yateks® USA

Realta 3D Measurement

Industrial Video Borescope

Operating Instructions

Warning: Please read the operating manual carefully before using the instrument.

User Instructions

Please read the user instructions carefully before operating the instrument.

⚠ Danger

1．Do not use the instrument to detect human or animals.
2．Do not use or store the device at the places with flammable materials, strong magnetic field, and combustible gas, otherwise it may cause fire or explosion.
3．Do not operate the observing object under the electrified conditions.

⚠ Warning

1．Do not repair, disassemble, or refit the product by yourself. Yateks gives no warranties and maintenance in this case.
2．Do not let any liquid except water contact the tube, otherwise it many causes damage to the tube.
3．Please make sure to turn off the power before putting the instrument into the case.
4．Do not touch the camera tip at the end of the insertion tube directly during use. Contact the camera after using in the high temperature environment and cut off the power.

5．In the event of smoking or abnormal noise, stop using the instrument immediately and cut off the power.

6．Do not look straight at the light from end of the insertion tube, avoiding the strong light affecting your eyesight.

10. If any anomaly felt in the angular adjustment, stop immediately using the instrument and turn off the power.

11.The Touch screen glass is fragile, do not use sharp objects to press the touch screen! Touch pressure must not be greater than 120g.

⚠ Precautions

1．Do not use the device beyond the temperature range for operation.

2．Do not bend, twist, or fold the insertion tube improperly.

3．Be sure to use the power adapter provided by Shenzhen Yateks Co., Ltd.

4．When removing the insertion tube from the observation object, do not remove it by force and play attention to the following:

a)．When to angle is locked or is partially bent, do not pull back the insertion tube directly, but set the insertion tube to straight status before pulling it.

b)．In the process of pulling back, if the insertion tube is stuck, please gently move the joystick so that the distal end of insertion tube is straight before pulling back.

5．After the operation of the instrument, the front camera bending should be reset, and it is not advisable to control the camera in

a certain direction for a long time, which will put the instrument in a high load state and will affect the service life.

6．Please note the following during the operation of the distal end of the insertion tube:

  a) Do not crash the front of the insertion tube or drag it by force.

  b) Do not crash its bending section or bend it excessively. It may cause the damage to the glass lens and precision components which are located at front of insertion tube and angle bending part.

7．Wipe the camera with alcohol or acetone before use to avoid fouling, corrosion, and deformation.

8．When performing the angle bending operation, if you feel any abnormality, do not force the operation, otherwise it may cause damage to the insertion tube or the observation object.

9．Do not let meter objects, foreign objects through the interface, the opening into the main machine, may cause failure or electric shock.

10. Do not strongly impact or press the screen，also do not use hard or sharp objects delimit the screen, otherwise it will cause cracks or scratches to screen.

11. Do not cover the main unit with plastic bags or other objects during use, as it may overheat inside the instrument and cause damage to the instrument.

12. When inserting and removing the quick release coupling, please pay attention to the direction of the red dot, do not use blind force.

13. Do not store the instrument in the following environments, otherwise it may cause damage to the instrument.

    a) In an environment with high temperature, high humidity and a lot of dust or particles.

    b) Where there is direct sunlight or radiation.

    c) Locations containing halide gases.

⚠️ **Battery treatment method**

Follow the instructions about danger, warnings and precautions described below when handing batteries.

⚠️ **Danger**

1. Be sure to use specially intended batteries and battery chargers for this instrument.

2. Do not invert the battery electrode and use it.

3. Do not use metal objects to connect the battery electrodes to each other, and do not carry or store the battery and metal objects together.

4. Do not throw the battery into the fire or heat the battery, otherwise there is a risk of explosion.

5. Do not attempt to open or modify the battery, otherwise there is a risk of explosion or fire.

6. Never immerse the battery in fresh or salty water, and never

expose the battery to moisture.

7. Never charge the battery near an open fire or in direct sunlight, otherwise there is a risk of explosion or fire.

8. Do not pierce the battery or make it subjected to strong impact or stress, otherwise there is a risk of explosion or fire. Do not drop or throw the battery or make the battery hit violently.

9. Place the instrument on a stable position to remove the batteries. If the instrument is unstable, the batteries could drop and hit the ground from a high position, causing an explosion and a fire.

⚠ **Warning**

1. Do not use batteries which don't fit with the instrument. Battery model is 18650 with protective circuit/plate, 3.6V lithium battery.

2. Do not attempt to recharge any battery that is not intended for this instrument.

3. Do not use abnormal batteries, such as leakage, discoloration, deformation, and other abnormal conditions.

4. If the battery liquid touches skin or clothes, wash immediately with running water, otherwise it may cause skin injury. If necessary, seek immediate medical attention.

5. Keep away from flammable materials during charging, and do not cover the battery charger with flammable materials.

⚠ **Precautions**

1. Do not use or store the battery in a high-temperature environment, such as in direct sunlight, in an enclosed car or in front of a heating instrument.

2. The battery will get hot after long time operation. Do not remove the battery immediately after use to avoid burning hands.

3. Do not put batteries where children can reach them.

4. Do not leave the battery in humidity, water leakage, or extreme high or low temperatures.

5. Do not touch the battery electrode with wet hands.

6. Recharge the battery for the first time after purchase or before reusing it after a long period of not using.

7. If the battery is not used for a long time, be sure to remove it from the instrument. Otherwise, battery leakage or heat buildup could lead to fire or injury.

📖 **User Tip**

1. Use the battery correctly, as improper use may lead to leakage, excessive heat, and damage. When replacing the battery, please check the insertion direction and install it correctly.

2．The performance of a battery usually deteriorates as the ambient temperature drops. Please note that battery performance, which is reduced by low temperature, can be restored when the temperature rises to normal levels.

3．When batteries run out of life, be sure to recycle them in accordance with local regulations.

4．Recommended temperature range for Li-ion battery operation.
Discharge (when using the instrument): 0°C to 40°C
Charging: 0°C to 40°C
Storage: -10°C to 50°C

5．Using the battery outside the above temperature range will result in reduced performance and lifespan. When storing batteries, be sure to remove them from the instrument.

6．Battery is consumable accessory.

7．The product pictures and displayed content in the manual are for illustration only, the actual product effect (including but not limited to appearance, color, size) and displayed content (including but not limited to background, UI, picture) may be different, please refer to the actual product.

8．To provide accurate product information, product parameters, and product features as much as possible, Yateks may adjust and correct the text expressions, picture effects, etc. match. Due to real-time changes in product batches and production supplier factors, if it is necessary to make the above modifications and adjustments, no special notice will be made.

Please refer to the real-time information on the official website.

Contents

I. Product Overview

The instrument is mainly composed of five parts: camera, insertion tube, host, LCD screen, and operating handle. It is a new type of non-destructive flaw detection instrument integrating optics, precision machinery, electronic machinery, electronic technology, and microscopic camera technology. It is often used for the detection of internal surface defects that cannot be touched by the naked eye.

Figure 1-1

Three-dimensional measurement industrial video endoscope

It adopts a 7-inch IPS high-definition LCD touch screen with a resolution of up to 1920*1080. With touch screen function, the operation is fast and convenient. Adopting the patented technology of Yatai Optoelectronics Co., Ltd., the probe can rotate 360° in all

directions, realize long-distance image transmission, and can enter deeper pipeline inspections. Adopt general-purpose computing graphics processor technology to make image and video processing algorithms faster and make images clearer and smoother. With measurement function, it can generate 3D point cloud map, depth map, contour map, etc., and reproduce the contour of the measured object. The 3D point cloud image can be scaled, rotated, etc., and the accuracy of the selected point can be verified in real time, to avoid inaccurate measurement results caused by incorrect point selection.

II. Parameter Definition

To meet the needs of different environments, users can choose insertion tubes according to their actual needs. The selection of insertion tubes mainly includes tube diameter, length, cameras, depth of field and other parameters.

III. Main Performance Parameters

System	Size	410mm*230mm*143mm
	Weight	<3kg(3m)
	Monitor	7-inch IPS, 1920*1080 (16:9), industrial high-definition touch LCD screen
	Main Function	Photo, video, light source brightness adjustment, screen brightness adjustment, zoom in and out, screen flip, color inversion, screen freeze, color mode adjustment, aspect ratio, grid

		measurement, automatic white balance, image browsing, lock fine-tuning, menu
	Joystick Control	Electric joystick 360° omni-directional camera guidance
	Guidance Control	Lockable fine-tuning, stepping, fast and slow speed adjustment, automatic reset
	Memory	Built-in 128G + extended 64G U disk (up to 256G)
	Data I/O port	2 USB2.0 host "A" ports, network interface RJ-45, Type-C interface, headset interface
	Video Output	Mini HDMI interface, WIFI interface
	Battery	Removable, independently rechargeable battery pack
	Standby Time	≥4h
	Operation Method	The host and the operating handle can be separated, and one host can be equipped with multiple handles
	Operating System	Multi-tasking intelligent operating system, menu-driven and key operation
	User Interface	Touch screen operation menu
	File Management	Support picture/video playback, delete, format, rename
	Image Control	zoom, playback
	Negative	dynamic negative

	Function	
	Digital Zoom	Continuous (level 10)
	Image Control	Screen freeze, image flip
	Image Format	JPG, PNG (recording date and time)
	Video Format	AVI, M P4 (recording date and time)
Software	Language	Simplified Chinese, English, French, Spanish, Russian, Japanese, Korean, Traditional Chinese, German, Portuguese
	Color Settings	Near distance, medium distance, far distance, custom color mode
	White Balance	Automatic white balance, manual white balance
	3D Measurement Information	Measuring principle	binocular measurement
		point to point	distance between two points
		point to line	The vertical distance between the point and the custom line
		point to surface	Orthogonal depth/height between a point and a custom plane
		Area/Line	Perimeter and area measurements of multiple points
		Measurement error	≤5%
	Text Note	It has the function of adding annotations to

		the text, and can annotate the endoscopic pictures at any time according to the detection situation, which is convenient for later report generation
	Software Upgrade	Upgrade through the U disk upgrade package
Probe	Lens outer diameter	6mm
	Insertion tube length	1~3 meters
	Insertion tube process	Tungsten alloy steel wire braided 4-layer tube
	camera turn	360°electric arbitrary direction
Operating environment	Host operating temperature	-10~50°℃
	Probe working temperature	-20~70°℃
	Relative humidity	Up to 90%, non-condensing
	waterproof	Host IP54/Probe IP67

IV. Purpose and Scope of Application

This instrument is widely used in aviation, automobile, ship, electrical, chemical, electric power and other modern core industrial production, maintenance, and other links. With the feature of direct visualization, it can directly observe whether there are defects or abnormalities on the inner surface of large devices such as pipelines, turbines, cylinders,

and engines. Real-time photography and video recording can be performed, providing indispensable data collection for analyzing equipment usage status and equipment production guarantee.

V. Functions of Each Part of the Instrument
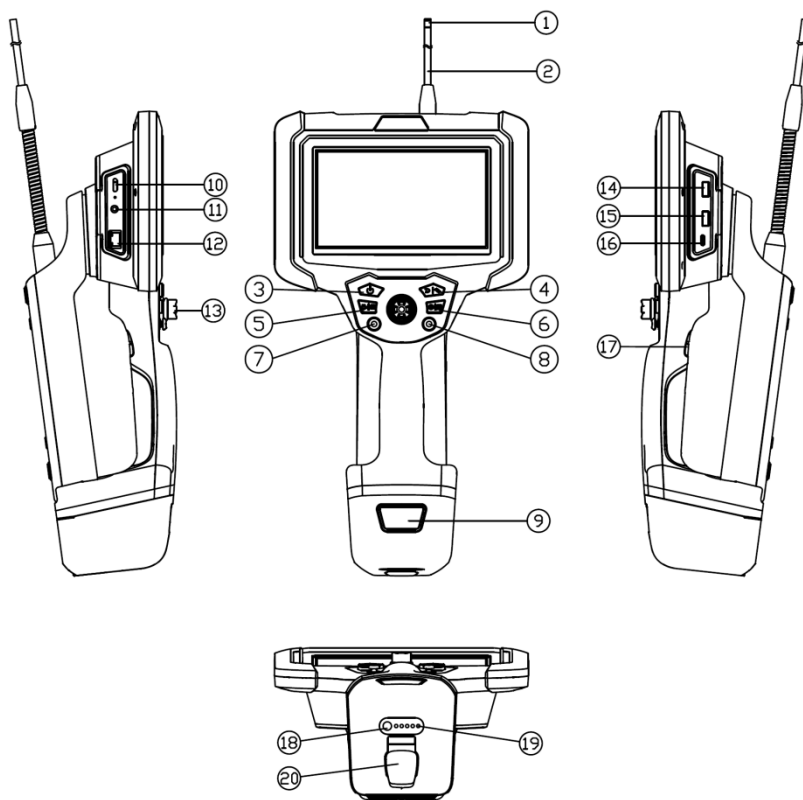
Figure 6-1 Host

See the table below for the numbered parts in Figure 6-1:

serial number	name
①	Camera
②	Insertion Tube
③	Host Key
④	Return/Motor mode Switching Key
⑤	Video Key /Video playback
⑥	Settings/Menu Key
⑦	Left Joystick
⑧	Right Small Joystick
⑨	Battery Pack
⑩	Mini HDMI Interface
⑪	Headset Jack
⑫	R J-45 Network Interface
⑬	Motor Rocker
⑭	USB Interface
⑮	USB Interface
⑯	Type-c Data Port
⑰	Camera Key /Switch Dual Cameras

⑱	Battery Pack Power Display Button
⑲	Battery Pack Indicator Light
⑳	Type-C Charging Interface

VI. Preparation Before Inspection

7.1 Handling of Case

 Important

- Before handling the boxes, please check whether there is any abnormality at the handle and buckles of the box.

- Please use standard boxes to prevent damage to the instrument.

■ Carry the Case

1) Make sure the snaps are closed tightly before lifting the case.
2) The smooth place can be moved with rollers.

Figure 7-1 Case handling

⚠ **Important**

● If the catch is not fully closed, the lid may accidentally open when the case is lifted.

● Do not kick or move the box.

■ **Unboxing**
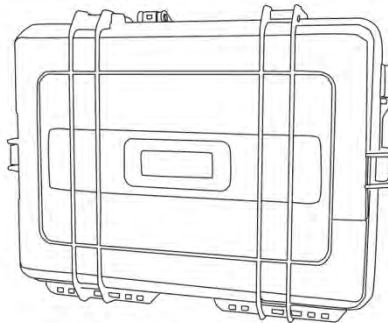
Figure 7-2 Take out the instrument from the box

⚠ **Warning**

● The cover must be fully opened before taking out the

instrument to prevent accidents caused by the automatic closing of the cover.

● Do not operate the main unit in the box to prevent the cover from accidentally closing and pinching your hands or signal lines.

⚠ **Important**

● Place the box horizontally so it remains stable.

● Before opening the box cover, please release the buckle on the front of the box.

● When taking out the insertion tube from the box, handle it with care. If the force is too strong, the insertion tube may be damaged.

● When taking the operating handle or main unit out of the box, never use the insertion tube or signal wire to secure it.

● Check whether the insertion tube, the host and the quick connector of the operating handle are clean. If there are foreign objects, please wipe them with a dust-free cloth.

7.2 Install the instrument

When in use, the following instrument disassembly modules are battery pack, host, handle probe

Figure 7-3

Instrument detachable modules

1) As shown in the figure above, put the main unit horizontally, and fix the handle probe on the main unit with a hexagonal screwdriver. There are 4 screw fixing holes in total.

2) Align the battery pack with the position of the battery pack of the main unit and tighten the clip.

⚠ **Important**

● Place the main unit horizontally so that it remains stable.

● Do not place the instrument on a high place to prevent the instrument from slipping and being damaged.

● the instrument during use, please fix the handle at a place that can support its weight.

7.3 Ready to Charge

Figure 7-4

Open the Battery

■ Battery Pack Charging

1) Take out the power adapter and connect it to the Type-C charging interface of the battery pack.

2) Make sure the power cord is connected to the Type-C charging port.

3) Plug the power cord into a power outlet.

4) the green light flashes, it means charging, and when the green light is all on, it means charging is complete.

5) Press the " battery pack power display button" to check the power, and the light will go out after 5 seconds.

⚠️ **Warning**

● Please check whether the power cord is in good condition before use.

● The input voltage of the power adapter is 100 - 240 V (50/60 Hz) AC, connecting to an outlet with an unrated voltage may result in fire or electric shock.

● Do not use non-specific power adapters, which may cause malfunction or damage to the instrument.

● The power adapter is not waterproof, it may cause electric shock when exposed to water.

● Charging input voltage: 20 V, current: 3A.

7.4 Check Insertion Tube

■ **Check the appearance of the insertion tube**

1) Observe the integrity of the outer material of the entire insertion tube and signal wire.

2) Check for loose outer covering material of the insertion tube (not the angled bend).

Figure 7-5

Inspect the Insertion Tube

⚠ **Important**

● If the insertion tube is deformed, it may not be possible to remove it from the viewing object.

● If the outer material of the insertion tube is broken, use caution to avoid injury.

■ **Inspect the Tip of the Insertion Tube**

1) Make sure the power is off.

2) Remove the end cap from the front end of the insertion tube.

3) If you find foreign matter on the lens, please clean it with a dust-free cloth, cotton swab or brush.

Figure 7-6

Lens cleaning

⚠ **Warning**

● Internal heat generated by electrical components can heat the tip of the insertion tube. Before wiping the lens, please turn off the light source and let it cool down before touching it.

⚠ **Important**

● the lens used, it may damage the optical adapter or the tip of the insertion tube.

● The angled bending part is composed of precision parts, please do not pull the front end of the insertion tube, and do not manually force the front end of the insertion tube to bend, which may damage the parts of the angled bending part.

7.5 Install the Operating Handle on the Host

The operating handle can be installed on the instrument as needed, which is convenient for carrying and observation.

    1) Align the I-shaped groove of the operating handle with the U-shaped groove of the host and press the front of the host vertically downward to press the operating handle into the U-shaped groove.

    2) When removing the operating handle from the instrument,

place the front of the instrument vertically and lift the operating handle.

7.6 Attaching and Removing Shoulder Straps

To hang the instrument on your shoulder, please attach the shoulder strap. Please use the original shoulder strap provided by manufacturer.
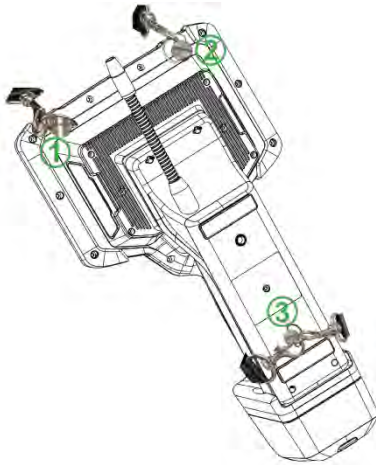
Figure 7-7

Shoulder strap installation

1) The 4 buckles of the shoulder strap to the 3 fixed positions of the instrument respectively.

2) There is a buckle on the left and right sides of the back of the host (as shown in Figure 7-7), ① and ② are fixed.

3) 2 buckles are hung on the back of the battery compartment at the same time (as shown in Figure 7-7), ③fixed position.

Figure 7-8

Shoulder Strap Installation Completed

4) Use the length adjuster to adjust the length of the shoulder strap and hang it on the shoulder.

5) Fix the insertion tube on the instrument with strip Velcro to avoid accidents caused by pipeline suspension.

⚠ **Warning**

● Do not use the shoulder strap to carry objects other than the instrument to prevent damage to the shoulder strap and cause the instrument to fall.

● Make sure there are no problems with the shoulder straps before use, such as fiber wear and metal parts damage.

● Do not subject the shoulder strap to excessive loads, such as shaking the instrument or placing heavy objects on it.

● When using the shoulder strap, please do not knock the instrument into other objects.

⚠ **Important**

● When installing or removing the shoulder strap, be careful not to drop the instrument.

● Do not store the instrument in a hanging position, the shoulder strap may be damaged.

● Carefully check to ensure that the shoulder strap hook is firmly fixed on the instrument, if the main unit is lifted directly by the shoulder strap, the instrument may fall.

■ **Install the Shoulder Strap**

1) While pressing the shoulder strap hook lever, install the hook to the 4 buckles on the shoulder strap of the main unit.

2) Use the length adjuster to adjust the length of the shoulder strap and hang it on your shoulder.

3) If you walk with the operating handle installed on the right side of the main unit, please insert the signal line between the handle and the main unit to avoid accidents caused by signal line suspension.

■ **Remove the Shoulder Strap**

When removing the shoulder strap, please press and hold the hook lever of the shoulder strap, and at the same time remove the shoulder strap from the strap buckle of the instrument.

VII. Basic Operation

8.1 Start up

Press and hold the [On/Off button] on the right side of the top of the instrument ⦿, the instrument will start and display real-time images.

8.2 Button and joystick function description
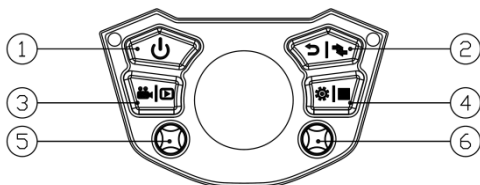
Figure 8- 1 Button Map
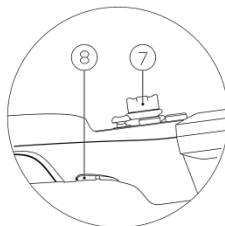
Figure 8- 2 Button Map

See the table below for the names and modes of the button numbers in

Figure 8-1 and 8-6

Serial Number	Name	Method	Real-time monitoring mode	Survey Navigation Mode	System settings navigation mode
①	Power On	Long press 3s	-	-	-
②	Return/Motor Mode Switching Key	Short press	Return/ motor mode is divided into lock fine-tuning, stepping, normal state	-	-
③	Left Video Key/Video Playback Key	Short press	Video record/stop	-	-
		Long press	image playback	-	-
④	**Settings/Menu Key Profile Cloud Cutting Change**	Short press	Show main menu navigation	Profiling/ 3D Cloud Mapping Switching	-

	Button	Long press	Enter system settings	-	
⑤	**Left Joystick**	Move left and right	choose left and right	left and right selection	-
		Move up and down	Up and down selection	Select point up and down	up and down selection
⑥	**Right Small Joystick**	Move left and right	choose left and right	left and right selection	-
		Move up and down	up and down selection	Select point up and down	up and down selection
⑦	**Direction Rocker**	control steering			
⑧	**Camera Button**	Short press	Photograph		
		Long press	Switch cameras (only for dual cameras)		

8.3 Menu

Main menu interface (as shown in Figure 8-3):

Figure 8-3

Short press the "Settings/Menu Button" without any operation, the menu bar will be automatically hidden or displayed.

Small joystick operation: In real-time monitoring mode, all functions can be adjusted by moving the small joystick up and down.

8.3.1 【Camera Brightness Adjustment】

[Camera Brightness Adjustment] icon on the screen to adjust the camera brightness, and the brightness level is divided into 1-10 levels.

8.3.2 【Screen brightness adjustment】

Click the [Screen Brightness Adjustment] icon on the screen to adjust the screen brightness, and the brightness level is divided into 0~10 levels.

8.3.3 【Display scale adjustment】

Click the [Display Ratio Adjustment] icon on the top of the screen to change the display ratio of the image. There are three display ratios: 16:9, 4:3, and 1:1.

8.3.4 【Color Mode Adjustment】 ⬚

Click the [Color Mode Adjustment] icon on the top of the screen to change the color mode. The color mode is divided into four types: original mode, close mode, far mode, and custom mode.

In the case of selecting the switch color mode icon custom mode, an edit icon will appear, click the edit icon to enter the color parameter setting interface.

Select the [Default] button to restore the factory default value, select the [OK] button to save the color and return to the main menu.

8.3.5 【Grid Measurement 】 ⬚

Click the [Grid Measurement] icon on the screen to select grids of different sizes. The grids are divided into three multiple sizes of 1, 2, and 4. ⊞ The actual distance of the corresponding side length of a grid is 20mm; ⬚ the actual distance of the corresponding side length of a grid is 10mm; the ⬚ actual distance of the corresponding side length of a grid is 5mm; users can estimate the size of a specific object through the grid.

⚠ **User Tip**

The grid measurement is related to the actual shooting distance of the camera. If you need to use this function, you need to correct the distance of the camera yourself.

8.3.6 【Image Browsing】 ⬚

Touch operation: Click the [image browsing] icon on the screen to enter the image browsing interface (as shown in Figure 8-4).

For details, refer to 8.6 image browsing.

Figure 8-4

8.3.7 【Zoom Function】

Click the [zoom function] icon on the screen to zoom the real-time monitoring interface. The zoom factors are: 1.15, 1.30, 1.45, 1.60, 1.75, 1.90, 2.05, 2.20, 2.35, 2.50.

8.3.8 【Flip Adjustment】

Click [Flip Adjustment] on the top of the screen to flip the real-time monitoring interface, the following four modes:

 For the actual screen, the default setting.

 180° Based on the actual picture.

 Left and right mirroring based on the actual picture.

 Based on the actual picture.

8.3.9 【Inverse Color Function】

Click the [Inverse Color Function] icon on the screen to adjust the inverse color of the real-time monitoring interface.

8.3.10 【Freeze Function】 ⬚

Touch Operation: Click the [Freeze Function] icon on the screen to freeze ⬚ and unfreeze the real-time monitoring interface ⬚ .

8.3.11 【White Balance Adjustment】 ⬚

Click the [White Balance Adjustment] icon on the screen to adjust the white balance on the real-time monitoring interface. The white balance is divided into ⬚ two modes: automatic white balance and manual white balance. ⬚

Note: Some cameras do not have automatic white balance function, please refer to the actual situation.

8.3.12 【System Settings】 ⬚

Click the [System Settings] icon on the screen to enter the system settings interface, see 8.5 System Settings for details.

8.4 3D Measurement

Click the 3D measurement icon ⬚ on the main interface to enter the 3D measurement interface and perform 3D measurement.

The operation method of entering 3D measurement:

① Point the camera at the object to be measured and try not to Move the camera abruptly.

② Click the 3D measurement icon ⬚ to enter the 3D measurement interface.

③ After clicking the icon, keep the camera position for about 1 second to prevent image and 3D point cloud image generation failure or poor effect.

④ After entering the 3D measurement interface, you need to wait for about 5 seconds to generate the measurement

image and 3D point cloud image.
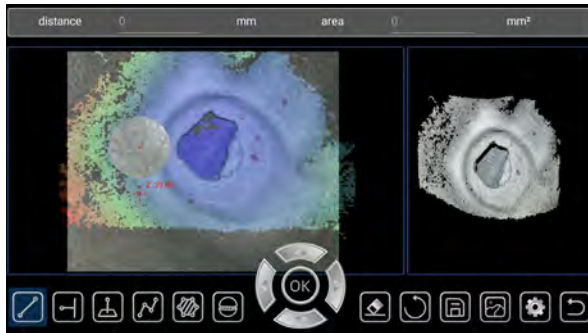
The 3D measurement interface is as follows:

Figure 8-5

Icon	Name	Icon	Name
	Straight Line Distance		Reset Measurement
	Multiline Length		Set Up
	Back to Previous Step		Point to Surface (Depth)
	Image Browsing		Profile
	Point to Line Distance		Save measurement results
	Perimeter and Area		exit measurement

Before measuring, select the type of measurement method:
Straight-Line Distance, Point-To-Line Distance, Point-To-Surface
(depth), Multi-Line Length, Perimeter and Area, Section, and
click the corresponding icon to select.
How to choose a point:

34

Screen Touch	Click the effective position of the measurement image on the left, and the cursor $-\overset{|}{+}-$ will be displayed on the corresponding position. The position can be adjusted by moving the virtual joystick up, down, left, and right. Click the "OK" button of the virtual joystick to confirm the selected point. After confirmation, the image will Displayed with a yellow dot marker.
Small Joystick Operation	Left joystick: Fine adjustment, very fine adjustment can be made by operating the left joystick. Right rocker: larger adjustment, by operating the right rocker, you can adjust the position by a large margin. You can first use the right joystick to confirm the approximate position of the selected point, and then use the left joystick to adjust the details, so that you can select the measurement point more accurately.

When adjusting the position, the cursor will move along with it, and a magnified interface will be displayed next to the cursor, which is the magnified area of the picture where the cursor is located. This function allows the operator to select the measurement point more accurately.

When the selected point is an invalid point, the interface will prompt the operator that the point is invalid.

When moving the cursor, the depth value (z value) of the measurement point will also be displayed in real time.

8.4.1 【Straight Line Distance】

This mode is to measure the distance between two specified measuring points. After selecting two measuring points in the left image through the point selection operation, the distance between the two points will be automatically generated and displayed on the image.
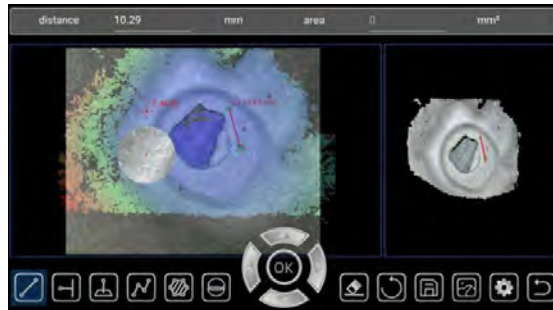

Figure 8-6

8.4.2 【Point to Line Distance】

This mode is to measure the distance between a point and a straight line. After selecting three measuring points in the left image through the point selection operation, the distance between the point and the line will be automatically generated and displayed on the image. The first point is the measurement point, the second and third points are
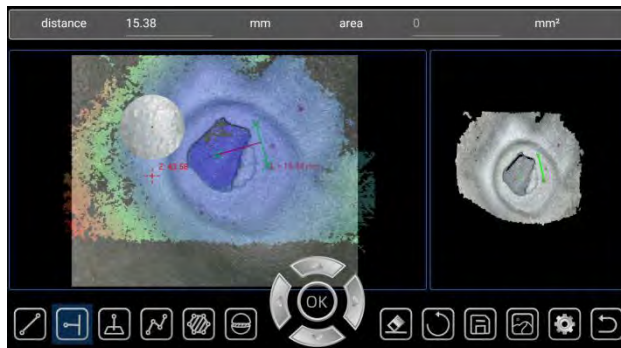
two points on the straight line.

Figure 8-7

8.4.3 【Point to Surface Distance (Depth)】 ⏏

This mode is to measure the distance between the point and the straight line. After selecting 4 measuring points in the left image through the point selection operation, the distance between the point and the line will be automatically generated and displayed on the image. The first point is the measurement point, the 2nd, 3rd, and 4th points are three points on the plane.
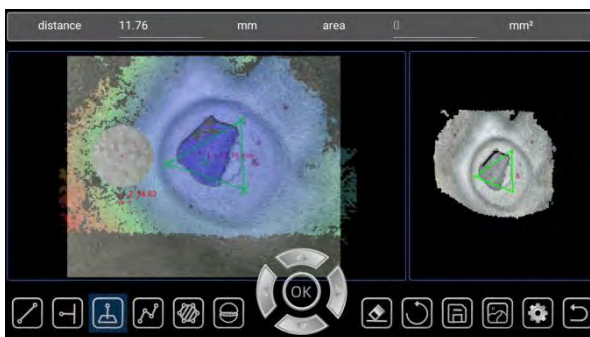

Figure 8-8

8.4.4 【Multiple Segment Length】 ⧑

This mode is to measure the sum of the lengths between the line

segments composed of multiple points. Select the measurement point in the image on the left, when the number of points is more than 1 point, the sum of the lengths of the line segments composed of these points will be automatically updated on the interface every time a point is selected, and displayed on the interface.
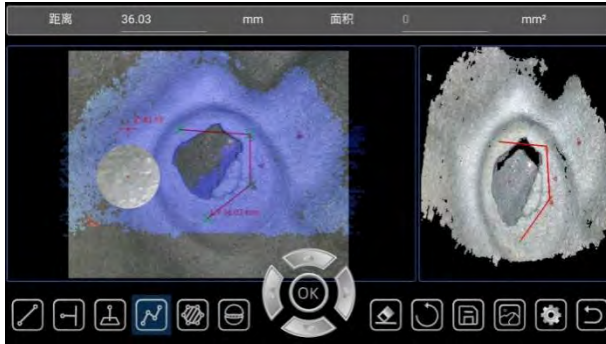

Figure 8-9

8.4.5 【Perimeter and Area】

This mode measures the perimeter and area of a polygon composed of multiple points. By selecting the measurement points in the image on the left, when the number of points exceeds 2 points, the perimeter and area of the polygon composed of these points will be automatically updated on the interface every time a point is selected, and the results will be displayed on the interface.
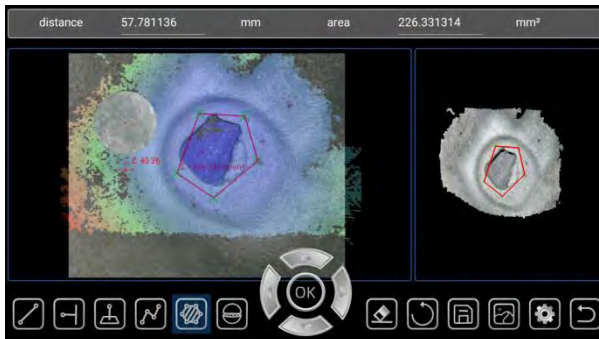
Figure 8-10

8.4.6 【Profile】 ⊖

This mode is to obtain the depth trend graph of a section on the cloud map relative to the points on the measured object. By selecting 3 measurement points to form a surface, obtain the depth of all points on the surface that intersect the measured object, and use the trend displayed in graphic form. Click the "Menu" button on the keypad to hide or display the trend graph.
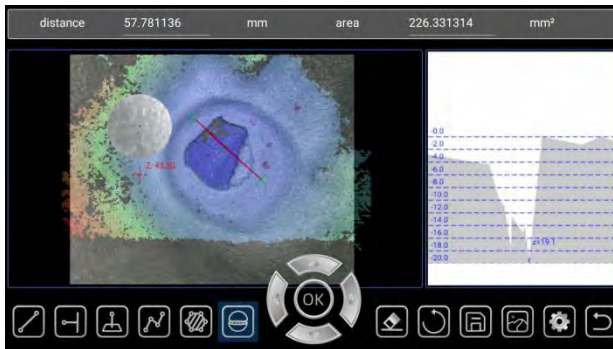

Figure 8-11

8.4.7 【Back to Previous Step】 ✎

Click this icon to return to the previous step.

8.4.8 【Reset Measurement】 ↺

Click this icon to clear all measurement points and measurement results on the image on the left, and perform measurement again, with the measurement method type unchanged.

8.4.9 【Save Measurement Results】 ⊖

Click this icon to save the measurement results in the form of pictures, and the measurement points and measurement results will be displayed on the saved pictures.

8.4.10 【Image Browsing】 🖼️

Click this icon to enter the image browsing interface, where you can view the saved measurement results and the generated point cloud image, original image, and grayscale image, and click the original image for secondary measurement.

Click on the icon to enter the image browsing interface, click on the relevant folder to view the saved measurement results as well as the generated point cloud, original map, and grey scale map, you can click on the original image for the second measurement, you can export the report to generate a PDF format image, you can view the saved report in the PDF folder.

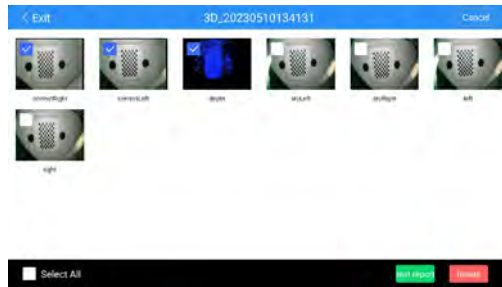The steps to generate a report are shown below:

Step 1: Click Image Browse to enter File Management as shown below:

Step 2: Click on the folder of 3D measurement images you want to export, and enter the folder, such as shown in the figure below:

Step 3: Click on the image you want to export the report as shown below:

Step 4: Click on the bottom right corner from the second icon on the right to export the report, as follows：

Step 5: Edit the report, click Preview, click Save to form the report, as follows：

8.4.11 【Set Up】 ⚙

Click on the icon to enter the setting interface, you can set the unit of measurement, divided into mm(mm) and inch (inch), you can set whether to hide/display the depth map on the left image, and you can set the function of displaying the full-screen 3D map.

8.4.12 【Return】 ↩

Click this icon to return to the camera monitoring interface (main interface).

8.4.13 【Point Cloud Display】

The area displayed on the right side of the interface is the point cloud image, which is the representation of the 3D space points of the measured object, and the specific shape of the measured object can be seen. The measured object can be observed by rotating, and the point cloud image can be zoomed in and out.

Another function of the point cloud image is to verify and determine whether the measurement point selected in the picture on the left is correct, and whether the selected point is on the measured object, which can better ensure the accuracy of the measurement.
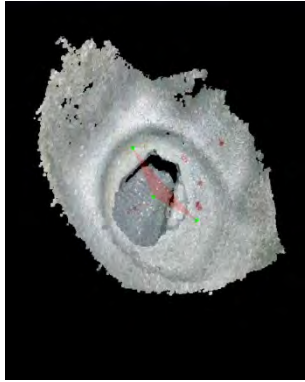
Figure 8-12

⚠ **If you cannot get precise result, please follow the below instructions for troubleshooting**

1） Bring the endoscope as close to the object as possible so that the object shows on the full screen.
2） When selecting measure points, try to select areas with high point cloud density.
3） If the object has similar patterns around the measurement point, lacks surface features, or the image is blurry or reflective, change the observation point and recapture the image.
4） If you still can't improve the accuracy, please retake the picture.

8.5 System Settings

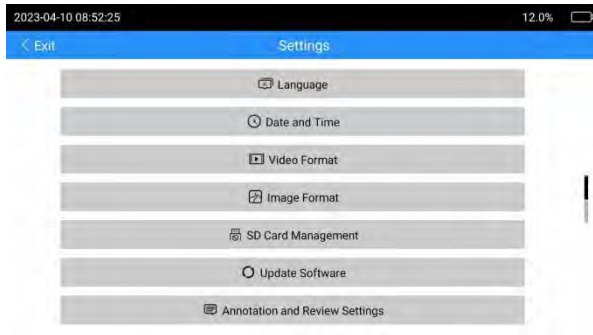System setting main interface (as shown in Figure 8-13):

Figure 8-13

up the menu with your finger to switch to the second page menu (as shown in Figure 8-14):

Figure 8-14

Swipe right on the menu button to switch to the first page menu.

8.4.14 【Language】

Click the [Language] icon on the main interface of the system settings to enter the language settings (as shown in Figure 8-15):
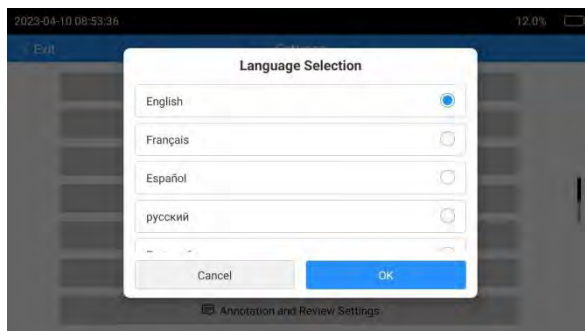
Figure 8-15

Ten languages (Chinese, English, French, German, Korean, Portuguese, Russian, Traditional Chinese, Japanese and Spanish) are available, click the button of the corresponding language to switch, click the [Cancel] button to exit the language setting interface.

8.4.15 【Time】

[Time] icon on the main interface of the system setting to enter the time setting (as shown in Figure 8-16):
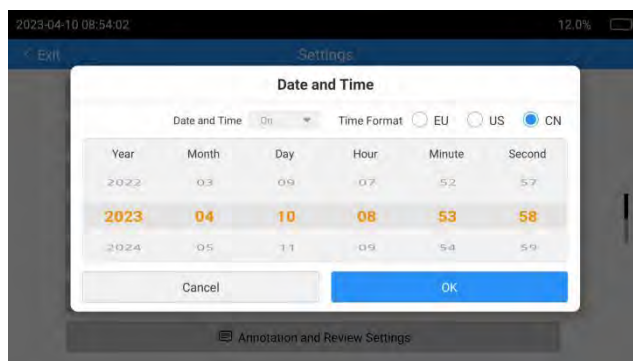

Figure 8-16

The time setting is divided into three formats: European (EU), American (US), and Chinese (CH). Set the main interface to display the time and select "On", and not to display the time. Select "Off", click [OK] to save the settings, and exit the time Settings, click [Cancel] without saving the settings, and exit the time setting.

8.4.16 【Video Format】

Click the [Video Format] icon on the main interface of the system settings to enter the video format settings (as shown in Figure 8-17):
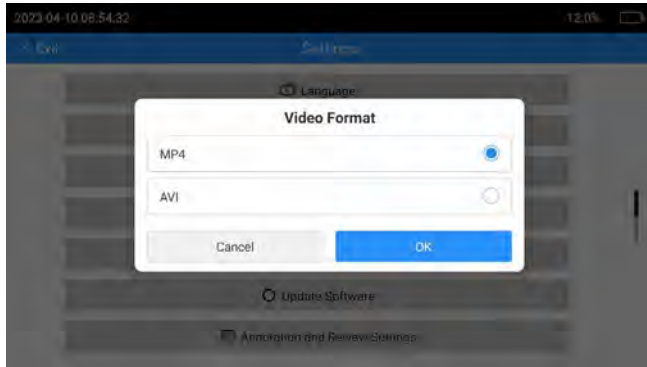

Figure 8-17

Video format: Set the file format for saving the video after recording the video, divided into AVI and MP4.

8.4.17 【Image Format】

Click the [picture format] icon on the main interface of the system settings to enter the picture format setting (as shown in Figure 8-18):
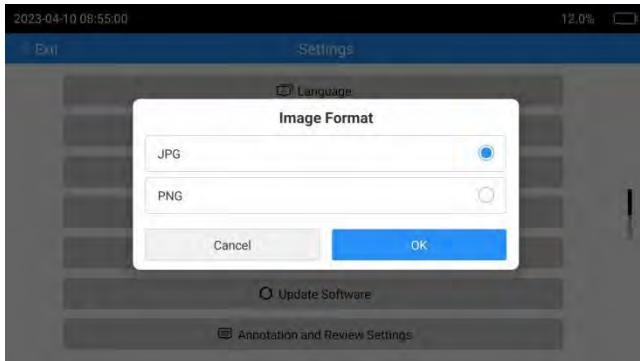

Figure 8-18

Picture format: Set the save format of the picture when taking pictures, divided into JPG and PNG.

8.4.18 【SD Card Management】

On the main interface of the system settings, click the [SD card management] icon to format the SD card, click [OK] to format the SD card, and click [Cancel] to exit the SD card format (as shown in Figure 8-19):
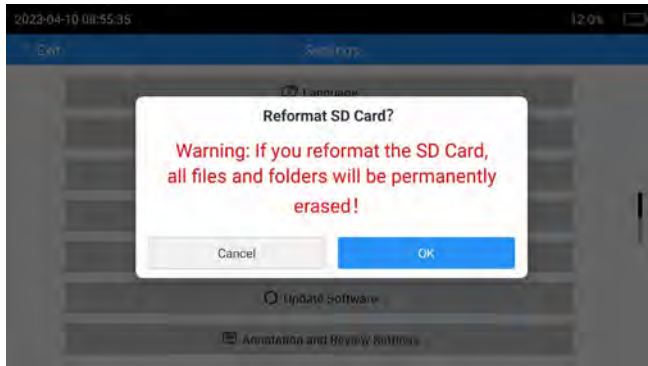

Figure 8-19

8.4.19 【Software Update】

[Software Update] icon on the main interface of the system settings to update the software. First copy the update file "scope" to the SD card, insert the SD card into the instrument, click [OK] to update the software, click [Cancel] to exit, and the software will restart after the software update is completed (as shown in Figure 8-20):
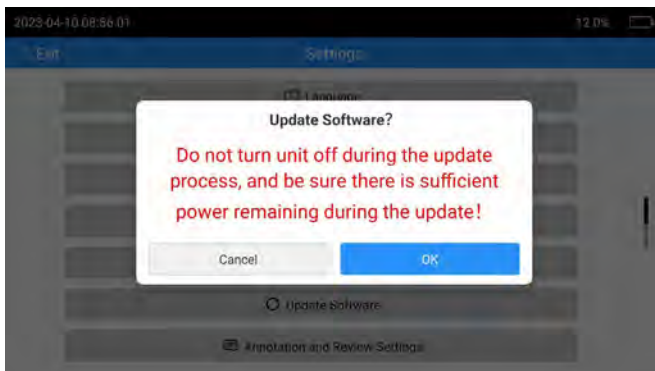

Figure 8-20

User Tip

Do not cut off the power when the instrument software is updated. Please pay attention to keep the battery fully charged during the update.

8.4.20 【Annotation settings】

Click the [Comment Settings] icon on the main interface of the system settings to enter the settings of image annotation, video annotation, and image dwell time (as shown in Figure 8-21):
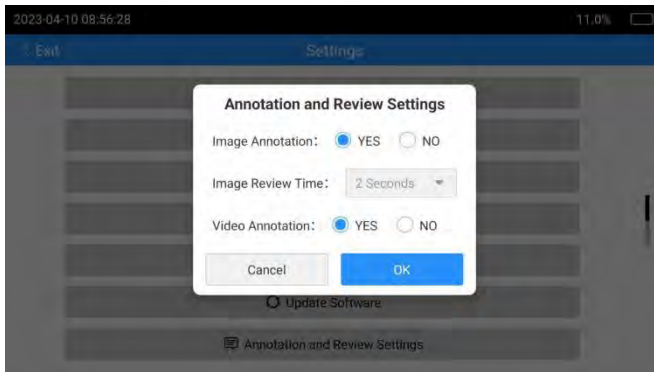

Figure 8-21

● **Image Annotation:** You can choose whether to make image annotation after taking pictures.

1）If it is set to "YES", a dialog box will pop up asking if comments are required after taking a photo. If you select "yes" to comment, the annotated picture will be saved; select "NO" to give up the comment.

2）If it is set to "NO", it will not ask whether to comment after taking a photo.

- **Video Annotation**: You can choose whether to make video annotation before video recording.

1）If it is set to "YES", the comment box will pop up before shooting the video, and after commenting, the video will have a comment watermark throughout.

2）If it is set to "NO", the comment box will not pop up before shooting the video.

- **Image Stay Time:** The time to stay on the picture that prompts "whether to add a note" after taking a picture.

1）The dwell time of the picture can be arbitrarily selected from 2 seconds to 15 seconds, and the prompt "whether to add a comment" will be prompted. If the picture comment selects "NO", the picture will not stay after taking a picture.

2）It is set as an optional time. If you select "YES" for the picture comment, the picture will stay for a corresponding time after taking a picture for the user to preview in real-time. When the time is over, it will automatically return to the real-time monitoring interface.

8.4.21 【About】

Click the [About] icon on the main interface of the system settings to enter the system information to view the software version number and handle version number (as shown in Figure 8-22):
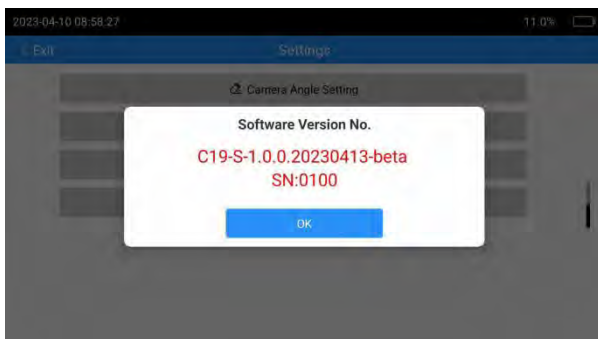
Figure 8-22

8.4.22 【WIFI Settings】

select "On" and confirm the WIFI settings (as shown in Figure 8-23):

Figure 8-23

the WIFI function is turned on, it will return to the implementation monitoring screen. At this time, the endoscope host has turned on the WIFI hotspot and displays the icon.

Connect the client (both mobile phone and computer) WIFI to the endoscope host hotspot name: endoscope, password: 12345678, and then open the dedicated APP or video application software to enter the real-time monitoring camera screen after the connection is successful.

Note: Some application software needs to enter the network address (rtsp://192.168.1.43:1234) provided by the endoscope on the APP side, and the instrument will push the video stream to the mobile phone or computer through this network address.

8.4.23 【Camera Temperature Setting】(optional feature)

Click the [Camera Temperature Setting] icon on the main interface of the system settings to set the camera temperature (as shown in Figure 8-24):
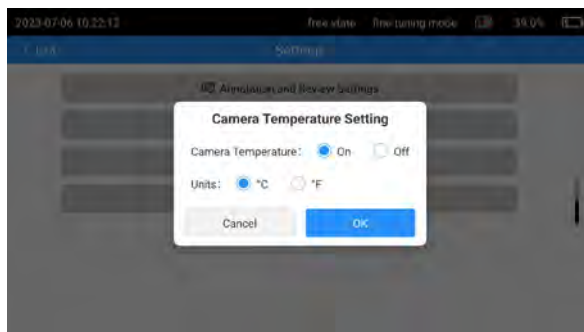

Figure 8-24

The camera temperature setting includes setting whether to display the real-time temperature of the camera on the main interface and the temperature unit, and the temperature unit is ℃ or ℉.

⚠ **User Tip**

Camera temperature setting requires corresponding camera support, please pay attention to model selection.

8.4.24 【Camera Angle Setting】 (hidden function)

Click the [Camera Angle Settings] icon on the main interface of the system settings to set the camera bending angle value and the joystick moving speed (as shown in Figure 8-25):

<div align="center">Figure 8-25</div>

1) Enter the camera angle setting, you can choose 850, 700, 650, and 3 angle values, you can also customize the angle value, click confirm to set successfully.

2) The joystick movement speed can be set to "fast" or "slow". Adjustment of the speed must be set at the same time as the angle value.

Note: 【Camera Angle Setting】 need to contact our company for setting.

8.4.25 【Light Source Settings】 (optional feature)

Click the [Light Source Settings] icon on the main interface of the system settings to set the light source (as shown in Figure 8-26):

<div align="center">Figure 8-26</div>

The current camera light source can be set to white light source or infrared light source. When it is set to infrared light source, there will be

a prompt for infrared light source on the main interface.

<div align="center">⚠️ Important</div>

The light source setting requires the corresponding camera support, please pay attention to the model selection, [Light source setting] needs to quickly click [WIFI setting] 10 times to display or hide this function.

8.4.27 【Calibration Settings】

Click the [Calibration Settings] icon in the main interface of the system setup to select the calibration mode for the

The camera screen enters the handle calibration mode (Figure 8-27):

<div align="center">Figure 8-27</div>

Return to the real-time monitoring screen, click "Start Calibration", and then calibrate the handle according to the calibration operation document. (Figure 8-28).

Figure 8-28

8.5 Image Browsing

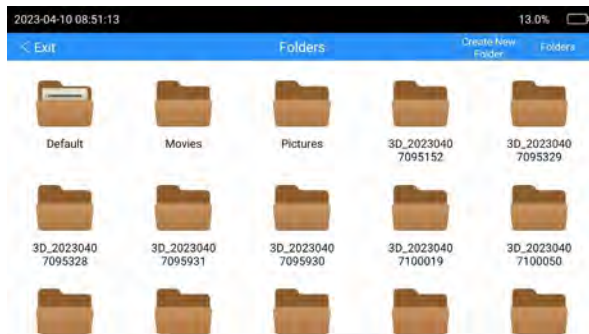Image browsing interface (as shown in Figure 8-29):

Figure 8-29

Click [Create Folder] to create a new folder, enter the folder name, and click Save to create a new folder to complete (as shown in Figure 8-30):
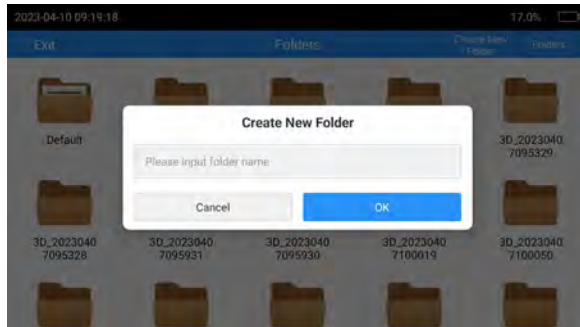
Figure 8-30

8.5.1 【Folder Management】

Click [Folder Management File] to enter the management operation mode, and click [Finish] to exit the folder management mode (as shown in Figure 8-31):
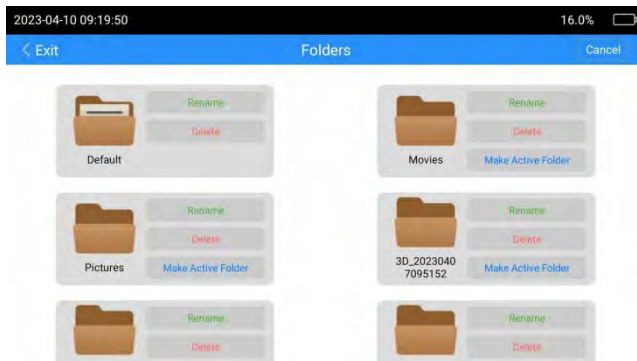

Figure 8-31

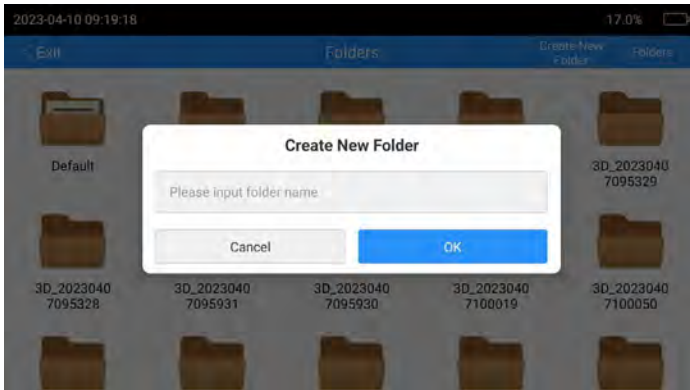Click [Rename] to rename the folder (as shown in Figure 8-32):

Figure 8-32

Click [OK] to complete the folder renaming.

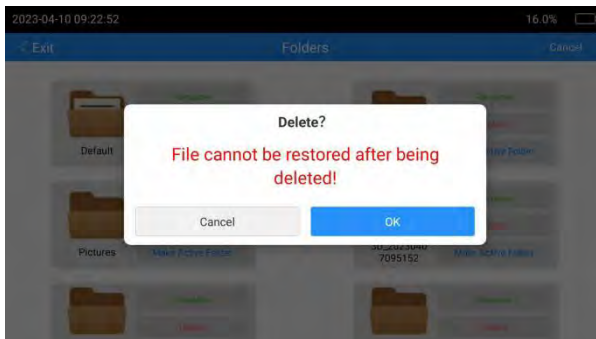Click [Delete] to delete the current folder (as shown in Figure 8-33):

Figure 8-33

Click [Set Default Path] to set the current folder as the default folder. After setting as the default folder, the photos and recorded videos will be saved in this folder.

⚠ **Instruction:**

● **The default folder is different than normal folders,**

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Pictures/videos will be stored in the default folder first.

● **The host is connected to the computer to read the data, and the contents in the SD card folder can be deleted and copied on the computer.**

8.5.2 【Photo and Video Browsing】

When the file is not in the folder management mode, click [folder] to browse the pictures and videos in the folder (as shown in Figure 8-34):
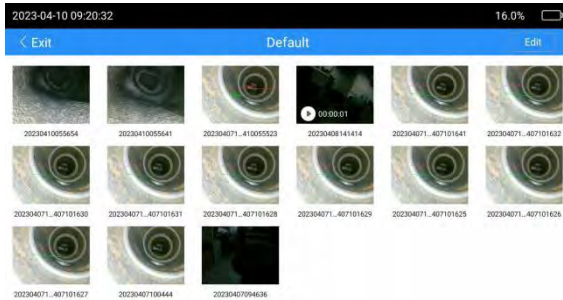

Figure 8-34

Click [Edit] to enter the multi-selection mode, and select multiple pictures or videos to delete (as shown in Figure 8-35):
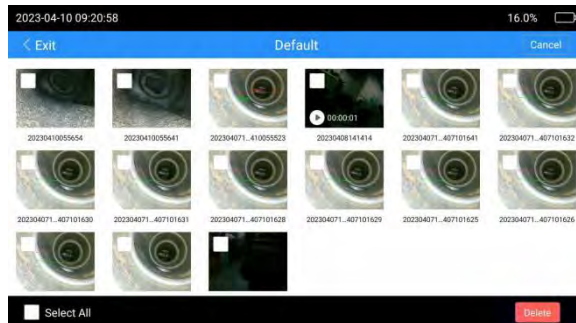

Figure 8-35

Without entering the multi-selection mode, click on the picture to enter the picture browsing mode (as shown in Figure 8-36):
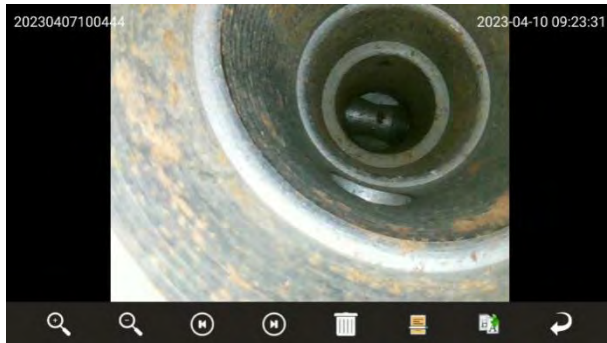
Figure 8-36

Click the zoom icon to zoom in on the picture.

Click on the zoom out icon for a reduced view of the enlarged image.

Click the forward and back icons to browse the previous picture and the next picture.

Click the delete icon to delete the current picture.

Click the rename icon to rename the current picture.

Click the edit icon to enter the picture editing mode.

entering the picture editing mode, click the curve icon to draw a line on the picture (as shown in Figure 8-37):

Figure 8-37

Click the arrow icon to draw an arrow on the picture (as shown in Figure 8-38):

Figure 8-38

Click the text editing icon to add a text watermark to the picture (as shown in Figure 8-39):

Figure 8-39

Click the measurement icon to measure the picture (as shown in Figure 8-40):

Figure 8-40

1）First select the position of the reference object in the picture by touching (the red line in the middle of Figure 8-40), The reference value refers to the data of this part that you already know, if you don't know any dimensions of the objects in the image, this function won't work.

2）Then select the location you need to measure (the green line in the middle of Figure 8-40), Please note that the measured value needs to be in the same plane as the reference value.

3）Finally, enter the reference real value, you can get the actual value required for the measurement, it is a simple 2D comparison measurement function.

4）Click Reset to re-measure.

Click the save icon to save the currently edited picture.

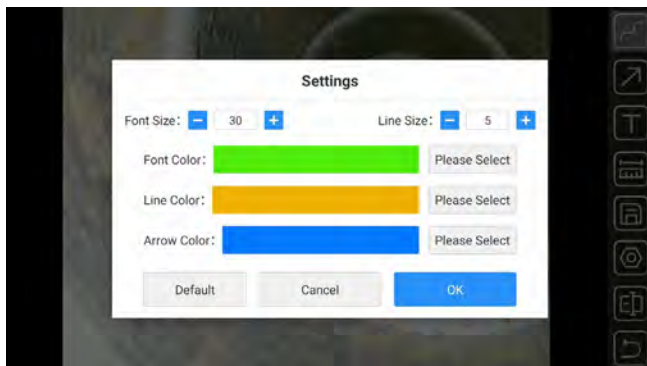Click the setting icon to set the line color or font size of each function (as shown in Figure 8-41):

Figure 8-41

Click the undo icon to undo all the effects of the current edit and return to the original picture state.

Click the exit icon to exit the picture editing mode.

Click the thumbnail of the video file to view the video (as shown in Figure 8-42):
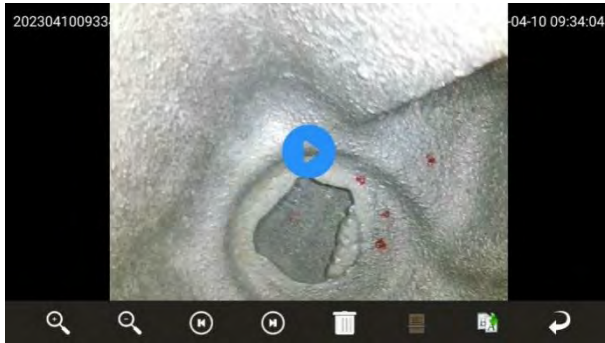
Figure 8-42

Click the play button in the middle to start playing the video, drag the left side of the screen up and down to adjust the screen brightness, drag the right screen up and down to adjust the sound intensity, drag the screen left and right to adjust the playback progress bar. to adjust the playback progress bar.

8.6 HDMI output

Connect the HDMI cable to the HDMI interface of the display and the host respectively to realize the video output interface and realize dual-interface display (that is, the host interface and the display interface).

8.6.1 【Introduction to Touch Screen Functions】

This instrument uses a resistive touch screen, which can also be used in harsh environments. Operations on the host interface (such as taking pictures, video recordings, etc.) can be performed with fingers or touch pens.

Important: Do not use sharp objects to press the touch screen. The touch pressure should not be greater than 120g.

8.6.2 【Data Transmission】

the main unit of the instrument is installed with a USB disk, and the pictures and videos taken will be automatically saved to the USB disk. Take out the U disk and use the card reader to read the data in the USB disk on the PC. When the instrument is turned on, you can use the data cable to connect to the PC to directly view or edit the data in the USB disk.

8.6.3 【Computer Sync Images】

Connect the HDMI cable to the HDMI interface of the display and the host respectively, and then turns on the host to realize the video output interface and realize dual-interface display (that is, the host interface and the monitor interface).
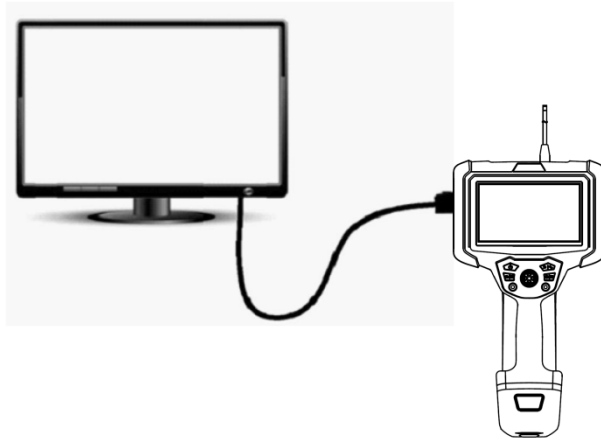
Figure 8 - 43 host connected to the display

8.7 Steering line handling guide

8.7.1 【Check the Angle Bend Function】

1) Straighten the insertion tube.
2) Slowly operate the rocker in the operating handle to ensure that the angled section moves smoothly.

⚠️ **User Tip**

The angle bending action corresponds to the angle and direction of the joystick action.

8.7.2 【Normal Mode】

1）The first is the normal mode, at this time the display shows the normal mode.
2）moving the joystick can control the 360° steering and locking function of the instrument lens in real time.
3）If you need to locate and observe, move the joystick to

the observation angle, stand still for 3 seconds, and the direction will be automatically locked.

4）If you want to reset the lens, just move the joystick arbitrarily and release it, and the lens will automatically reset.

8.7.3 【Fine-Tuning Mode】

1）Press the " Return/Motor Mode Switching Key" button

⊃｜⇆ directly and the display will prompt fine-tuning and enter the fine-tuning mode at this time.

2）At this time, move the joystick to fine-tune the direction.

3）   Fine-tuning mode, which is fine-tuning based on the normal mode. At this time, the display shows the fine-tuning mode, and the bending direction will be automatically locked when it is adjusted to any direction.
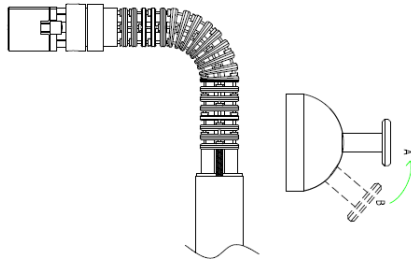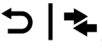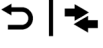

Figure 8-44

Angle Check and Lock/Fine Adjustment

⚠ **Warning**

● When entering the locking and fine-tuning functions, do not bend the lever excessively with your hands.

8.7.4 【Stepping Mode】

1） Press the " Return/Motor Mode Switching Key " button directly ⏎ | ➥, the display prompts to step mode.

2） After entering the stepping mode, the steering will automatically straighten the steering position.

3） Move the rocker up and down, the bending direction will be synchronized with the rocker, and the angle is still locked even when the rocker is released.

4） If you need to reset the lens, press the " Back/Motor Mode Switching Key " button again ⏎ | ➥, the lens will automatically straighten the steering position, and the fine-tuning function of the instrument display will disappear.

5）

8.7.5 【Interchangeable Lens Series Only】

1) Check for dust or water inside and outside the objective lens. If there is dust or water, please hold the hard part of the end and wipe it clean with soft gauze, cotton swab.

2) Position the optical adapter by the end of the insertion tube, then carefully insert the optical adapter into the end of the insertion tube.

positioning section of the optical adapter

the second screw thread

nut

optical adapter

the end of the insert tube

O-ring

the first screw thread
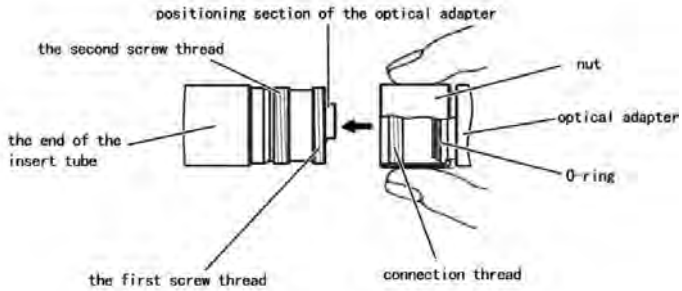
connection thread

Figure 8-45

3) Turn the optical adapter nut clockwise until the first turn passes through the connecting threads.

optical adapter

Figure 8-46

4) Once through the first thread, turn the entire optical adapter body clockwise while gently pushing the end of the insertion tube into place and no further turns.
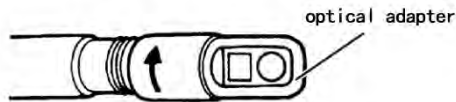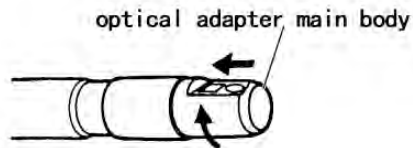

optical adapter main body

Figure 8-47

5) Turn the optical adapter's nut clockwise until a second turn of thread is threaded onto the connecting threads. Tighten the nut until it cannot go any further.

8.7.6 【Insertion Tube】

■ Hold the operating handle and insertion tube

1) When the rocker is working, the operation can be completed by pressing the thumb.

2) Other buttons can be operated by pressing and holding the thumb.
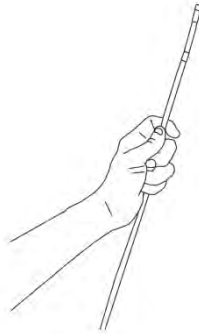
Figure 8 -48 handle operation

■ Insertion Tube

1) When observing the monitor screen, carefully check the insertion tube and slowly insert the observation object, bending the angle as needed, using careful and even force.

2) When withdrawing the insertion tube, please confirm that the front end of the insertion tube is in a straight position (the rocker is in the middle position), and then withdraw it slowly.

■ Angle Bending Operation

1) According to the needs of on-site inspection, operate the joystick to control the bending of the lens for observation.

2) Adjust the brightness of the light source to achieve the desired brightness, so that the picture can achieve the clearest effect.

⚠ **User Tip**

1) If the bending control mechanism stops its function, or if any abnormality is found during the operation of the instrument, please stop using it immediately. Release the joystick to the auto-zero (central) position and carefully withdraw the insertion tube from the observation.

2) If you hear a harsh current sound inside the instrument when you move the joystick, please stop using it, and use it only after the test is normal.

3) You should develop the habit of moving the rocker slowly.

4) Repeated bending of the insertion tube reduces the maximum bend in the angled bend, keeping the insertion tube as straight as possible.

5) Make sure that the insertion tube and the lens are straightened before starting work. When the insertion tube is curled up, it is strictly forbidden to turn to avoid damage to the traction mechanism.

8.7.7 Remove the insertion tube

1) Unlocks the angle bend lock.

2) Remove the insertion tube.

⚠ **Warning**

● Do not remove the insertion tube while angling, locking, or fine-tuning the angle, as this may damage the insertion tube and scope.

- In a short time after use in a high-temperature environment, the temperature at the front end of the insertion tube becomes high, and it can be used after cooling down.
- If the insertion tube is abnormal during the removal process, please turn the rocker lightly to remove it, do not use too much force to avoid damage.

VIII. Instrument storage and maintenance

9.1 【Cleaning and Maintenance】

■ **cleaning insertion tube**

1) Wipe foreign matter from the insertion tube with a lint-free cloth.
2) If liquid (wastewater or engine oil) touches the insertion tube, wipe it in the following order: ① Wipe with a dust-free cloth or cotton cloth. ② Wipe with a neutral detergent and a dust-free cloth. ③ Wipe with a dust-free cloth dipped in water. ④ Wipe away water stains with a lint-free cloth.

⚠ **Important**

- To prolong the life of the insertion tube, clean it with a lint-free cloth.
- Do not rinse the lens directly with tap water, it may damage the instrument.
- Store the instrument horizontally at room temperature and keep the room clean and dry.

- Do not collide with other objects when storing, handle it with care and use it safely.
- When not in use for a long time, the function of the instrument should be checked regularly.

⚠ **Warning**

- Keep the instrument out of the reach of children and use it only after you are familiar with the rules of use.
- It is strictly forbidden to store the instrument in high temperature, high humidity, strong light, strong shock, high dust, polluted or corrosive environment.

■ **Clean the LCD screen**

If you find fingerprints or stains on the LCD screen, wipe it clean with a dust-free cloth.

■ **Clean the host and operating handle**

If the main unit is found to be dirty, wipe it clean with a dust-free cloth.

⚠ **Warning**

- Do not wash the instrument directly with tap water to prevent damage to the instrument.

9.2 【Repacking】

Reassemble the instrument in the following order: Access Line → Main Unit.

⚠ **Important**

1) Store the operating insertion tube and main unit in the correct

order. Insertion tubes may be damaged if not stored in the correct order.

2) When putting the insertion tube into the box, please handle it with care, otherwise the insertion tube will be damaged.

3) Store the insertion tube so that it does not become bent.

4) Please lock the buckle of the case correctly. If not locked properly, the lid may open during handling.

5) Before putting the main unit back into the box, please lay the box flat and close the lid carefully, so as not to pinch your hands or instrument accessories.

6) Please use the standard box, otherwise the instrument may be damaged or malfunction.

■ **Close the box**

If the box is hit while moving, the lid of the box may open. Boxes should be checked for tight closure during handling.

⚠ **Important**

Fasten the four buckles of the case.

9.3 【Precautions for Storage】

1) Store the instrument under normal room temperature and humidity conditions.

2) Please turn off the instrument power before packing.

3) Place the instrument on a clean, dry, and stable surface.

⚠ **Danger**

Do not bend, pull, twist, or crush the signal wires with

excessive force, otherwise a break in the signal wire may result in a risk of fire or electric shock.

⚠️ **Important**

1) Do not store the instrument in places with high temperature, high humidity, excessive dust or fine particles, direct sunlight, or discharge of radioactive substances, otherwise the instrument may be damaged.

2) Handle it gently when storing. Do not hit it against other objects. Otherwise, it could cause a failure.

IX. Troubleshooting

Please contact Yateks if cannot solve by referring to the following method, and do not use the device.

① Inspect the equipment as described in Chapter 8 or have obvious problem.

② If the problem cannot be solved by referring Chapter 10.1

10.1 【Troubleshooting Guide】

Fault	Possible reason	Recommended Action
The system cannot be turned off.	Operation freezes frequently	Press and hold the "host switch" for 6 seconds to shut down and restart; pull out the battery and restart
video playback	It can't play the video of AVI format.	It can be played by using the VLC media player which is the professional software as provided by our company or QQ Player.
Pictures and videos cannot be recorded	the U disk is insufficient, or the U disk is not inserted	Delete the files in SD card or insert the SD card
No card is still shown after the insertion of the SD card	The SD card is inserted well	Need to reinsert into the card slot
Shut down automatically	If the ambient temperature of the instrument is too high, it will trigger automatic shutdown	Terminate the check, allow the instrument to cool down, and then turn it on again
	*Low battery triggers automatic shutdown	Charge the instrument Charge the battery
The image is not sharp.	The object lens on the videoscope end or the optical adapter is	Wipe with a clean lint-free cloth or cotton swab

	dirty.	
The operating handle has a "squeak" sound	Motor Noise	It is normal.
The load is more and more strenuous when the bending is manipulated	Bending control motor overloads.	Stretch the insert tube as far as possible to reduce the looping amount.
The bending can't return to the initial position.	Set up the bending locking	Move the joystick arbitrarily to release the angle bending lock Move the joystick in any way to release the bending locking.
	The locking and tuning function might be entered. At this time "Locking/tuning" indicator is red.	Press "Locking/tuning" button again and then the "Locking/tuning" indicator goes out and the bending locking is released. The angle returns to the initial position. It can reposition the direction.
Depth of field is wrong	Optical adapter thread not screwed into place (interchangeable lens series only)	operate according to 8.7.5

Poor Color Reproduction	The white balance setting is wrong.	readjust white balance
When the Battery is Sufficient, the Low Battery Warning Will Pop Up	Power monitoring is wrong	Ignore it, wait a few seconds and it will disappear
Video Recording Can't Be Closed, Recording Repeatedly, Clicking File Management Will Exit	SD card is not in FAT32 format.	Format the SD card once, in FAT32 format.

10.2 【Instrument Repair】

1) Before returning the instrument for repair, contact Yateks USA please. It shall include the failure and a detailed description of the conditions under which it occurs when returning the device.

2) Failures that occur during the warranty period are repaired at no charge according to the warranty agreement. Be sure to attach the warranty agreement when returning the device for repairs.

3) Any parts of this product are not provided for the autonomous repair by users. Do not attempt to dispatch, modify, and repair. Otherwise, Yateks does not undertake any responsibility for the damages and losses of users caused by those. The repair service of this product is only offered by

Yateks and its authorized agencies.

⚠ **Warning**

Yateks doesn't have any responsibility for any hurt or damage caused by the repair other than those made by Yateks

External Standards

Low Voltage Directive and EMC Directive	Conforms to CE	CE
WEEE Directive	Compliant with WEEE	🗑
RoHS Directive	RoHS Compliant	**RoHS**

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