Yateks G Series Industrial Video Borescope

Operating Manual



Please read the operating manual carefully before using.

User Notice

Please read the Operating Manual carefully before operation. Shenzhen Yateks Co., Ltd. hereinafter referred to as Yateks.

⚠ DANGER

1. Do not use it on people or animals.
2. Do not use or store it in a place with explosive, strong magnetic field or combustible gas.
3. Working under electrified condition is strictly forbidden.

⚠ WARNING

1. No warranty and maintenance for the unauthorized dismantling or modification of the instrument.
2. Never let the insertion tube contact the liquid other than water, or it may cause damage.
3. Make sure the power is turned off before putting the instrument into the carrying case.
4. Never touch the camera tip of the tube directly during use. It may cause burns after use at high temperature.
5. Stop using and turn off the power supply immediately once smoke or abnormal noise is found.
6. Do not directly look at the light from the front end of the tube in a short distance to avoid glare.
7. Stop using and turn off the power supply immediately in case of any abnormality during the angle adjustment.

⚠ CAUTIONS

1. Use within the operating temperature range.
2. Do not wrap or fold the insertion tube.

3. Please use the power adapter provided by Yateks.
4. Please pay attention to the following when the insertion tube is taken out of the observation target in a non-forced way:

a) The insertion tube should be adjusted to be straight before taken out.

b) Do not pull hard if insertion tube is stuck when taken out.

5. Note the following when operating the front end of the insertion tube: Do not impact or pull the front end of the insertion tube severely.
6. Wipe the lens with alcohol or acetone before use in order to avoid dirt and corrosion.
7. Do not let metal objects, foreign matter enter through the interface and openings into the host to prevent malfunction or electric shock.
8. Do not collide or press the screen hard or use hard or sharp object to scratch the screen, otherwise it may leave cracks or scratches on it.
9. Never cover the host with plastic bags or other objects during use. It may cause damage if overheated inside the instrument.
10. Do not keep the instrument in the following environment, otherwise it may cause damage.

a) A place with high temperature, high humidity, and a large amount of dust or particles.

b) A place with direct sunlight or radiation.

c) A place with halide gas.

⚠ BATTERIES DISPOSAL

Please notice the following dangers, warnings and cautions for battery disposal.

⚠ DANGER

1. Be sure to use batteries and chargers specially designed.

2. Do not use with the battery electrode reversed.

3. Do not connect the electrodes of battery with metal objects, nor carry or store with metal objects.

4. Do not throw the battery into the fire or heat the battery. Otherwise it will lead to an explosion.

5. Do not attempt to open or modify batteries. Otherwise it will lead to an explosion or fire.

6. Do not immerse in water, or damp the battery.

7. Do not charge near an open flame or direct sunlight. Otherwise it will lead to an explosion or fire.

8. Do not pierce the battery, crash or press it fiercely. Otherwise it will lead to an explosion or fire. Do not drop or throw the battery, or crash it fiercely.

9. Remove the battery when in a smooth place. Otherwise it may drop and cause an explosion and fire.

⚠ **WARNING**

1. Do not use the batteries that are not dedicated to this instrument. The battery model of this instrument is 18650 3.6V lithium battery with protective board.

2. Never try to recharge the batteries that are not dedicated to this instrument.

3. Do not use abnormal battery such as those with leakage, discoloration or deformation.

4. Clean immediately with tap water if your skin or clothing contacts the battery solution. Otherwise, it may cause skin damage. See the doctor if necessary.

5. Do not deform the battery case or put foreign objects inside.

6. Keep the flammables away from the charging battery. Do not cover the battery charger with flammables.

⚠ **CAUTIONS**

1. Do not use or store the batteries in a high temperature environment, such as a place under the direct sunlight, closed cars under the sun or heating equipment.
2. The battery will become hot after a long-running operation. Please do not take the battery out immediately after use to avoid scalding.
3. Keep it out of reach of the children.
4. Keep away from the environment with moist, water leaking, extremely high and low temperature.
5. Do not touch the battery electrodes with wet hands.
6. Please charge first before the first use or reuse after a long time.
7. If the instrument will not be used for a long time, please make sure to take the battery out of the instrument. Otherwise, the battery leakage or heat accumulated may result in fire or personal injury.

🕮REMINDER

1. Please use the battery properly, or it may cause damage due to the leakage and excessive heat. Check the direction and load it correctly when replacing.
2. The battery performance usually decreases as the ambient temperature drops. Notice that it can be restored at normal temperature if the battery performance reduces due to low temperature.
3. When the battery expires, make sure to recycle it according to the local regulations.
4. Recommended temperature range for lithium ion battery:
Discharging (in use): 0°C to 40°C
Charging: 0°C to 40°C
Storage: -10°C to 50°C
5. Using in a temperature out of the above range will reduce the battery performance and service life. Be sure to remove it out of the equipment in case of storing.
6. Batteries are consumables.

7. It is recommended to use 18650 lithium battery chargers for full battery charging because of the power difference after a period of use.

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I. Product Overview

The instrument mainly consists of four modules: camera module, insertion tube, host and LCD screen. It is a new nondestructive testing instrument integrated with optics, precision machinery, electronic machinery, electronic technology and micro camera technology, which is often used in internal inspection that is invisible to the naked eye.



Fig. 1-1 Portable industrial borescope

II. Model Definition

In order to meet the needs of different environments, users can select the insertion tube according to the actual demand. The insertion tube selection

mainly includes a tube diameter, length, camera module, depth of field and other parameters, please contact our sales manager for specific parameters.

III. Main Performance Parameters

System	Dimensions	277.5 mm × 133.4 mm × 87 mm
	Net weight	0.75 kg
	LCD	5″ IPS screen
	Display resolution	854 * 480
	Function	Photo taking, video recording, brightness adjustment
	Memory	32G SD card (supporting extension up to 128G)
	Data I/O port	SD card, HDMI video signal, USB
	Battery	Two 18650 lithium battery (replaceable)
	Stand-by time	6h
	Operating mode	Handheld
	Brightness control	5 levels adjustable
Software	Operating system	Real-time multitask operating system
	User interface	Drop-down menu-driving operations, menu navigation
	File Management	Supports photo/video playback, deletion, formatting
	Fig. control	Zoom and play back
	Digital zoom	Continuous (4 times)
	Image control	Image freeze, image flip
	Fig. format	JPEG/JPG (Record date and time)
	Video format	MOV(Record date and time)
	Language	English, Simplified Chinese, Traditional Chinese, German, Spanish, Portuguese, French, Japanese, Korean
	Upgrade	Upgrade via Mirco SD card

IV. Application

The visible light camera can be used to observe the inside crack, rust and foreign substances. It is widely used in the production and detection procedures of modern core industries like aviation, automobile, ship, electrical engineering, chemistry, electric power and so on. Adjustable sharpness, strong light suppression, low light compensation, exposure mode and other functions. With the general graphic processor technology, the camera has the best color reproduction ability and light sensitivity for better color restoration and definition.

V. Work Environment

Host operating temperature	-10℃ ~ 50℃
Insertion tube	-20℃ ~ 60℃
Recommended storage temperature	-10℃~40℃
Protection grade	Probe: IP67

VI. Packing List

S/N	Name	Unit	Qty.	Remarks
1	Host	Set	1	
2	18650 lithium battery	Piece	2	
3	USB Type-C data line	Piece	1	
4	Power adapter	Set	1	

5	HDMI video converter cable	Piece	1	
6	Operating Manual	Piece	1	

VII. Preparation and Testing Before Detection

7.1 Carrying of the case

⚠ **NOTE**

- Please check the handle, buckle and so on before carrying.
- Please use standard cases to prevent damage to the instrument.

■ **When using handle**

Make sure that the buckle is tightly closed before lifting the case.

⚠ **NOTE**

- The case cover may be accidentally opened when lifting if the buckle is not fully closed.
- Do not kick or move the case with feet.

■ **Take the instrument out of the case**

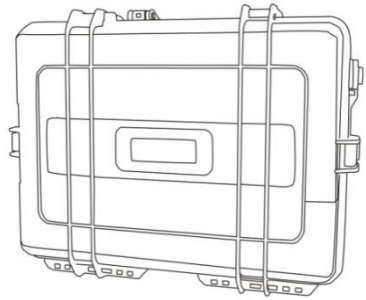


Fig. 7-1 Take out of the case

⚠ **WARNING**

- Take the instrument out when the case cover is completely opened to prevent accidents caused by close of cover.
- Do not operate the host in the case to prevent the case cover from

clamping the hand accidentally.

⚠ **NOTE**

- Place the case horizontally to keep it stable.
- Please loosen the buckle in front of the case before opening the cover.
- Take out the insertion tube from the case and handle it gently. The tube may be damaged if handled too hard.
- Never fix the host with an insertion tube when taking out from the case.
- Please wipe with clean cloth if there is any foreign matter on the host LCD screen.

7.2 Installation of the host

There are two ways to place the host when using: horizontal placement and stand placement.

⚠ **NOTE**

- Place the host horizontally to keep it stable.
- Do not put the host aloft to prevent damage caused by sliding down.
- Please fix the host where it can support in case of suspension installation. The host bracket is optional.

7.3 Power supply preparation

■ Take out the battery compartment

Unscrew the metal lock at the bottom of the handle and take out the battery compartment (see Fig. 7-2)

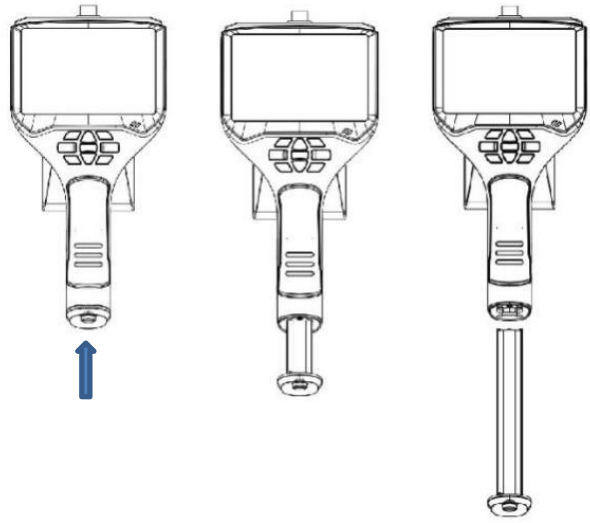


Fig. 7-2 Take out the battery compartment

■ **Open the battery compartment**

Find the buckle of the battery compartment cover, and use your hands or tools to pull the right groove to open the cover of the battery compartment. (see Fig. 7-3).

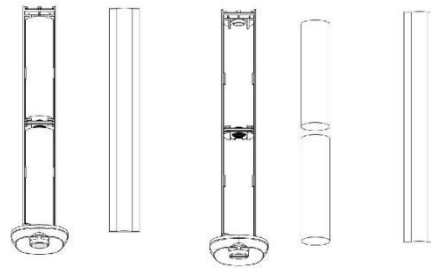


Fig. 7-3 Open the battery compartment

■ **Load the battery**

Load the 18650 lithium battery according to the indications on the positive and negative electrode.

⚠ **NOTE**

- The battery cannot be placed in reverse polarity.
- Only two 18650 lithium batteries are required.
- Please select the standard 18650 lithium battery with protection circuit provided by Yateks in case of replacement.

■ **Built-in charging**

1) Take out the power adapter and connect it to the host power interface.
2) Ensure that the power line is connected to the host power interface.
3) Insert the power line into the outlet.
4) It means charging when the host red light is on, and charging is finished when the green light is on.

⚠ **WARNING**

- Please check the power cord before use.
- The self-prepared power adapter should have micro USD port with 5V output voltage, 2A-3A current and 2A is the typical current. The interface is a power adapter of Micro USB interface. It should be conform to RoHS and CE or UL certification (or user's local compulsory standards). Connecting to the adapters that do not conform to the above input, output and safety certifications may cause fire or electric shock.
- Do not use a non-professional power adapter, which may cause malfunction or damage to the instrument.
- Electric shock may be caused when contacting water since the power adapter is not waterproof.

VIII. Menu Operation and Function

8.1 Button and interface position

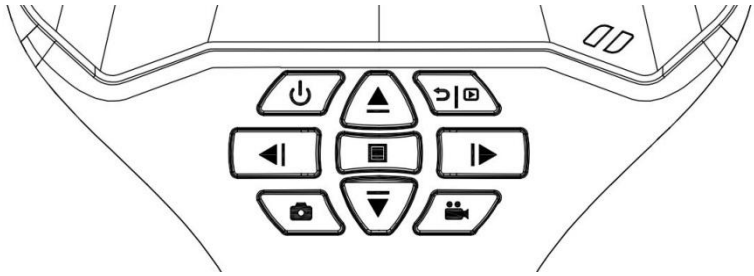


Fig. 9-1 Button and interface position 1

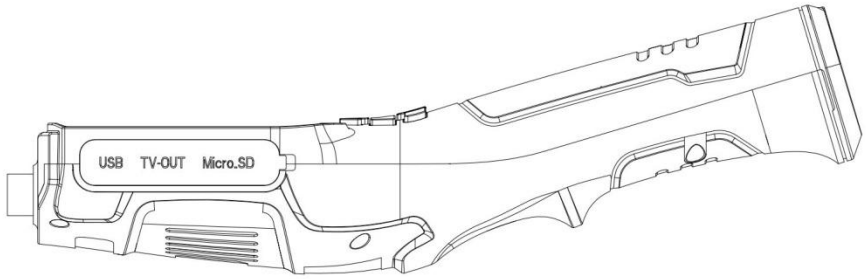


Fig. 9-2 Button interface position 2

	ON
	Up
	Image/Video Preview, Playback, Back
	Left Adjustment
	Menu

	Right Adjustment
	Take Photos
	Down
	Record Videos
USB	USB Type-C interface
TV-OUT	HDMI output interface
Micro.SD	Micro SD card interface

8.2 Button function

1) [Menu] is used to display the main menu in any mode when pressing the [Menu]. It is used as "OK" in the menu.
2) [Up] is usually used to turn to the previous page. It is used to turn to the previous page in the left menu and main menu.
3) [Down] is usually used to turn to the next page. It is used to turn to the next page in the left menu and main menu.
4) [Left Adjustment] is used to switch the function status in the left menu.
5) [Right Adjustment] is used to switch the function status in the left menu.
6) [Back/Video/Image Playback Switch] is used to switch

among current mode, photo playback and video playback mode. It is used to execute 'Back' in the menu.

7) [Photo] is used to take photos.

8) [Video] is used to record videos.

9) [On-Off] is used for startup and shutdown.

8.3 Introduction of menu function

8.3.1 System settings

1) System setup menu operation: Press [menu] in any mode or click the catalogue icon on the right side of the screen to enter the main menu. Click on the option to do settings (see Fig. 8-3).

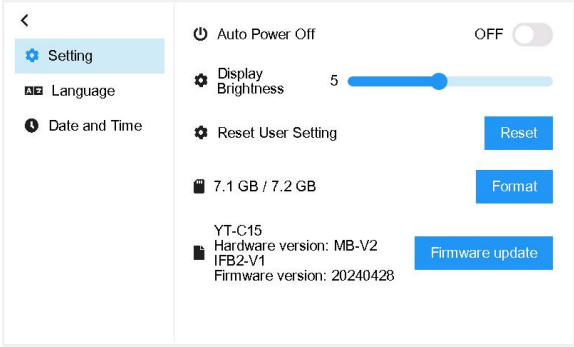


Fig. 8-3

2) Display system memory information and version information

■ **Memory Information**

Displays the memory card usage: available memory/total memory.

■ **Version information**

YT-C15

Hardware version:

MB -Motherboard version

IFB -Camera interface board version

Firmware version: Firmware burning date

3) The system settings are the general settings of the instrument, with seven items: language, date and time, automatic shutdown, screen brightness, formatting, reset user settings, and firmware upgrade. Change the system settings through the menu operation. The specific settings and methods are as follows:

■ Language settings

It is used to set the display language of the instrument. English (En), Simplified Chinese (Simplified), Traditional Chinese, German (De), Spanish (Es), French (Fr), Russian (RU), Japanese (JP), Korean (Kr) are optional. Select the language by sliding the screen up and down, and click the icon on the right to save the set language (Figure 8-4).

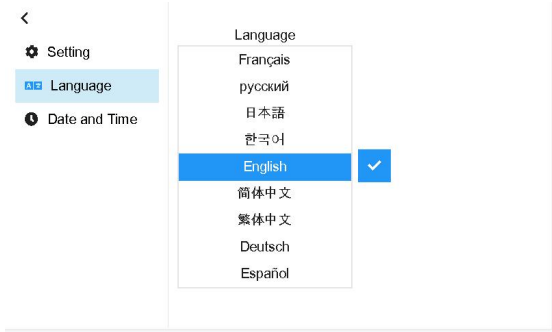


Fig. 8-4

■ Date and time settings

For adjusting the time of the instrument, slide the screen up and down to select the time you need to set, and click the icon on the right to save the set time (Figure 8-5).

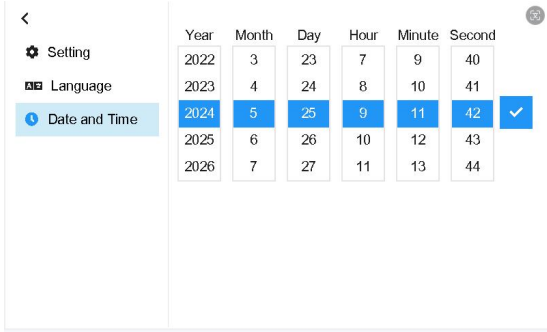


Fig. 8-5

■ **Automatic shutdown**

1) Used to adjust the automatic shutdown and set the time.
2) Click to turn on the auto shutdown setting, slide the progress bar left and right to set the shutdown time, the range is 1 to 30 minutes.

■ **Screen brightness setting**

1) Used to set the display brightness of the screen.
2) Slide the progress bar left and right to set the screen brightness, ranging from 1 to 10 (see Fig. 8-3).

■ **Format**

Formatting (initialising) the Micro SD card will delete all data. Select the Format option through the menu operation and then select [Yes] to format the Micro SD card, please do not pull out the Micro SD card

during the formatting process. After formatting, the data will not be recovered, please be careful (Figure 8-3).

■ **Factory setting**

Restore the system data to the factory setting. After restoring to the factory setting through the option in the menu, select [Yes] to restore it to the factory setting.

■ **Firmware upgrade**

It can be used to upgrade the software. Perform a firmware update by clicking the Firmware Update button (Figure 8-3).

8.3.2 Setting of left menu

Under the photo or video mode, click the screen or press other buttons except [Back/Playback] and [Menu] will automatically pop up the left function menu (Figure 8-6).

You can directly click the icon of each option to adjust it, or you can select the option you need to adjust by pressing the [Up] and [Down], and then adjust the function of the option with the [Right Adjustment] and [Left Adjustment].

Enter the left menu setting and there are 12 settings available: LED brightness, exposure mode, special effect, zoom-in, freeze, grid, rotation, screen ratio, white balance, metering mode, sharpness and dual camera switch.



Fig. 8-6

■ **LED brightness**

It is used to adjust the brightness of LED, 5 adjustable brightness levels. Directly tap the icon , or click [Up] or [Down] to select [LED Brightness] and then adjust the brightness of LED through [Right Adjustment] and [Left Adjustment] .

■ **Exposure mode**

It is used to adjust the currently displayed and recorded image exposure values.

■ **Special effect**

1) Used to adjust the special effects of the static images currently displayed and recorded.

2) Options: Normal, Black and White, Invert Colors. The icons are:



■ **Zoom-in**

1) The display image can be zoomed so that an enlarged view of the object can be obtained.
2) The image can be magnified by one time for each press of the [Right Adjustment] ▶|, and maximally 4 times can be realized.
3) In order to restore the image to the original size, just press [Right Adjustment] ▶| to adjust it to original size. During the process of zooming, the screen will display the values of zooming by the icons which are:



■ **Freeze**

1) In case of real-time image display, press [Freeze] to freeze the image on the screen. If you want to defreeze it, just adjust it to the icon to restore the screen to a real-time image display.

⚠ **REMINDER**

- Do not insert or pull out the insertion tube when the image is frozen.
- The frozen image may be very blurred when it contains fast motion.

■ **Grid**

1) It is used as reference for the size of the measured object.
2) Options: Thick, Medium, Thin, represented by the icons which are:



■ **Rotation**

1) When displaying the live image, this option allows you to adjust the display of the image by flipping the live image.

2) When the display icon is , the live image is mirrored left and right based on the initial screen.

3) When the display icon is , the live image is mirrored up and down based on the initial screen.

4) When the display icon is , it is the real-time screen with 180° rotation based on the initial screen.

■ **Screen ratio**

It is used to set the display scale, and 16:9  and 1:1  are available.

■ **White balance**

Auto white balance : It is a certain scheme stored by the camera to optimize general light source. It is able to detect the color temperature of the photographed object automatically and make judgment upon the condition for camera working according to the light getting through the lens and white balance sensor.

Manual white balance : Under the light of shooting site, implement the white balance by occupying the entire lens with a piece of white paper or a white object.

■ **Metering Mode**

Used to set the exposure mode of the camera

1) When the display icon is , for spot exposure (metering that takes only a small spot in the centre of the image).

2) When the display icon is , it is centre exposure (metering that takes the central area in the image).

3) When the display icon is , for the centre of the weighted exposure (metering way: the image is divided into the central circle and surrounded by two pieces, respectively metered, and then weighted average to get the light intensity).

4) When the display icon is , for the average exposure (metering way: the image is divided into a number of pieces, respectively on each piece of metering and then weighted average to get the light intensity).

■ **Sharpness**

It is used to adjust the sharpness of the picture, from S0 to S5 can be adjusted in six stops, the higher the stops the sharper the picture, the greater the noise of the image.

■ **Dual camera switch**

It is used to switch the camera view on the front of the module.

When the display icon is 

, the front camera display.

When the display icon is 

, the side camera display.

8.3.3 Playback interface

Under the preview interface, click the playback icon on the right side of the screen or press the [Return/Playback Switch] to enter the photo playback interface, and press the [Return/Playback Switch] again to enter the video playback interface.

Under the photo playback interface, view the previous and next picture through [Up Button] and [Down Button]. Tap the screen to call out the picture information interface, you can tap the DEL icon on the right side of the picture information interface to delete the currently displayed picture (Figure 8-7).



Figure 8-7

Under the video playback interface, view the previous and next picture by [Up Key] ▲ and [Down Key] ▼, press [Right Adjustment Key] ▶| or Play icon to start playing the video, and pause the playback after pressing it again. In the video playback, you can click +30 icon to fast forward 30 seconds or click -10 to fast rewind 10 seconds, click the end of playback icon to end the icon. Press the [Return/Playback Toggle Key] ↩|▣button again to exit the playback interface (Figure 8-8).



Fig. 8-3

8.3.4 HDMI output

Connect the HDMI cable to the display and the HDMI interface of host respectively to output the video.

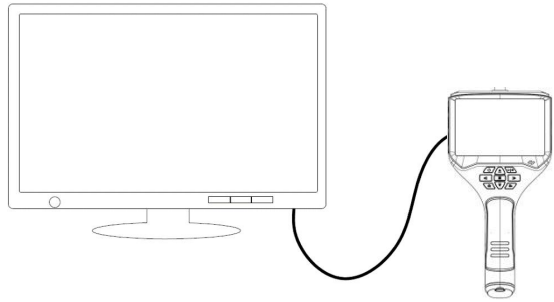


Fig. 9-7

8.3.5 Camera settings

After plugging the probe into the host, the initialisation camera interface will pop up, click 'Yes' on the screen to restart loading the correct camera parameters.

IX. Storage and Maintenance

9.1 Cleaning

■ **Clean the insertion tube**

1) Wipe the foreign objects on the tube with a dust-free cloth.
2) If contact with the liquid (waste water or engine oil), wipe the insertion tube in accordance with the following order: ① Wipe with the dust-free cloth or cotton cloth; ② Wipe with the neutral detergent and dust-free cloth; ③ Wipe with the dust-free cloth dipped in water; ④ Dry the water stain with a dust-free cloth.

⚠ **NOTE**

- Clean it with dust-free cloth for long life of the insertion tube.
- Do not flush the lens with tap water, which may damage the instrument.
- Store the instrument horizontally at room temperature and keep it

clean and dry.

- Do not collide with other objects when storage, handle gently and use safely.
- Regularly check the function if not used for a long time.

⚠ **WARNING**

- Keep the instrument away from children and use after getting familiar with the rules.
- It is strictly forbidden to store in high temperature, high humidity, strong light, strong vibration, high dust, pollution or corrosive environment.

■ **Clean the LCD screen**

Wipe the LCD screen with dust-free cloth if there is fingerprint or stain on the screen.

■ **Clean the host and operation handle**

Wipe the host with dust-free cloth if dirty.

⚠ **NOTE**

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

9.2 Repacking

⚠ **NOTE**

1) Store the insertion tube and host orderly. Otherwise the insertion tube may be damaged.
2) Please handle gently when putting the insertion tube into the case to prevent damage.
3) Make sure that the insertion tube is not bent when storage.
4) Please lock the case buckle correctly. Otherwise the cover may open during transit.

5) Please keep the case flat, and carefully close the cover to prevent clamping the hands or accessories before putting the host back.

6) Please use the standard case, otherwise it may cause damage or malfunction to the host.

■ **Tighten the case**

The case cover may be opened if hit during the moving. Check that the case is tight during carrying.

⚠ **NOTE**

Fasten the two buckles of the case.

9.3 Attentions for storage

1) Store at the normal ambient temperature and humidity.
2) Please turn off the power before packing.
3) Put the instrument on a clean, dry and firm surface.

⚠ **NOTE**

1) Do not keep in a place with high temperature, high humidity, excessive dust or fine particles, direct sunlight or radioactive materials, or it may damage the instrument.
2) Please handle it gently and avoid collision with other objects, otherwise it may cause malfunction.

X. Troubleshooting

Please do not use the instrument if faults cannot be solved by referring to the following methods, and contact Yateks:

① There are obvious faults in the preparation and examination before observation in Chapter 7.

② An exception that cannot be resolved based on the “10. 1 Troubleshooting guide”.

10.1 Troubleshooting guide

Malfunction	Possible causes	Proposed measures
No response of image recording	No Micro SD card	Install the Micro SD card correctly
Still showing no SD card after insertion of SD card	SD card is not inserted well	Re-insert the SD card into the slot
Automatic shutdown	Triggered by too high ambient temperature	Stop using to let it cool down, and then restart
	Triggered by too low battery	Charge the instrument
Unclear image	The front of the insertion tube or the LCD screen is dirty	Wipe with clean dust-free cloth or swabs
No display when booting, and can not turn off the instrument	No connection to insertion tube before booting	Release the battery box to power off, connect the host with insertion tube and restart the host
Unable to power on	No battery, circuit protection	Connect the instrument to power with a power adaptor to activate it

10.2 Repair

1) Please contact InterTest Inc before repair. A detailed description of the fault and the environment should be provided when submitting for repairing.
2) Any fault during the warranty period can be repaired free of charge based on the warranty agreement.

3) Do not disassemble, refit or repair personally since there have no any parts for autonomous maintenance. Therefore, InterTest has no responsibility for the losses caused by the user due to personal maintenance. The repair service of this product is only provided by Yateks and authorized distributor.

⚠ **WARNING**

Yateks shall not be liable for any loss caused by the maintenance of staff not belonging to Yateks.

➢ External specification

Low voltage directive and EMC directive	Conform to CE	CE
WEEE directive	Conform to WEEE	
RoHS directive	Conform to RoHS	RoHS



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