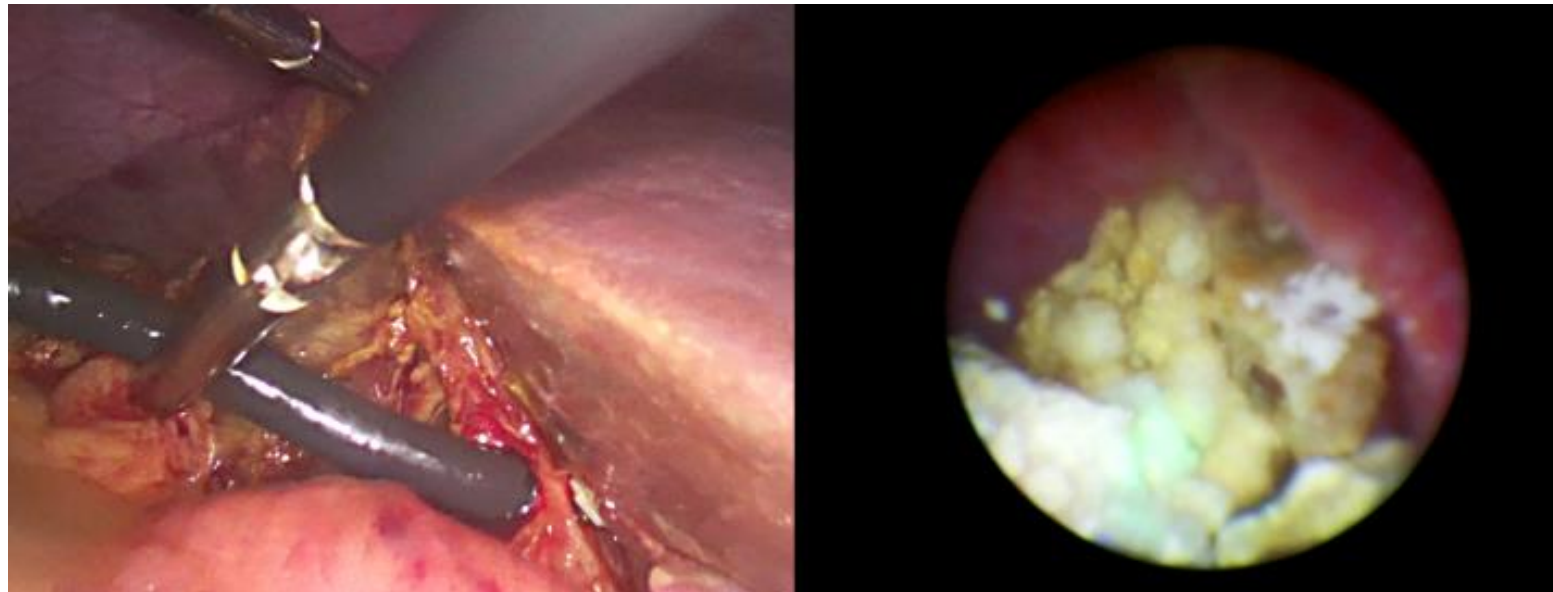
Using the characteristics of blood vessel distribution, combined with the principle of spectral shift, by changing the background color in the cavity, the display of hemoglobin can be highlighted, so that the distribution of tiny blood vessels is clearly displayed, and the red spectrum can also be filtered to highlight the color contrast of different tissues and increase the recognition of foreign objects in the field of view.

- RDE



The unique red statistical scheduling algorithm dilutes the visual impact of large-area red scenes and relieves the operator's visual fatigue caused by large-area red.

- Dual-endoscope



Under dual-endoscope surgery, the dual-endoscope images can be displayed on the same screen, and the images of the two cavities can be viewed on the same screen in real-time.

And the fused real-time images can be recorded, eliminating the need for later video splicing processing.

Application of special functions in various departments

- Examples of representative applications in each department

Department	Applied surgery	Special feature	Value
ENT	Nasal endoscopic surgery	<ul style="list-style-type: none"> Dark Area Improvements RDE Sharpness 2.0 	<ul style="list-style-type: none"> The dark area enhancement can brighten the lighting in the deep nasal passage, so that the operator's field of vision has no dark corners The nasal cavity is rich in blood vessels, which is easy to cause bleeding and make the vision completely red. Activating the RDE function can reduce the visual impact of red and relieve red visual fatigue
			Ureteral stone surgery
Urology	Cystoscopy	detail filter	<ul style="list-style-type: none"> Improve the differentiation and identification of abnormal tissue

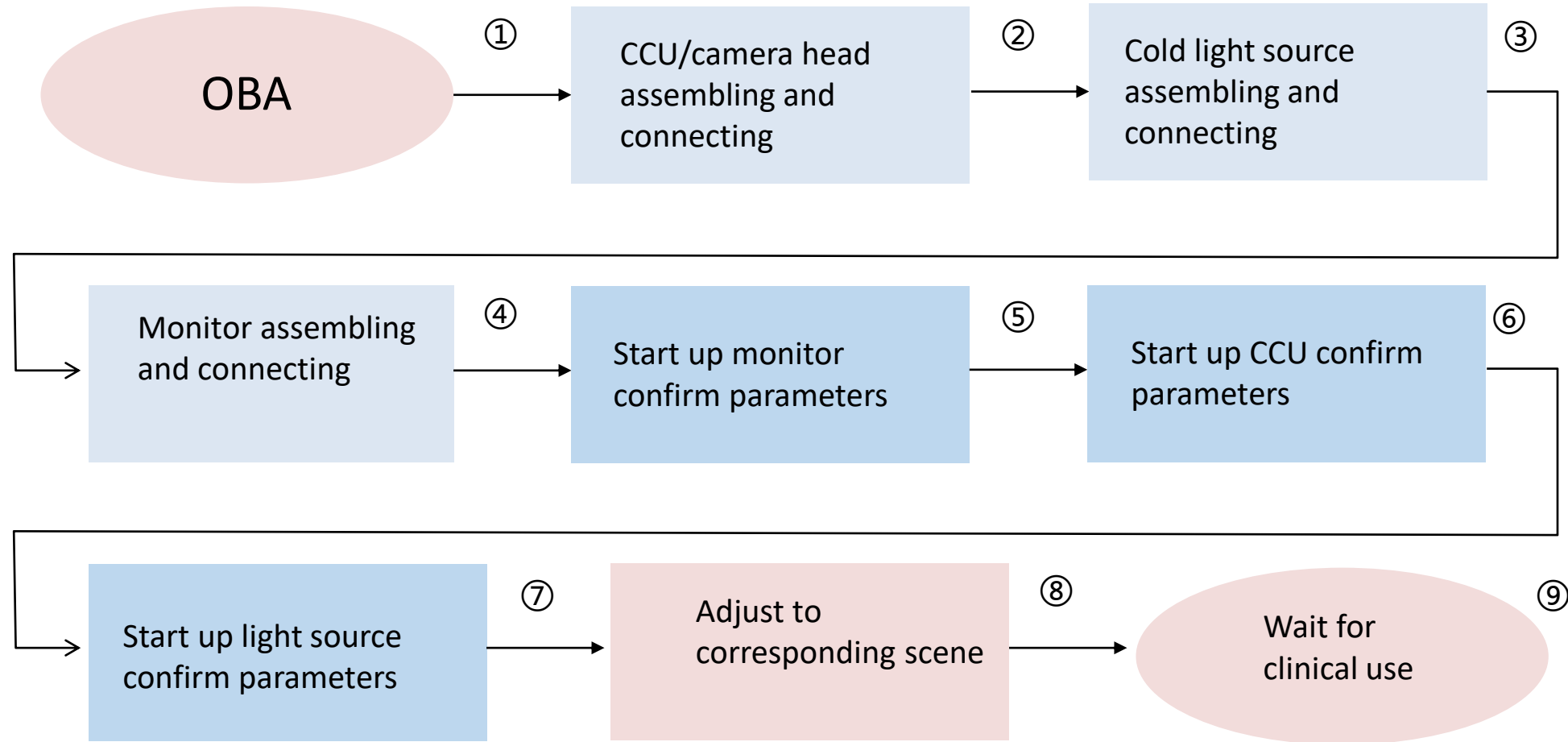
Application of special functions in various departments

- Examples of representative applications in each

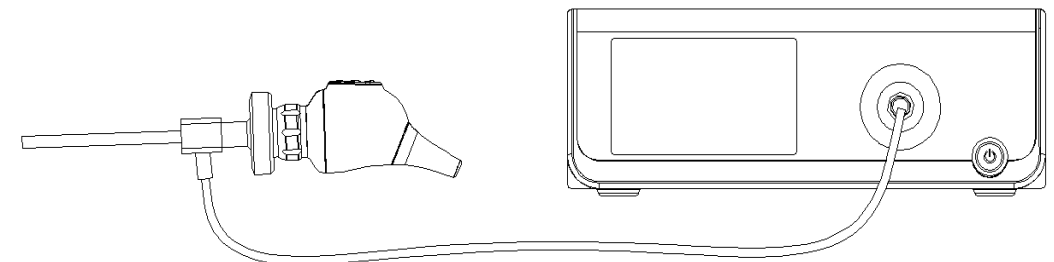
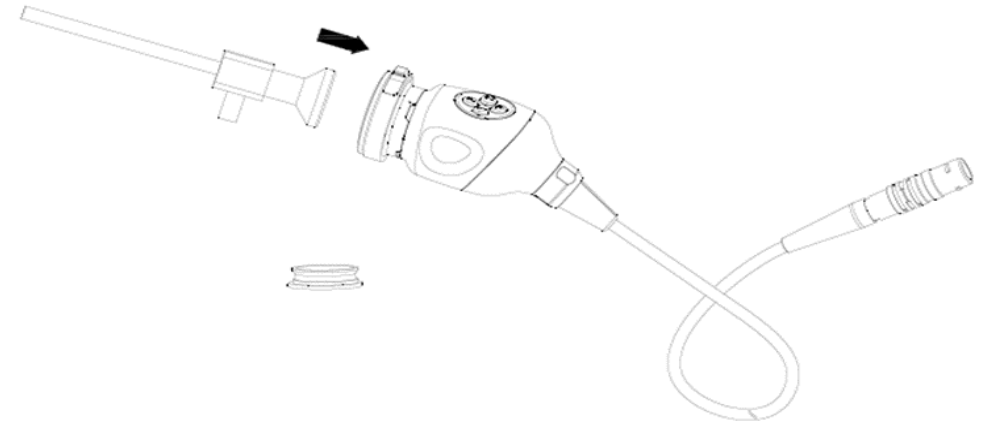
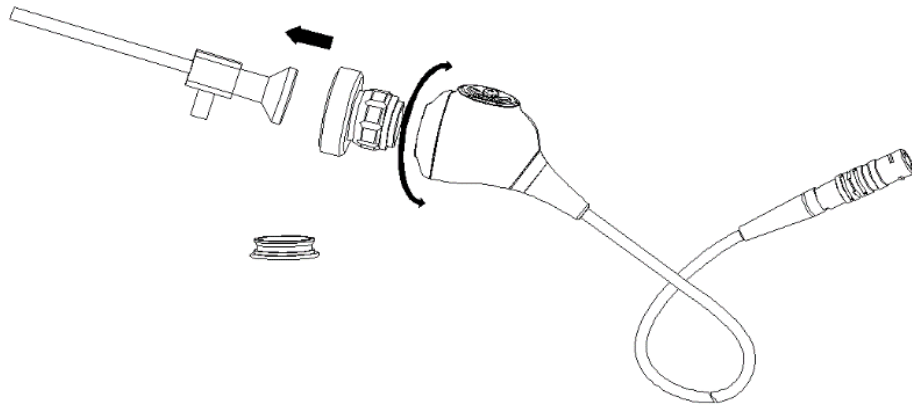
Department	Applied surgery	Special feature	Value
General Surgery	<ul style="list-style-type: none"> Laparoscopic gallbladder exploration 	<ul style="list-style-type: none"> Dual endoscope 	<ul style="list-style-type: none"> View the pictures of two cavities in real time on the same screen
	<ul style="list-style-type: none"> Gastrointestinal surgery Thoracoscopic Surgery 	<ul style="list-style-type: none"> Dark-Improv De-highlight Defog 	<ul style="list-style-type: none"> Brighten the dark corner and improve the transparency of the surgical field Inhibit the reflection of the instrument and reduce the strong light stimulation of the reflection to the operator Eliminate the smoke interference of high-frequency electric knives and improve the transparency of the surgical field
Gynecology	<ul style="list-style-type: none"> Laparoscopy 	<ul style="list-style-type: none"> Defog De-highlight 	<ul style="list-style-type: none"> Eliminate the smoke interference of high-frequency electric knife and improve the transparency of the surgical field Inhibit the reflection of the instrument and reduce the strong light stimulation of the reflection to the operator
	<ul style="list-style-type: none"> Hysteroscopy 	<ul style="list-style-type: none"> Detail filter 	<ul style="list-style-type: none"> Improve the differentiation and identification of abnormal tissue

03

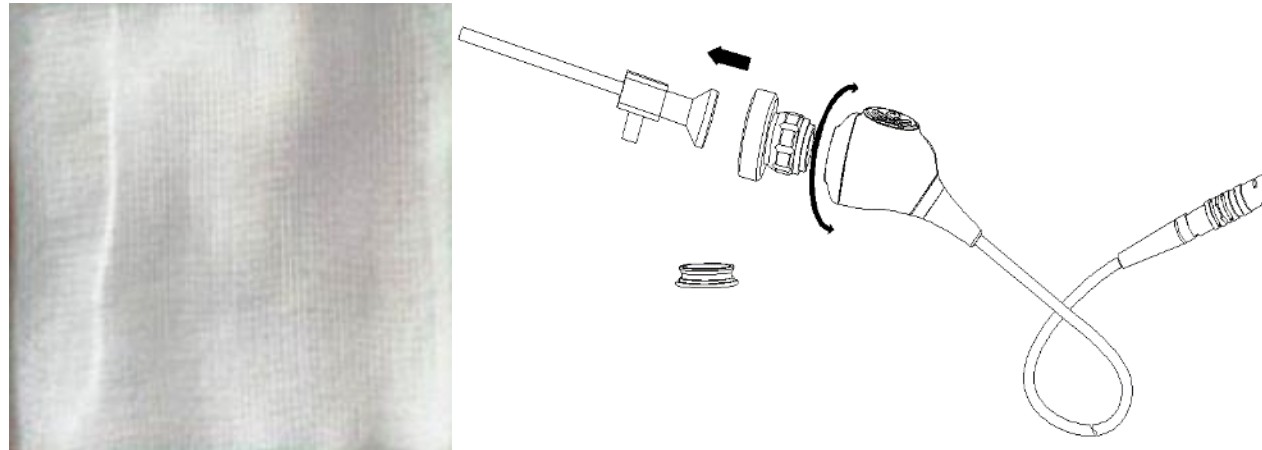
Operating procedures



- Connection



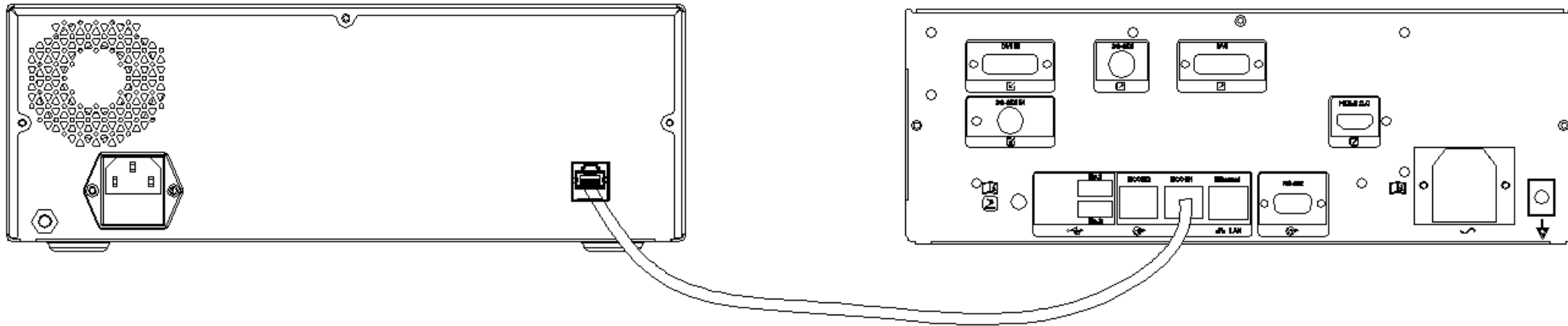
- Operation Process - White Balance



Method 1: After installing the endoscope, directly press AWB on the operation panel; wait for the prompt "White balance is complete!"

Method 2: After installing the endoscope, press button 1 on the camera handle to perform white balance; wait for the prompt "White balance is complete!"

- Light linkage



HCOM1

- **Operation process - open the monitor to confirm the parameters**

Sony 27-inch/32-inch 4K monitor parameters

Page	Project	Recommended configuration
1/3	gamma	2.2
	phase	50
	Chroma	50
	brightness	50
	contrast	80
	AIME	close
	AIME structure	S2
	AIME color	close
	gradient extension	close
	color temperature	D65
2/3	Gain R Offset	0
	Gain G Offset	0
	Gain B Offset	0
	Bias R offset	0
	Bias G Offset	0
	Bias B Offset	0
3/3	monochrome	close
	Horizontal Resolution	0
	vertical resolution	0
	RGB range	automatic
	color space	BT.709

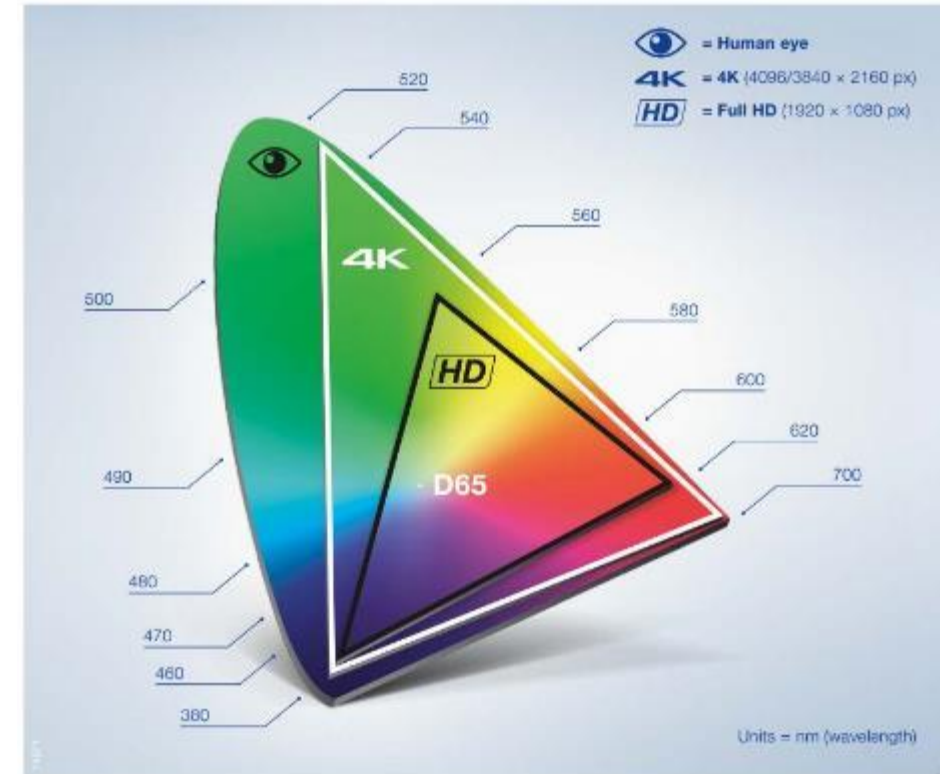
- **Operation process**
 - **open the monitor to confirm the parameters**

Barco 31 inch 4K monitor parameters

Page	Project	Recommended configuration
Picture (Screen menu)	Profile	Factory
	Brightness	95
	Contrast	50
	Saturation	50
	Color Temperature	6500K
	Color Space	ITU709
	Gamma	2.2
	Sharpness	0

BT2020 background

In 2013, the International Telecommunication Union Radiocommunication Sector (ITU-R) promulgated the BT.2020 standard for a new generation of ultra-high definition (UHD) video production and display systems, redefining the definition of ultra-high definition **in the field of television broadcasting and consumer electronics**. Various parameters and indicators of high-definition video displays promote the further standardization of 4K ultra-high-definition home display equipment. Can display high-density **dark green, orange, etc.**



- ▶ BT2020 is more suitable for outdoor scenes, and BT709 is more in line with doctors' color requirements for scenes in human body chambers.

04

Questions and Answers

Question 1

- **Before following the surgery, what we should do?**

1. Disinfect endoscopes, insufflation tubes, insufflation needles, and light guide.
2. Check the monitor configuration.
3. Check the CCU configuration.
4. The endoscope is fogging up because the temperature at the front of the endoscope is too low, and it will be fine if it is turned on for a while.

- **Doctor is not satisfied with the image, what parameters should be adjusted**

1. The color is too bright or too light - adjust the Chroma.
2. The image is too bright or too dark - adjust the brightness or light source.
3. There are many noises in the picture - adjust the sharpness, gain or light source.
4. The picture is not clear – refocus.

Note: Debugging principle: monitor>light source>CCU.

Question 3

- Scene switching and parameters of laparoscopy, ENT, thoracic cavity, etc.

Scenes	Digital noise reduction	Gain	Brightness	Sharpness	Dark improve	De-moire
Laparoscopy	Low	8	5	5	Close	Close
Hysteroscopy	Low	5	5	4	Close	Close
Fiber Optics	Low	5	5	5	Close	Mode 1
Otoscopy	Low	8	5	3	Low	Close
Laryngoscopy	Low	8	5	3	Low	Close
Ureteroscopy	Low	5	5	5	Close	Mode 2
Arthroscopy	Low	5	5	3	Low	Close
Ventriculoscopy	Low	7	5	4	Low	Close
Standard	Low	5	5	5	Close	Close
User 1	Low	5	5	5	Close	Close

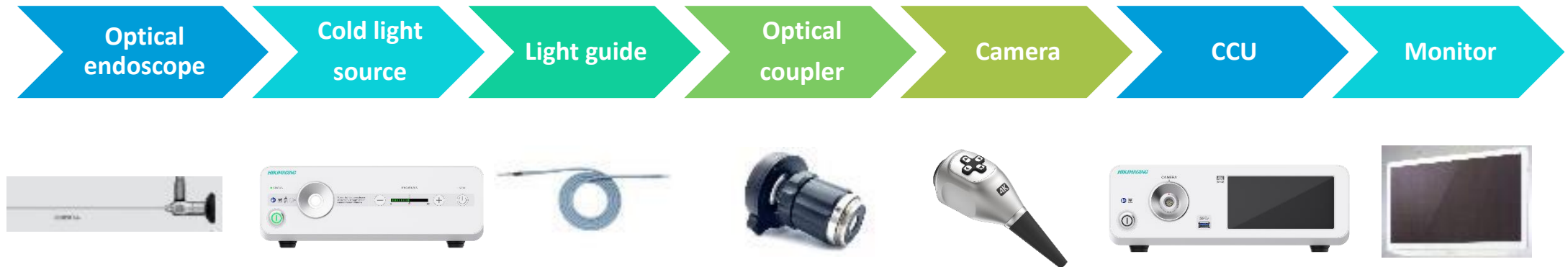
- **Dual endoscope setup and connection**

1. The SDI IN or DVI IN on the rear panel is connected to other equipment output interfaces.
2. Select the dual-endoscope mode in the settings.

- **Compatibility of endoscopes, cameras, and light guide cords from different manufacturers**

1. Our camera head adapts to the endoscopes of 99% manufacturers on the market.
2. Our equipment does not support cameras from other manufacturers at present.
3. Light guide cords are compatible with all endoscopes.

Note: It is recommended to use our recommended endoscope and light guide cord.



The image quality of an endoscopic imaging system is determined by a **system**, not just the camera.

- Barrel principle of definition



Short boards that affect definition:

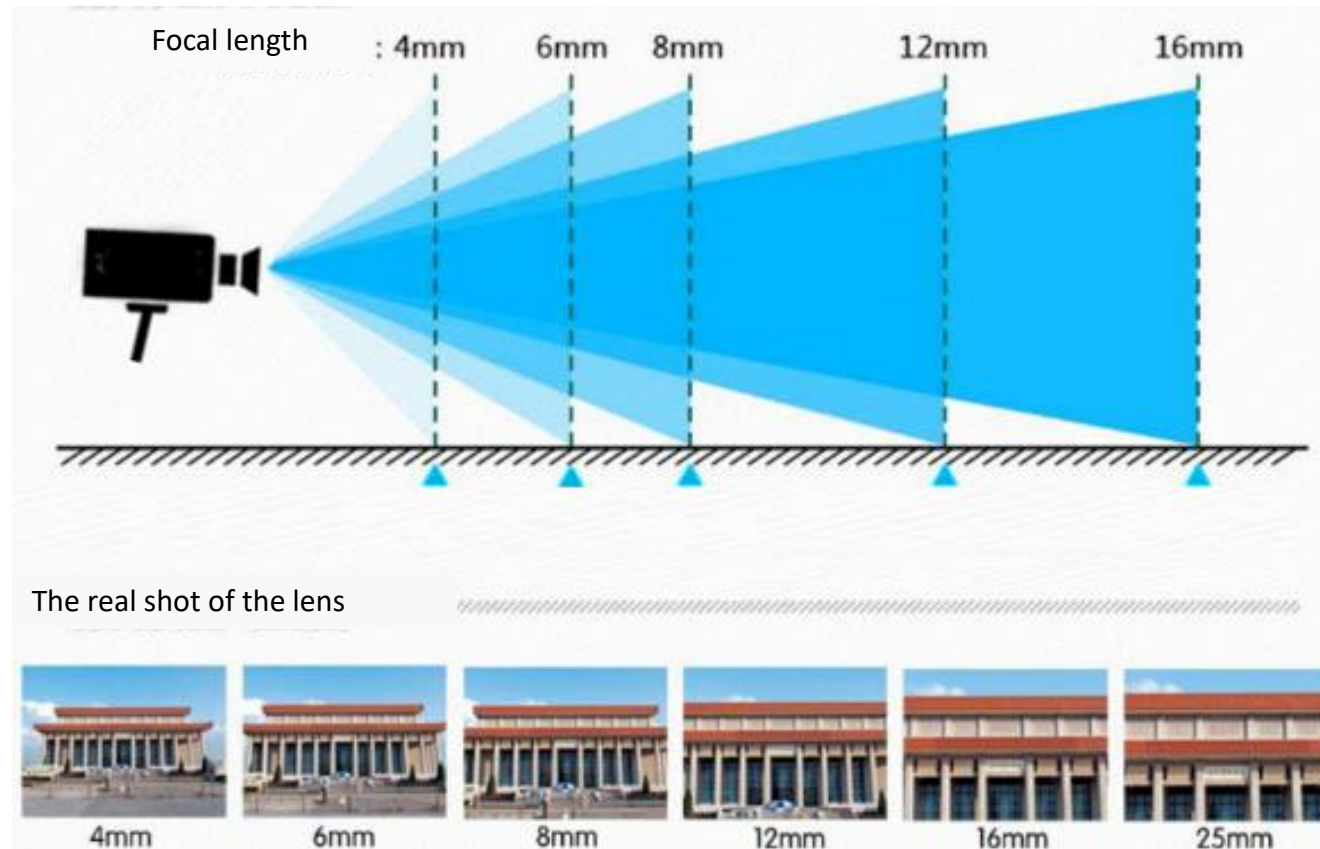
Usually is optical coupler or optical lens.

- ▶ The definition of the endoscope imaging system is jointly determined by the cold light source, optical endoscope, optical coupler, camera, CCU and monitor.

Question 6

- The relationship between optical coupler of different focal lengths and image size

The shorter the focal length, the larger the field of view.



- **Difference and advantages and disadvantages of 1CMOS , 3CMOS , autofocus, fluorescence camera**
 - 1CMOS: the current mainstream 4K solution, 8 million pixels true 4K ;
 - 3CMOS: FHD imaging solution, with 3 imaging chips, but only 6 million pixels ;
 - Autofocus: no need to manually adjust the angle, focus can be completed with one hand, the focus speed is fast, and the focus is accurate;
 - Fluorescence: Help identify special lesions such as tumors by drugs;
 - 3D: Images with a large depth of field are more three-dimensional.

- Light source brightness adjustment



- For laparoscopy, it is recommended to adjust to about 50-60 ;
 - For ENT and hysteroscopy, adjust it to about 30 ;
 - In other scenes, the appropriate light source intensity can be adjusted according to the actual situation.
- ▶ The above parameters are only applicable to the original cold light source equipment. If you use a cold light source CCU from other manufacturers, please contact the corresponding technical personnel of the manufacturer to know specific operations and parameters.

- **Choice of different surgical endoscopes**
 - The endoscopes commonly used in the operation of each department are determined, and can be equipped according to the needs of the department.
 - Unused endoscopes we can assist in testing and evaluating endoscope performance.

Conclusion

- a. 4K recording
- b. 8 Advanced algorithms full customized
- c. Auto-focus(optional, depending on cost and positioning in different tenders) C322+P322 or C321(manual focus) +P322
- d. Better cost-effective
- e. Basic-middle-end customer



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THANK YOU

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