Industrial Videoscope

User Manual

COANTEC X5 Series

Please read the User Manuals carefully before using this instrument.

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In case of any questions, please call our after-sales service personnel. **Tel.: +86 -755-89728626**

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1.1 Purpose and Application Scope

This product is designed to observe the inner surface and internal structure of the target object in real time and it can collect image data by photographing and recording a video. Three-dimensional measurement function can be configured to accurately measure the internal defects of equipment or parts and components, providing users with more complete and reliable test data. It is suitable for testing in the fields of aerospace, automobile manufacturing, precision casting, railway and ship, petrochemical power, special equipment testing, etc., so as to help users better familiarize the situation on site.

1.2 Repair and Refitting

This product has no parts or components that can be repaired by the user. Do not try to disassemble, refit or repair the instrument by yourself, and Coantec will not assume any responsibility for injury or loss caused to the user thereby. This product can only be repaired by Coantec and its authorized dealers.

1.3 Safety Precautions

- **When using this product, please observe the following instructions to avoid accidental injury or instrument damage due to improper operations:**

① Do not use this instrument to check human or animal bodies.

② Do not work on the object under test while it is electrified in order to avoid electric shock.

③ Do not touch the lens end with a bare hand during operation; otherwise, it may cause burns.

④ Do not look directly at the strong light from the front end of the probe at close range as it may affect your vision.

⑤ Do not bend, stretch, twist or roll over the tube excessively.

⑥ The image will be blurred if the lens is stained. Please wipe the lens clean with a lint-free wiper dipped in a little alcohol before using the instrument.

⑦ During use, the probe shall be prevented from directly contacting corrosive liquids or various oils as far as possible.

⑧ Please clean the instrument in time after use.

⑨ Make sure that the insertion tube is straightened before turning on the instrument. Do not make turns when the insertion tube is curled up. During operation, toggle the joystick slowly to control the probe orientation and do not keep the probe at the maximum bending angle for a long time; otherwise, its service life will be affected.

⑩ If the instrument does not function properly, please stop examination immediately and adjust the probe to the middle position, carefully retract the insertion tube and turn off the instrument. Contact the manufacturer or distributor in time.

2. Products Description

Coantec X5 series high-performance multi-purpose industrial videoscope is a visual testing device that can be used for real-time observation of areas that are difficult for human eyes to directly observe. It employs excellent image sensing technology to comprehensively improve the definition of images, presenting more detailed HD images with more vivid colors. Brand new modular design with touch screen, testing insertion tube and battery detachable is convenient for replacement. The unique dual-engine power supply mode achieves ultra-long battery life. The product can adapt to different testing scenarios and effectively improve testing efficiency.

3. Operation Process

① Unpacking of instrument: Open the instrument case and take out the host, handle and umbilical cable. Please hold the probe properly during unpacking and do not bump it. Connect the umbilical cable to the host and handle according to the instructions.

② Preparation before turning on: Check whether all parts of the instrument are in good condition, confirm that the battery and USB flash disk have been correctly installed, and long press the power button to turn on the instrument.

③ Real-time examination: Extend the tube into the equipment or device to be examined, and control the moving direction of the front-end probe by operating the joystick.

④ Brightness adjustment: Adjust the brightness of the light source to obtain appropriate illuminance and the clearest image possible.

⑤ Examination: Adjust the parameters such as the observation angle, movement mode and speed of the probe as needed to examine the target in real time, and carry out operations such as photographing, video recording, browsing files and graffiti.

⑥ Tube retraction: Adjust the probe movement mode to the release to unlock the probe for automatic resetting. Retract the tube slowly after it is approximately straight.

⑦ Storage of instrument: Turn off the power switch, unplug the umbilical cable, sort out and store all parts of the instrument into the case, close the upper cover and fasten the lock catch.

4. User Manuals

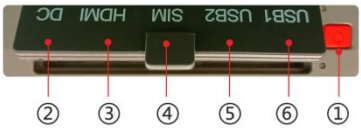
4.1 Buttons and Interfaces

The operation buttons, interfaces and functions of main components of Coantec X5 series industrial videoscope are shown in Fig. 1.

① Power on/off button
② DC charging port
③ HDMI interface
④ SIM card slot
⑤ USB3.0 interface
⑥ USB3.0 interface
⑦ Insertion tube
⑧ Touch screen replacement button
⑨ burnprocess button (manufacturer-dedicated)
⑩ Shoulder belt clip interface
⑪ Type-C interface (manufacturer-dedicated)
⑫ Earphone interface
⑬ Control rocker/System selection button/OK button
⑭ Status indicator
⑮ Power switch/Setting menu button/Return
⑯ Brightness enhancement button
⑰ Brightness decrease button
⑱ Freeze button
⑲ Image zoom-in button
⑳ Image zoom-out button
㉑ Photo/Video button
㉒ Battery capacity balance
㉓ Battery capacity display button
㉔ Battery capacity indicator
㉕ Battery compartment

Fig. 1

X5



X5 pro

4.2 Operation Interface

Long press the power button for about 3 seconds to turn on the host, and the indicator at the upper left of the operating handle will light up in green. The system boots up and the startup picture shows on the display. After the program is loaded, the home interface of real-time examination will show on the display (as shown in Fig. 2). Extend the insertion tube into the target to be examined to start the examination.

Note: Before the examination, the insertion tube shall be straightened. Do not make turns when the insertion tube is curled up.

Press the power button briefly or double-click the blank area on the screen to enable the menu function setting (press the button briefly again to hide the menu). Rotate the menu selection button to switch over among the menus available and press the button to confirm the selection.

The buttons in the main menu correspond to the functions described below (as shown in Fig. 2):

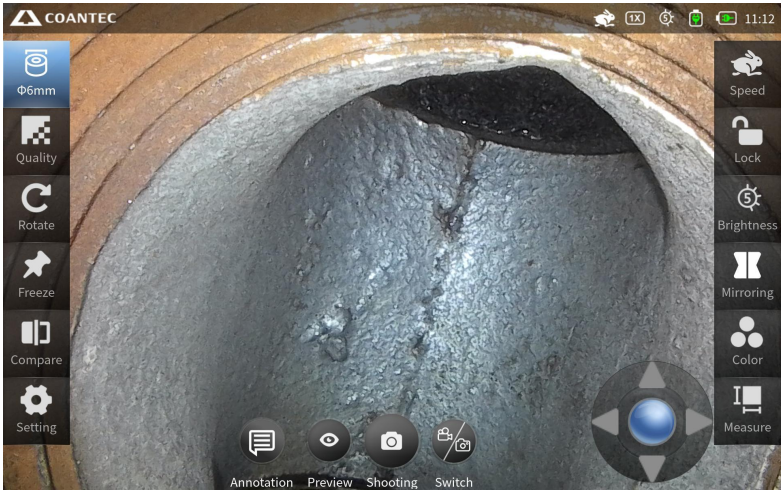


Fig. 2

① Tube diameter: The system automatically checks and displays the diameter of the current insertion tube.

② Image quality: adjust the image brightness, contrast, tone, saturation, definition and gamma, and restore defaults.

③ Rotation: rotate the real-time examination image clockwise by 90° each time.

④ Image freezing: freeze the real-time examination images.

⑤ Comparison: compare the real-time examination images with the saved images.

⑥ Settings: enter the setting interface where the following operations can be performed:

- WLAN Setting: connect/disconnect the wireless network.
- User Administration: enable the administrator, visitor, and standard user administration modes.
- About this Product: view the product information, check for upgrades, and upgrade this product to the latest version.
- Display: set the screen brightness, language, date, and time.
- Custom Settings: enable the watermark and scale functions, and set the image format.
- Help：It provides product instructions.

⑦ Speed: Adjust the moving speed of the probe. There are two options, fast and low.

⑧ Release: Lock/release the probe.

⑨ Brightness: Set the illuminance of the probe LED. It is adjustable from level 0 to level 9.

⑩ Mirroring:To switch mirror image.

⑪ Color: Set the image quality to default, monochrome, negative, bright, highlighted, or soft.

⑫ Measurement: Enter 3D measurement mode (applicable to binocular camera only).

⑬ Annotation: add annotations and preferences.

⑭ Preview: Enter the file browsing interface.

⑮ Photo taking: Take photos and save them automatically.

⑯ Switching: Switch between photo/video modes.

⑰ Virtual joystick: Drag the blue roller in the middle of the virtual joystick to turn the probe orientation.

⑱ Icon display: The icons in the upper right corner of the screen indicate the current status: probe locked (no icon if the probe is released), probe moving speed (fast/slow), image magnification (1~5 times), LED illuminance level (0~9),SOC of handle battery, SOC of host battery, and system time.

4.3 User Management

The user management is mainly used to provide permissions for functions such as photographing, video recording and report generation (as shown in Fig. 3). Enter the user management interface from the setting function on the home interface（as shown in .Fig. 3-1）. Log in as an administrator (the initial password is "123456"), and then the user may create a standard user, delete a user, and change the password. Information such as images taken and reports generated in different user management modes can only be viewed and processed in the current mode. The default mode is visitor mode, requiring no login.

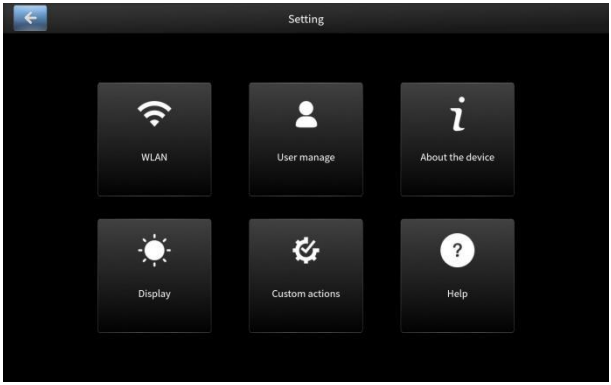


Fig. 3

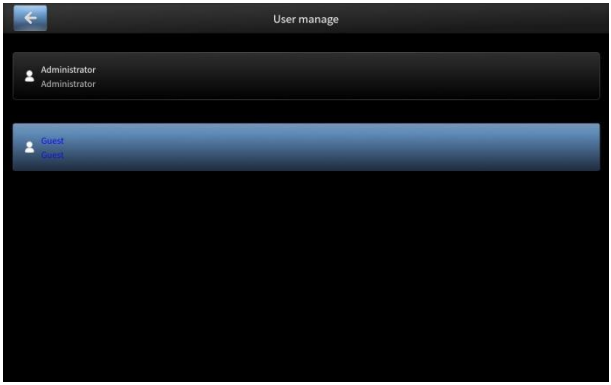


Fig. 3-1

4.4 Movement Control

In the real-time examination mode, the direction and angle of probe movement can be controlled by toggling the joystick or using the virtual joystick, and the probe movement mode can be switched by pressing the lock/release button or the middle button of the joystick in the main menu interface (as shown in Fig. 4).

Release: The probe bends towards the joystick moving direction. Release the joystick, and the probe will automatically reset. Under this mode, the user may identify the target to be examined quickly;

Locking: Toggle the joystick and the probe will inch. This ensures accurate control of the probe moving angle, thus facilitating precise observation of the target to be examined. The middle button of the joystick can release the locked probe (automatic reset).

Virtual joystick: Set to display the virtual joystick on the main menu to enable relevant functions. Drag the blue roller in the middle of the virtual joystick to turn the probe and differentiate release/lock mode.

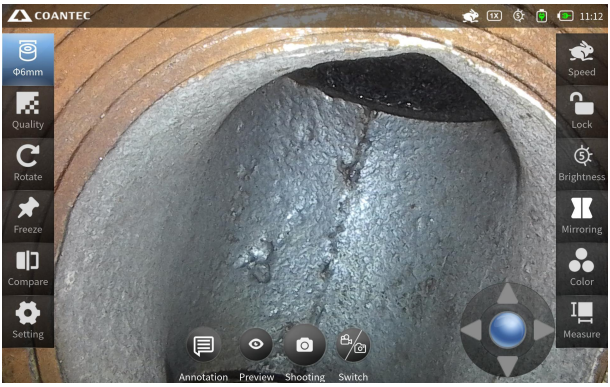


Fig. 4

4.5 Speed Control

In the real-time examination mode, the moving speed of the probe can be controlled by the speed control button（as shown in .Fig. 5）. The current moving mode is displayed in the upper right corner of the screen.

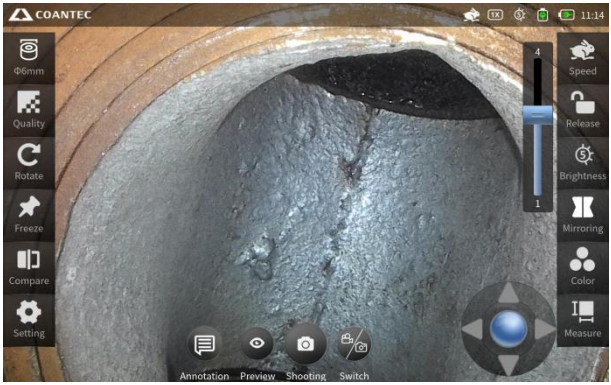


Fig. 5

4.6 Brightness Control

In the real-time examination mode, the illuminance of the front-end probe LED can be controlled by the illuminance adjustment button (as shown in Fig. 6) to obtain a better observation view. The illuminance is adjustable from Level 0 to Level 9. At Level 0, the LED is off, while at Level 9, the highest illuminance will be given. The current illuminance level is displayed in the upper right corner of the screen.

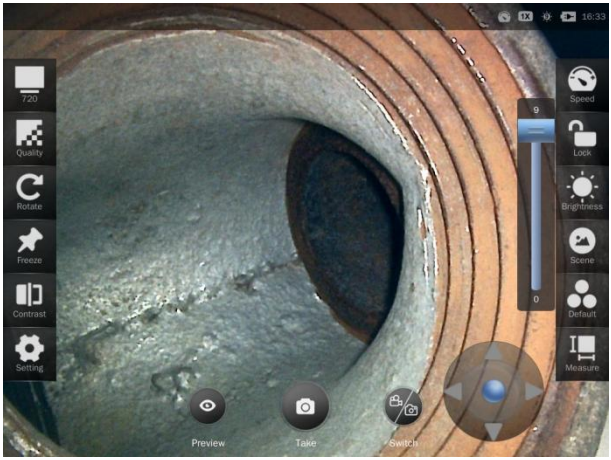


Fig. 6

4.7 Image Quality Adjustment

Enter the image quality adjustment interface from the home interface. The user may adjust the following parameters of the image settings：brightness,contrast,hue,saturation,definition,gamma or restore the default (as shown in Fig.7) .

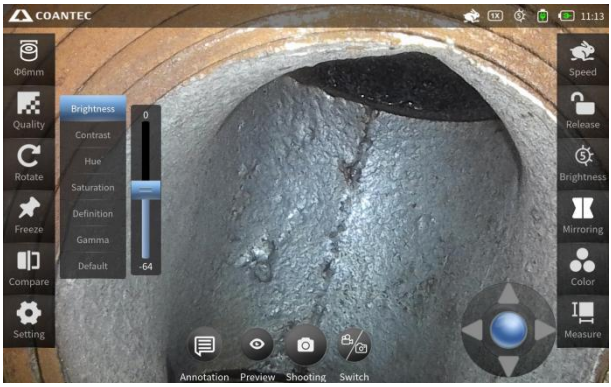


Fig. 7

4.8 Photo/Video

Photo: The real-time examination will be performed in photo mode by default. The user may take photos directly by pressing the photo button on the touch screen, or briefly press the photo/video button on the host handle to take and save the photos (as shown in Fig. 8).

Video: Switch to the video mode by pressing the photo/video switch button to record/save the video, to pause the image, or to make a screenshot, etc. (as shown in Fig. 8-1), or press the photo/video button on the host handle to start recording, and press it again to stop recording and save the video. It supports screenshot during video recording.

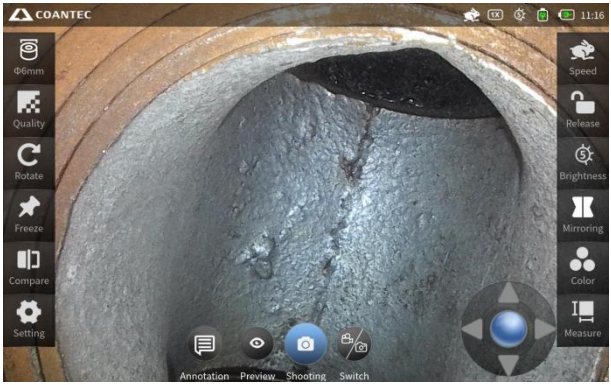


Fig. 8

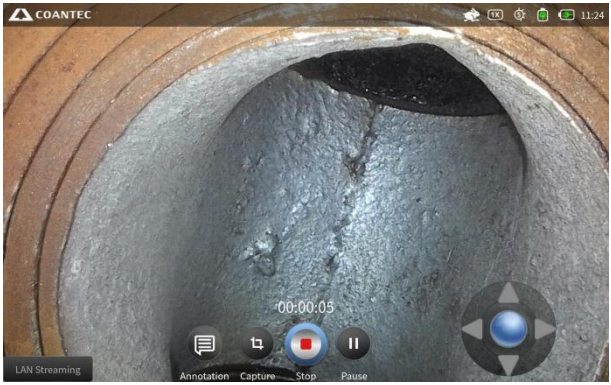


Fig. 8-1

Enter the main interface to enable the Video mode for LAN streaming.The Video-streaming function is to transmit the examination image to the receiving device (mobile phone) in real time through the LAN so that the real-time examination images can be viewed remotely. It is suitable for experts or multi-person diagnosis to achieve efficient collaboration.

Connect the videoscope and the mobile phone with the same LAN. Enable the LAN streaming function, open the QR code, and scan the QR code with a mobile phone (as shown in Fig. 13) so that the real-time examination images can be viewed synchronously on the mobile phone.

Note: The LAN streaming QR code is generated in real time and can be photographed and sent to the mobile phone that receives the video, and the video streaming can be played remotely by the image recognition function of the mobile phone. Images can be saved on the mobile phone by screenshot or

screen recording. To disable the Video streaming function, select "Stop stream" on the videoscope.

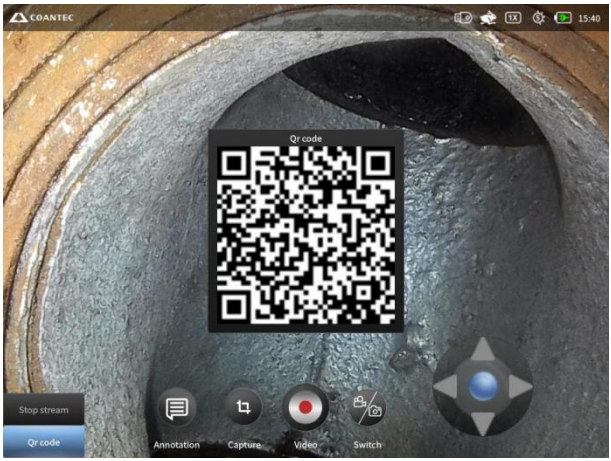


Fig. 8-2

4.9 Image Comparison

Enter the image comparison interface from the home interface to compare the real-time image with the image in the gallery. The user may browse and select an image, or select the previous image or the next image. The real-time image can be frozen and rotated. The virtual joystick is also available in this function (as shown in Fig. 9).

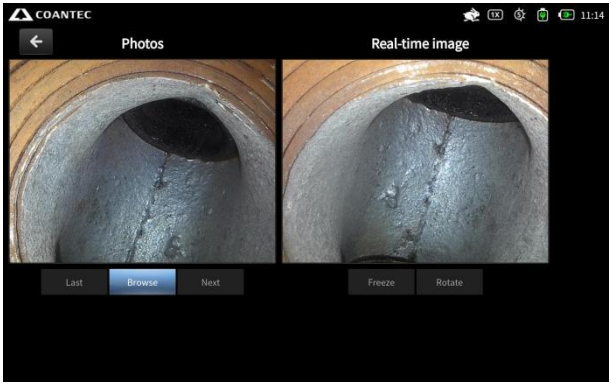


Fig. 9

4.10 File Preview

Press the Preview button to enable the playback mode to search for files and view images, videos, and reports respectively (as shown in Fig. 10).

The file can be searched by inputting certain characters of the file name in the Files Search box in Simplified Chinese, English, French, German, Portugal, Spain, Italy, Netherlands, Poland, Korean, Traditional Chinese, Japanese, and other languages, and also by inputting numbers, capital and lower-case letters, symbols, etc.

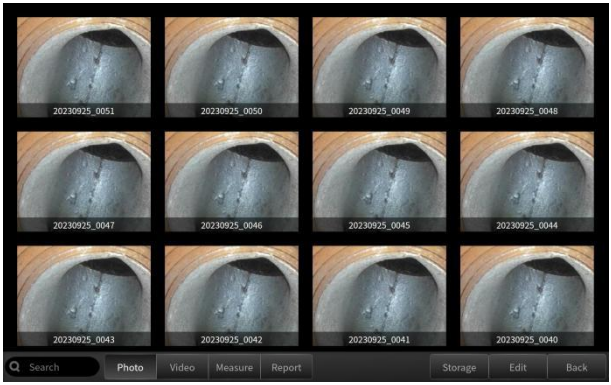


Fig. 10

Save: select the file save path, create/rename folders (in more than ten languages such as Chinese and English), select the folder save path, and set the current path as the default save path (as shown in Fig. 10-1).

Fig. 10-1

Edit: Select files (multiple choices), move, share, select all/clear all, and delete (as shown in Fig. 10-2).

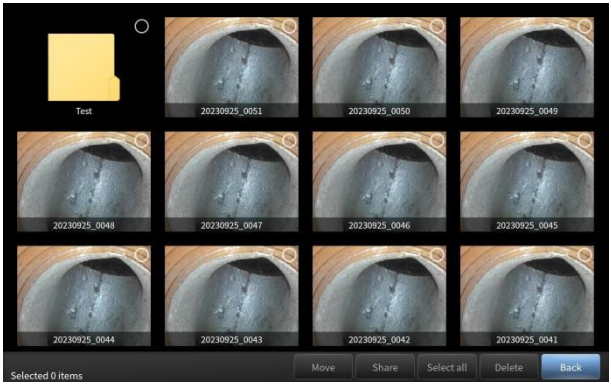


Fig. 10-2

Move: Select a file, and cut and paste it to a designated folder (as shown in Fig. 10-3).

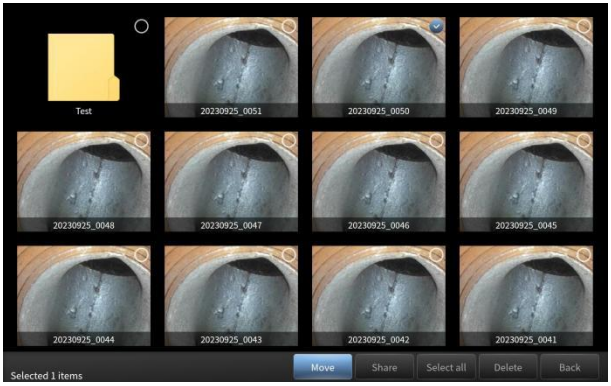


Fig. 10-3

Share: Multiple files can be shared through the TF card and USB, while a single file can be shared through the TF card, USB, Bluetooth, LAN, and the Internet (as shown in Fig. 10-4).

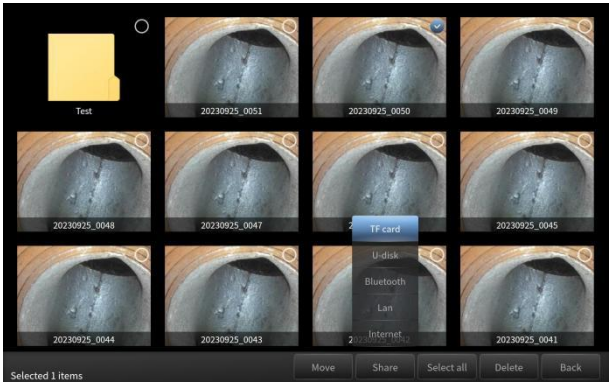


Fig. 10-4

TF card: Share files in the videoscope through the TF card. The file sharing is disabled without a built-in TF card.

USB: Share files in the videoscope through the USB. The file sharing is disabled without a USB inserted.

Bluetooth: Enable the Bluetooth function of the receiving device (mobile phone), and select a device to be paired with the videoscope from the list of devices in the system, allowing for file transmission through Bluetooth.

LAN: Connect the videoscope with WLAN, with the receiving device (mobile phone) also connected with the same LAN. The system displays the QR code shared through the LAN, and files can be received by scanning this QR code with a mobile browser (as shown in Fig. 10-5).

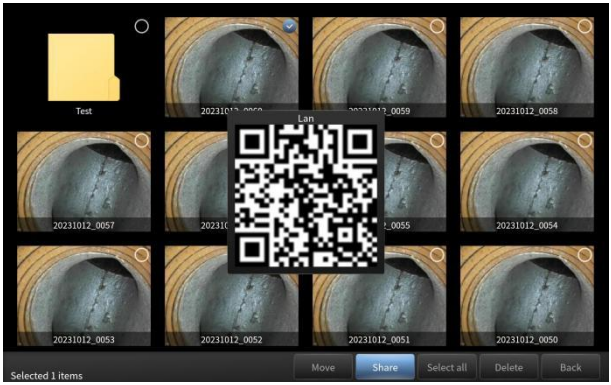


Fig. 10-5

Internet: Connect the videoscope with WLAN, with the receiving device (mobile phone) connected with other WLANs or mobile data networks. The system displays the QR code shared through the Internet, and files can be received by scanning this QR code with a mobile browser (as shown in Fig. 10-6).

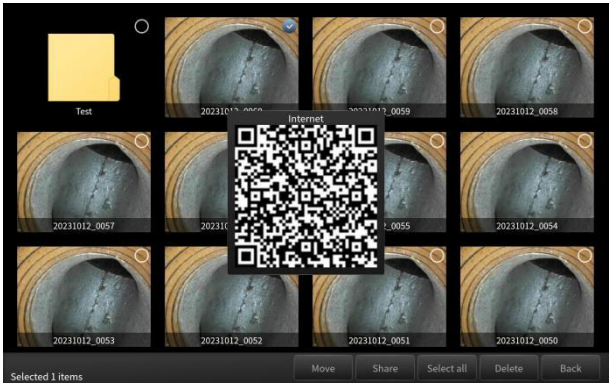


Fig. 10-6

Note: After this product is connected to a mobile phone or other receiving devices through Bluetooth, LAN, or the Internet, images or videos can be shared through Bluetooth, LAN, and the Internet.

Video files: open the video file to play, pause the video, and move the progress bar to adjust the playback progress, or delete the video.

4.11 Picture Editing

Open the image, view the image details and the previous and next images, graffiti, rename, rotate and delete files (as shown in Fig. 11).

Details: indicate file name, type, size, creation time, etc.

Image up-scaling/moving: scale the image up and down by two-finger pinching, and move and view the enlarged part of the image.

Rename: The user can rename the image file in more than 10 languages such as English and simplified Chinese.

Rotate: rotate the image clockwise by 90° each time.

Delete: directly delete the image.

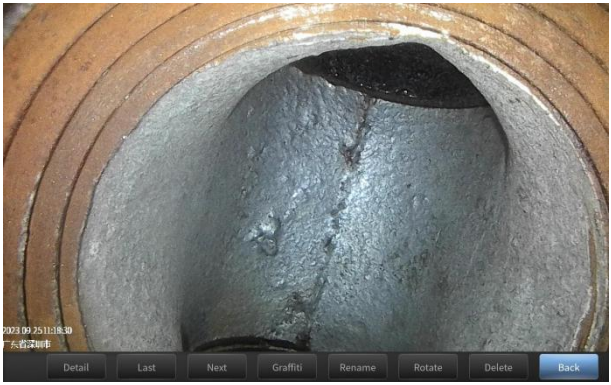


Fig. 11

Graffiti: The Graffiti function can be used to mark images (as shown in Fig. 11-1). The main functions include image up-scaling/moving, brush, rectangle, oval, arrow, text, brush color and thickness setting, undoing the previous step, back to the previous step, save, and return.

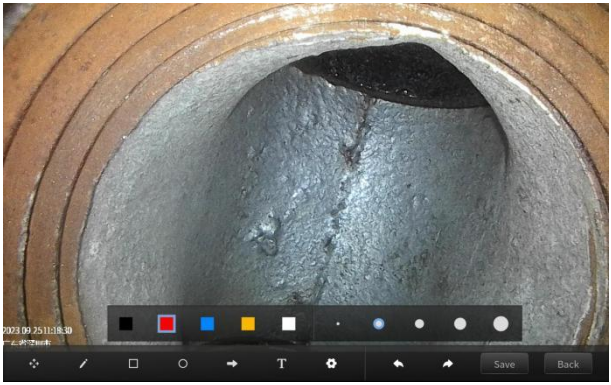


Fig. 11-1

4.12 Report Generation

Enter the main interface to enable the File Preview function and open the report options, to set the page, and create and edit reports.

Page setting: The header and footer images are imported through an external USB (as shown in Fig. 12).

Report creation: edit the title, format, size, and examination items, and select an examination image (multiple images) to create a report (as shown in Fig. 12-1).

Report editing: move the report to another folder, view the report details, share the report through the USB, Bluetooth (it is necessary to enable the Bluetooth function of the receiving device in advance for device pairing), LAN, the Internet, select all/clear all, delete files, etc. The specific operation method can be found in 4.10 File Management Instructions.

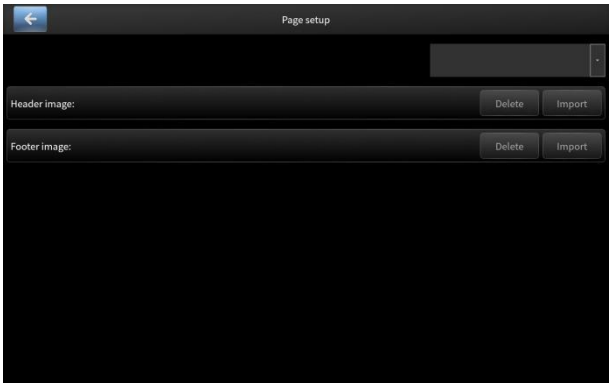


Fig. 12

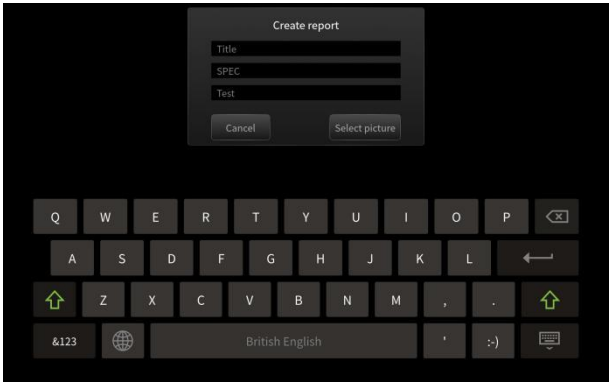


Fig. 12-1

4.13 File Reading

The instrument is configured with 2 USB2.0 ports to connect external USB flash disks for data storage. Pull the USB flash disks out and insert them into the computer to read the picture or video files stored directory. To transfer the data in the instrument to the USB flash disk, the user may share the picture/video to the USB flash disk through the preview function.

Note: Type C interface can only be used for program writing and recording, not for reading the data stored in the instrument or USB flash disk.

4.14 Video Output

Connect the external display to the instrument host with HDMI cable. Select an HDMI signal input, and the real-time display image will show on the external display directly (as shown in Fig. 13).

Fig. 13

4.15 Battery Capacity Display

Press the battery capacity indicator button to observe the four indicators in different states, corresponding to the remaining battery capacity of 25%, 50%, 75% and 100% respectively. If the battery capacity reaches 100%, all four indicators will be in green. In the case of low battery capacity, please charge the device with the adapter attached (as shown in Fig. 14).

Fig. 14

5. 3D Measurement

5.1 Measurement Interface

The 3D measurement function is only available for products with a binocular measurement system. Enter the main interface to enable the measurement mode. The functions on the measurement interface are provided below (as shown in Fig. 15):

Fig. 15

The measuring points are indicated by the cross cursors in the left and

right figures. The measuring point indicated by the cross cursor in the left display window can be moved, and the measuring point in the right display window can move accordingly.

1-----Left display window, which displays the image taken by the left camera during measurement.

2-----Right display window, which displays the image selected, such as right image, disparity image, and 3D images.

3-----The enlarged image of the cross cursor position in the left display window.

4-----The enlarged image of the cross cursor position in the right display window.

5-----Select the right display window to display the image.

Right image: the image taken by the right camera during measurement.

Disparity image: show the matching between the images taken by the left and right cameras at the same position.

3D image: a 3D view showing the height of the surface of the examined object (viewed from different angles by rotation) and the height information of the middle position of the image.

Exit-----Exit the current measurement interface

OK----Confirm the measuring point added

Description of disparity image colors:

When the background is black, the disparity image can be in different colors according to the object distance, and it is black if no matching points are found.

6----Optional measurement methods: Length,Veitical,Depth,Multisegment，Area,Missing corner,Sectional,and Circle measurement methods are available.

Back-----Return to the previous step.

Next-----Proceed to the next step

7-----Measuring Point Move. The direction keys respectively control the measuring point to move vertically and horizontally, with OK in the middle, point-press for micro-movement, and press and hold for fast movement.

8-----Measurement data display window

Save-----Save the measurement data (viewable in the Preview menu)

Clear-----Clear the information of selected points and data (measurements) in the measurement window

9----Confidence-based point selection. In point selection, the red, yellow, green and dark green bars shown in the middle of the left and right images indicate the increasing matching degree of the current points selected. The closer to dark green, the better the quality of the selected points and the better the measurement effect. Red indicates that the selected points are poor in

quality and new measuring points shall be selected.

10-----Show the current measurement mode and object distance (the distance from the examined object to the lens).

Note: If the left-hand operation mode is enabled in the Custom Settings interface, the layout of these function buttons in the 3D Measurement interface may vary. In the Operation Instructions, the right-hand operation mode is enabled by default.

5.2 Measurement Procedure

Move the front-end probe, control the LED brightness to make the images taken at the measurement points better in definition and contrast, fix the probe, and press the Measurement button, without moving the probe during measurement and photo taking; in the measurement preview interface, check whether the measuring area is in the middle of the photo taken during measurement and whether the definition and brightness at the measuring points are appropriate. If the photos taken are poor in effect, return to the main interface and repeat the above measurement and photo-taking process.

Measurement methods such as Length,Veitical,Depth,Multisegment， Area,Missing corner,Sectional,and Circle are available. When the measurement mode is enabled, the right image (as shown in Fig. 16), disparity image (as shown in Fig. 16-1) and 3D image (as shown in Fig. 16-2) can be

selected for comparison, facilitating the accurate selection of measuring points and improving measurement accuracy.

Fig. 16

Fig. 16-1

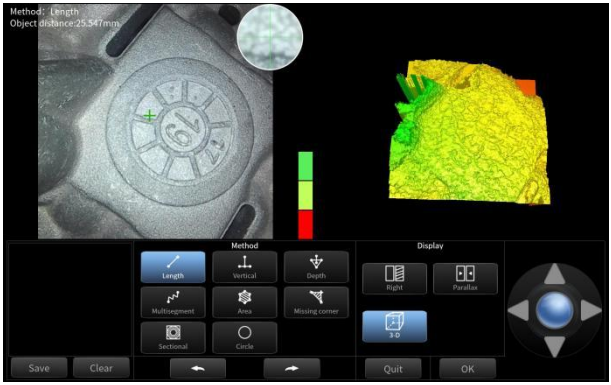


Fig. 16-2

For stereo measurement, a pair of corresponding measuring points (same position) must be determined in the left and right images, which is called matching. The software has an auto-matching function. The better the matching effect, the more accurate the measurement results. After image processing, if no same shapes are found at the designated points in both images, the correct measuring points may not be obtained. During measurement, pay attention to the points where the cross cursors are located in the left and right small circular window images. Move the cursors until the same shape is shown in the circular window, to confirm that the same point on the object is indicated by the cursors. If the corresponding measuring points are wrong, the measurements may be unbelievable. In this case, it is advisable to change the viewing angle (by moving the end of the insertion tube) or select new measuring points for measurement. The measuring points in images of some

surface reflective objects cannot be matched, such as clean stainless steel pipes. In this case, it is advisable to change the viewing angle or apply a layer of non-reflective powder particles on the surface for measurement to obtain more accurate results.

Select the measuring point in the left figure of the measurement interface, which can be dragged and moved in all directions by virtual keys. Observe the color bars for confidence-based point selection in the middle of the left and right figures. If the bar is red, the measuring points selected are poorly matched and cannot be measured. The yellow, green and dark green bars indicate the increasing matching degree of the current measuring points selected, and dark green indicates the best measurement effect.

After confirming that the well-matched measuring points in the photo can be used, select an appropriate measurement method. When the length measurement mode is enabled, select a measuring point in the left display window, move the measuring point to the position to be measured through the Measuring Point Move button, observe the enlarged images at the measuring points in the left and right small circular windows, and check whether the corresponding point at the center of the cross cursor in the small window is located at the corresponding position. If the measuring points in the two figures are located at the same point, the points can be used. Press the "OK" to

display "Points Selected: 1", i.e., the first measuring point is successfully added to the image. Other measuring points can be selected by moving the cursor. After a new measuring point is added in the same way, "Points selected: 2" will be displayed, and then the distance between the two points will be automatically displayed in the right figure. The specific measurement data can be seen in the measurement data display window.

If "the points are poorly matched" is prompted, the measurement cannot be made, and a new measuring point shall be selected.

Select the well-matched measuring points on the touch screen and press the Measuring Point Move button to move the cursors to the position to be measured. length, Vertical, Depth, Multisegment, area, Missing corner, Sectional, circle, and other measurement methods are available.

Length:This method is adopted to measure the distance between two points, and two measuring points are required. The length distance is shown in the measurement data display window (as shown in Fig. 16-3).

Fig. 16-3

Veitical:This method is adopted to measure the vertical distance from point to line, and three measuring points are required. The first two points define the line for measurement, and the point added later is the point for measurement. The Vertical distance is shown in the measurement data display window (as shown in Fig. 16-4).

Fig. 16-4

Depth:This method is adopted to measure the vertical distance from a

measuring point to a surface, and four measuring points are required. The first three points define a surface for measurement (the system prompts "Select three points to define a measuring surface"), and the fourth point is the point required for measurement. After the surface is defined by the first three points, all green points on the object that are coplanar with this surface appear in the figure. If the area formed with green points is relatively small, new points shall be selected to define a surface to obtain more accurate results. The Depth distance is shown in the measurement data display window (as shown in Fig. 16-5).

Fig. 16-5

Multisegment: This method is adopted to measure the total length of two or more lines, and three measuring points are required to be added in sequence for measurement. The distance to Multisegments is shown in the measurement data display window (as shown in Fig. 16-6).

Fig. 16-6

Area: This method is adopted to measure the area and circumference of an area, and three measuring points are required to be added in sequence for measurement. The area and circumference of the area are shown in the measurement data display window (as shown in Fig. 16-7).

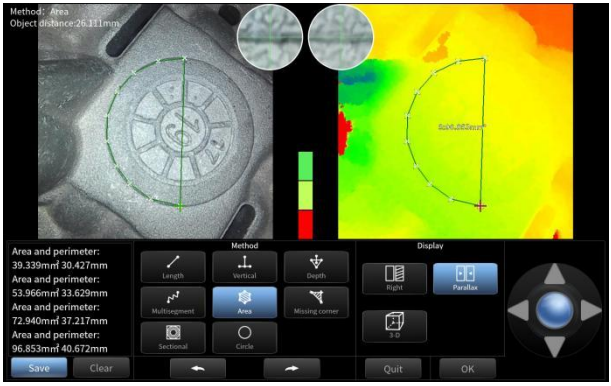


Fig. 16-7

Missing corner: The measurement method is mainly adopted to measure the material missed, especially the missed aeroengine blade tips. A base plane

is defined by selecting three points in the area without the blade tips, and the area coplanar with this base plane is shown in light green (reference plane, i.e. a collection of points 0.05 mm from the base plane). Select the first measuring point along the defective edge, and select the measuring points one by one so that the connecting line between each two points is as close to the defective edge as possible. Multiple measuring points can be selected. The last measuring point is located at the outermost edge of the defect to be measured. The measuring points shall be coplanar with the base surface, that is, in the light green area, the closer to the defective edge, the more accurate the measurement data. Finally, select a virtual point (which may be outside the light green area) at the estimated defective tip, where the connecting line L1 between the first measuring point and the virtual point forms an included angle with the connecting line L2 between the last measuring point and the virtual point, move the virtual point so that the two side lines of the included angle coincide with the edges of the existing area, respectively. The included angle, the length of lines L1 and L2, and the area of the tip-missed area are shown in the measurement data window. The virtual point can be adjusted several times to obtain more accurate measurement results. The base plane, measuring point and virtual point selected will affect the measurement accuracy. If the defect measuring point is not coplanar with the base surface, wrong results will also

be obtained (as shown in Fig. 16-8).

Note: The measurement results can be displayed by moving the virtual point so that the two side lines of the angle formed by lines L1 and L2 coincide with the two edges of the existing area, respectively. For more accurate results, the first and last measuring points should be located at the extreme edge of each side of the missed tip.

Fig. 16-8

Sectional: This method is mainly adopted to examine and measure the depth of the Sectional formed by any two-point connecting line perpendicular to the flange surface direction of the probe, as well as the vertical depth of pits, crack depth, etc. Select one point on each side above the concave surface to be measured, and the depth image of the Sectional formed by the connecting line between the two points and the corresponding Z value can be displayed (as shown in Fig. 16-9).

Fig. 16-9

Circle: Select any three points on the circle, and the diameter and area of the circle are calculated by the system and shown in the measurement data display window (as shown in Fig. 16-10).

Fig. 16-10

6. Removal and Installation of Display Screen

Removal: Press and hold the rear left button on the back of the display screen and directly remove the display screen from above (as shown in Fig.

17). At this time, the display screen can be operated separately to edit, share, delete and rename the stored pictures and videos.

Installation: Press and hold the rear left button on the back of the display screen, align the slot on the display screen with the connector on the unit, and push it directly from top to bottom until a "click" sound is heard. It indicates that the installation is completed.

Fig. 17

7. Removal and Installation of Insertion Tube

Removal: Turn the locking ring on the detection insertion tube to align the direction mark with the unlocking icon on the host machine on the same horizontal line (as shown in Figure 18), and after the "click" sound is heard, the insertion tube can be pulled out directly.

Installation: align the direction mark on the locking ring horizontally with the unlocking icon in the middle, and install the insertion tube completely. Turn the locking ring clockwise/counterclockwise to the end (as shown in

Figure 18-1), and the insertion tube will be locked. Users can replace insertion tube s of different specifications as required.

Fig. 18

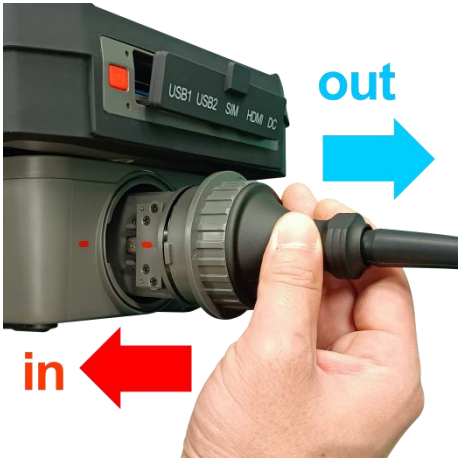


Fig.18-1

8. Removal and Installation of Battery

Removal: Press and hold the black button on the battery module to loosen the internal connecting clip between the battery and the unit, hold the handle of the unit, and pull out the battery from below (as shown in Fig. 19).

Fig. 19

Installation: Press and hold the black button on the battery module to align it in the right direction, and push the battery upward from the bottom of the unit (as shown in Fig. 19-1) until a "click" sound is heard. This sound indicates that the battery has been correctly installed.

Fig.19-1

9. Installation of Shoulder Belt

Fit the clips of the detachable shoulder belt into the mounting holes on both sides of the unit and the battery respectively, and adjust the length of the shoulder belt as required.

10. Basic Configuration

X5 videoscope*1, High-grade instrument box*1, 32G USB flash disk*1, HDMI cable*1,Direct Charger*1, Battery*1,Battery Charger*1, Operation Manual*1

11. Storage and Maintenance

① Please store the instrument in a clean, dry and stable place, keep it horizontal and keep it at normal room temperature;

② It is strictly prohibited to store the instrument in high temperature, high humidity, strong light, strong vibration, high dust, pollution or corrosive environment;

③ Do not let the instrument collide with other objects or handle it roughly during storage;

④ In order to avoid over-discharge of the battery, which may result in failure to charge the battery in the future, when it is prompted that the battery is insufficient in power during use, the battery shall be fully charged in time before use;

⑤ When the instrument is idled for a long time, it shall be stored after being fully charged, and attention shall be paid to charging and replenishing the battery every 3 months.

12. Analysis and Troubleshooting of Common Faults

S/N	Fault	Cause	Troubleshooting method
1	Startup failure	Low battery or no battery installed	Charge or replace with a new battery
2	Automatic	Low battery	Charge or replace with a new

	shutdown		battery
3	The system stops on the startup screen	System startup failure	Remove and reinstall the battery and restart the system
4	Image cannot be recorded or viewed	The USB flash disk is damaged or has insufficient capacity	Replace USB flash disk or delete useless files

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