



# Laptop Full-digital Ultrasound Diagnostic System

## USER'S MANUAL

China Care Medical Equipment Co.,Ltd  
Adress:Room B101, Zhongbang Business Building, PuXing  
Road No. 87, Tianhe, Guangzhou,  
Chinaweb:[www.chinacaremedical.com](http://www.chinacaremedical.com)



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## Foreword

### Statement

- This publication, including all photographs and illustrations, is protected by international copying laws and all copyrights are owned by to our company.
- The information in this document has no comments to change. The manufacturer makes no representations or warrants any warranties based on this point and expressly disclaims any implied warranties of merchantability or interest for a particular purpose.
- This document may not be photocopied, reproduced or translated into the language of any country without the prior written permission of the manufacturer.
- The contents of this document are subject to revision by us without prior notice.
- Some pictures in this manual are schematic diagrams, for reference only. If the pictures do not match the actual objects, the actual ones shall prevail.
- Date of revision: JULY 10, 2024. Version NO.V9.1.0

### Manufacturer's guarantee

- The disassembly and repair of the equipment is completed by our company's assigned professionals, and the use of the equipment is strictly in accordance with the instructions for use. Our company only regards the safety, reliability and performance of the equipment. The consequences are responsible.
- We assure the user that the warranty period will be within twelve months from the date of purchase and delivery, ensuring that the new equipment has no problems in materials and processes. During the warranty period, Our company will repair the faults and replace the non-human damaged parts for free. If the surface of the equipment is damaged, it will not be repaired or replaced.
- This warranty applies only to faults that occur in accordance with the conditions specified in the instruction manual. The equipment that is guaranteed can only be used in the scope of use specified in the random instructions.
- Our company is not responsible for damage caused by other equipment or by arbitrarily connecting other equipment.
- Our company is not responsible for loss, damage or injury caused by delaying service requests.
- When there is a problem with us during the warranty period, please contact us., and indicate the model, serial number, date of purchase and nature of the problem.

### Precautions

In order to ensure the safety of operation and long-term stability of equipment performance, please

read this instruction manual carefully before operating the equipment to fully understand the function, operation and maintenance of the equipment. In particular, you must pay attention to the “warning”, “caution” and “attention” contents in the instruction manual.

Improper operation or failure of the user to follow the instructions of the manufacturer or its agent may result in equipment damage or personal injury.

The following conventions are used throughout the instruction manual to indicate information that is particularly emphasized.

◆ "Warning": Used to indicate that it will cause serious personal injury, death or actual property damage if ignored.

◆ "Caution": Used to indicate that it will cause minor personal injury or property damage if ignored.

◆ "Attention": Used to prompt the user to install, operate or maintain information, this information is very important, but there is no danger. Hazard warnings are not included in the cautions.

## Chapter 1 Safety Precautions

### 1.1 Safety Precautions

- **Statement:** This instrument should be operated by or under the guidance of qualified operators. Improper operation or the user's failure to follow the instructions of the manufacturer or its agent may cause damage to the equipment or personal injury.
- **Statement:** This instrument is forbidden to be used with cardiac defibrillators and high-frequency surgical equipment!
- **Statement:** This instrument cannot be directly applied to the heart! The probe can only probe the heart through the body surface. This instrument prohibits heart measurements other than this manual.
- **Warning:** The power plugs of this instrument and the external instrument connected to this instrument must be plugged into the power socket on the wall, and this socket must meet the requirements on the rated power identification plate. The use of multi-function sockets may affect the ground leakage current exceeding safety requirements.
- **Warning:** The interconnection of multiple instruments may cause leakage current to accumulate, resulting in damage to the instrument and electric shock to the human body. Therefore, it is forbidden to interconnect multiple instruments! If the power cords of multiple instruments are connected to the same power outlet, the leakage current in the device will increase, which will cause danger to the patient.
- **Warning:** The probe is forbidden to scan the eyes!
- **Warning:** Ultrasound may have harmful effects on human tissues and potentially cause personal injury to patients. If there is no medical significance, the patient's exposure time under ultrasound should be minimized and the lowest ultrasound level should be used, use ALARA (As Low As Reasonably Achievable) principle. Within a reasonable range, the lowest possible output power should be used. The time for physical examination should not be too long, only limited to the time necessary to make a diagnosis.
- **Warning:** When there is a need for clinical indications, the user of the instrument must have sufficient knowledge of the acoustic output or be able to obtain the relevant thermal index value. Ultrasound probes that can detect self-heating in the air should not be used for trans-vaginal exploration; special attention should be paid to reducing the sound output power and irradiation time of the embryo or fetus.
- **Attention:** Connecting accessories and cables beyond the regulations may result in an increase in equipment emission or a decrease in immunity. In order to reduce the risk, please use the matching power cord. If you need to connect other power adapters, devices or accessories, please contact the manufacturer.

- Probe surface temperature : When the ambient temperature is higher than 25℃, the surface temperature of the probe should not exceed 41℃; when the ambient temperature is lower than 25℃, the temperature rise of the probe surface should not exceed 16℃.

## 1.2 Equipment identification

Equipment identification description:

|                                                                                     |                                |                                                                                     |                                                                                                  |
|-------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|    | Class II equipment             | <b>IPX1</b>                                                                         | Anti-immersion degree of the probe cable: IPX1<br>( Prevent dripping in the vertical direction ) |
|    | Type B application part        | <b>IPX7</b>                                                                         | Anti-immersion degree of probe transducer: IPX7<br>( Prevent short-term flooding )               |
|    | Turn on the main power         | <b>VGA</b>                                                                          | VGA video output                                                                                 |
|  | Disconnect the main power      | <b>VIDEO</b>                                                                        | PAL video output                                                                                 |
|  | Note! View files               |  | USB interface                                                                                    |
|  | Dangerous voltage              |  | DC input                                                                                         |
|  | Electrostatic sensitive device |  | Charging                                                                                         |

Packaging and transportation marking instructions description:

|                                                                                     |                      |
|-------------------------------------------------------------------------------------|----------------------|
|  | Fragile              |
|  | Temperature limit    |
|  | Up                   |
|  | Stacking layer limit |
|  | Avoid rain           |
|  | Avoid sunlight       |

### 1.3 General safety information

Considering the safety of the operator and the patient and the reliability of the equipment in the design and manufacturing process, the following safety precautions must be implemented:

1. The equipment is used by or under the direction of a qualified operator.
2. Do not change the equipment parameters. If it is necessary, please ask us or its authorized agents to provide services.
3. The equipment has been adjusted to the best performance at the factory. Do not adjust any preset controls or switches unless specified operation according to the manual.
4. If the equipment fails, please shut down immediately and contact us or its authorized agent.
5. If you need to connect other companies' electronic or mechanical devices, please contact us or its authorized agents before connecting.
6. Avoid violent vibration under normal operating conditions. The host and probe should maintain temperature, humidity and atmospheric range as follows:
  - a) Ambient temperature range:  $+5^{\circ}\text{C} \sim +40^{\circ}\text{C}$
  - b) Relative humidity range:  $\leq 80\%$
  - c) Atmospheric pressure range: 860hPa to 1060hPa
7. The diagnostic system can be transported by ordinary means of transportation. It should be protected from rain and snow splashing and mechanical collision during transportation, and should not be mixed with corrosive substances.
8. The warehouse where the diagnostic system is stored should be dry, ambient temperature:  $-40^{\circ}\text{C} \sim +55^{\circ}\text{C}$ , relative humidity:  $\leq 80\%$  ( $20^{\circ}\text{C}$ ), it should avoid strong sunlight and other gases that cause corrosion, and should be well ventilated.
9. Ultrasound may cause harm to the human body and should be avoided for a long time scan. See Appendix A for acoustic output parameters.
10. To reduce the risk of use, please use a randomly configured power cord.
11. Our company is not responsible for any risks caused by the user's own dis-assembly and modification.
12. The adapter output is forbidden from short circuit, and long-term short circuit will cause damage to the adapter.
13. The internal lithium-ion rechargeable battery of the instrument is forbidden to impact or throw into the
14. fire to prevent explosion; do not short-circuit the battery output electrode to prevent battery damage; please use the original charger to charge the battery. Waste batteries can cause environmental pollution. Please recycle the batteries properly.
15. The power adapter is forbidden to be disassembled. The fault should be repaired by a professional.



The charging output can only be used to charge the battery in the standard configuration of the instrument. Charging other batteries may cause unexpected dangers such as explosion and fire.

## 1.4 General tips for device operation:

### ◆ In operation

1. Do not cover the cooling holes of the equipment.
2. Turn on the main switch, press and hold the power button, the instrument is turned on after a beep.
3. During scanning, if abnormal conditions are found, stop scanning and shut down immediately.
4. It is strictly forbidden for the patient to touch any part of the non-application part of the device.
5. When using, do not press the keyboard panel excessively, otherwise the device may be damaged.
6. This machine can store more than 300 pictures, and it is equipped with a USB flash drive. It is recommended to store images to a USB flash drive, which has a larger storage capacity.

### ◆ After operation

1. After a day's work is over, short press the power button, then turn off the main switch, and unplug the power plug to completely power off the instrument. Incomplete power off may cause safety hazards such as lightning strikes.
2. Pull the plug out of the power outlet instead of pulling the cable.
3. Wipe the gel on the probe with a soft medical sterile cotton ball.
4. Place the probe into the probe box.
5. Wait at least 2-3 minutes after shutting down before turning it on again.

## 1.5 Other notes and tips

- The capacity of the power supply line and power socket of the instrument shall not be lower than the requirements of the instrument. Please use the supplied adapter.
- Check the power cord of the instrument frequently. If it is damaged or broken, replace it immediately.
- The power supply of the instrument should be checked frequently. When the power supply voltage is lower than the specified applicable range of the instrument, the instrument may not work normally. When it is higher than the specified applicable range of the instrument, stop using it. The power supply should remain stable to ensure the normal use of the instrument.
- Before starting up and using, check whether the installation of the probe of the instrument is properly tightened and whether the protective grounding is reliable.
- Check the probe frequently. If you find that the cable is damaged, the plug is damaged, cracked, the probe and the surface are damaged, burrs, scratches, etc., you should stop using it.

- Check the validity, safety and reliability of the instrument after starting up. If the probe is found to have leakage, it should be shut down immediately and stop using it.
- The operator of the instrument must be trained in using skills, must be familiar with the instruction manual, have proficient operating skills and common sense of safe electricity use.
- If any abnormal phenomenon is found in the machine during use, it should be shut down immediately and stop using it.
- It is forbidden to place debris, such as water cups, on the operating table.
- Check the instrument when it is turned off after use to prevent abnormal phenomena and prevent the power supply from not being completely cut off.
- Do not pull out or insert the power plug when the power switch is not turned off.
- Do not plug or unplug the probe at will when it is turned on.
- The probe is a vulnerable part, it is strictly prohibited to collide and scratch the surface of the acoustic window.
- The wiring methods of probes from different manufacturers are different. If they are randomly connected, the host will be damaged, or they will not work normally due to different parameters. Therefore, this instrument can only use the probe provided by our company.
- The use of corrosive couplant will corrode the acoustic window and cause the probe to leak, which will not only affect the normal diagnosis, but also cause safety accidents. Therefore, professional "medical ultrasonic couplant" must be used.
- When using with other medical electrical equipment at the same time, it should be carried out under the guidance of the company
- Avoid direct sunlight to the display screen, shading indoors to facilitate image observation, and keep ventilation and dustproof.
- The maintenance service of the instrument must be carried out by the company's professional technicians. The user's self-disassembly will not only not solve the failure of the instrument, but will increase the difficulty of maintenance and repair costs, and even cause safety hazards.

## 1.6 Waste disposal

The outer packaging of this product and waste generated during use, such as cleaning paper, empty bottles after using up couplant, etc., should be disposed of in accordance with the regulations of the local environmental protection department. Prevent the spread of disease.

## Chapter 2 Summary

### 2.1 Functional characteristics

Laptop ultrasound diagnostic system (the following Referred to as instrument) is composed of a host, a 3.5MHz convex probe and a power adapter.

The instrument uses the ARM chip architecture to provide a stable and concise operating system. Including B, B+B, B+M, M, 4B imaging modes; Image grayscale is 256; It can perform image smoothing/sharpening, tissue harmonics, gamma correction, intelligent 8-segment TGC control, false color processing and adjustment of up and down, left and right, brightness, focus number, focus distance, focus position, dynamic range, scan angle, frame correlation, M speed adjustment; With functions such as date, clock, name, age, gender, doctor, hospital name, image annotation, etc; Including abdomen, heart, urology, gynecology, obstetrics, small organs, blood vessels, musculoskeletal and other multi-department software packages; , It has different ethnographic measurement formulas, which can monitor gestational week (BPD, GS, CRL, FL, HC, AC, EDD, AFI) and expected date of delivery, fetal weight , last menstrual period, etc; It has Chinese, English , French, Spanish, Russian and Portuguese interface, can write in German, Turkish, Arabic, etc.

### 2.2 Scope of application

Mainly used in ultrasound examination of heart, abdomen, urology, obstetrics and gynecology, pediatrics, musculoskeletal, etc.

### 2.3 Main functions

2.3.1 Operating system: using ARM chip architecture, stable, concise and powerful

2.3.2 Display: 15-inch 1024\*768 resolution high-definition LED LCD screen

2.3.3 Imaging modes: B, B+B, B+M, M, 4B

Probe array element : automatically identify and use a variety of array element probe ( 80 elements,96 elements,128 elements )

2.3.4 Image preset: The system combines a large amount of clinical experience, has different preset adjustment conditions for the parts or organs, and has a one-key optimization function

2.3.5.Cine playback:  $\geq$  about 256 frames

2.3.6 Image storage:  $\geq 300$  frames. External USB storage, Single image storage time  $\leq$  about 9s. (Storage speed is related to the USB device used)

2.3.7 Scanning angle adjustment: adjustable

2.3.8 Image enlargement: Separate knob depth adjustment ( $\geq$  about 20 levels adjustable)

2.3.9 Puncture: with puncture guide line, angle and position are adjustable

2.3.10 Focus: more than 5 levels of focus position adjustment

2.3.11 Image adjustment: up and down, left and right, brightness, focus number, focus position, dynamic range, scan angle, frame correlation, M speed

2.3.12 Image Processing: image smoothing/sharpening, tissue harmonics, gamma correction, false color

2.3.13 Notes and characters: date, clock, name, age, gender, doctor, hospital name, image annotation

2.3.14 Position mark: ≥about 97 kinds

2.3.15 Measurement function

a) Routine measurement: distance, circumference, area, volume;

b) Heart measurement: left atrium, right atrium, left ventricle, right ventricle, aorta, descending aorta, aortic isthmus;

c) Obstetric measurement: gestational sac, biparietal diameter, head circumference, abdominal circumference, femur length, fibula length, head hip diameter, yolk sac, abdomen, cerebrum, cerebellum, amniotic fluid, gestational age, expected date of delivery, fetal weight, etc;

d) Gynecological measurement: uterus, cervix, endometrial thickness, ovaries, follicles;

e) Urology measurement: kidney, adrenal gland, prostate, testicular mass, epididymis, etc;

f) Pediatric measurement: common liver duct, common bile duct, pancreas, spleen, kidney, adrenal gland, etc;

g) Small organ measurement: thyroid, seminal vesicle, testis, scrotum, breast mass, skin mass, etc.

The instrument has different ethnographic measurement formulas.

2.3.16 Report function: automatically generate reports on abdomen, urology, obstetrics, heart, etc

2.3.17 External interface: VGA interface, USB2.0 interface, A/V interface, double Probe interface.

2.3.18 Power saving mode: the panel key light can be turned on and off by one key, and the instrument will automatically turn off the power if it is not used for 6 minutes. Press any key to resume operation

2.3.19 Language settings: Chinese, English, French, Spanish, Russian and Portuguese, etc.

2.3.20 Built-in operating instructions

## 2.4 Contraindications

★This instrument is not suitable for the inspection of air-containing organs such as lungs.

★It is recommended not to explore the wound or acute inflammation site to avoid cross infection.

★The probe must not scan the eyes!

★Ultrasound probes that can detect self-heating in the air cannot be used for transvaginal exploration.

★Special attention should be paid to reducing the irradiated sound output power and irradiation time to the embryo or fetus.

★The following patients should not use vaginal probes:

Vaginal inflammation, such as trichomonas vaginitis, fungal vaginitis, venereal disease, etc.; unmarried; vaginal deformities; menstruation; postmenopausal vaginal atrophy; difficult vaginal ultrasound

examination; vaginal bleeding; patients with placenta previa, etc.

★The following patients are prohibited from puncture:

Hypertension, coronary heart disease, patients with coagulopathy and bleeding tendency.

## 2.5 Performance

|                                             |                                    |                     |                             |
|---------------------------------------------|------------------------------------|---------------------|-----------------------------|
| Probe frequency(MHz)                        | 3.5MHz                             | 6.5MHz              | 7.5MHz                      |
| Probe type                                  | Convex probe                       | Intracavitary probe | High frequency linear probe |
| Probe model                                 | C1-5-2/60R/3.5MHz                  | EC1-9-4/13R/6.5MHz  | L1-9-5/7.5MHz               |
| Detection depth(mm)                         | ≥220                               | ≥40                 | ≥50                         |
| Lateral resolution(mm)                      | ≤3 (depth≤80)<br>≤4 (80<depth≤130) | ≤2 (depth≤30)       | ≤2 (depth≤40)               |
| Axial resolution(mm)                        | ≤2 (depth≤80)<br>≤3 (80<depth≤130) | ≤1 (depth≤40)       | ≤1 (depth≤50)               |
| Blind spot(mm)                              | ≤5                                 | ≤4                  | ≤3                          |
| Horizontal geometric position accuracy(%)   | ≤15                                | ≤10                 | ≤10                         |
| Longitudinal geometric position accuracy(%) | ≤10                                | ≤5                  | ≤5                          |
| Slice thickness(mm)                         | ≤10                                | ≤10                 | ≤10                         |
| Perimeter and area measurement deviation(%) | ±20                                | ±20                 | ±20                         |
| M mode time display error                   | ±10                                | ±10                 | ±10                         |
| M mode distance display error               | ±10                                | ±10                 | ±10                         |

Monitor: 15 inch 1024\*768 resolution HD LED screen

Grayscale: 256 levels

Continuous working time: ≥8 hours

Standby time of battery pack: ≥2 hours

weight: about 4 kg

Size: 366×355×69 (length × width× height) (mm3)

## 2.6 Working Principle

The equipment is based on the different density and different ultrasonic propagation speed of different tissues and organs of the human body, that is, the characteristics of different acoustic impedance (the product of medium density and sound speed), and uses a certain regular electric pulse to excite the piezoelectric chip (transducer) ) To produce a certain frequency of ultrasonic waves, which are injected into the human body, through the interfaces of different organs in the body to produce reflected echoes; the reflected echoes of different sizes are used by the original ultrasonic transducer Receive, and then convert the received echo (acoustic energy) into electrical pulses. This electrical pulse is processed by digital beam

synthesis and digital scan conversion to form a standard video signal, which displays the cross-sectional image of the organ on the monitor screen .

**Warning:**

**Please choose the accessories according to the manufacturer's specified model. If you choose non-standard accessories, the manufacturer will not bear this risk for the unexpected degradation of safety and electromagnetic compatibility performance caused.**

## Chapter 3 Instrument installation

### 3.1 Environmental requirements

- a) Ambient temperature range:  $+5^{\circ}\text{C} - +40^{\circ}\text{C}$ ;
- b) Relative humidity range:  $\leq$ about 80%
- c) Atmospheric pressure range: 700hPa  $\sim$  1060hPa;
- d) Power supply: AC 100V  $\sim$  240V, tolerance  $\pm 10\%$ , 50Hz / 60Hz, tolerance  $\pm 1\text{Hz}$ . DC 14V  $\pm 0.5\text{V}$ , 3A uses a separate network power outlet.
- e) Keep away from strong electric fields, strong magnetic field equipment and high voltage equipment; avoid strong direct sunlight. The room should be shaded to facilitate image observation and to maintain ventilation, moisture and dust.

### 3.2 Storage and transportation environment requirements

- a) Ambient temperature range:  $-40^{\circ}\text{C} - +55^{\circ}\text{C}$ .
- b) Relative humidity range:  $\leq 80\%$  (no condensation).
- c) Atmospheric pressure range: 860hPa - 1060hPa.

#### Attention:

After unpacking, the instrument should be checked carefully according to the "packing list". After confirming that there is no transportation damage, install it according to the instrument and methods of "installation".

#### Warning:

Unpacking inspection found that the instrument is damaged, to ensure safety, prohibit use.

The probe should not be dropped or collided. The manufacturer is not responsible for the risks caused by this

### 3.3 Appearance of the instrument



**Prompt:** USB1 interface for future expansion.

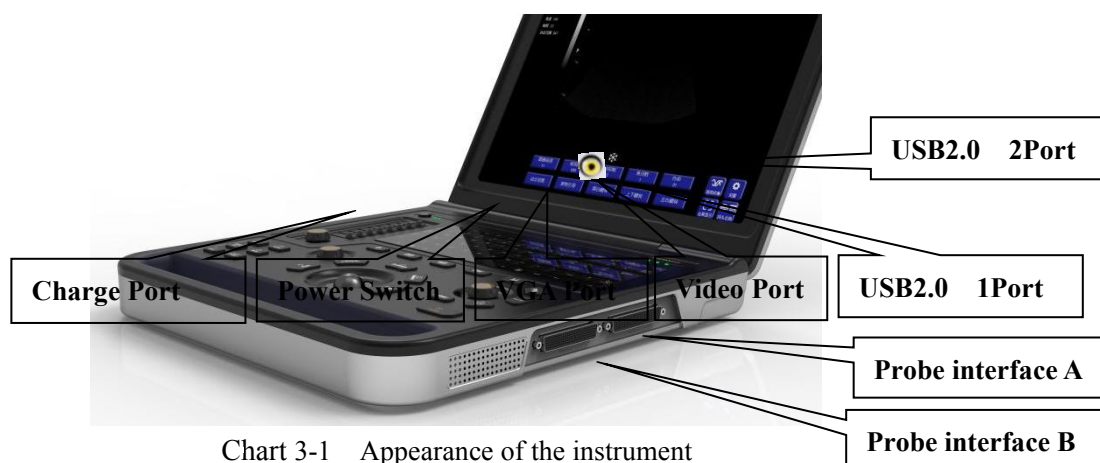


Chart 3-1 Appearance of the instrument

### 3.4 Probe installation

Before using the new probe, gently tear off the protective tape that was attached to the acoustic window of the probe at the factory. Hold the probe plug during installation, press the lock hook handles on both sides of the probe plug inward at the same time, align the probe socket on the side of the host as shown in Chart 3-2, insert the probe plug into the probe socket of the host, and release the probe. The lock hooks on both sides of the plug press the handle to securely lock the probe plug.



Chart 3-2 Probe installation

#### Warning

1. Do not pull or insert the connector plug in the power-on state to avoid damage to the probe and host; once the probe is connected to the host, please do not pull or plug at will to avoid poor contact between the probe and the socket. The probe must be plugged and unplugged in the shutdown state.

2. It is forbidden to touch the connecting pins of the probe connector, and handle the instrument gently.



3.The probe should avoid falling or collision, and the manufacturer is not responsible for the risks caused by this.

4.The probe configured by our company must be selected, and the company does not bear this risk for the damage caused by the use of other probes.

### 3.5 External video equipment

The external video output can be equipped with VGA to AV or Video converter for external video printer.

### 3.6 Battery installation and removal

Battery installation: align the battery with the battery installation slot, insert the battery fixing screw and tighten it.

Battery removal: Loosen the battery fixing screw and pull the battery outward to take it out.



Step 1



Step 2

Chart 3-3 Battery installation

### 3.7 Power connection

Connect the DC output plug of the adapter port to the "DC14V 4A" interface on the back of the host. The instrument has two power supply modes: adapter and built-in battery. The two power supply modes can be switched automatically.

### 3.8 Recharge

1. Install the battery on the host correctly.
2. Connect the DC output plug of the adapter port to the "DC14V 4A" interface on the back of the host.
3. Connect the power cord of the " $\sim 100-240V$  50/60Hz" port of the adapter to the AC power supply.
4. The indicator light next to the power button shows a green light to indicate that the power is on (charging), the green light is off to indicate that the charging is complete, and a red light indicates that the battery is low.

#### Prompt:

To extend the battery life, please make sure that the charging indicator indicates full charge

**before ending the charge.**

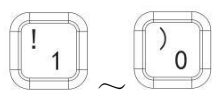
**It will automatically shut down when the battery is less than about five minutes.**

## Chapter 4 Operation panel description

The operation panel of the equipment is as shown below :



Chart 4-1 Keyboard diagram



: Number and comment input



: Character and symbol comment input



: Exit function selection



: Backspace



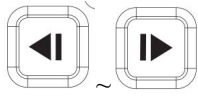
: Character case conversion



: Enter and line feed keys



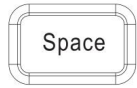
: Enter the characters on the keyboard



: Number and cursor movement direction, movable sampling line



: Control key



: Space in comment state



: M mode selection



: BM mode selection, heart check



: 4B mode selection



: B/B (double B) type mode selection



: Type B mode selection (this mode is the default mode after power-on)



:PW mode selection



: New case establishment



: Output report



: Upside down



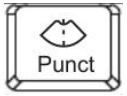
: Flip left and right



: Black and white flip



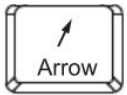
: Body mark input



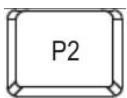
: Puncture guide function, continuous pressing can adjust the puncture guide line. Press again to puncture the guide line disappear



: Image capture



: Annotation arrow



: Tissue harmonic switch key(The standard keyboard shortcut is the P2 key)



: Frequency conversion function



: Zoom activation button



: Fan scan angle adjustment in B mode



: False color



: Frame related adjustment activation button



: Focus position activated



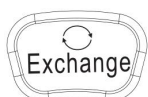
: One-click image optimization



: Exit



: Recall of conventional measurement menu



: Exchange measurement cursor



: Recall of the measurement menu of the corresponding department



: Confirm



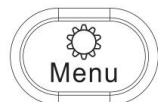
: Store images



: Recall stored image



: Real-time playback of images



: Recall the menu, including measurement setting, time setting, language setting, image setting, system setting, etc.



: Clear screen



: Select the corresponding probe, and then select the department after confirmation



: Switch the image real-time/freezing state; in the frozen state, operations such as measurement, storage can be realized

### Supplementary description of standard keyboard shortcut function

- Depth +: Activate depth adjustment function
- TGC +: TGC adjustment
- Gain +: Overall gain adjustment
- Select + : Rotate and adjust the peripheral function, and press down to display the full screen

## Chapter 5 Instructions

### 5.1 Operating procedures

1. Turn on the power switch on the side of the host, press and hold the power button, the instrument will work after the beep sound, the panel power indicator will light up, and enter the power-on interface; after one minute of warm-up, adjust the total gain, near field and far field knobs, and press "Menu " key to adjust the brightness and contrast through the knob in other settings, so that the image contrast, brightness and gain strength are in the best state.

2. Create new patient information

Press the "Patient" key to call up the patient information window, and then the "Set" key to input basic information such as name and age according to the prompts.

3. Apply the medical ultrasound couplant to the surface of the acoustic window of the probe, close to the scanning site, and observe the real-time image on the screen.

4. After scanning is completed, press (Freeze) to freeze the image, and perform measurement operations on the image.

#### Boot interface display (B mode)

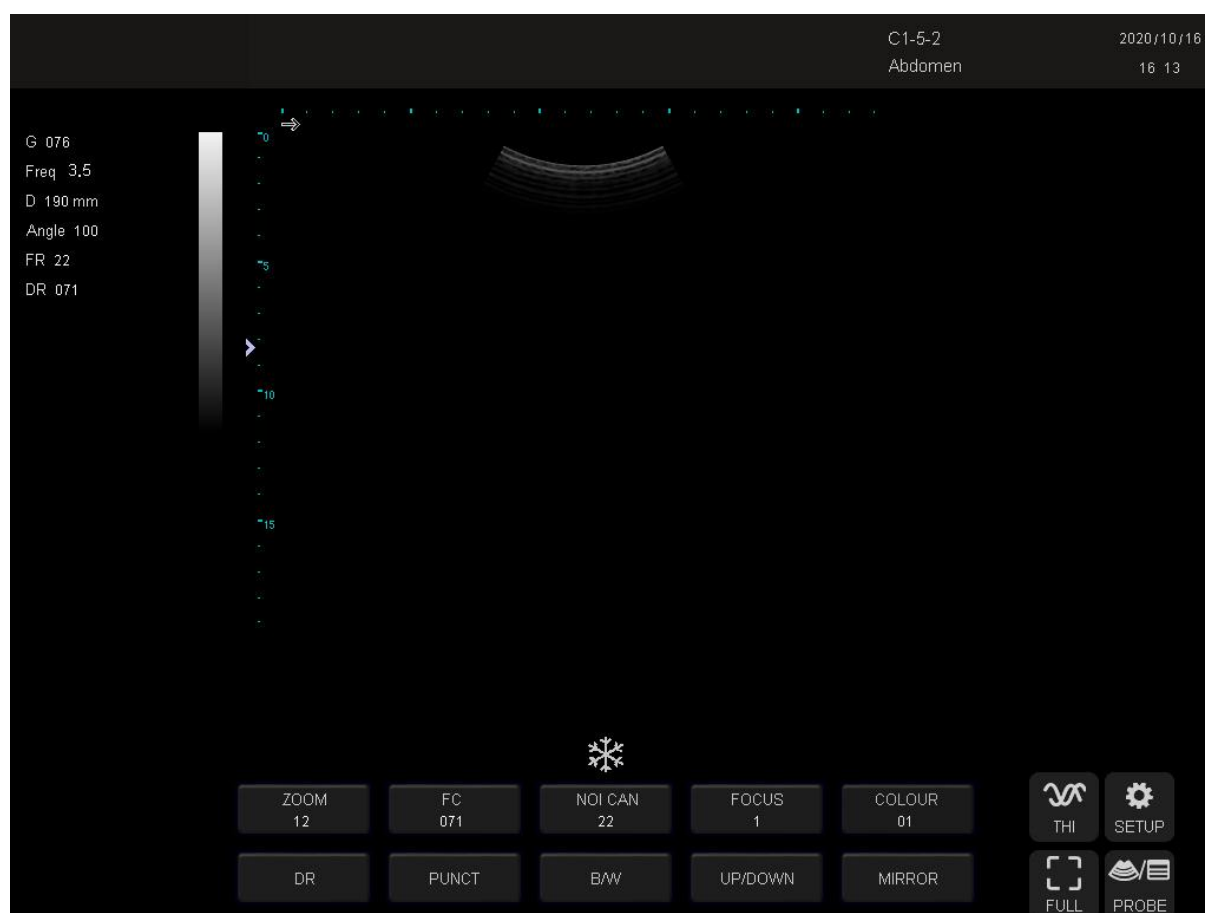


Chart 5-1 Boot interface

## 5.2 Adjust image parameters

### 5.2.1 Switch display mode

#### B mode switch

Press the "B" key to switch the current image to real-time single B mode (the default mode when the device is turned on).

#### BB mode switch

Press the "BB" key to switch the current image to double B mode. The real-time and frozen images are displayed on the screen. Press the "BB" key continuously to switch the real-time and frozen state of the two images.

#### BM mode switch

Press the "BM" key to switch the current image to B+M mode. The screen will display a B-type and M-type real-time image at the same time. The sampling line on the B-type image can move left and right through the trackball.

#### M mode switch

In the B+M mode, press the "M" key to switch the current image to M mode, and an M-shaped image will be displayed on the screen.

#### 4B mode switch

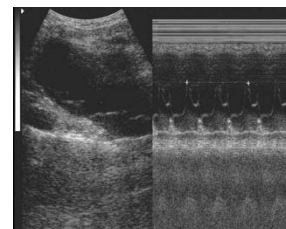
In B and BB modes, press the "4B" key to switch the current image to 4B mode. The screen displays four B-type images, one of which is in real-time status. Press the "4B" key continuously to switch between the real-time and frozen states of the four images.



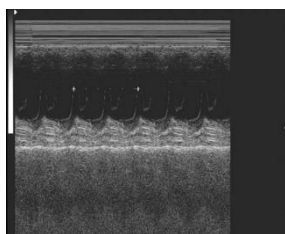
B



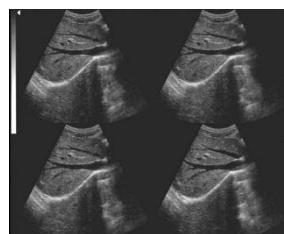
BB



B+M



M



4B

After calling up the menu, please press "Cancel" to exit the menu and switch the display mode.



**PW mode switching (Note: Only the PW version of the instrument has this function)**

In B-mode scanning, select a better quality B-mode image, adjust the probe and image so that the target area is located in the center of the B-mode image.

Press the "PW" key and move the trackball to position the sampling line on the target area (press the "set" key to position the sampling line for the linear array probe).

Press the "PW" key again to display only the real-time PW spectrum.

Press the "PW" key again to enter the real-time spectrum full screen state.

During the scanning process, press the "MENU" key and move the cursor to the row of parameter keys at the bottom of the screen to adjust the image parameters and obtain the best spectrum image.

Press any key to exit the parameter adjustment and perform other operations (such as measurement and calculation) to obtain the necessary data messages.

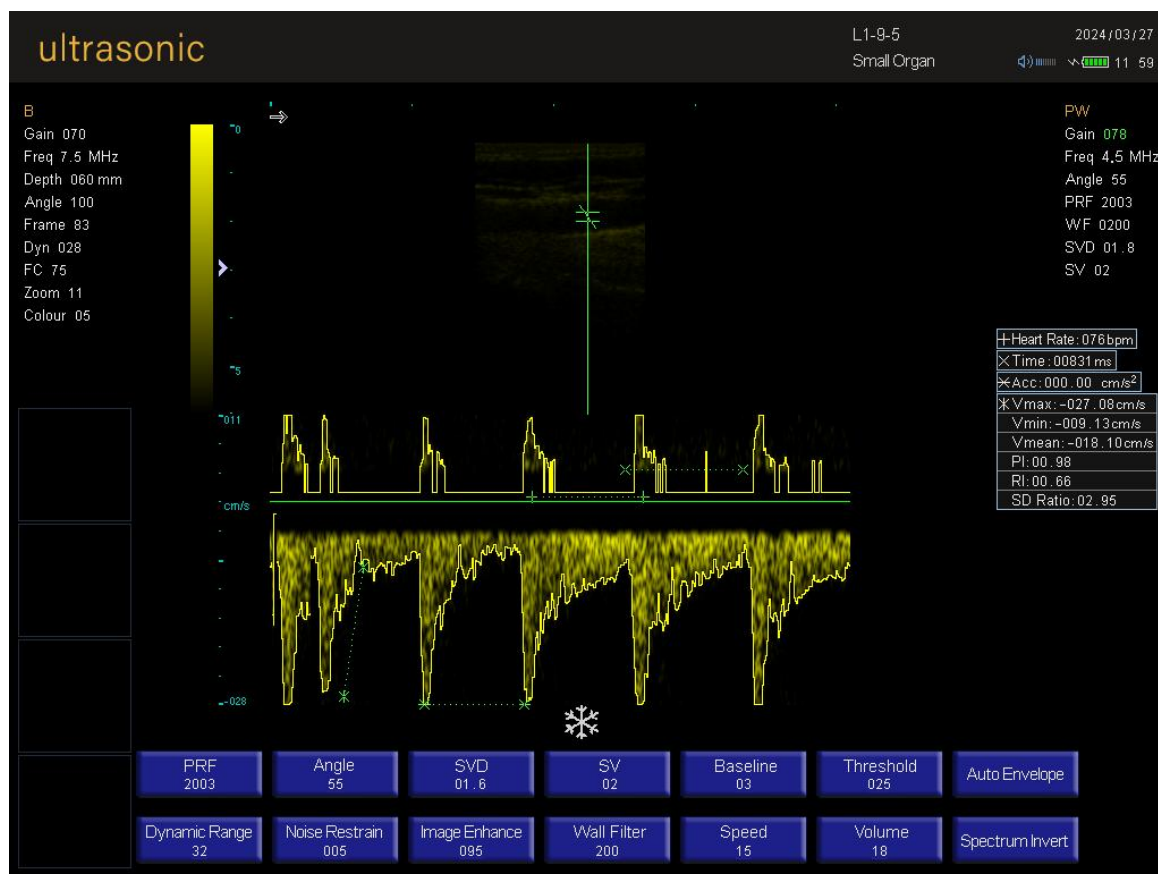


Chart 5-2-1 PW image

**Note:** To exit PW mode, press the "B" mode key to exit.

### 5.2.1.1 PW mode image adjustment

Pulse repetition frequency

In PW mode, move the cursor to select the [PRF] item on the menu, and then rotate the Select knob to adjust it.

### Sampling depth

In PW mode, move the trackball to change the sampling depth.

### Sampling line angle

In PW mode, move the cursor to [Angle] and then rotate the Select knob to adjust the sampling angle.

### Sampling volume

In PW mode, move the cursor to select the [SV] item on the menu, Angle and then rotate the Select knob to adjust.

The smaller the sampling volume, the more accurate the result.

### Sampling scan speed

In PW mode, move the cursor to select the [Speed] item on the menu and then rotate the Select knob to adjust.

After adjustment, make the measured speed as close to the actual speed as possible. Control the speed of spectral Doppler mode imaging output. The smaller the value, the faster the refresh speed.

### Baseline adjustment

In PW mode, move the cursor to select the [Baseline] item on the menu, and then rotate the Select knob to adjust.

### Wall filter

In PW mode, move the cursor to select the [wall Filter] item on the menu, and then rotate the Select knob to adjust.

Filter low-frequency noise to reduce the impact of activities such as breathing.

### Dynamic range

In PW mode, move the cursor to select the [Dynamic] item on the menu, and then rotate the Select knob to adjust.

The larger the dynamic range, the richer the layers displayed in the image, the more information, but the noise will also increase.

### Image enhancement

In PW mode, move the cursor to select the [Image Enhance] item on the menu, click the [Set] key, and then rotate the Select knob to adjust.

### Noise suppression

In PW mode, move the cursor to select the [Noise restrain] item on the menu, click the [Set] key, and then

rotate the Select knob to adjust.

#### Spectrum volume

In PW mode, move the cursor to select the [Volume] item on the menu, click the [Set] key, and then rotate the Select knob to adjust.

Control and adjust the output audio volume generated by the spectrum Doppler.

### 5.2.1.2 PW basic measurement

#### Speed

Function: On the Doppler image, measure the velocity of a point on the Doppler spectrum waveform.

- 1) Press the "Caliper" key, move the cursor to "Speed", press the "Set" key to select, and the measurement cursor appears on the screen.
- 2) Move the cursor to the position of the predicted speed.
- 3) Press [Set] to confirm, and the measurement result is displayed in the result window.

#### Heart rate

Function: Measure the time interval between cardiac cycles on the Doppler image and calculate the heart rate.

- 1) Press the "Caliper" key, move the cursor to "Heart rate", press the "Set" key to select, and a vertical time bar is displayed in the image area;
- 2) Move the time bar to the first peak and press the "Set" key, and the second time bar appears;
- 3) Move the time bar to the second peak and press the "Set" key;
- 4) Complete the measurement, and the measurement result is displayed on the right side of the screen.

#### Time

Function: Measure the time interval between two points on the Doppler image.

#### Acceleration

Function: Measure the time interval between two points on the Doppler image and calculate the acceleration.

- 1) Select "Acceleration" in the measurement menu, and the measurement cursor appears on the screen.
- 2) Move the cursor to the first point where you want to measure the speed.
- 3) Press [Set] to confirm the first point where you want to measure the velocity.
- 4) Move the measurement cursor to the second point where you want to measure the velocity, press [Set] at this time, and the measurement result will be displayed in the result window.

## Index

- 1) Select [Index] in the measurement menu, and the measurement cursor will appear on the screen.
- 2) Move the cursor to the measurement starting point, press [Set] to complete the Doppler velocity measurement of the first peak point.
- 3) Move the cursor to the measurement end point, press [Set] at this time, and the measurement result will be displayed in the result window.

Note: After calling up the menu, press any key to exit the menu and switch the display mode.

### 5.2.2 Freeze image

Press the "Freeze" key to switch between real-time and freeze status, and "❄" at the bottom of the screen is the freeze mark. B. In BB mode, click the image box at the bottom left of the screen to select the



frozen image into the report, and press "BackSpace" to cancel the selection.

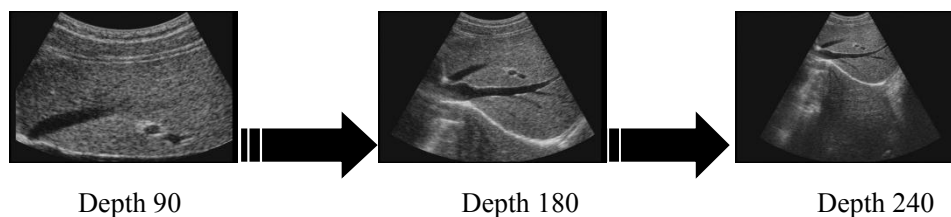
Chart 5-2 Freeze image

### 5.2.3 Adjust the gain

"G ××" on the left side of the screen is the current gain value, and the gain value can be changed by adjusting the total gain knob. The near-field, mid-field and far-field can be adjusted separately through the 8-segment TGC on the keyboard.

### 5.2.4 Adjust display depth

In the real-time state, turn the "Depth" key to activate the depth adjustment, change the current display depth (or magnification), the depth adjustment range changes with the probe type.



### 5.2.5 Adjust the scanning angle of the probe

In the real-time scanning state, press the "Angle" key to activate the angle adjustment function, and use the "Select" knob to adjust the angle.

### 5.2.6 Adjust dynamic range

Move the cursor to the "Dynamic Range" at the bottom of the screen, and use the "Select" knob to adjust the dynamic range.

### 5.2.7 Adjust focus

**Number of focal points:** The instrument can be set to more than four focal points. Move the cursor to the "Focus Number" at the bottom of the screen, and use the "Select" knob to adjust.

#### Focus position

In the real-time scanning state, press the "Focus" key and adjust the focus through the "Select" knob to move the focus up and down to change the focus position.

#### Prompt:

The image near the focus  indicator will focus better. You can change the focus position to make the focus point to the area of interest.

### 5.2.8 Probe working frequency

In the real-time scanning state, press the "Freq" key to switch the frequency of the current working probe, press this key continuously to change to the desired frequency, the upper left corner of the screen will display the current working frequency such as "Freq 3.5".

### 5.2.9 Switch probe

When the instrument is connected to two probes, it will automatically recognize the upper socket A as the default working probe after power on. Press the "Probe" key to switch to socket B, and the probe on socket B starts to work. Press the "Set" key again to select the corresponding measurement department.

**Attention:**

**Two probes cannot work at the same time.**

**The probe must be plugged and unplugged in the shutdown state.**

**5.2.10 Frame Correlation adjustment**

In the real-time B, BB, 4B mode, press the "FC" key to activate this function, after the "Frame Correlation" at the bottom of the screen is lit, adjust the frame correlation size through the "Select" knob and display in real time at the bottom of the screen such as "Frame Correlation: 010 ".

**5.2.11 M speed adjustment**

In the real-time B+M, B+M/M, M mode, press the "Menu" key to adjust the refresh rate of the M-shaped image on the screen through the "Select" knob in other settings.

**5.3 Menu**

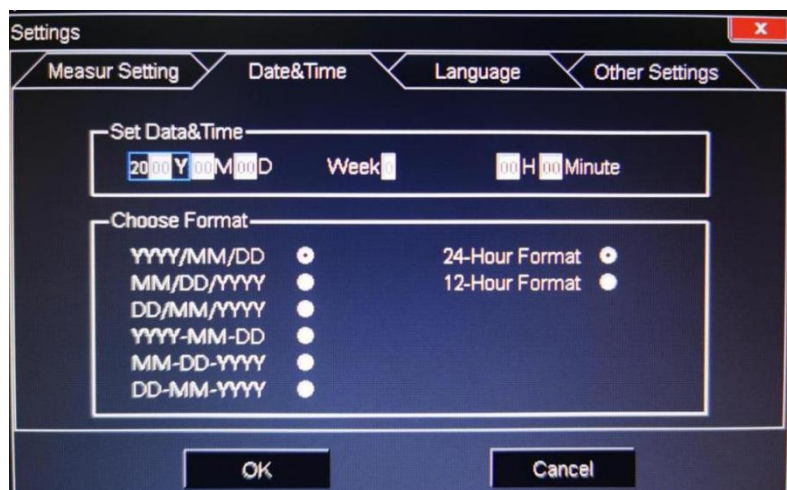
Press the "Menu" key to call up the menu window.

**5.3.1 Measurement method setting**

Move the cursor to the selected measurement method, press the "Set" key to confirm, and press the "Exit" key to exit. The "TOKYO" calculation formula set by default is suitable for Asian races; the "HADLOCK" calculation formula is suitable for European races.

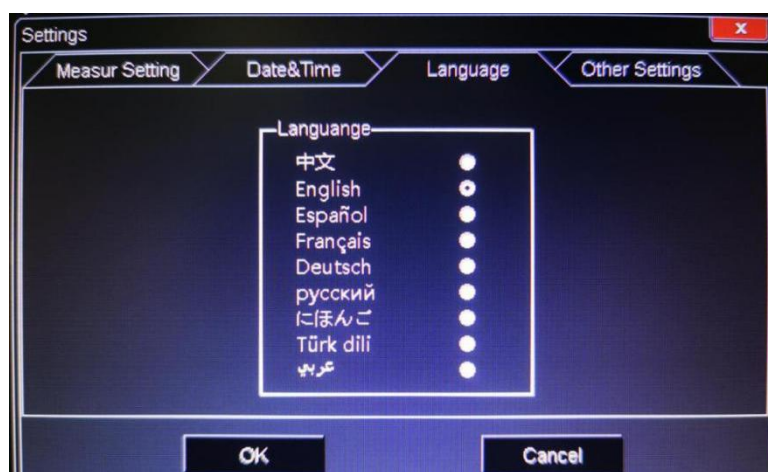


### 5.3.2 Time setting



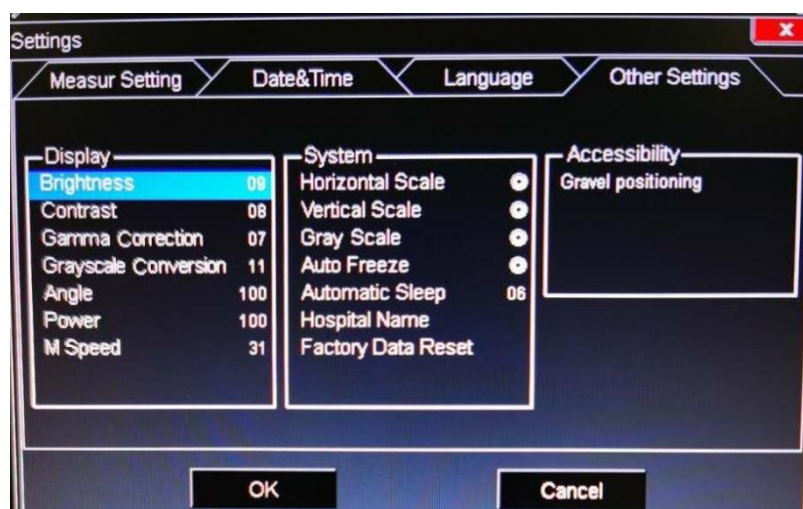
Move the cursor to the input box, turn the "Select" knob to select the corresponding time, and press the "Exit" key to exit after input. You can also choose the time display format below the input box.

### 5.3.3 Language setting



Including various languages. Move the cursor to the selected language, press "Set" to confirm, and press "Exit" to exit.

### 5.3.4 Other settings



**Image**

Including brightness, contrast, gamma correction, gray-scale conversion, scanning angle, ultrasonic power and M-scan speed. Move the cursor to the option, turn the "Select" knob to adjust, press the "Set" key to confirm, and press the "Exit" key to exit.

**System**

Including electronic ruler, grayscale display bar, automatic freezing, automatic sleep time, hospital name and factory reset. Move the cursor to the option, press the "Set" key to cancel the default selection, and turn the "Select" knob to adjust the size.

**Gravel positioning line**

Turn off auto-freeze, set the sleep time greater than 60 minutes, click the button to enter the state, in this state a center line appears in the image area, and move the trackball up and down to measure the distance in real time, press the "Exit" key to exit the state

**5.4 Shutdown**

Short press the power button, turn off the power switch, and unplug the power plug; after shutting down, make sure that the probe and the whole machine are clean and placed.

**Prompt:**

**If the instrument is not used for a long time, remove the battery from the host and unplug the**

**AC power plug of the adapter.**

**Attention**

**It is strictly prohibited to unplug or insert the power plug when the power switch is on; if you need to turn on the device immediately after it is turned off, you should wait 2-3 minutes before turning it on to avoid damage to the instrument.**



## Chapter 6 Image Processing

**Note:** This instrument has corresponding inspection and adjustment conditions for different departments or diagnostic sites. If the user needs to restore the settings after adjusting the parameters by himself, press the "i-clear" key to perform one-key optimization.

### 6.1 Tissue harmonics

In the real-time scanning state, click the mouse on the lower right corner of the screen "P2" key to turn on the tissue harmonic imaging, and the "harmonic imaging" will light up at the bottom right of the screen.

Turn off tissue harmonics and press "P2" to exit.



Turn off tissue harmonics



Turn on tissue harmonics

### 6.2 Image flip

#### Flip up and down

In non-4B mode, click "Flip Up and Down" at the bottom of the screen to flip the image upside down.



#### Flip left and right

In the real-time scanning state of B, BB, 4B mode, click "Flip left and right" at the bottom of the screen to flip the image left and right, the upper left corner of the screen → is the image scanning direction sign



#### Flip black and white flip

Click "Black and White Flip" at the bottom of the screen to realize the image black and white flip

### 6.3 Enlarge

Press the "ZOOM" key and adjust the image magnification through the "Select" knob.

### 6.4 Dynamic range adjustment

Move the cursor to the "Dynamic Range" at the bottom of the screen, and use the "Select" knob to adjust the dynamic range.

### 6.5 Scanning range adjustment

In the real-time scanning state, press the "Angle" key to activate the angle adjustment function, and use the "Select" knob to adjust the angle. When the parameters on the left side of the screen are activated, press "Exit" to exit.

### 6.6 Depth adjustment

Rotate the "Depth" button to activate depth adjustment. Different probes display different depth ranges. When the parameters on the left side of the screen are activated, press "Exit" to exit.

### 6.7 False color

Press the "Colour" key to activate the pseudo-color function, and adjust the color through the "Select" knob.

### 6.8 Image storage and movie playback

#### Image storage

Follow the steps below to store images:

1. Press the "Save" key to call up the selection box: One-key storage to U disk or one-key storage to this machine.
2. Press the "Set" key to confirm the selection and start saving the image.
3. Wait for about 9 seconds, the image is saved successfully.

**Note: The storage number is compiled based on time. The example of this machine is "200809104211", which means year, month, day, hour, minute, second and second. An example of a USB flash drive folder is "20200809", that is, year, year, month, day, and day; an example of a USB flash drive image is SS104211, real-time hours, minutes, seconds, and seconds; an example of USB flash drive report "RR104211", real-time hours, minutes, seconds.**

**It is recommended to store images to a USB flash drive, which has a larger storage capacity.**

**When storing to a USB flash drive, it is recommended to wait for about 3 seconds before pulling out**

**the USB flash drive to protect the USB flash drive device.**

**Bring up the image**

Press the "Freeze" button and then "Review", the image recall window appears, select the picture and then recall the image.

**Movie playback**

Press the "Cine" button to start playback, which can provide  $\geq$  about 256 frames of movie playback; press "Cine" again to pause during playback, and you can observe satisfactory images.

## Chapter 7 Comment

### 7.1 Image annotation

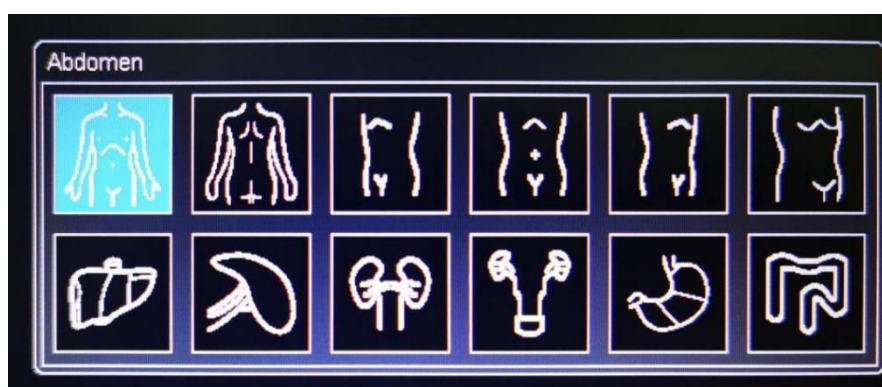
Press the " " key to enter the image annotation function, a orange cursor is displayed on the screen, move the trackball to any image area, press "Set" to confirm, enter the note, press the "Exit" key to complete the input and exit. (You can press "Arrow" to add a comment arrow to indicate the location of the comment.)

### 7.2 Posture mark

#### Body mark

Press the "Body mark" key to call up the body mark selection window, move the trackball or press the arrow keys to light up the desired body mark, and then press the "Set" key to select, and the corresponding body mark will be displayed at the bottom left of the screen. Different body marks can be selected for different organs, and there are more than 97 body marks that can be set. The following is a brief description of the body mark.

1. Abdomen:



2. Obstetrics



## 3. Gynecology



## 4. Urology



## 5. Pediatrics

## 6. Small organs

## 7. Cardiac



**Body position indicator**

After the selected body mark is displayed, the probe direction of the body mark can be adjusted by the "Select" knob or direction keys, and press the "Set" key to complete and exit.



## Chapter 8 Measurement and report

### 8.1 Routine measurement

#### 8.1.1 Distance measurement

press the "Caliper" key, The measurement information area appears on the right side of the screen:

1. Move the trackball to select the distance option;
2. Press the arrow keys or move the trackball to the starting point of measurement, press "Set" to fix and move the trackball;
3. Move the cursor to the end of the measurement and press the "Set" key to display the measurement result, and the cursor will appear for the next set of measurements;
4. Press the "CLR" key to clear the measurement result;
5. Repeat the second and third steps to perform multiple data measurements at the same time.

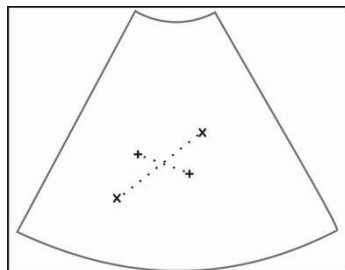


Chart 8-1 Distance measurement

#### 8.1.2 Perimeter/area measurement

press the "Caliper" key, The measurement information area appears on the right side of the screen:

1. Move the cursor to the area to be measured and press the "Set" key to confirm the position;
2. After moving the trackball to enlarge the ellipse track to a suitable position, the measurement result will be displayed on the right side in real time;
3. Press the "Set" key again to confirm the ellipse measurement track;
4. Press "CLR" key to clear measurement data.

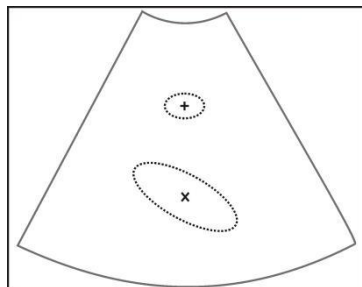


Chart 8-2 Ellipse measurement

#### 8.1.3 Volume measurement

This instrument provides a three-axis measurement method, that is, the distance measurement calculation of the long and wide section and the cross section of the target part; it is recommended to complete the measurement in the double-frame mode:

1. Confirm the starting point of the profile length and press the "Set" key. When the cursor appears, move the trackball to the end point and press the "Set" key to confirm;
2. When the first set of distance measurement is completed, a measurement cursor will appear at the same time; confirm the starting point of the profile width and press the "Set" key, the cursor will appear and move the trackball to the end point and then press the "Set" key to confirm;
3. When the second set of distance measurement is completed, the measurement cursor will appear at the same time. Confirm the starting point of the cross section and press the "Set" key. After the cursor appears, move the trackball to the end point and press the "Set" key to confirm;
4. Press "CLR" key to clear measurement information..

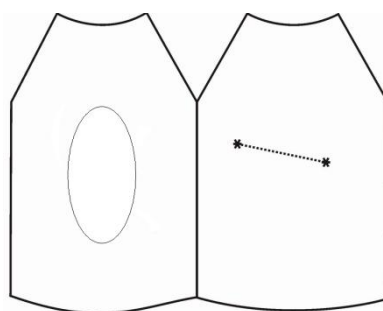


Chart 8-3 Triaxial measurement

## 8.2 Cardiac measurement

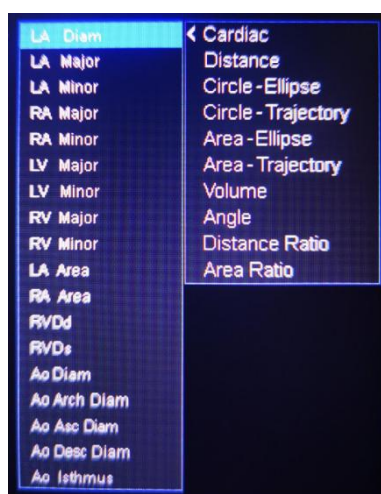


Chart 8-4 Cardiac routine measurement menu

Enter the B/M mode, press the "Probe" key to call up the routine measurement menu; then move the cursor to "Heart", press the "Set" key to call up the heart routine measurement menu, see the chart below:

Move the cursor to the measurement item, press "Set" to enter the measurement, and the corresponding obstetric data is automatically displayed on the right side of the screen.

### Left atrial diameter measurement

1. Move the cursor to the "left inner diameter", press the "Set" key to select;
2. Press the arrow keys or move the trackball to the starting point of measurement, press "Set" to fix



and move the trackball;

3. Move the cursor to the end of the measurement and press the "Set" key to display the measurement result;

4. Press "CLR" key to clear the measurement result.



Chart 8-5 Left atrial diameter measurement

### Heart rate measurement

Enter B/M mode, press "Caliper" key to call up the measurement menu, see the chart below:

1. Move the cursor to "Heart Rate", press "Set" to select, a vertical time bar is displayed in the image area;
2. Move the time bar to the first peak and press the "Set" key, the second time bar appears;
3. Move the time bar to the third peak and press the "Set" button;
4. The measurement is completed and the measurement result is displayed on the right side of the screen.

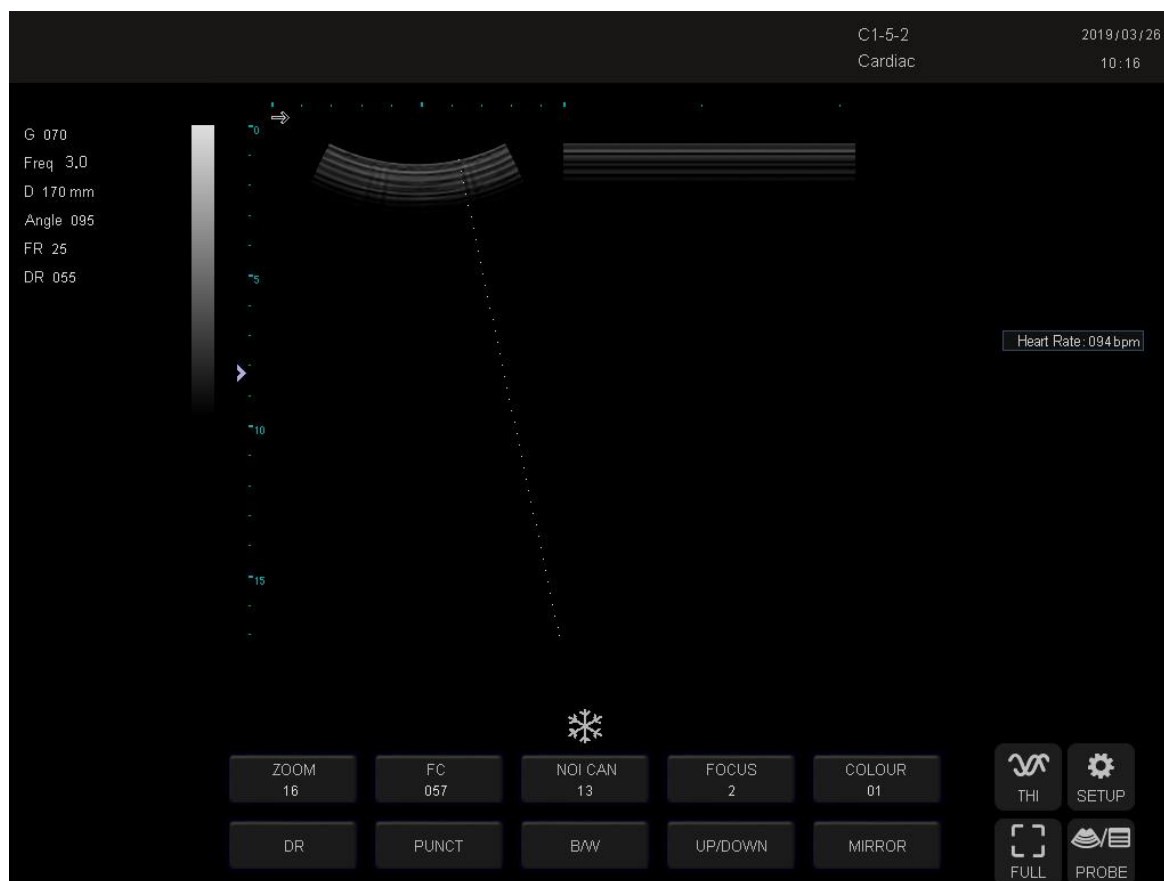


Chart 8-6 Heart rate measurement

### 8.3 Obstetric measurement

Switch the probe to "Obstetrics". Obtain a satisfactory image in the B mode, press the "Measure" key to

Call up the Obstetrics Measurement menu, see the chart below:

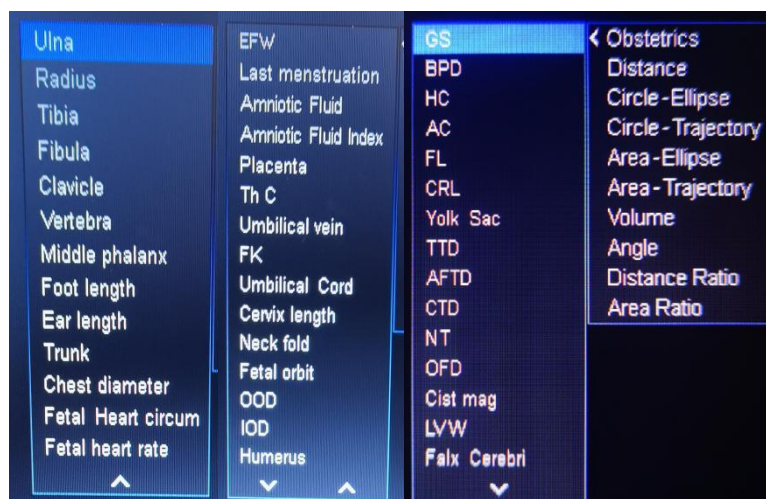


Chart 8-7 Obstetric routine measurement menu

Move the cursor to the measurement item, press "Set" to enter the measurement, and the corresponding obstetric data is automatically displayed on the right side of the screen.

**Double parietal diameter measurement gestational week**

1. Move the cursor to "double parietal diameter", press "Set" key to select;
2. Press the arrow keys or move the trackball to the starting point of measurement, press "Set" to fix and move the trackball;
3. Move the cursor to the end of the measurement and press the "Set" key to display the gestational week and expected delivery date measurement results.



Chart 8-8 Double parietal diameter measurement gestational week

**Estimated date of last menstrual period**

When you press the "Patient" key to create a new patient, enter the first day of the pregnant woman's last menstrual period, and the date format is YY/MM/DD, that is, "year/month/day", confirm the entered date is correct and select the obstetric department, move the cursor to "Last Menstruation", press the "Set" key to select, and the expected date of delivery will appear.

**Attention:**

1. The accuracy of the system date must be ensured in the calculation of the due date.
2. The standard pregnancy period recognized by the system is 40 weeks. If the interval between the date entered in the last menstrual measurement and the date displayed by the current system exceeds 40 weeks, the system will not accept the date entered and must be entered again.
3. If the date entered is greater than the date displayed by the current system, the system will

**automatically recognize it as the date of the previous year.**

## 8.4 Report

Press the "Report" button to give priority to the basic information of the patient, ultrasound findings and ultrasound tips, among which the ultrasound findings and ultrasound tips module doctors can enter the corresponding diagnostic information; press the "Report" button again to preview the overall report preview, as shown in chart 8-9, after confirming that it is correct, press "Report" to save the report to the U disk.



Ultrasonic parts : Cardiac

Ultrasound No : 01

Name : aa

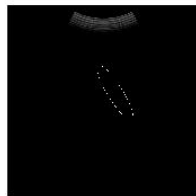
Gender : Female

Age : 22

Registered No : 02

Applying physician : bb

Ultrasound image :



Measurement result & Describe :

HC : 13.89cm, GA : 17w1d, EDD : 2021-04-01 ; LMP : 2020-09-16, EDD : 2021-06-25;  
[AVG] EDD : 2021-05-13 ;

Summary :

Diagnostician :

Reviewer :

For reference of clinicians only !

Audit date :

Chart 8-9 Report preview

**Prompt: You should press the "Probe" key to select the corresponding probe and department to observe and measure, create a report, and ensure that relevant information is stored.**

**If the latest 3 measurements of biparietal diameter (BPD), femoral length (FL), head and hip length (CRL), and gestational sac (GS) are selected, AVG represents the average of the three measurements.**

## Chapter 9 Daily Maintenance

### 9.1 Lifetime

Always check the power cord and probe cable of the device. If damage or breakage is found, it is forbidden to use and replace it immediately.

According to the manufacturer's design, production and other related documents, the product's Life expectancy is generally 6 years, the raw materials constituting the product will gradually age over time, and the product will continue to be used beyond its life, which may result in performance degradation and problems like failure rate increasing.

**Note:**

**1. Disposal of the product should comply with the regulatory requirements of the user's location.**

**2. Do not scrap it with your household waste.**

**WARNING: The manufacturer will not be liable for any risks arising from continued use beyond the life of the product.**

### 9.2 Host maintenance

9.2.1 The environment in which the instrument is used shall comply with the requirements of 3.1.

9.2.2 When the instrument case needs to be cleaned, it should be wiped off with a soft clean cloth (or a little neutral detergent) in the off state. Do not scrub with organic solvents such as alcohol or gasoline.

9.2.3 The instrument should not be turned on and off frequently. If you need to turn it on again after shutdown, wait at least 2-3 minutes.

9.2.4 If the instrument is used less, it should be powered on at least once a week, and the power-on time is about 4 hours.

9.2.5 When the instrument is not parked for a long time, the instrument should be packed into the packing box according to the original packaging and stored properly. The storage should meet the requirements of "Storage Environment" in Article 3.2.

**Note: 1. Please refer to the manufacturer's instructions carefully for the use of detergent.**

**2. Pay attention to the cleanliness of the display. Since the display is easily scratched and damaged, wipe it with a soft dry cloth.**

**3. Please do not clean the inside of the instrument.**

**4. Please do not put the instrument into the liquid.**

**5. Do not leave detergent on the surface of the instrument.**

**6. Although the instrument housing does not react chemically with most detergents. We also recommend not using the cleaner arbitrarily to avoid damaging the surface of the instrument.**

**Warning**

**To avoid accidents, cleaning the instrument and probe should be in the state of power off.**

### 9.3 Probe Maintenance

9.3.1 The probe is a valuable and vulnerable item, and it is strictly forbidden to collide or fall. When you pause the diagnosis, place it in the probe box and press the “FREEZE” button to put the probe in a “frozen” state.

9.3.2 If the probe is slightly affected, it will be damaged. Be especially careful not to be shocked or bump into hard objects.

9.3.3 The head of the probe (transparent sound window) should be fully protected from scratches.

9.3.4 Non-conducting "medical ultrasonic coupling agents" should be used during inspection. Conductive or corrosive coupling agents should not be used.

9.3.5 Cleaning, sterilization and disinfection of the probe: After each diagnosis, the disinfection treatment should be carried out after each use. A 5% sodium hypochlorite solution can be diluted 100 times with water to prepare a dilution having an effective chlorine content of 500 mg/L, and the probe surface is wiped or sprayed for 10 minutes.

9.3.6 The probe is a common anti-dip type. Do not immerse any conductive liquid to avoid corrosion of the probe; the position of the probe immersed in water shall not exceed 5 mm of the acoustic window.

9.3.7 Once the probe is connected to the host, it must not be disassembled at will, so as to avoid poor contact between the probe plug and the socket.

**Note:**

- 1. Long-term repeated exposure of the gel on the probe may damage the probe.**
- 2. The probe must be cleaned after each use.**
- 3. Do not use a surgical brush to clean the probe. Even with a soft brush, the probe may be damaged. Use only a soft cloth.**
- 4. The contact time between the probe and the patient should not be too long to avoid patient discomfort.**

To extend the life of the probe and get the best performance, do the following:

1. Regularly check the probe cable, socket and acoustic window.
2. Shut down before connecting or removing the probe.
3. Do not drop the probe to the floor or hard objects. Do not collide with the sound window of the probe, otherwise it will be easily damaged.
4. Do not heat the probe.

5. Do not bend or pull the probe cable. Otherwise, the internal connection of the cable may be broken.
6. Use gel only on the probe head and clean the probe after use.
7. After the probe is cleaned, the sound window, casing and cable of the probe must be carefully checked. If cracks or breakage are found, it should be prohibited.
8. Place the probe into the shelf when not in use.
9. It is recommended that all intracavitary probes should be used with sterile probe covers and sterile gel in clinical applications. Do not open the probe sheath and gel package before inspection.

#### **9.4 About the battery**

1. The instrument is equipped with a rechargeable lithium-ion battery, battery capacity: 4400mAh.
2. The new battery must pass two or three cycles of full charge and discharge (normal use, non-forced discharge) to achieve the best results.
3. The battery can be charged and discharged hundreds of times, but it will still be lost. The battery should be inspected every month. When it is found that the usable time of the battery is significantly shortened, please replace it with a new one.
4. Always use the charger (ie AC adapter) specified by our company for charging. Do not connect the battery to the charger (AC adapter) when not charging. Do not connect the battery Full-digital Laptop Ultrasonic Diagnostic Apparatus User Manual to the charger (AC adapter) for more than 10 hours, otherwise the battery life may be shortened. If the full battery is not used for a long time, the battery will discharge itself over time.
5. To prevent battery failure, the battery should be charged and discharged every 3 months.
6. Extreme temperature (supercooled or overheated) environment can affect the battery charging effect. Do not charge the battery under fire or extreme heat! Do not use or store batteries near heat sources such as fire or heaters! If the battery leaks or emits an odor, remove it immediately from an open flame.
7. Do not continue to use the damaged battery and charger (AC adapter).
8. Do not attempt to disassemble the battery.
9. Do not short the battery out.
10. Do not throw the battery into the fire or heat the battery, otherwise it will cause an explosion.
11. Do not put the battery into the water or get it wet.
12. Do not reverse the positive and negative electrodes.
13. Do not connect the battery directly to a wall outlet or a car cigarette lighter socket.
14. It is forbidden to short the positive and negative terminals of the battery with wires or other metal objects. It is forbidden to transport or store the battery together with necklaces, hair clips or other metal objects.

15. It is forbidden to pierce the battery case with nails or other sharp objects, and it is forbidden to hammer or pedal the battery.
16. It is forbidden to impact, throw or use the battery to be mechanically shaken.
17. Direct soldering of battery terminals is prohibited.
18. It is forbidden to disassemble the battery in any way.
19. Do not place the battery in a microwave or pressure vessel.
20. It is forbidden to use in combination with primary battery (such as dry battery) or battery of different capacity, model and variety.
21. Do not use the battery if it emits odor, heat, deformation, discoloration or any other abnormality. If the battery is being used or charged, immediately remove it from the appliance or the charger and stop using it.
22. Dispose of used batteries in accordance with local regulations regarding proper disposal of waste.
23. The diagnostic instrument is in the scanning display working state. The connection adapter should be able to work normally after 8 hours of continuous startup. After AC power failure, it will automatically switch to internal battery DC power supply. The diagnostic instrument should work continuously for more than 3 hours when using internal power supply.

## 9.5 Instrument detection and calibration

Detect the leakage current of the instrument every year. The reference data is shown in the table below.

| Test items  |                          |                                     | Standard Requirement                  |
|-------------|--------------------------|-------------------------------------|---------------------------------------|
| Normal      | Shell leakage current    | Normal Status                       | $\leq 100 \mu A$                      |
|             |                          | Single fault                        | $\leq 500 \mu A$                      |
| operating   | Patient leakage current  | Normal Status (AC)                  | $\leq 100 \mu A$                      |
|             |                          | Single fault (AC)                   | $\leq 500 \mu A$                      |
|             |                          | Normal Status (DC)                  | $\leq 10 \mu A$                       |
|             |                          | Single fault (DC)                   | $\leq 50 \mu A$                       |
|             |                          | input/output partial screen voltage | $\leq 5mA$                            |
| temperature | A-a2 Dielectric strength |                                     | 4000V/ 1min No flashover/No breakdown |
|             | B-a Dielectric strength  |                                     | 4000V/ 1min No flashover/No breakdown |



## Chapter 10 Simple Fault Checking and Troubleshooting

In the process of using the instrument, if you encounter difficulties, you can't solve it yourself. Please consult the company's professional technicians or contact the company's after-sales service department.

The troubleshooting methods for common simple faults are listed below for reference only.

### Check before starting:

- a) Check if the power supply is normal, the main power cable is connected, and it is plugged into the power socket;
- b) Check if the probe is connected to the host correctly;

### Troubleshooting:

- a) Turn on the instrument power switch, the power indicator does not light:

Check if the power supply is normal;

Check if the power cord and plug connection are reliable;

Check if the battery is connected properly;

The power switch is in good contact or not.

- b) No signal on the display:

Adjust the brightness and contrast knob of the instrument; check if the display signal input line is reliable with the host.

The external display is used to check whether there is a signal to determine whether the hardware is faulty.

- c) The image on the display is not clear:

Adjust the gain, near field, far field, and focus and frequency buttons in the instrument;

Adjust the THI, dynamic range and other buttons;

- d) There is intermittent stray interference on the display, and snowflake interference:

Check if the power supply is disturbed by other equipment; unplug the adapter and use battery power to eliminate it.

Whether there is electricity or magnetic field interference in the space around the instrument; moving the device can check whether the interference situation is alleviated or disappeared in real time.

Check if the instrument power supply and the probe plugs are in good contact; the probe and the instrument host should be as far away as possible from the adapter.

Avoid using the same network power supply with chargers, fans, and lighting.

## Chapter 11 Transport and storage

### 13.1 Environmental requirements

The diagnostic system can be transported by ordinary vehicles. It should be protected from rain and snow splashing and mechanical collision during transportation, and should not be mixed or mixed with corrosive substances.

The warehouse where the diagnostic system is stored should be dry, ambient temperature:  $-40^{\circ}\text{C} \sim +55^{\circ}\text{C}$ , relative humidity:  $<80\%$  ( $20^{\circ}\text{C}$ ), indoors should avoid strong sunlight and other gases that cause corrosion, indoors should be well ventilated.

### 13.2 Storage

When the instrument is stored for more than 3 months, the instrument should be taken out of the box. After being powered for 4 hours, the instrument should be put back into the box and put away in the warehouse. Do not stack the instruments, do not put closely to the ground, walls and the roof, and should be protected from moisture and moisture.

The storage environment requirements are detailed in 4.2. The room is well ventilated to avoid strong sunlight and corrosive gas.

### 13.3 Transportation

The mark on the packing box of the instrument complies with the requirements of GB/T191-2000 “Package Storage and Transportation Graphic Mark”. The box is equipped with simple anti-shock facilities, which are suitable for air, railway, highway and ship transportation. Rain, snow, splashes, and collisions should be avoided.



China Care Medical Equipment Co.,Ltd  
Address:Room B101, Zhongbang Business Building, PuXing  
Road No. 87, Tianhe, Guangzhou,  
China web: [www.chinacaremedical.com](http://www.chinacaremedical.com)