Statement

Thank you for selecting Full Digital Colour Doppler Ultrasonic Diagnostic System.

Prior to use the system, please read this user manual carefully.

In addition, keep this user manual so that you may read it at anytime when necessary.

Responsibility of the manufacturer

The manufacturer is responsible for the effects on safety, reliability, and performance of the product, only if:

- All installation operations, expansions, adjustments, upgrades and repairs of this product are conducted by the manufacturer authorized personnel;
- All components for replacement, accessories, consumables are original of the manufacturer or approved by the manufacturer;
- Electrical installation complies with the applicable national standards and the requirements of this user manual;
- Use this product only in accordance with this user's manual.

About This Manual

Version: 1.0 Issue date: 2019.05.30

This manual details all information necessary for safe operation of the system. The applications, functions, operations and maintenance of the product are described with the most comprehensive configuration in this manual. If there is any discrepancy between the description in the manual and the physical one, please prevail in kind. If you have questions, please contact us.

The manufacturer is committed to continuously improve product performance and reliability. Contents of this manual are subject to change without prior notice. Figures showed in this manual may be different from physical one, please prevail in kind.

This manual is intended for users familiar with the basic principles and techniques of ultrasound. It does not involve ultrasound training or medical procedures.

Conventions used in this manual

Before using the system, read carefully and be sure to completely understand these conventions in this manual.

Symbols and conventions	Description
	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING indicates a potentially hazardous situation, which, if not avoided, may result in physical injury or death.
	CAUTION Indicates a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury or equipment damage.
	Patient /user infection due to contaminated equipment.
NOTE	Provide additional Information
Click	Press the **[Set]** button
Double-click	Press the **[Set]** button twice in quick succession
Select	Highlight a menu item with the trackball
［**Bold**］	Physical buttons or knobs on the device, prompts or menu items on the touch screen
<Keyboard>	Keyboard keys

Warranty

The warranty period is subject to the sale contract.

Consumables refer to disposable consumables that need to be replaced after each use or vulnerable materials that need to be replaced regularly. Consumables are not covered by warranty.

The warranty period starts from the "installation date" filled in the "Product Warranty Card" that accompanies the product. The "Product Warranty Card" is the only voucher for calculating the warranty period and enjoying the warranty service.

To protect your rights and interests, please fill in the warranty card after the system is installed, and give it to the installer or mail it to the Customer Service Department of the manufacturer Company.

During the warranty period, the manufacturer will provide you with free warranty service; beyond the warranty period, the manufacturer will provide maintenance service for products under the condition of reasonable labor fee, spare parts fee and transportation fee.

But please note that even during the warranty period, the following condition is not covered by the free warranty.The manufacturer will charge for repair and accessories:

- Artificial damage.
- Improper use.

- The voltage of the power grid is beyond the scope specified by the product.
- Irresistible natural disasters.
- Replace or use of parts, accessories, and consumables not approved by the manufacturer or maintain the system by unauthorized personnel.
- Failures not arise from the product itself.
- Failure to follow any operation instruction of the user manual.

Disclaimer

The manufacturer dose not assume any responsibility for unintended use, mis-operation by unqualified medical personnel or failure to follow operation instruction of the user manual.

The manufacturer does not assume any responsibility for any medical disputes arising from the rental of equipment to third parties or other institutions.

Contents

1 Safety

1.1 Safety Information

Read, understand and strictly follow the instructions before using the system to ensure the safety of patient and operator.

This system should be used by a professional clinician or under the guidance of a professional clinician. Unauthorized person or untrained person shall not perform any operation.

Manufacturer is responsible for the effects on safety, reliability, and performance of the product, only if following precautions are strictly followed.

1.1.1 Precautions

1.1.1.1 System Safety

Danger

- **DO NOT operate the system in the presence of flammable gases or anesthetics or ethyl alcohol. Explosion may result.**

  -If flammable substances are detected, DO NOT plug the power cord or power on the system.

  -If flammable substances are detected after the system is powered on, DO NOT attempt to shut down the system or unplug the power cord.

  -If flammable substances are detected, exhaust the air in the area and make well ventilation before shutting down the system.

Warning

- **DO NOT place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of electric shock. If liquid is accidentally into the system, stop using the system immediately and shut down the system, contact the manufacturer Customer Service Department or sales representative**
- **Never allow the patient to contact the live part of the system or other device, e.g. Signal I/O ports. Electric shock may result.**
- **DO NOT use the system with high-frequency surgical equipment, high frequency electrotome, or defibrillator.**
- **Unauthorized personnel are NOT allowed to remove protective covers. Short-circuit or electric shock may result. Refer servicing to authorized service personnel only.**
- **Before cleaning procedure, shut down the system and unplug the power cord. Electric shock may result.**
- **Keep the system dry all the time; avoid fast moving the system from a cold place to a warm place. Otherwise, condensation or water droplets may occur, which may lead to short circuit or shock hazard.**
- **When the non-medical electrical equipment in the system is**

powered by a removable, multiperture socket with an isolating transformer, the plug must be full-plugged into a standard socket (hospital grade). Professional installer is responsible to comply with the safety requirements.

- **All devices (analog and digital) connected to this ultrasound system must comply with specified IEC standards (e.g. IEC 60950 information technology equipment safety standard and IEC 60601-1 medical equipment standard). All configurations must in accordance with relevant requirements of IEC standards. When using additional peripheral equipment that is to be interconnected by functional connection, the combination is considered to be a medical electrical system. It is your responsibility to comply with IEC 60601‑1-1 and test the system to those requirements. If you have questions, contact your sales representative.**

- **If any part of the system is known or suspected to be detective or incorrectly adjusted, DO NOT use the system until it is repaired.**
- **Use the system in proper environment, DO NOT use the system in the cases of direct sunlight, heat source, high humidity, drastic temperature change, dusty and vibration-easily situation.**
- **DO NOT use the system in the vicinity of strong electric field, magnetic field or mobile radio frequency communication equipment, such as mobile phones, radio transceivers, mobile radio transmitters, etc. Otherwise, poor performance or even malfunction may result.**
- **When using movable multiperture socket, qualified, safe products with grounding protection should be selected, and the maximum allowable load should not exceed the maximum power of the system.**
- **DO NOT connect non-system components of electrical equipment to movable multiperture sockets; otherwise it may cause interference, overload and other risks.**
- **DO NOT place movable multiperture sockets on the ground.**
- **When there is a large temperature difference in the operating environment of the system, the system should be vacant for 4 hours before the first power-on to keep the temperature and humidity reach a balance within the system.**
- **The system must be installed and set up by the manufacturer's authorized or trained personnel. Unauthorized personnel may not disassemble, install or misuse the system by themselves.**
- **Shut down the system and unplug the power cord before moving the system.**
- **Avoid large vibration during transportation. Mechanical parts damage may result.**
- **DO NOT lean or sit on the control panel. Function button damage may result.**
- **DO NOT place any object on the control panel to prevent them from falling and causing damage.**
- **DO NOT block the air filter or the air outlet. Otherwise, the**

internal temperature of the system may rise, causing fire, personal injury and other potential hazard.

- **If the system triggers the shutoff protection, which, indicating the malfunction of the system or peripheral equipment. Contact manufacturer's Customer Service Department or sales representative.**
- **Maintenance shall be taken regularly to ensure the performance of the system, and ensure that the system is well grounded and meets the safety requirements.**

1.1.1.2 Accessories Safety

Warning

- **Use only approved accessories. E.g. probes, peripheral equipments or cables.**
- **The ultrasound probes apply for use by qualified specialist staff only. Physicians who use this system for biopsy must undergo professional ultrasound guidance training and strictly observe the operation requirements of biopsy in order to avoid unnecessary harm to patients.**
- **DO NOT immerse any probes beyond the specified cleaning or disinfection level showed in "12.1.5 Probe Disinfection".**
- **Never make conducting solution contacts with probes.**
- **Be sure the probe and cable are in normal before and after performing an ultrasound exam.Use the probe with care. Stop use immediately if the probe appears to be malfunctioning.**
- **Never attempt to strike or damage the surface of transducer. Otherwise, electric shock may result when using.**
- **Sterile probe sheath is required when performing intra-cavitary ultrasound exam. DO NOT activate intra-cavitary probe in vitro.**

Caution

- **The system and accessories are not disinfected and sterilized when delivering. Before use probe and biopsy bracket, disinfection or sterilization is required according to the method provided in their instructions.**
- **Always inspect whether the edge of the probe is too sharp or the surface is too rough before using the probe. If so, replace the probe to avoid damaging sensitive tissue.**
- **DO NOT disconnect probe when scanning. Otherwise, system damage may result.**
- **Normally, there is no risk of burnt when using this system; however, if the probe is placed in the same part of the patient's body for a long time, burnt may result. Under the condition of obtaining effective images, shorten the inspection time as possible.**
- **Shut down the system before plugging or unplugging the system or other peripheral equipment (such as printers). Otherwise system damage may result.**
- **Always use approved, sterile coupling gel. Read the instructions of the coupling gel carefully before operation.**
- **Remove the coupling gel from the probe thoroughly after each use. Otherwise, moisture in the coupling gel may affect the safety and performance of the probe.**

- **Always use sterile, legally marketed probe sheaths for infection control in intra-cavitary and biopsy procedure.Before using latex probe sheaths, check the packaging and determine the composition of the latex probe sheaths. Studies have shown that natural rubber latex may cause allergic reactions in latex sensitive individuals. DO NOT use and change the brand of latex probe sheaths if allergic reaction occurs.**
- **After cleaning or disinfecting accessories, the chemical reagents or odors must be completely removed. After cleaning or disinfecting accessories, the chemical reagents or odors must be completely removed.**
- **Never use foot switch in operating room.**

1.1.1.3 Software Safety

- **To ensure the security of data, users must backup to external storage media when recording important data (such as hospitals, patient data, etc.), for the data stored in the system may be lost due to abnormal operation or failure.**
- **DO NOT shut down the system when print, save and load data, or data will be lost.**
- **Improper power failure may result in damage to the drive or system.**
- **Attempt to power the system on again at least 5 minute later after each shutting down. System malfunction may result.**
- **DO NOT run non-system software on your system computer.**

1.1.1.4 Biological Hazard

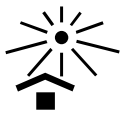
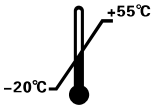
- **For patient and personnel safety. Never contact with samples, mixtures and waste liquids by hand directly. Use protective barriers (gloves and probe sheaths) and follow sterile procedures when appropriate.**
- **If the sample contacts with skin inadvertently, you must immediately stop operating and notify your physician.**
- **Some disinfectants have strong acidity or alkalinity. Please use them carefully to prevent direct contact with hands and clothes. If hands or clothes are inadvertently exposed to disinfectants, wash them with soap and flowing water immediately; if disinfectants enter eyes inadvertently, wash them with plenty of clean water immediately and consult an ophthalmologist.**
- **Disinfectants, intensive cleaning agent and waste liquids must be disposed as bio-hazardous material in accordance with local standards. Consult the relevant disinfectant manufacturer or distributor for details.**
- **Probes used on patients with Creutzfeldt-Jakob disease (CJD) must be disposed. Otherwise, it may infect the patients and operators. There is no method to clean, disinfect and sterilize the probes used by Croytsfelter-Jacob patients currently.**
- **Follow all internal infection control procedures applicable to personnel and systems.**
- **Disposable biopsy bracket must be disposed of as infectious waste.**
- **Disinfect the reusable biopsy bracket before store it.**

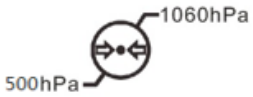
1.1.2 Labels and Symbols

The following table describes the important information of labels and symbols used on the equipment.

Table 1 Labels and symbols

Labels/symbols	Description
Tag	Tag includes the following information: ● The name and address of the manufacturer ● Date of manufacture ● Model and Serial Number ● Electrical rating
	Type BF applied part
	Important information concerning the safe operation
	Dangerous voltages
	Equipotential terminal
	On/off(used in only one part of the equipment)
	Alternating current
	Power on/ off switch
	Output port for video
	USB port
	Ethernet connection
	Manufacturer

Labels/symbols	Description
	Date of manufacture
	Serial number
	See the instructions for use for safety information
	Fragile, handle with care
	Keep dry
	Away from sunlight
	Keep facing up
	Temperature range (transport and storage)
	No rolling
	Stacking load limitation
	Indoor use only
	Waste electrical and electronic equipment

Labels/symbols	Description
	Relative humidity range (transport and storage)
	Atmospheric pressure range (transport and storage)
	Nonionizing electromagnetic radiation
	Chinese Enviormentally Friendly Use Period symbol

1.2 Application of Acoustic Power

Although it is generally believed that diagnostic ultrasound is safe, there are still studies confirming that there is a risk of damage when high-intensity ultrasound passes through human tissues. Therefore, the operator must follow the ALARA principle when using the ultrasonic diagnostic equipment and use the ultrasound with care.

1.2.1 ALARA

The guiding principle for the use of diagnostic ultrasound is defined by “ALARA principle” (As Low As Reasonably Achievable). That is, by keeping ultrasound intensity as low as possible while obtaining diagnostic images.

The ultrasound intensity depends on the intensity and exposure time of irradiation.

The ultrasound intensity required differs among application modes and patients.

Less ultrasonic power can only obtain low-quality images, which affects the reliability of the diagnosis; and using overdose ultrasonic power increases the risk of bioeffects.

Therefore, it is operator’s responsibility to reconcile ultrasonic power with diagnostic image quality. That is, to obtain qualified images while minimizing the ultrasonic bioeffects.

Warning **Special attention should be paid to the ALARA principle in obstetric exam, as any potential bioeffect can have a significant impact on the embryo or fetus.**

Caution

- **Operators should always follow the ALARA principle to ensure the image quality and keep the referencing index and exposure time at lowest level.**

- **It is important for operators to master the function of the system and observe the acoustic output referencing index reading all the time.**

1.2.2 Bioeffect

Ultrasound produces two types of bioeffects, thermal and mechanical.

1.2.2.1 Temperature Index (TI)

The TI informs the operator about the potential for temperature rise in body tissue. It is an estimate of temperature rise in body tissue with specific properties. And temperature rise is influenced by factors such as tissue type, vascularity, operation mode, and others.

There are three types of TI. The system only displays one index at a time. The operator should choose the appropriate index to display according to the actual application location:

- The soft tissue thermal index (TIS) is suitable for abdominal and cardiac application. It indicates the potential for temperature rise in homogeneous tissue.
- The bone thermal index (TIB) is suitable for obstetric (mid-late pregnancy) or pediatric (newborn head) applications. It indicates the potential for temperature rise of bones or at near soft tissue.
- The cranial thermal index (TIC) indicates the potential for temperature rise of bones or at near soft tissue.

1.2.2.2 Mechanical Index (MI)

The MI informs the operator about the possibility for mechanical bioeffect occurrence. It is an estimate of damage in body tissue due to cavitation.

The higher the MI value the greater the possibility of mechanical bioeffect result.

NOTE : When gas and soft tissue exist at the same time, special attention should be paid to setting the MI value to a lower level.

1.2.3 Output Display

The system displays two basic index of Acoustic Output.

TI includes TIS, TIB and TIC. Each probe has a set of appropriate default options.

A TI, TIB or TIC is displayed by probe and application mode chosen, and the increment is 0.1 on the system.

The MI ranged from 0~1.9.

A lower TI/MI index signifies a lower bioeffect. Operators should take TI and MI values as a reference when applying the ALARA principle.

1.2.4 Probe Surface Temperature

The surface temperature of the transducer should not exceed 43℃ to ensure the safety of

patients.

1.2.5 Acoustic Power Control

The acoustic power can be controlled through three ways:

1.2.5.1 Direct Control

The direct control is to adjust the acoustic power by using **[◀][▶]** to select **[A.Power]**, and then rotating the **[Value]** knob on the control panel.

Refer to “Annex D Acoustic Output Report” for typical values for the acoustic output of specific application.

The maximum value of acoustic output in any mode should not exceed the limit value of acoustic output (MI limit value is 1.9, $I_{spta.3}$ limit value is 720 mW/cm^2).

1.2.5.2 Indirect Control

Indirect control is mainly performed by adjusting image parameters to control the acoustic power. Parameters that affect acoustic power include: imaging mode, probe and its frequency, position and number of focus, image depth, and PRF.

1.2.5.3 Receiver Control

The receiver control only affects the receiving mode of the ultrasonic wave, and does not affect the acoustic output while improving the image quality. The operator can optimize the image quality by adjusting the gain, TGC, and dynamic range to obtain effective diagnostic image with the minimum acoustic output.

Receiver control is recommended before direct control and indirect control.

2 System Overview

2.1 Application Range

The device is suitable for clinical ultrasound examination of abdomen, gynecology and obstetrics, small parts, cardiac and peripheral vessel.

2.2 Intended use

The System is intended for use by a qualified clinicians or health care professionals for Ultrasound evaluation. Clinical applications include:

- Abdominal
- Gynecology (including endovaginal)
- Obstetric
- Cardiac
- Small parts (Breast, Testes, Thyroid, etc.)
- Urology
- Musculoskeletal
- Peripheral vascular

2.3 Applicable human

Child & Adult

2.4 Product Formation

This device is composed of host, adapter and transducers

2.5 Contraindication

Do not suitable for eye examination

2.6 Packing List

Check the contents of the packing list before installing the system to ensure that the accessories are complete.

If you have any question, please contact manufacturer or sales representatives.

The following table shows the standard packing list. The contents of the packing list should be based on the actual purchased model.

Table 2 Standard Packing List

No.	Description
1	Console * 1
2	Power Adapter * 1
3	User Manual * 1
4	Accessory Package * 1

2.7 System Components

2.7.1 Console

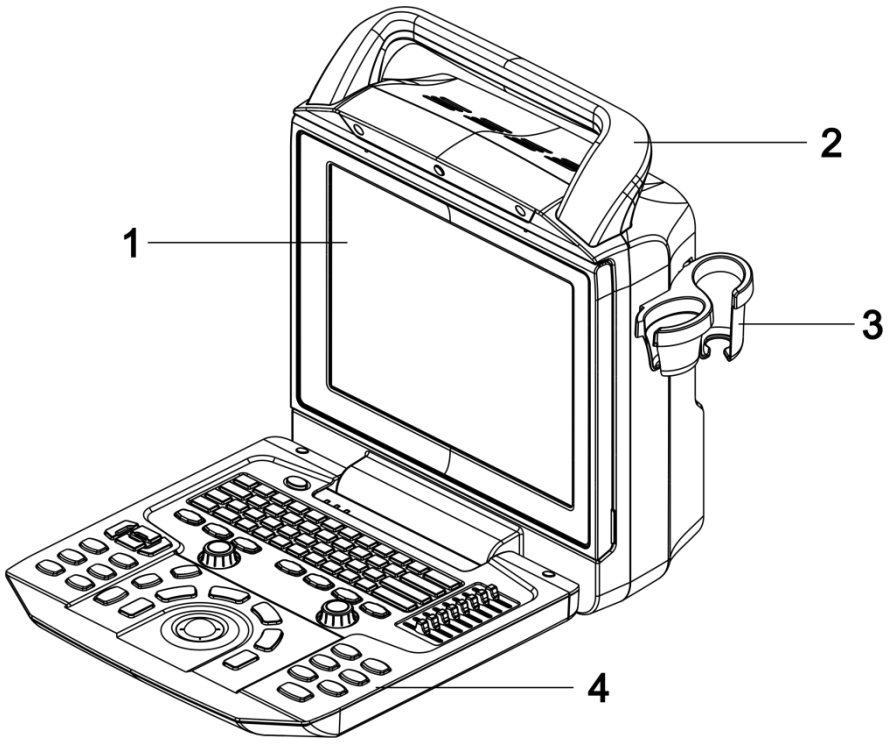


Figure 1 Front View

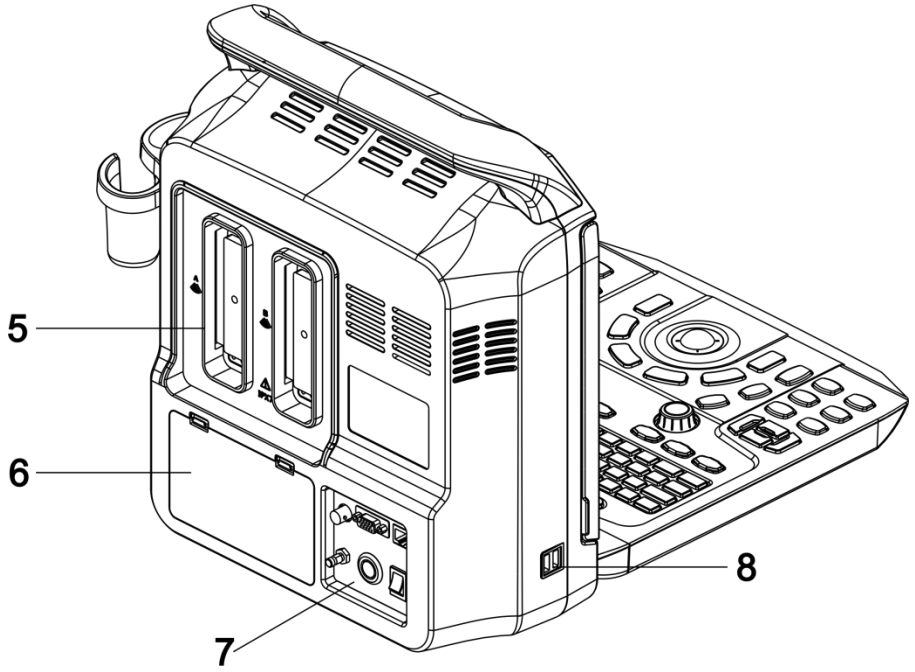


Figure 2 Back View

Table 3 Console

No.	Item	Function
1	**Monitor**	Display all user interfaces.
2	**Handle**	Used for moving and lifting the system
3	**Probe Holder**	Used for fixing a normal probe.
4	**Control Panel**	Provide system human-machine interface to facilitate the operation and control.
5	**Front Panel**	Probe receptacles.
6	**Battery Box**	Used for battery storage.
7	**I/O board**	Used for connecting peripherals and accessories. Refer to “2.7.6 I/O Board” for details.
8	**USB Port**	Connects an USB device.

2.7.2 Option Module

Table 4 Option Module

DICOM Service	

2.7.3 Option Accessories

Table 5 Option Accessories

External Printer	External Optical Disc Drive
Battery	

2.7.4 Control Panel

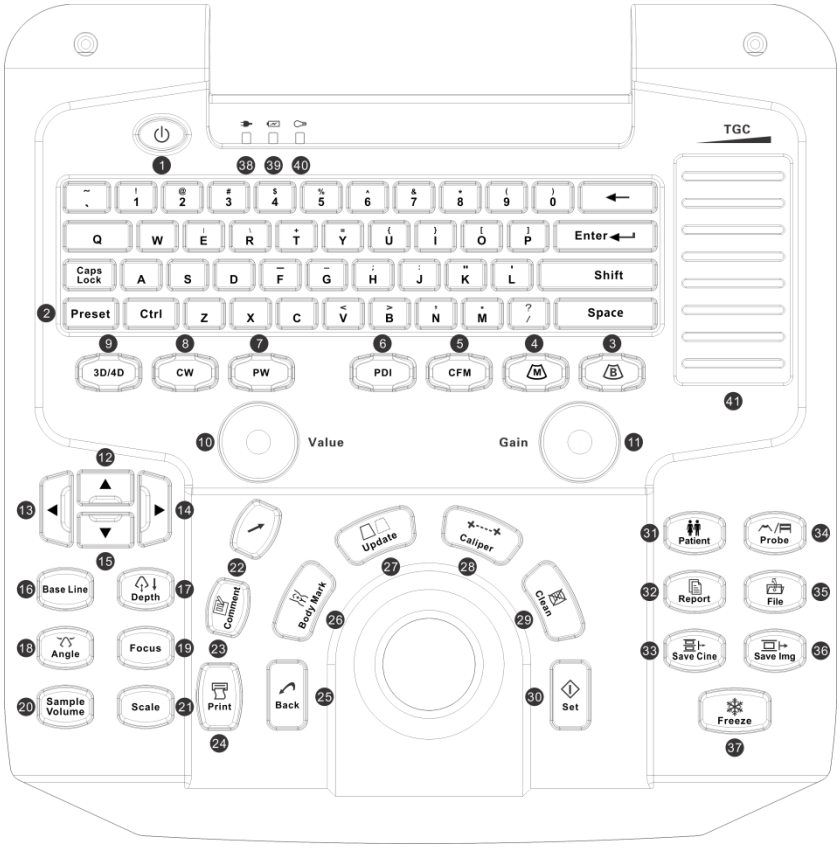


Figure 3 Control Panel

Table 6 Control Panel

No.	Icon	Description	Function
1	⏻	Power switch button	Power on/ off the system.
2	Preset	Preset	Press to enter / exit the preset screen.
3	B	/	Press to enter B mode.
4	M	/	Press to pre-activate M mode, press this button again button to enter B+M mode.
5	CFM	Color Doppler	Press to enter Color mode. Under B+C mode, press to enter Dual Live (B+BC) mode.
6	PDI	Power Doppler	Press to enter PDI mode. Under B+PDI mode, press to enter Dual Live (B+BPDI) mode.
7	PW	Pulsed Wave Doppler	Press to pre-activate PW mode, press this button again button to enter PW mode.
8	CW	Continuous Wave Doppler	Press to pre-activate CW mode, press this button again button to enter CW mode.

No.	Icon	Description	Function
9	3D/4D	/	Press to enter 3D/4D function (Reserved function).
10	Value	Value adjustment	Press to switch parameter item. Rotate to adjust the parameter value.
11	Gain	Gain	Rotate to adjust the image gain.
12	▲	Move up/ Increase	Switch menu / Select parameter.
13	◀	Move left / Decrease	Switch menu / Select parameter.
14	▶	Move right / Increase	Switch menu / Select parameter.
15	▼	Move down / Decrease	Switch menu / Select parameter.
16	BaseLine	BaseLine	Press this button and then rotate the **[Value]** knob to adjust the baseline position.
17	Depth	Depth	Press this button and then rotate the **[Value]** knob to adjust the display and scan depth.
18	Angle	Angle	Press this button and then rotate the **[Value]** knob to adjust the SV angle.
19	Focus	Focus	Press this button and then rotate the **[Value]** knob to adjust the focus position.
20	Sample Volume	Sample volume	Press this button and then rotate the **[Value]** knob to adjust the SV.
21	Scale	Scale	Press this button and then rotate the **[Value]** knob to adjust the PRF of CFM/PDI/PW.
22		Cursor	Press to display/ hide the cursor.
23	Comment	Comment	Press to activate comment function.
24	Print	Print	Press to print the current screen.
25	Back	Back	Press to cancel current operation. (Reserved function)
26	Body Mark	Body Mark	Press to activate body mark function.
27	Update	Update	Compound operation keys, used together with other keys;
28	Caliper	Measure	Press to perform measurement.
29	Clean	Clean	Press to clean the comments.
30	Set	Set	Press to confirm the operation.
31	Patient	Patient info	Press to enter the patient information screen.

No.	Icon	Description	Function
32	Report	Report	Press to enter the report screen.
33	Save Cine	Save Cine	Press to save cine to the system quickly.
34	Probe	Probe/Exam switch	Press to enter the probe/ exam selecting screen and toggles the probe and exam mode.
35	File	Image management	Press to enter the review screen.
36	Save Img	Save image	Press to save image to the system quickly.
37	Freeze	Freeze	Press this button to freeze the current image and press again to resume real-time status.
38	/	Indicator	Power indicator.
39	/	Indicator	Working status indicator.
40	/	indicator	Battery indicator.

2.7.5 Trackball

Use the trackball and **[Set]** button to control the screen directly and easily.

Function	Description
Move	Roll the trackball to move the cursor.
Click/ Select	Use the trackball to move the cursor over the select item, image, or annotation you want to select and press the **[Set]** button.
Drag	1） Click on the image or annotation you want to move. 2） Roll the trackball to drag the image or annotation to the desired location. 3） Press the **[Set]** button and release trackball.
Adjust ROI	1） Click on the ROI frame you want to adjust. 2） Roll the trackball to adjust the size of ROI frame. 3） Press the **[Set]** button and release trackball.

2.7.6 I/O Board

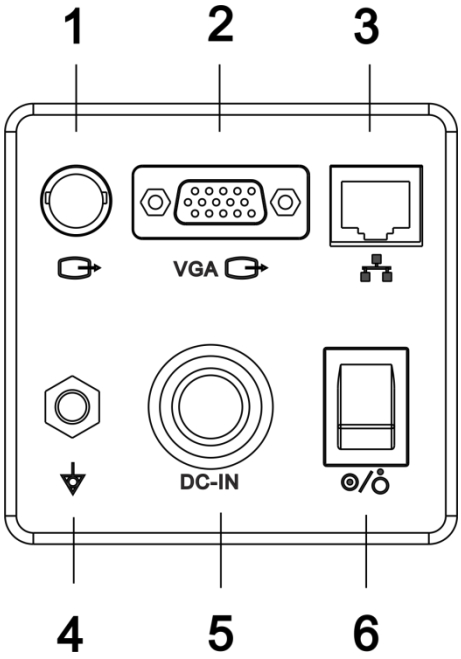
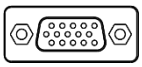
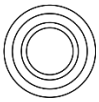
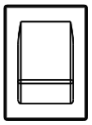


Figure 4 I/O Board

Table 7 I/O Board

No	Icon	Description
1		Video output.
2		VGA port.
3		Network port.
4		Equipotential terminal.
5		DC input port.
6		Power switch.

3 Preparing the System

3.1 Moving the System

Care must be taken when moving the system and the specifications of this section must be strictly followed.

1. Shut down the system and disconnect the power cord and peripheral equipment cables.
2. Disconnect all cables, probes and accessories and move the system separately.
3. Pack the system correctly. It is recommended to pack the system in the original packaging at the factory.
4. Do not invert the system during transportation.

3.2 Positioning the System

To position the system, perform the following steps:

1. Position the system on a level, anti-slip surface. Leave at least 25 cm of space on the back and left and right sides of the system.
2. Properly place all power cords and cables to prevent tripping hazard.
3. Make sure that the environment is well ventilated.

Warning **DO NOT place the system on a slope or a slippery surface to prevent a tipping hazard which causes possible patient or operator injury and damage to the system.**

3.3 Connecting the System

The system supports external power supply and battery power supply.

3.3.1 External Power Supply

The system power must be supplied from a properly rated outlet as described in Annex A.

To connect the system, perform the following steps:

1. Plug the supplied power cord into the input port on the I/O board.
2. Plug the supplied power cord into a hospital grade grounded power outlet.

3.3.2 Battery Power Supply

Warning

- **Battery is installed at the back of the console and can only be disassembled or installed by professionals. Disassembly and assembly by user will void the warranty. If the battery fails or needs to be replaced, please contact the manufacturer or your sale-representative.**

- **If you do not use the system for a long time on battery power, please shut down the system. Frequent charging and discharging will impact the service life of batteries.**

3.3.2.1 Battery Charging and Use

The battery is a rechargeable lithium ion battery.

When an external power source is connected, the battery will be charged automatically when the battery power is not full. The battery indicator is orange when charging and green when it is fully charged.

The system switches to battery power supply automatically when external power source is removed. Fully charged battery will give about 0.5 hours of use.

3.3.2.2 Battery Maintenance

It is recommended to perform a complete discharge/charge cycle when the battery is used for the first time or not used for more than 3 months.

To perform a complete discharge/charge cycle:

1. Allow the battery to discharge completely until the system turns off.
2. Full charges the battery.
3. Repeat step 1~2 if necessary.

3.3.2.3 Battery Recycling

Replace and properly recycle the battery when it is obviously damaged or exhausted. Follow the corresponding regulations when disposing the used batteries.

3.4 Power On/ Off the System

3.4.1 Power on

Caution

- **If an abnormal power interruption occurs during the last system operation (such as a sudden interruption of AC power), you may have to wait longer 30~60s than usual to reboot the system.**
- **System can be rebooted 5 minute later of power off. Otherwise system failure may result.**

NOTE : First power-on is recommended to be done by the authorized personnel. Make sure that the power cord is connected to the system and fully plugged into an appropriate grounded power rating outlet.

To power on the system, perform the following steps:

1. Turn on the power switch located on the back of the console.
2. Press the power switch button **[** **]** located on the upper left section of the control panel to startup the system and the working status indicator. lights up.
3. A boot screen appears, and the Home screen displays after startup.

4. After initialization has been completed, refer to the following items for startup check. If there is any abnormality, please contact your sales representative or the customer service department of the manufacturer.

Table 8 Checking List

No.	Item
1	Abnormal sound, smell, or overheating.
2	Error massage.
3	Discontinuous display or abnormal dark area on the 2D image.
4	When the probe is connected to the system, monitor that the surface temperture of the probe all the time to avoid abnormal heat burn the patient.
5	The buttons and knobs of the control panel are fully functional.
6	The system time displays correctly.

3.4.2 Shutdown

To shutdown the system, perform the following steps:

1. Press the power switch button **[**  **]** located on the upper left section of the control panel. Click **[Shutdown]** to perform the shutdown procedure.
2. When the power indicator lights out, the shutdown is completed.
3. Turn off the AC power and unplug the cable cord as needed.

- **Never attempt to shutdown the system while the system is in an upgrade or data transfer process.**
- **End the current exam before shutdown the system.**
- **DO NOT unplug the power plug or cut the power supply before the shutdown procedure is completed. Files damaged and patient data lost may result.**

NOTE :

- **If the system fails to power off normally, cut the power supply or unplug the power cord to force the system to shut down.**
- **It is not recommended to cut the power supply or to unplug the power cord directly for doing this may cause damage or loss of patient data.**
- **If the system is not used for a long time, disconnect the external power supply and all peripheral equipment after shutdown the system.**

3.4.3 Standby

Without any operation for a period of time, the system will enter standby mode. You can set the waiting time to enter the standby mode.

Setting path: **[Preset]** (press **[Preset]**) → **[System Preset]** → **[General]** → **[Standby]**,

refer to “4.2.2 General” for details.

3.5 Monitor Adjustment

Before starting the exam, you can adjust the monito for better viewing.

NOTE : Be careful to prevent crushing your hands when adjusting the monitor.

1. Grab the top and bottom of the monitor with two hands and tilt the monitor up and down.
2. The tilt range is 0°~90°.

NOTE : When transporting or moving the system, tilt the monitor to the vertical position and close the console to avoid damage to the screen.

Figure 5 Monitor Adjustment

3.6 Connect / Remove the Probe

Warning

- **Before connect or remove the probe, freeze the image or shutdown the system power, otherwise the system and probe damage may result.**
- **Use only probes provided by manufacturer. Using other probes may damage the system and probes and cause unpredictable accidents or malfunctions.**
- **Before connecting the probe, make sure that the surface, cable and socket of the probe are without cracks or any failure. Electrical shock may result if a defective probe has been used.**
- **Before connecting or removing the probe, place the probe in the probe holder and fix the probe cable to prevent the probe from accidentally falling.**

3.6.1 Connect the Probe

To connect a probe, perform the following steps:

1. With the cable facing upward, fully insert the probe connector into the probe receptacle.
2. Rotate the probe lock clockwise to lock the probe.

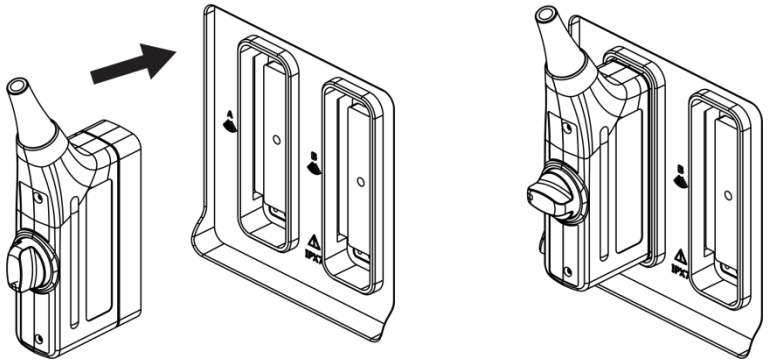


Figure 6 Connect the Probe

3.6.2 Remove the Probe

To remove a probe, perform the following steps:

1. Rotate the probe lock counterclockwise to unlock the probe
2. Pull the probe connector straight out of the probe receptacle.

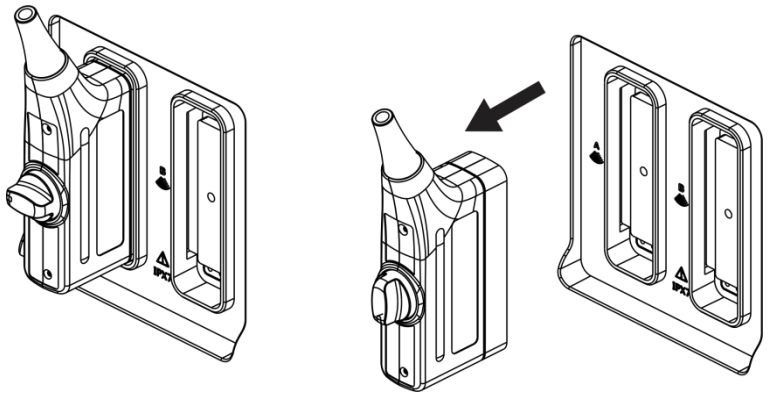


Figure 7 Remove the Probe

3.7 Foot Switch (Option)

Foot switch is an option accessory. Preset its function before using.

Setting path: **[Preset]** → **[System Preset]** → **[Customize]**, refer to “4.2.6 Customize” for details.

Operation: connect the foot switch to the system via USB port, and step on the foot switch

to perform the corresponding operation.

3.8 Connect the Network

NOTE : To ensure the network security of the system, DO NOT connect to any external network when using the system normally.

To connect the network, perform the following steps:

1. Connect the network port  of the I/O board and the local LAN port with network cable
2. Preset the local network.
   - Setting path: **[Preset]** → **[Network]** → **[Local TCP/IP]**, refer to “4.5 Network Preset” for details.
3. Check the network connection status by the screen status bar.
   -  means successful network connection.
   -  means failed network connection, try to connect again.
   - Place the cursor on the network icon to automatically display the network information.

3.9 Connect Peripheral Device

3.9.1 Connect USB Storage Device

➢ **To connect a USB storage device:**

1. Insert the USB storage device into the USB port.
2. After initialization,  displays on the status bar.

➢ **To remove a USB storage device:**

1. Move the cursor over the  , press the **[Set]** button.
2. Click on **[Remove]** in the pop-up menu to remove the USB storage device safely.

- **Do not use USB memory with unsafe data, otherwise system damage may result.**
- **Remove the USB storage device safely. Direct removal may damage the USB storage device and the ultrasound system.**

3.9.2 Connect Printer

3.9.2.1 Connect Digital Printer

For the printer connection, please refer to the printer manual.

The basic connection procedures are as follows:

1. Connect the power supply and the printer with the power cable of the printer.
2. Connect the system and the printer with an USB cable.
3. Add print service to the printer.
   1) Press **[Preset]** to enter the Preset screen. Click **[Print Preset]** to enter print setting screen.
   2) Click **[Add Service]** to add print service to the printer.
   3) Enter the printer service name, select the printer type, and click **[OK]**.
4. Add printer.
   1) The preset print service is displayed in the print service list; select the service by pressing **[Set]** button.
   2) Click **[Add Printer]** and a dialog box pops up. Finish setup as needed.
   3) Click **[OK]** to install the driver.

Warning **When using multiple peripherals that are not powered by the auxiliary output of the system, it must be ensured that the total leakage current of the peripherals and the system meets the medical equipment electrical safety standards in relevant areas。**

3.9.2.2 Connect Video Printer

Please refer to the printer manual for installation details.

Once the printer connected successful, you can use it after relevant settings.

3.9.2.3 Connect DICOM Printer

Once the system is connected to the DICOM server and the DICOM print server has been set up, patient images and reports can be printed remotely. Refer to “11.2.2 DICOM Print” for details.

3.10 Screens

The system enters the Home screen by default after power on.

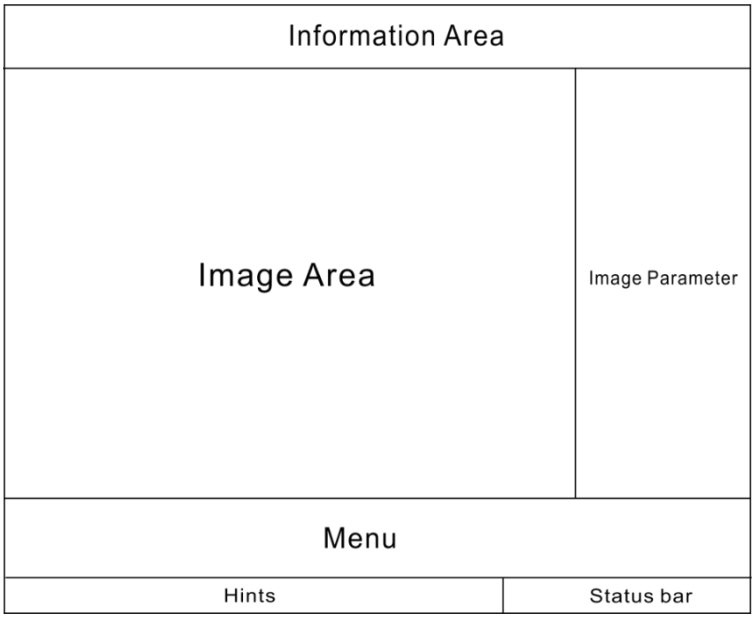


Figure 8 Home Screen

Table 9 Home Screen

Functional Area	Description
Information Area	The information area is located at the top of the Home screen. This area displays information including manufacturer logo, hospital name, operator, patient personal information, exam mode, exam time, and probe parameters. You can set whether to display patient ID, name, gender, age, birthday, operator and hospital information as needed. Refer to “4.2.2 General” for details.
Image Area	The ultrasound image area is located in the center of the Home screen. This area displays real-time ultrasound images, probe marks, coordinate axes, focus positions, gray scale bars, and color bars of each exam mode. The parameters such as acoustic power, mechanical index and thermal index are displayed on the upper left of the image area. The cine replay progress bar is displayed under freeze state. The corresponding annotation information is displayed when the text/body mark/arrow annotation functions are activated. The measuring scale is displayed when the measure function is activated.
Image Parameter	The image parameter area is located on the right side of the image area. This area displays the real-time parameters of current mode.
Menu	The menu is located at the bottom of the Home screen. This area displays the options of the current mode.
Hints	Displays prompt information, help information, or progress status of the current screen.
Status bar	Displays icons for current system status, including USB, printer, network connection status, input method, power status, battery status, storage status, and recycle bin.

4 System Settings

4.1 Overview

This section details the access to configuration and service functions for the system. Customize your system to facilitate operation and clinical needs.

Item	Description
Enter the Preset screen	Press **[Preset]** button on the control panel to enter the Preset screen.
Tab	Move the cursor over the tab and press the **[Set]** button to enter the corresponding setting screens.
Select a Item	Move the cursor over a setting item; press the **[Set]** button to select the item.
Text box	Select the text box, enter text and numbers directly.
Drop-down box	Click the drop-down box to display all the sub-options under the current option.
Check box	Check the check box to activate corresponding option.
Save	Click to save current settings and return to the Home screen.
Cancel	Click to cancel all modifications and return to the Home screen.
Exit the Preset screen	In the Preset screen, press **[Preset]** button again or click **[Cancel]** to cancel all modification and exit the Preset screen. In the Preset screen, click **[Save]** to save all modification and exit the Preset screen.

4.2 System Preset

4.2.1 Region

The Region tab is the default page of the Preset screen.

Open the Region tab via **[Preset]** (press **[Preset]**) → **[System Preset]** → **[Region]**. This tab is access to related information settings, such as hospital information, system language, and system time.

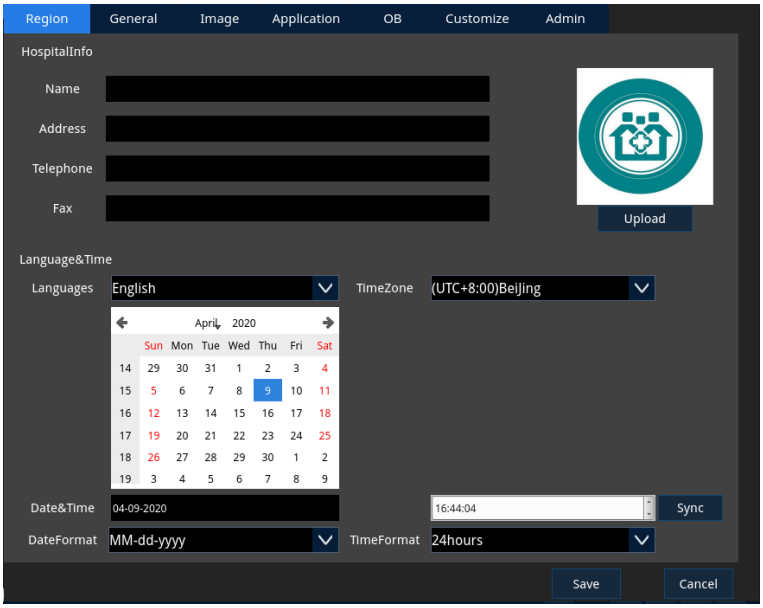


Figure 9 System Preset-Region

Table 10 System Preset-Region

Item		Description
Hospital Info	**Name**	Hospital Name.
	Address	Hospital Address.
	Telephone	Hospital telephone.
	Fax	Hospital Fax.
	Upload Hospital Logo	Click **[Upload]**, a dialog box pops up. Select the picture you want to upload, and click **[OK]**. After the upload is completed, the logo is displayed in the Logo area. This logo will be displayed in the hospital information area of the Home screen.
Language & Time	**Languages**	Set the system language. Options : Chinese, English
	Date & Time	Set the current date and time of the system. Enter the date in the date and time bar, or select the date through the calendar.
	Date Format	Set the date format. Options : yyyy-MM-dd、MM-dd-yyyy、dd-MM-yyyy
	Time zone	Set the time zone of the system.
	Current Time	Set the current time of the system. Delete the original value, and enter the new value.
	Time Format	Set the time format of the system. Options : 12-hour , 24-hour
	Sync	Synchronize system time to the system hardware time.

4.2.2 General

Open the General tab via **[Preset] → [System Preset] → [General]**.

This tab is access to patient information display settings of the Home screen, including general measurement parameters, response after exam the exam and standby mode, etc.

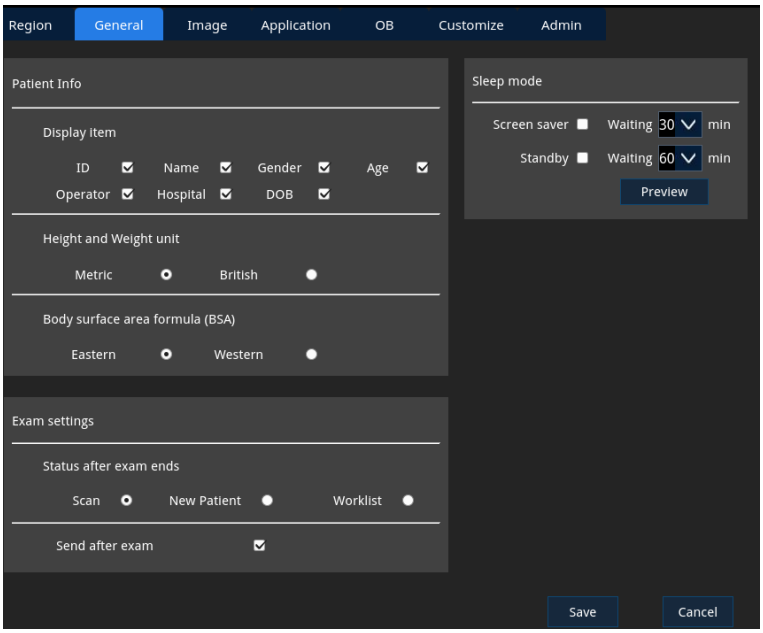


Figure 10 System Preset-General

Table 11 System Preset-General

Item		Description
Patient Information	**Display item**	Set whether to display patient ID, name, gender, age, date of birth, operator and hospital information in the Home screen.
	Height and Weight units	Set the Height and Weight units of patients. Options: Metric, British
	Body surface area formula (BSA)	Set BSA formula. Options: Eastern. Western
Exam Settings	**Status after exam ends**	Set the status after exam ends. Options: Scan, New patient, Worklist
	Send after exam	Set whether to send the patient data automatically to the DICOM server for storage or printing after exam ends.
Sleep Mode	**Screen Saver**	Enable/disable the screen saver and to set the waiting time before entering the screen saver state.
	Standby	Enable/disable the standby mode and to set the waiting time before entering the standby mode.
	Preview	Preview the screen saver picture.

4.2.3 Image

Open the Image tab via **[Preset]** → **[System Preset]** → **[Image]**. This tab is access to related settings on save, output, display, and freeze for images and cines.

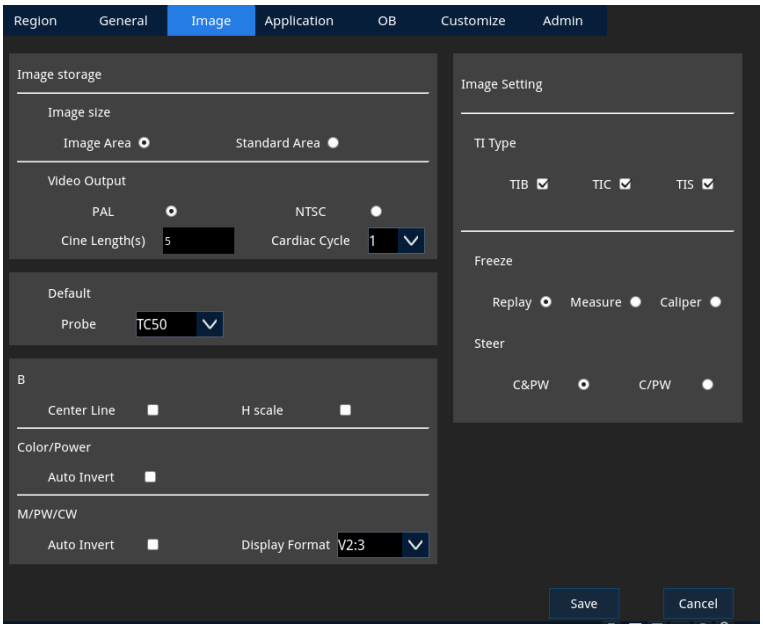


Figure 11 System Preset-Image

Table 12 System Preset-Image

Item		Description
Image Storage	**Image Size**	Set the save area of the image. Options : Image, Standard (full screen)
	Video Output	Set the format of video output. Options : PAL、NTSC
	Cine Length	Set the cine length.
	Cardiac Cycle	Set the cardiac cycle.
Default	**Probe**	Select default probe.
B	**Center Line**	Set whether to enable the centerline function in B mode.
	Horizontal Scale	Set whether to enable the horizontal scale function in B mode.
Color/Power	**Auto Invert**	Set whether to enable the auto invert function in Color/Power mode.
M/PW/CW	**Auto Invert**	Set whether to enable the auto invert function in M/PW/CW mode.
	Display Format	Set the display format of M/PW/CW mode.

Item		Description
Image settings	**TI Type**	Set whether to display the bone thermal index (TIB) and the cranial thermal index (TIC) or soft tissue thermal index (TIS) in the image area.
	Freeze	Set status after freeze. Options : Cine, Measure, Caliper
	Steer	Set whether to steer the sampling frame of the Color mode and the sampling line of the PW mode together under B+Color+PW mode. Options : C&PW(together),C/PW(separately)

4.2.4 Application

Open the application tab via **[Preset]** → **[System Preset]** → **[Application]**.

This tab is access to related setting of measurement and annotation.

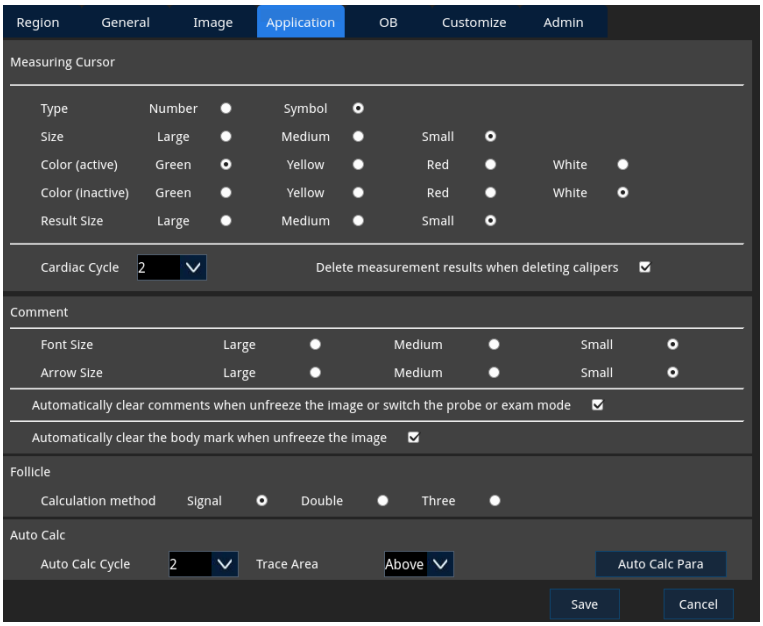


Figure 12 System Preset-Application

Table 13 System Preset-Application

Item		Description
Measuring Cursor	**Type**	Set the cursor type. Options : symbol, number
	Size	Set the cursor size. Options: Large, Medium, Small
	Color (active)	Set the color of cursor and measurement results of activated state. Options : Green, Yellow, Red, White
	Color (inactive)	Set the color of cursor and measurement results of not-activated state. Options : Green, Yellow, Red, White

Item		Description
	Result Size	Set the font size for measuring result. Options: Large, Medium, Small
	Cardiac cycle	Set the number of cardiac cycles when taking heart rate measurement.
	Delete measurement results when deleting calipers	Set whether to clear the measurement results in the result window when deleting the calipers.
Annotation	**Font size**	Set the font size for text annotation or comments. Options: Large, Medium, Small
	Arrow size	Set the arrow size for arrow annotation. Options: Large, Medium, Small
	Automatically clear comments when unfreeze the image or switch the probe or exam mode	Set whether to clear all comments or annotations on the image automatically when unfreeze the image, or switch the probe, or switch the exam mode.
	Automatically clear the body mark when unfreeze the image	Set whether to clear the body mark automatically when unfreeze the image.
Follicle	**Calculation Methods**	Set calculation method for follicle measuring. Options: 1 distance, 2 distances, 3 distances.
Auto Calc	**Auto calculation period**	Set the auto calculation period.
	Trace area	Set the trace area.
	Auto parameter calculation	Set the auto parameter calculation.

4.2.5 OB

Open the OB tab via **[Preset]** → **[System Preset]** → **[OB]**. This tab is access to related setting for obstetric calculation and measurement display.

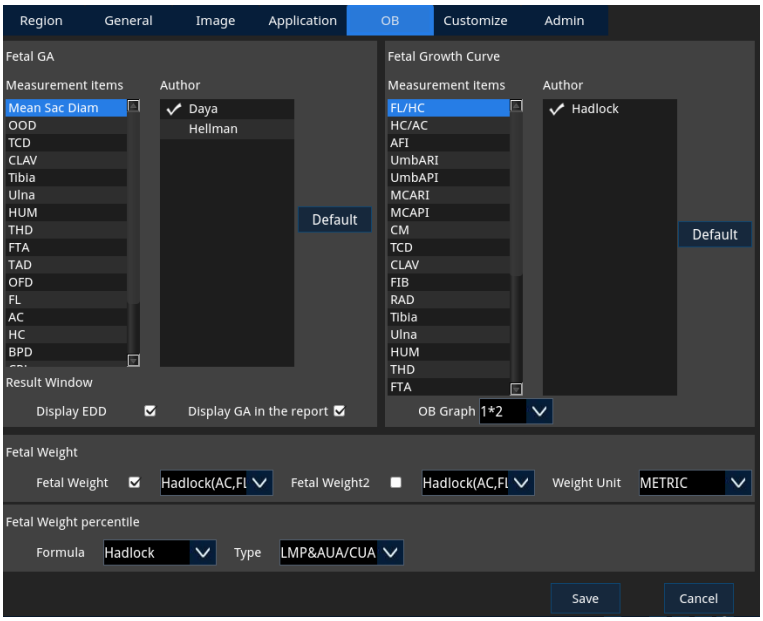


Figure 13 System Preset-OB

Table 14 System Preset-OB

Item	Description	
Fetal GA	**Measurement Item**	Select measurement item for gestation age.
	Author	Select calculation formula for obstetric measurements.
	Default	Set as the default calculation formula for gestational age.
Result window	**Display EDD**	Set whether to display EDD in the result window when obstetric measurement completes.
	Display GA in the report	Set whether to display GA in the report.
Fetal Growth Curve	**Measurement Item**	Select measurement item for fetal growth.
	Author	Select calculation formula for fetal growth.
	Default	Set as the default calculation formula for fetal growth.
	OB graph	Set the display format of the trend chart of fetal growth curve. Options: 1*1、1*2、2*2
Fetal weight	**Fetal weight**	Set fetal weight for calculation and select calculation formula of fetal weight.
	Fetal weight 2	Set fetal weight 2 for calculation and select calculation

Item	Description	
		formula of fetal weight 2.
	Weight unit	Select the fetal weight unit. Options: Metric, British, Metric and British
Fetal Weight percentile	**Formula**	Select the calculation formula for the fetal weight percentile.
	Type	Set fetal weight for calculation and select calculation formula of fetal weight.

4.2.5.1 Calculation Formula for GA/Fetal Growth Curve

To set calculation formula for GA/Fetal Growth Curve:

1. Select an OB item in the left column, and the available calculation formula author name displays in the right column.
   - Default formula is marked with a "√".
2. Select a calculation formula in the right column.
3. Click **[Default]** to set the calculation formula as default for GA or fetal growth curve.

4.2.5.2 New Calculation Formula

New calculation formula is added by importing.

4.2.6 Customize

Open the Customize tab via **[Preset]** → **[System Preset]** → **[Customize]**. This tab is access to function definition for foot switch.

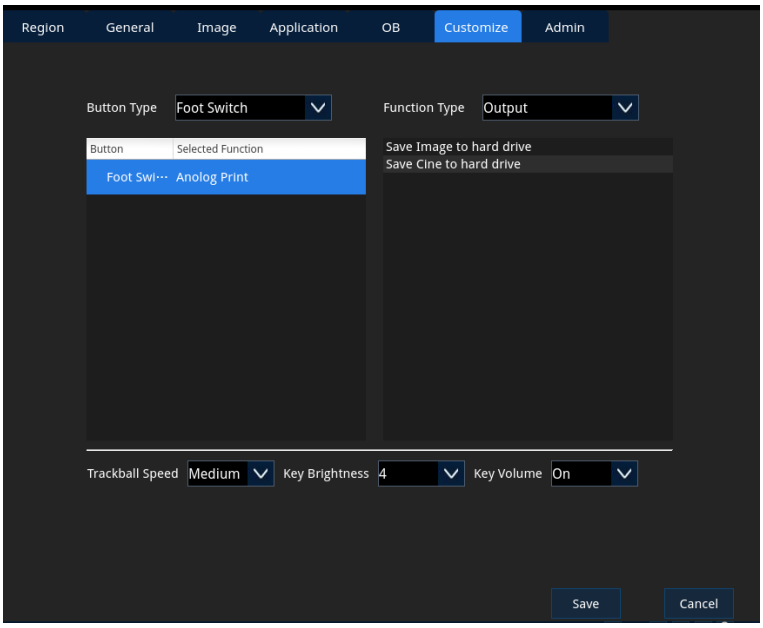


Figure 14 System Preset-Customize

Table 15 System Preset-Customize

Item	Description
Button Type	Select the button type you want to set.
Function Type	Select the function assigned by the button and the function list displays below.
Trackball Speed	Set the speed of trackball.
Button Brightness	Set the button brightness level.
Button Volume	Turn on/off the button volume function.

To set the foot switch, perform the following steps:

1. Click **[Button Type]** drop-down box and select foot switch.
2. Click the **[Function type]** drop-down box to display all definable functions.
3. Select function type to assign the function to the desired button.
4. Click **[Save]** to save modifications and return to the Home screen.

4.2.7 Admin

The system supports three types of users: the administrator, operater and emergency user.

Icon	User	Permission
	Administrator	Access to all patient data in the system and be able to add users, delete users, import data, export data, delete data, edit data, store data, upgrade software / firmware, etc.
	Operator	Access to all patient data in the system and be able to import data, export data, delete data, edit data, and store data.

	Emergency user	Access to view and store patient data only. Data exporting, deleting and edition are not allowed.

4.2.7.1 Access Setting

Open the Permission tab via **[Preset]** → **[System Preset]** → **[Admin]**.

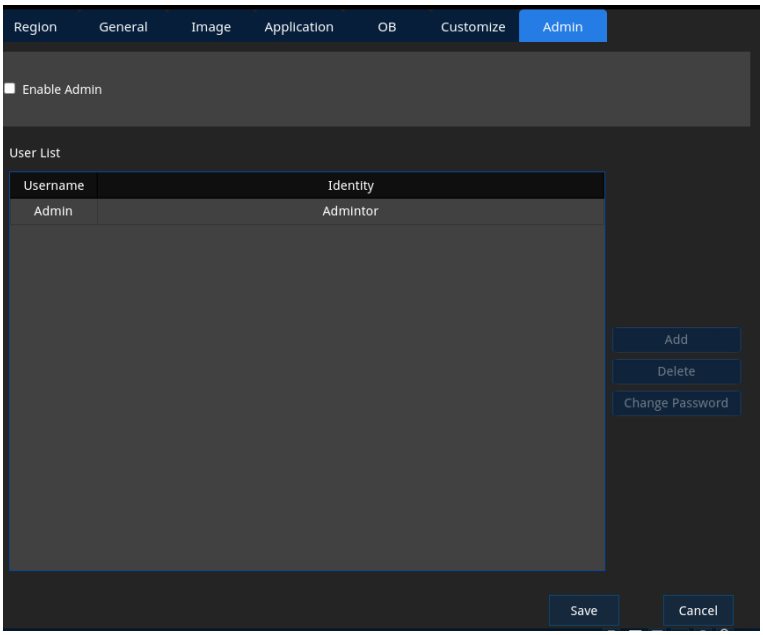


Figure 15 System Preset-Admin

Table 16 System Preset-Admin

Item	Description
Enable Admin	After enable admin, login is required when exporting data, backing up data, deleting data, etc. Admin is not enabled by default.
Add	To add a new user: 1) Click **[Add]** to pop up the Add New User dialog box. 2) Enter a new user name, enter password, confirm the password, select a new user type, and click **[OK]** to complete adding a new user.
Delete	To delete an existed user: ● Select the target user in the user list and click **[Delete]**.
Change Password	To modify the password of current user: 1) Select the target user in the user list and click on **[Change Password]**, a dialog box pops up. 2) Enter the new password, confirm the new password and click **[OK]** to complete the password modification.

NOTE: Only administrators can add or delete users.

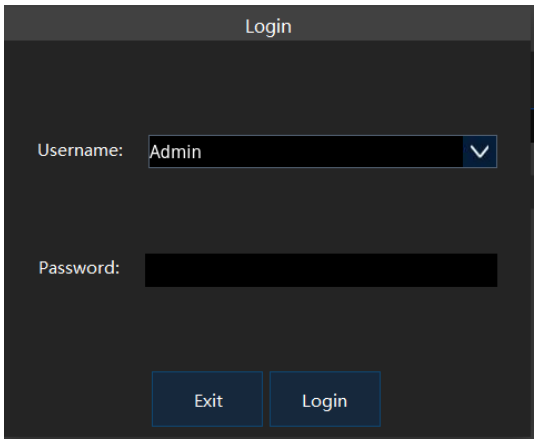
4.2.7.2 System Login

If admin is enabled, you can access the data in the system only after you log on the

system.

To log on the system:

1. Open the login dialog box.

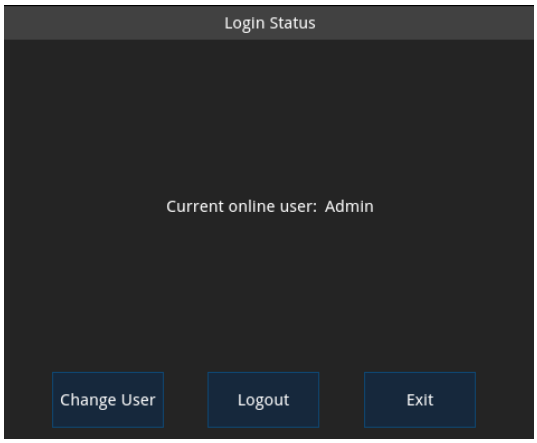


2. Click **[User name]** drop-down box to select the user name.
3. Enter correct password and click **[Login]**.

4.2.7.3 Change User

To change user:

1. Click the icon at the lower right corner of the screen to pop up the dialog box as shown below.

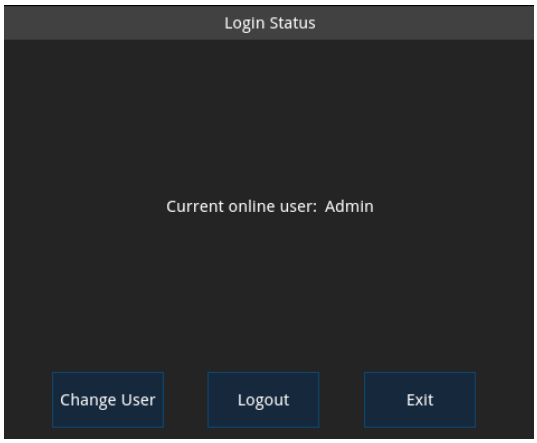


2. Click **[Change user]**, the login dialog box pops up.
3. Select desired user name and enter the password and then click **[Login]**.

4.2.7.4 System Logout

To log out the system:

1. Click the icon at the lower right corner of the screen to pop up the dialog box as shown below.



2. Click **[Logout]**.

4.3 Exam Preset

Enter the Exam Preset screen via **[Preset]** → **[Exam Preset]**.

The Exam Preset screen is access to related settings for probe and exam mode.

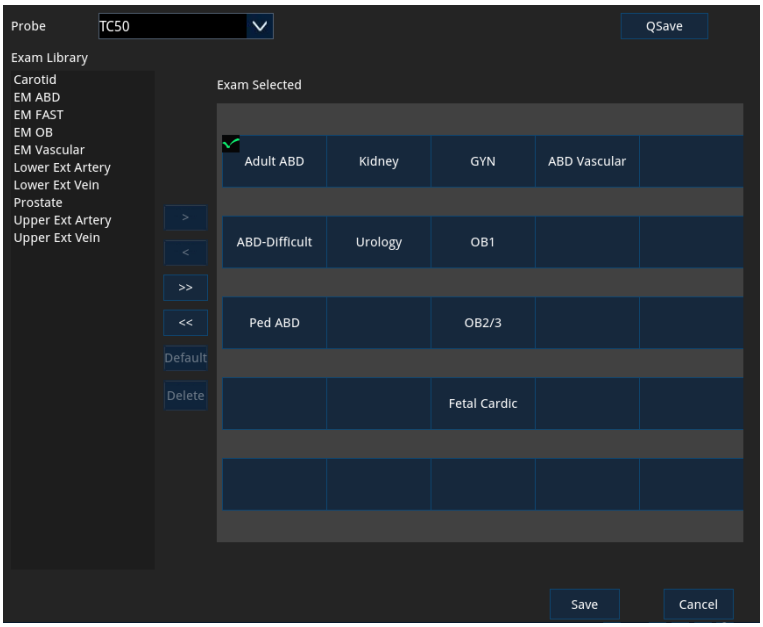


Figure 16 Exam Preset

Table 17 Exam Preset

Item	Description
Probe	Select a probe.
Exam Library	Display all available exam modes for current probe.
Exam Selected	Display all selected exam modes for current probe.
[<] / [>]	Add/Remove selected exam modes of current probe.
[<<] / [>>]	Add/Remove all exam modes of current probe.

Item	Description
Default	To set the selected exam mode as default to the current probe. Default exam mode is marked with a “√”.
Delete	Delete User-defined exam mode.

4.3.1 Add Exam Mode

To add exam mode, perform the following steps:

1. Click the **[Probe]** drop-down box to select the probe type.
2. Select the desired exam mode list from the Exam Library.
3. Click the blank box of the Exam Selected area to determine the location to add exam mode.

   If you do not assign a location, the system defaults to add an exam mode to the blank box in the order of top-down, left-to-right.
4. Click the **[>]** to add selected exam mode to the Exam Selected area.

   Or click the **[>>]** to add all exam mode from the Exam Library to the Exam Selected area.
5. Click **[Save]** to complete setting.

4.3.2 Remove Exam Mode

To remove exam mode:

1. Click the **[Probe]** drop-down box to select the probe type.
2. Select an exam mode to remove from the Exam Selected area.
3. Click **[<]** to remove the selected exam mode.
   Or click **[<<]** to remove all exam mode listed in the Exam Selected area.
4. Click **[Save]** to complete setting.

4.3.3 Create/Delete User-defined Exam Mode

To create a user-defined exam mode:

1. Select **[Exam Preset]** tab in the Preset screen.
2. Click **[QSave]** to open the QSave dialogue box.
3. Rename and select the data source as required, and then click **[Create]** to create a new user-defined inspection mode.

To delete a user-defined exam mode:

1. Select the user-defined exam mode you want to delete in the Exam Preset screen.
2. Remove the desired exam mode to the Exam library and click **[Delete]** to delete a user-defined exam mode.

4.3.4 Adjust Exam Mode Display Position

You can adjust the display position of the exam mode to facilitate operation by following methods:

- **Method 1**

  Select an exam mode to move and click on a blank box.

  The selected exam mode will move to the blank box position.

- **Method 2**

  Click two exam modes to exchange the positions of these two exam modes.

4.4 Measure Preset

Enter the Measure Preset screen via **[Preset]** → **[Measurement Preset]**.

The Measure Preset is access to related settings for general measure items, application measure items and report templates.

4.4.1 General Measurement Preset

To preset the general measurement:

1. Click **[Caliper]** tab to enter the general measurement preset page.The left column lists available measurement items while the right column lists selected measurement items.
2. Tap **[2D]**, **[M]**, or **[Doppler]** tab to set measurement items under corresponding imaging mode.
3. Click **[Measurement Pckage]** drop-down box to select an exam mode.
4. Set measurement item.

Operation	Description
Add Measurement Item	1) Select the item(s) you want to add from the left column. 2) Click **[>]** to add the selected items of the left column to the right column. Or Click **[>>]** to add all the selected items of the left column to the right column.
Remove measurement Items	1) Select the item(s) you want to remove from the rigjt column. 2) Click **[<]** to remove the selected items from the right column to the left column. Or Click **[<<]** to remove all the selected items from the right column to the left column.
Adjust measurement item position	Select a selected measurement item and click **[Up]** / **[Down]** to adjust the position of the measurement items.
Set default measurement item	Select a selected measurement item and click **[Default]** to set the measurement item as default. Default measurement item is marked with a “√”.

Operation	Description
Set Measurement Item Properties	Select a selected measurement item; click **[Properties]** to open the properties dialog box. Check the items to display in the result window or set the measurement item properties.
Status after completing current measurement.	Click **[Measurement Sequence]** drop-down box to set the status after completing current measurement. ● None: No measurement item is activated after completing the current measurement. ● Repeat: Activate the current measurement item again after completing the current measurement. ● Next: Activate the next current measurement item after completing the current measurement.

5. Click **[Save]** to save current settings and return to the Home screen.

4.4.2 Application Measurement Preset

To preset application measurement item:

1. Click **[Measure**] tab to enter the application measurement preset page.
   The left column lists available measurement items while the right column lists selected measurement items.
2. Click **[2D]**, **[M]**, or **[Doppler]** tab to set measurement items under corresponding imaging mode.
3. Click **[Measurement Package]** drop-down box to select an exam mode.
4. Set measurement item.

Operation	Description
Add Measurement Item	1) Select the item(s) you want to add from the left column. 2) Click **[>]** to add the selected item of the left column to the right column. Or click **[>>]** to add all the selected items of the left column to the right column.
Remove measurement Item	1) Select the item(s) you want to remove from the right column. 2) Click **[<]** to remove the selected item from the right column to the left column. Or click **[<<]** to remove all the selected items from the right column to the left column.
New	Open the Customize Wizard dialog box.
Delete	Remove a customize measurement item.
Advanced	Open the Advanced Setting dialog box.
Adjust measurement item position	Select a selected measurement item and click **[Up]** / **[Down]** to adjust the position of the measurement items.
Set default measurement	Select a selected measurement item and click **[Default]** to set

Operation	Description
item	the measurement item as default. Default measurement item is marked with a "√".
Set Measurement Item Properties	Select a selected measurement item; click **[Properties]** to open the properties dialog box. Check the items to display in the result window or set the measurement item properties.
Status after completing current measurement.	Click **[Measurement Sequence]** drop-down box to set the status after completing current measurement. ● None: No measurement item is activated after completing the current measurement. ● Repeat: Activate the current measurement item again after completing the current measurement. ● Next: Activate the next current measurement item after completing the current measurement.

5. Click **[Save]** to save current settings and return to the Home screen.

4.4.2.1 Customize Application Measurement / Calculation Item

To customize application measurement / calculation item:

1. Click **[New]** to open the Customize Wizard dialog box.
2. Enter an item name, select item type, and click **[Next]**.
3. Set measurement item properties.

Item		Description
Measurement Item	**Measuring Area**	Select exam modes and check whether it is applied to the left/right, near/middle/far area of the target site.
	Tool Type	Select the measure or calculate tool.
	Measurement Result	Measurement results are displayed in the result window. Double-click the item name to modify the name. Double-click the unit to modify the unit.
Calculation Item	**Measuring Area**	Select exam modes.
	Unit	Select unit.
	Formula	Enter a formula or select a formula in the formula text box.
	Imaging Mode	Select imaging mode.
	Item Name	Select item name and unit.

4. Click **[Finish]** to save the customize measurement/calculation item settings and close the Customize Wizard dialog box. The customize measurement / calculations items are displayed at the bottom of the list of available measurement items on the left.

4.4.2.2 New Study

1. Select the measurement package you want to add a new study.

2. Click on **[New Study]** to open new study dialog box.
3. Enter the name of the new study and click **[OK]**. The new study is displayed at the bottom of the list on the right.

4.4.2.3 Edit Measurement Package

To edit measurement package:

1. Click **[2D]**, **[M]** or **[Doppler]** tab to set the imaging mode of the measurement package.
2. Click **[Advanced]** to enter the New Measurement Package interface. Available packages are listed in the left column while the selected packages are listed in the right column.
3. Edit Measurement package. You can add, remove, adjust the measurement package order, and set the default measurement package.

Operation	Description
Add Measurement Package	1) Select the package(s) you want to add from the left column. 2) Click **[>]** to add the selected package from the left column to the right column. Or click **[>>]** to add all the selected packages from the left column to the right column. 3) The measurement package can be activated by rotating the corresponding knob under the **[Exam]** button of the touch screen.
Remove Measurement Package	1) Select the package(s) you want to remove from the right column. 2) Click **[<]** to remove the selected package from the right column to the left column. Or click **[<<]** to remove all the selected packages from the r right column to the left column.
Adjust Measurement Package Position	Select a selected measurement package and click **[Up]** / **[Down]** to adjust the measurement package position.
Set Default Measurement Package	Select a selected measurement package and click **[Default]** to set the measurement package as default. Default measurement package is marked with a “√”

4. Click **[OK]** to exit the New Measurement Package interface and the current measurement package will be replaced by the new default measurement package.

4.4.3 Report Template

Click **[Report]** tab to enter the Report Preset screen. This tab is access to relevant settings of repor template.

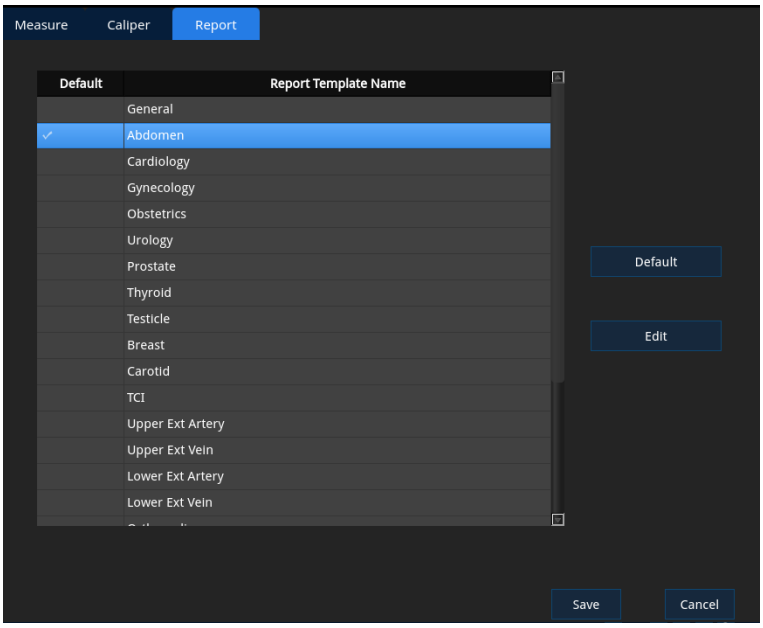


Figure 17 Measure Preset- Report

4.4.3.1 Default Report Template

Select a report template in the report template list and click **[Default]** to set the template as default.

Default report template is marked with a "√".

4.4.3.2 Edit Report Template

1. Select a report template in the report template list.
2. Click **[Edit]** to enter the report template edit screen.
3. Complete relevant settings as needed.
4. Click **[OK]** to save modifications and exit the report template edit screen.

4.5 Network Preset

Network preset includes local and DICOM service-related network settings.

This section only introduces the local network setting. For details about the DICOM service-related network settings, refer to "11 DICOM".

Enter the local network setting screen via **[Preset]** → **[Network Preset]** → **[Local TCP/IP]**. This screen is access to local network and LAN settings.

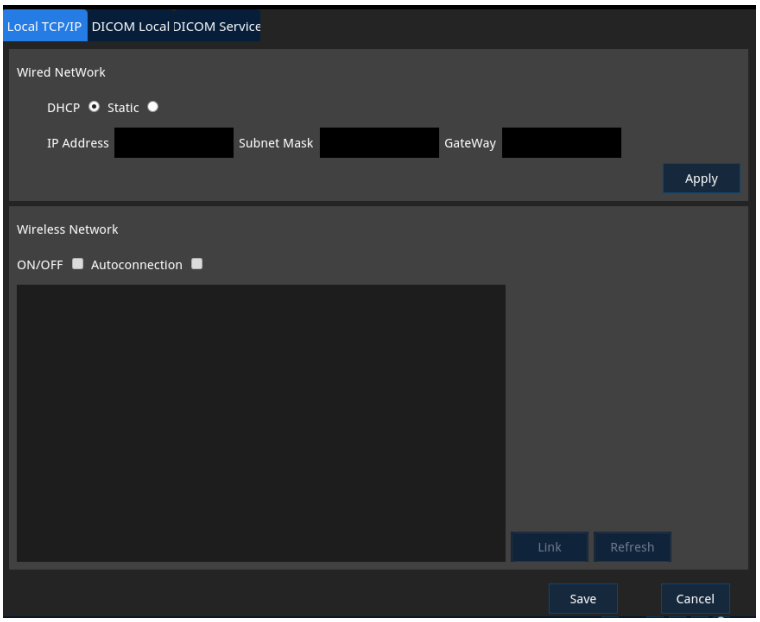


Figure 18 Network Preset- local TCP/ IP

Table 18 Network Preset- local TCP/ IP

Item	Description	
Wired Network	**Network Type**	Select wired network type. Options : DHCP/ Static
	IP Address	The IP address of system should be in the same network segment as the IP address of the server.
	Subnet Mask	Enter the subnet mask address of the system to set different network segments.
	Gateway	Enter the gateway address of the system.
	Apply	Click to make the modifications in this network property effective.
Wireless Network (option)	**ON/OFF**	Enable /diable the wireless network.
	Auto Connection	Enable / diabale the auto connection function.

NOTE : IP address should not be occupied by other device in the LAN. Malfunction of DICOM will result.

4.6 Print Preset

Enter the print preset screen via **[Preset]** → **[Print Preset]**. This screen is access to printing settings.

To add a printer, please refer to “3.9.2 Connect Printer” for details.

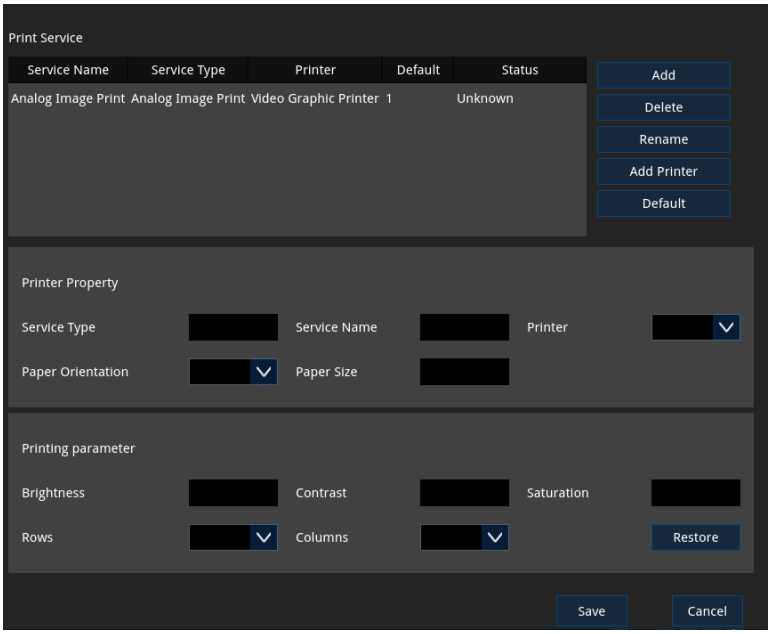


Figure 19 Print Preset

Table 19 Print Preset

Item		Description
Print Service	**Add**	Click to open the add service dialog box.
	Delete	Click to remove the selected service.
	Rename	Click to rename the selected service.
	Add Printer	Installs the printer driver and performs related settings.
	Default	Click to set the selected service as default.
Printer Property	**Service Type**	Set the service type of the printer.
	Service Name	Set the service name of the printer
	Printer	Set the printer type.
	Paper Orientation	Set the paper orientation for printing.
	Paper Size	Set the paper size for printing.
Printing Parameter	**Brightness**	Set the brightness for printing.
	Contrast	Set the contrast for printing.
	Saturation	Set the saturation for printing.
	Rows	Set the number of rows for printing.
	Columns	Set the number of columns for printing.
	Restore	Restore default parameter setting for printing.

4.7 Maintenance Preset

Enter the maintenance preset screen via **[Preset]** → **[About & Maintenance]**.

This screen is access to system information, detailed information option settings and other settings. You can view important information regarding the system information, submenus for option and other settings.

4.7.1 System Information

Enter the screen via **[Preset]** → **[About & Maintenance]** → **[System Info]**. This screen displays the issue version of the system.

4.7.2 Detailed Information

Enter the screen via **[Preset]** → **[About & Maintenance]** → **[Detailed Information]**. This screen displays the detailed information of the system. The displayed information varies depending on the configuration and version of the system.

4.7.3 Option

Enter the screen via **[Preset]** → **[About & Maintenance]** → **[Option]**. This screen lists all the supported options and their installation status in the system.

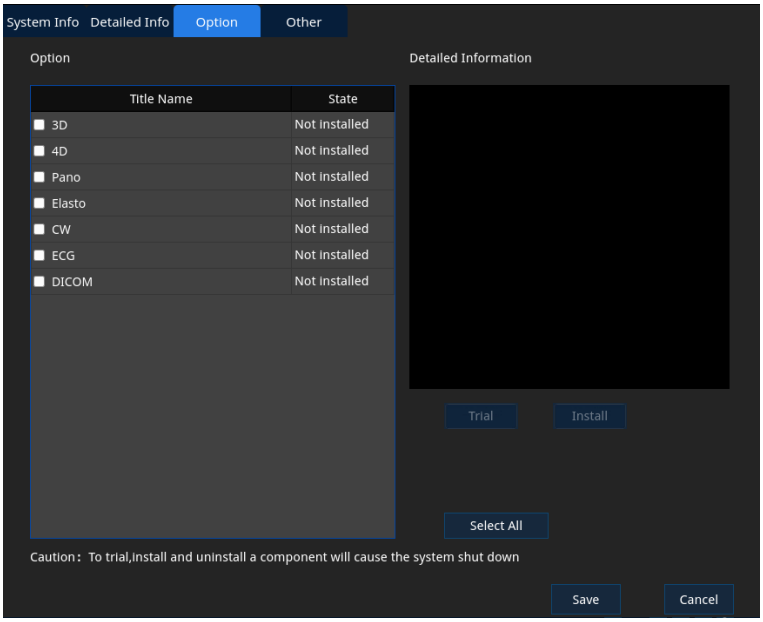


Figure 20 About & Maintenance- Option

4.7.4 Other

Enter the screen via **[Preset]** → **[About & Maintenance]** → **[Other]**.

This screen is access to import / export for preset data and exam mode, restore factory

defaults and upgrade.

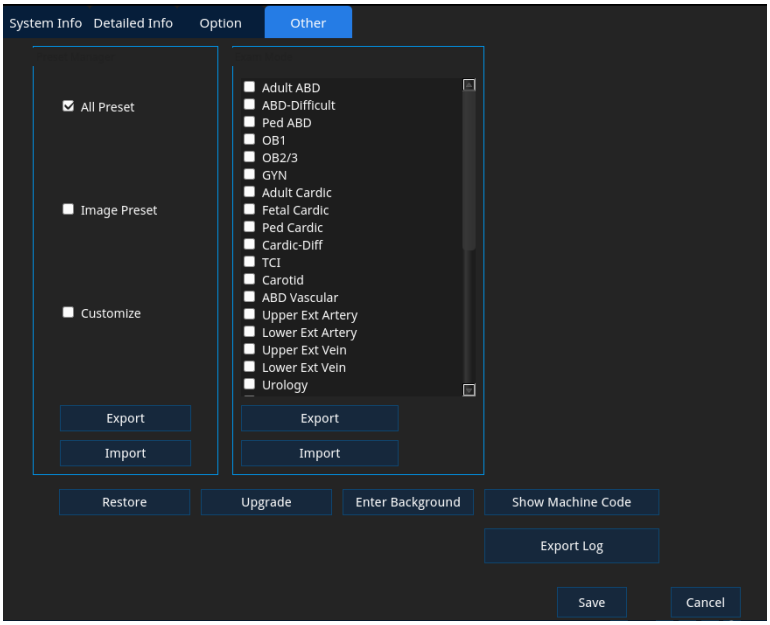


Figure 21 About & Maintenance- Other

Table 20 About & Maintenance- Other

Item		Description
Preset Management	**All preset**	Set all management preset data to all preset.
	Image preset	Set all management preset data to image preset.
	Customize	Set all management preset data to customize measurement preset.
	Export	Export current preset data.
	Import	Import preset data to the system.
Exam Mode	**Export**	Export selected exam mode.
	Import	Import exam mode to the system.
Restore		To return all settings to factory defaults.
Upgrade		To upgrade system software.
Enter background		To enter the engineer mode. Only avialble to authorized personnel.
Show Machine Code		Display the machine code.
Export Log		To export the log. Only avialble to authorized personnel.

5 Preparing an Exam

5.1 Patient Information

Although the system supports exam without entering patient information, to avoid data chaos, it is recommended to enter patient information before performing an exam for better patient data management.

For archived patients, you can obtain patient information via the local and DICOM servers.

5.1.1 New Patient

Enter the patient information prior to the exam for the first time.

To start a new patient, perform the following steps:

1. Press the **[Patient]** button on the control panel to enter the patient information screen.

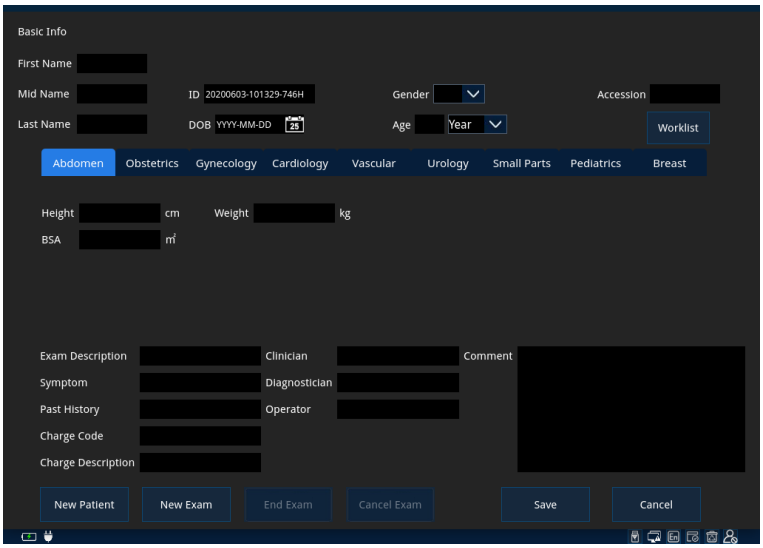


Figure 22 Patient Information Screen

Table 21 Patient Information Screen

Item	Description
Worklist	Click to open the Worklist screen.
New Patient	Click to erase all patient data and create a new patient record by entering new patient information.
New Exam	Click to end current exam and create a new exam for current patient.
End Exam	Click to end the current exam.
Cancel Exam	Click to cancel the current exam. Canceled exam cannot be restored.
Save	Click to save patient information and back to the home screen.

Item	Description
Cancel	Click to cancel patient information input and back to the home screen.

2. Move the cursor to the desired text box and enter the patient basic information.

Exam Information	Description
Name	Enter patient name.
Patient ID	The system generates the patient ID automatically. To enter the patient ID manually, please delete the default patient ID first and then enter the new ID.
Gender	Click **[Gender]** drop-down box to select patient gender.
DOB (Date of Birth)	Enter directly in the text box, or click on the **calendar icon** to select the patient's date of birth in the calendar.
Age	Enter the date of birth; the system will automatically calculate the patient's age. Otherwise, manual input is required.
Accession	The system auto-synchronizes the serial number of the same patient in the worklist.

NOTE : Use keyboard for information entry. Press < Ctrl > + < Space > to switch input method between Chinese and English.

3. Click the corresponding tab to select the appropriate exam type, and enter the patient's exam information.

- Available exam types are: ABD (Abdomen), OB (Obstetrics), GYN (Gynecology), CARD (Cardiac), VAS (Vascular), URO (Urology), SMP (Small part), PED (Pediatrics) and BREAST (Breast).
- Exam-specific information is required for different exam types.

Exam Type	Exam Information	Description
Abdomen	**Height**	Enter patient height.
	Weight	Enter patient weight.
	BSA (Body Surface Area)	After entering the height and weight, the system calculates the BSA according to the formula selected by the user in **[System Preset]**.To set the BSA formula, refer to "4.2.2 General" for details.
Obstetrics	**Calculation Index**	When perform obstetrical exam, the system calculates the GA and the EDD based on the entered calculation index; or calculates the GA and the LMP based on the entered EDD and uses this as a basis assessment for fetal physiology scores. **Calculation index:** LMP: Enter the last menstrual period. DOC: Enter the date of conception. IVF: Enter the in vitro fertilization date.

Exam Type	Exam Information	Description
		PRV: Enter the previous exam date and GA obtained from the previous exam. EDD: Enter the excepted date of delivery.
	Gestations	Select fetus number. The system supports up to 4 fetal measurements.
	Gravida	Enter times of pregnancy.
	Para	Enter times of delivery.
	Ectopic	Enter times of abnormal pregnancy. (E.g. Ectopic pregnancy)
	Abortion	Enter times of abortion.
Gynecology	**LMP**	Enter the date of last menstrual period.
	Gravida	Enter times of pregnancy.
	Para	Enter times of delivery.
	Ectopic	Enter times of abnormal pregnancy. (E.g. Ectopic pregnancy)
	Abortion	Enter times of abortion.
Cardiology	**Height**	Enter patient height.
	Weight	Enter patient weight.
	BSA (Body Surface Area)	After entering the height and weight, the system calculates the BSA according to the formula selected by the user in **[System Preset]**. To set the BSA formula, refer to “4.2.2 General” for details.
	HR	Enter the heart rate of the patient.
	RA Press	Enter the right atrium pressure of the patient.
	BP	Enter the blood pressure of the patient.
Vascular	**Height**	Enter patient height.
	Weight	Enter patient weight.
	BP (L)	Enter the left blood pressure of the patient.
	BP (R)	Enter the right blood pressure of the patient.
Urology	**Height**	Enter patient height.
	Weight	Enter patient weight.
	Serum PSA	Enter the serum PSA of the patient.
	PPSA coefficients	Enter the PPSA coefficient, the default coefficient is 0.12.

Exam Type	Exam Information	Description
Small Parts	/	/
Pediatrics	/	/
Breast	**Height**	Enter patient height.
	Weight	Enter patient weight.

4. Enter operation information.

Operation Information	Description
Exam Description	Briefly describe the exam.
Clinician	Enter the name of the clinician.
Symptom	Explain the reasons for performing ultrasound exam.
Diagnostician	Enter the name of the diagnostician who is responsible for the exam.
Past History	Enter the previous medical history of the patient.
Operator	Enter the name of the operator.
Charge Code	Enter the charge code.
Charge Information	Enter the charge information.
Charge Description	Briefly describe the charge information.

5. Click **[Save]** to save the patient information and return to the Home screen.

NOTE:
- **In case of emergency, you can perform an exam directly without patient information entry.**
- **When an image or cine is frozen, the system automatically generates a patient ID.**

5.1.2 Retrieve Patient Information (Station)

For patient information stored in the local hard disk, you can obtain patient information through the Station screen.

To retrieve patient information, perform the following steps:

1. Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen.

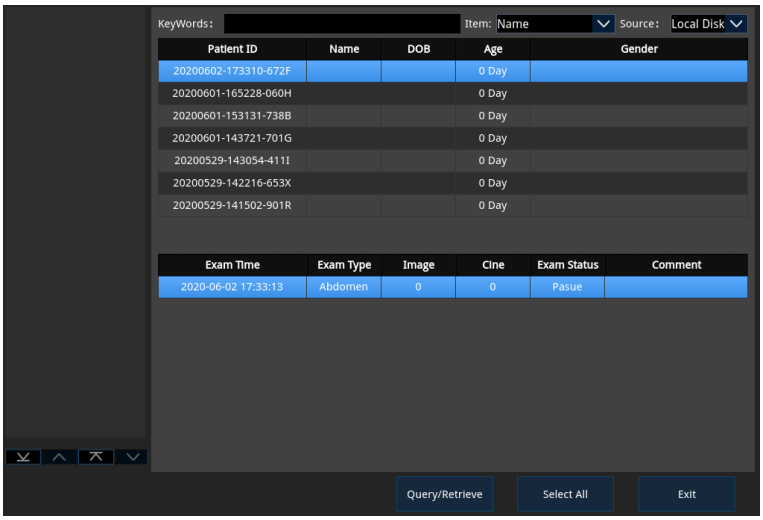


Figure 23 Station Screen

2. Click **[Source]** drop-down box to select the storage location of the target patient information
3. Search the target patient.

Item	Description
Search Item	Click **[Search Item]** drop-down box to select a search item. Options : Name , ID, Date of Birth, Exam Date
Keyword	Enter the keyword for the research item. The patient list shows the patients who meet the requirements, the exam list shows all the exams under the selected patients, and the system defaults to select the first patient in the patient list.

4. Select the target patient and press the **[Set]** button to open the operation menu.

Item	Description
Patient Information	Click to enter the Patient Information screen, and view the selected patient information.
Review Image	Click to enter the Review screen, and review the images of the selected exam.
Review Report	Click to enter the Report screen and review the selected report.
New Exam	Click to create a new exam for the selected patient.
Activate Exam	Click to continue an exam that ends within 24 hours.
Resume Exam	Click to continue an exam that was interrupted within 24 hours.
Delete Exam	Click to delete the selected exam.
Export Exam	Click to export the selected exam to the storage media supported by the system.
Import Exam	Click to import patient information from other media to the system.
Send Exam	Click to send the selected exam to the external storage media, DICOM server or printer.

Item	Description
Query / Retrieve	Click to view patient information stored on the DICOM server.
Select All Exams	Click to select all patients and exams for batch operations.
Exit	Click to exit Station screen and back to the Home screen.
∧	Turn page up to view the thumbnails on the clipboard.
∨	Turn page down to view the thumbnails on the clipboard.

5.1.3 Retrieve Patient Information (DICOM)

After the system is connected to the DICOM server and the worklist server is preset (refer to “11.1.2.3 Worklist” for more information). You can remotely query or import patient information via the worklist server. Refer to “11.2.3 DICOM Worklist” for details.

5.2 Select Probe and Exam Mode

NOTE :

- **If the exam mode is switched during the measurement, all general measurement data will be cleared while the application measurement data will be saved in the report.**
- **Freeze the image or shutdown the system power before connect or remove the probe. Otherwise, system and probe damage may result.**

To select probe / exam mode, perform the following steps:

1. Connect the probes to the probe receptacle. (Refer to “3.6 Connect / Remove the Probe” for details).
2. Press **[Probe]** button on the control panel to enter the Probe / Exam mode screen. The screen displays connected probe icon and exam mode supported by corresponding probe.

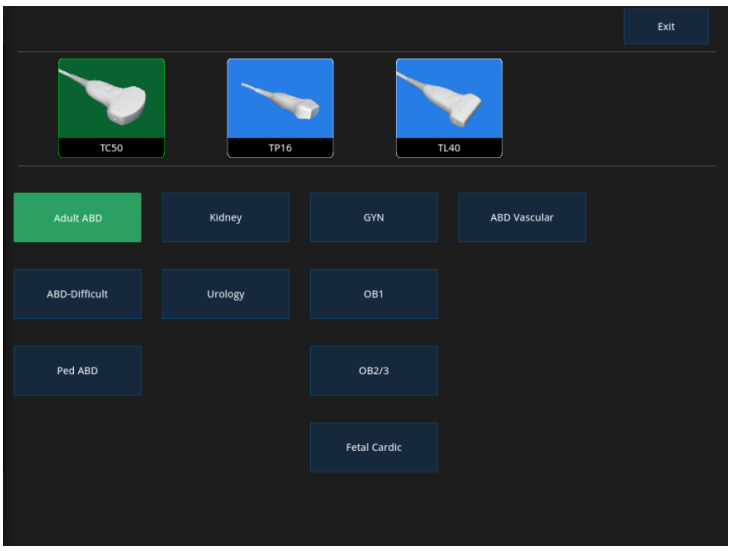


Figure 24 Probe/Exam Mode Screen

3. Click the probe icon to select an appropriate probe.
4. Select an exam mode under the probe icon and the system enters the corresponding exam mode environment.

5.3 Select Imaging Mode

Select an appropriate imaging mode. Refer to“6 Optimizing the Image”for more informations of each imaging mode

5.4 Resume/Activate Exam

5.4.1 Resume Exam

To resume an interrupted exam, perform the following steps:

1. Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen.
2. Select the target patient and press the **[Set]** button to open the operation menu.
3. Click **[Resume Exam]** to load the patient basic information and measurement data to resume the previously interrupted exam.

   NOTE : Only exams interrupted within 24 hours can be resumed.

5.4.2 Activate Exam

For patients who have completed the exam but need to be re-examined, perform the following steps:

1. Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen.
2. Select the target patient and press the **[Set]** button to open the operation menu.
3. Click **[Activate Exam]** to load the patient basic information and measurement data to resume the previously completed exam.

   NOTE : Only exams completed within 24 hours can be reactivated.

5.5 Cancel / End Exam

5.5.1 Cancel Exam

To cancel an exam, perform the following steps:

1. Press the **[Patient]** button on the control panel to enter the Patient Information screen.
2. Click **[Cancel Exam]** to pop up the Cancel exam dialog box.

3. Click **[OK]** to cancel the exam or **[Cancel]** to resume the current exam.

5.5.2 End Exam

To avoid data chaos between different patients and measurement items, end the current exam before proceeding to the next exam.

1. Press the **[Patient]** button on the control panel to enter the Patient Information screen. Click on **[New Patient]** or **[New Exam]** or **[End Exam]**.
2. The end exam dialog box pops up. Click **[OK]** to save the current patient data and exit the current exam.

6 Optimizing the Image

6.1 Imaging Mode

The ultrasound system offers a set of imaging modes to accommodate a variety of imaging applications. Some modes display a live gray image. Others are Doppler modes to evaluate the amplitude or the direction of the blood flow and the spectral information.

The system supports following imaging modes:

Imaging Type	Imaging Mode
B	B-mode
M	M-mode, Color M-mode
Color	Color mode, PDI mode
Doppler	CW mode, PW mode

6.2 B B-mode

The B-mode imaging uses a multi-beam scanning method to form each scanning line into a 2D grayscale image, and displays the strength of the tissue echo signal by the intensity of the brightness.

B-mode imaging is the most basic imaging mode by displaying the anatomical structure of tissues and organs in real time.

B-mode can also be used together with other modes.

6.2.1 Basic Procedure of B-mode

To perform B-mode imaging:

1. Start a new exam.
2. Select appropriate probe and exam mode, the system enters B-mode by default or press the **[B]** button on the control panel to enter B-mode.
3. Optimize the image.(Refer to “6.2.2 Image Optimization (B)” for details)
   The parameter area on the right side of the screen provides real-time parameter information of the B-mode. The meanings of each parameter are as follows

Parameter	B (2D) Mode
F	Working Frequency (MHz)
D	Depth
G	Gain (dB)

FR	Frame Frequency
DR	Dynamic Range
ZClear	Image Enhancement

4. Perform measurement and calculation as needed.

6.2.2 Image Optimization (B)

6.2.2.1 Gain

The gain is used to adjust the brightness of the B image. You can brighten the image and observe more echo signals by increasing the gain. However, with increased gain, more noise has been introduced.this also introduces more noise.

Operation:

Rotate the **[Gain]** knob on the control panel to adjust the gain value.

6.2.2.2 TGC

The TGC controls compensation for echo attenuation as depth increases by varying the gain of the received echoes at a specific depth.

The TGC curve is displayed on the left side of the image area when adjusting.

Operation:

Move the TGC slider on the control panel to adjust the brightness of the segmented image of the corresponding depth.

6.2.2.3 Depth

Depth controls the flied of view. Increase the depth to look at a deeper or larger tissue structure, decrease the depth to look at tissue structures near the skin line. Increase the depth tends to decrease the frame rate.

Operation:

Press the **[Depth]** button on the control panel and then rotate the **[Value]** knob to adjust the image depth. Press the **[Depth]** button again to exit this function.

NOTE : Adjustable range depends on the current probe. The actual depth is shown in mm in the image parameter area.

6.2.2.4 Steer

Steer control is used to deflect the direction of beam without moving the probe.

Operation:

Press the **[Angle]** button on the control panel and then rotate the **[Value]** knob to adjust the direction of the ultrasonic beam. Press the **[Angle]** button again to exit this function.

NOTE : Applicable to linear probe only.

6.2.2.5 Acoustic Power

Adjust the acoustic power of current selected probe in B-mode.

The actual acoustic power value is displayed at the upper left corner of the image.

Operation:

Select **[A.Power]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the acoustic power.

6.2.2.6 Auto-optimization

The system automatically optimizes image parameters based on the tissue characteristics of the current scan area.

When auto-optimization function is enabled, an “Auto” mark is displayed in the image parameter area.

Operation:

Press the **[Gain]** knob on the control panel to enable/ disable the auto optimization function.

6.2.2.7 Focus Position/Number

Adjust the focus of the ultrasonic beam to increase the resolution of the particular area and focus the optimized image.

The focus symbol “◁” is displayed on the image depth scale.

- **Adjust the Focus Position**

Press the **[Focus]** button on the control panel and then rotate the **[Value]** knob to adjust the focus position. Press the **[Focus]** button again to exit this function.

- **Adjust the Focus Number**

Press the **[Focus]** button on the control panel and then adjust focus number by pressing [▲] or [▼] button.

NOTE:
- **Disable the SCI function before adjusting the focus number.**
- **The phased array probe does not support adjusting the focus number.**

6.2.2.8 Image Quality

Adjust image quality by controlling the frequency. User selects the appropriate frequency type and frequency value based on the depth of scanning and tissue characteristics to achieve optimal imaging results.

The fundamental wave is marked with an “F” while the harmonic wave is marked with an“F H”.

Operation:

1. Select **[Image Quality]** by pressing **[◀]** or **[▶]** button and then press the **[Value]**

knob to switch between **[Fundamental Frequency]** and **[Harmonic Frequency]**.

2. Rotate the **[Value]** knob to select the frequency.

   - Fundamental frequency options: Pen (Penetration priority), Gen (General imaging), Res (Resolution priority)
   - Harmonic frequency options: HPen (Penetration priority), HGen (General imaging), HRes (Resolution priority), HPen-Gen (between Penetration and General)

NOTE : Adjustable range depends on the current probely.

6.2.2.9 Dynamic Range

Change the display range of the grayscale to adjust the contrast of the image.

Operation:

Select **[Dyn Ra.]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the dynamic range.

6.2.2.10 ZClear

Used to enhance image contrast, smooth images and reduce noise.

Operation:

Select **[ZClear]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the ZClear level.

6.2.2.11 Persistence

Superimpose and average the images of adjacent frames to remove the noise and enhance the details.

Operation:

Select **[Persistence]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the persistence value.

6.2.2.12 Gray Map

Optimize the images by adjusting the black-white contrast of the image.

Operation:

Select **[Graymap]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the effect of the grayscale map.

6.2.2.13 TSI

Select the acoustic velocity according to the scanning site to highlight the tissue texture.

Operation:

Select **[TSI]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select the

tissue texture.

6.2.2.14 Chrome

Replace grayscale distinction with color distinction to intuitively show grayscale level of the images.

Operation:

Select **[Chrome]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to change the color.

6.2.2.15 Field of View

Change the scan range without moving the probe or ROI box.

You can get a wider FOV (field of view) by a larger scan range. A larger FOV trends to decrease the frame rate.

Operation:

Select **[Field of View]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the FOV.

6.2.2.16 Compound Imaging

Compound imaging is the process of merging frames of different steering angles into a single frame. This function is used to improve the spatial resolution and signal-to-noise ratio of the image, making the image subtle and clean.

There are two types of compound imaging: SCI (Spatial Compound Imaging) and FCI (Frequency Compound Imaging).

- **SCI (Spatial Compound Imaging)**

Operation:

Select **[SCI]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to to enable / disable SCI function. Rotate the **[Value]** knob to adjust the SCI level.

- **FCI (Frequency Compound Imaging)**

FCI is only available for the fundamental frequency.

Operation:

Select **[SCI]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to to enable / disable FCI function.

6.2.2.17 Line Density

Line density determines the number of the ultrasonic scanning lines of a certain width or angle.

Operation:

Select **[Line Density]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust line density level.

6.2.2.18 Image Rotation

Change the orientation of the image display.

Operation:

Select **[Rotation]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to change the orientation of the image display.

Rotation Options: 0°, 90°, 180°, and 270°.

NOTE : "● " of the image is consistence with the orientation mark of the probe.

6.2.2.19 Image Reverse

Reverse the image orientation horizontally or vertically for better observation.

Operation:

Select **[UD Reverse] or [LR Reverse]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable / disable image reverse function.

6.2.2.20 EFOV (Extended filed-of-view)

When the extended imaging function is enabled, trapezoidal imaging (for linear array probes) or extended scanning angle (for convex array and phased array probes) will be displayed.

Operation:

Select **[EFOV]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the EFOV level.

6.2.2.21 Center Line

Display or hide a centerline which is used for needle guidance.

Operation:

[System Preset] → **[Image]** → **[B]**, check **[Center line]** to display the center line.

NOTE : Center Line is only available for convex probes.

6.2.2.22 Horizontal Scale

Display or hide the horizontal scale.

Operation:

[System Preset] → **[Image]** → **[B]**, check **[H Scale]** to turn on the horizontal scale.

6.3 M-mode

M-Mode is used to determine patterns of motion for objects along the M-line. The most common use is for viewing motion patterns of the heart.

6.3.1 Basic Procedure of M-mode

In M-mode, the M-line can only be set within 90 degrees of sector angle, so it is more suitable for organs with regular shape and normal position.

To perform an M-mode imaging:

1. Optimize the B-mode image to make the image sharper.
2. Press the **[M]** button on the control panel to enter the pre-active M-mode, and an M-line is displayed on the B-mode image.
3. Roll the trackball to adjust the position of the M-line.
4. Press the **[M]** button on the control panel again to enter the M-mode. The image is divided into two parts: B-mode image at the top and M-mode image at the bottom.
   - The X axis indicates time.
   - The Y axis indicates the tissue interface position or depth.
5. Move the M-line on B-mode image with the trackball and you can learn the movement of the anatomy along the M-line in the M-mode image.
6. Optimize the M-mode image. (Refer to “6.3.2 Image Optimization (M)” for details.)
   The parameter area on the right side of the screen provides real-time parameter information of the M-mode. The meanings of each parameter are as follows:

Parameter	M-mode
F	Working Frequency (MHz)
D	Depth
G	Gain (dB)
V	Velocity
DR	Dynamic Range

7. Perform measurement and calculation items as needed.

6.3.2 Image Optimization (M)

6.3.2.1 Gain

The gain is used to adjust the brightness of the M-mode image.You can brighten the image and observe more echo signals by increasing the gain. However, with increased gain, more noise has been introduced.this also introduces more noise.

Operation:

In M-mode, rotate the **[Gain]** knob on the control panel to adjust the gain value.

6.3.2.2 Dynamic Range

Change the display range of the grayscale to adjust the contrast of the image.

Operation:

Select **[Dyn Ra.]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the dynamic range.

6.3.2.3 Gray Map

Optimize the images by adjusting the black-white contrast of the image.

Operation:

Select **[Gray Map]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the gray map.

6.3.2.4 Speed

Control the imaging speed.The speed is displayed in the image menu area.

Operation:

Select **[Speed]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the M speed.

6.3.2.5 Chrome

Replace grayscale distinction with color distinction to intuitively show grayscale level of the images.

Operation:

Select **[Chrome]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to change the selection color.

6.3.2.6 Display Format

Change the display format of B image and M image for easy comparison of images.

Operation:

[System Preset] → **[Image]** → **[M/PW/CW]** to set the display format.

6.4 Color Mode

Color mode is also a Doppler mode to provide blood flow information in colors. Color mode includes basic color mode and PDI mode.

NOTE : Acoustic power in color mode is synchronous with that of B-mode.

6.4.1 Basic Procedure of Color Mode

Typically, the color above the color bar baseline indicates the flow towards the probe;

while color below the color bar baseline indicates the flow away from the probe.

The brighter the color, the faster the blood flows; the darker the color, the slower the blood flows.

To perform a color mode imaging:

1. Observe the anatomical structure, adjust the B-mode image and probe to make the target area at the center of the B-mode image.
2. Press the **[CFM]** button on the control panel to enter Color-mode.
3. Adjust the position and size of the ROI box.

    - When the ROI box displayed a solid line frame, roll the trackball to adjust the position of the ROI box, press the **[Set]** button to confirm
    - When the ROI box displayed a dotted line frame, roll the trackball to adjust the size of the ROI box, press the **[Set]** button to confirm.
    - Press the **[Set]** button to toggle between position and size adjustment.

4. Optimize the image. (Refer to “6.4.3 Image Optimization (Color/PDI)” for details) The parameter area on the right side of the screen provides real-time parameter information of the Color-mode. The meanings of each parameter are as follows:

Parameter	Color-mode
F	Working Frequency (MHz)
G	Gain (dB)
WF	Wall Filter
PRF	Pulse Repetition Frequency

5. Perform measurement and calculation items as needed.

6.4.2 Basic Procedure of PDI mode

Power Doppler Imaging (PDI) is used to show the presence or absence of blood flow and to reflect the density of red blood cells.

NOTE : PDI mode only provides perfusion information of blood flow, but cannot indicate the direction and speed of blood flow.

To perform a PDI-mode imaging:

1. Observe the anatomical structure, adjust the B-mode image and probe to make the target area at the center of the B-mode image.
2. Press the **[PDI]** button on the control panel to enter PDI mode.
3. Adjust the position and size of the ROI box.

    - When the ROI box displayed a solid line frame, roll the trackball to adjust the position of the ROI box, press the **[Set]** button to confirm.

- When the ROI box displayed a dotted line frame, roll the trackball to adjust the size of the ROI box, press the **[Set]** button to confirm.
- Press the **[Set]** button to toggle between position and size adjustment.

4. Optimize the image. (Refer to “6.4.3 Image Optimization (Color/PDI)”)
   The parameter area on the right side of the screen provides real-time parameter information of the PDI mode. The meanings of each parameter are as follows:

Parameter	PDI-mode
F	Working Frequency (MHz)
G	Gain (dB)
WF	Wall Filter
PRF	Pulse Repetition Frequency

5. Perform measurement and calculation items as needed.

6.4.3 Image Optimization (Color/PDI)

6.4.3.1 Gain

Adjust the overall sensitivity of flow signals.

Operation:

In Color/PDI mode，Rotate the **[Gain]** knob on the control panel to adjust the Color/PDI gain value.

6.4.3.2 Baseline (Color)

Calibrate the 0 position of the scale for the best blood flow speed display.

Operation:

Press the **[Base Line]** button on the control panel and then rotate the **[Value]** knob to adjust the image depth. Press the **[Base Line]** button again to exit this function.

NOTE : Baseline function is unavailable for PDI mode.

6.4.3.3 Image Quality

Adjust the frequency of current selected probe in Doppler mode.

Operation:

- Select **[Image Quality]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select the frequency.
- Options: Pen (Penetration priority), Gen (General imaging), Res (Resolution priority

6.4.3.4 PRF

Adjust the speed range of color flow. The real-time PRF value is displayed in the image parameter area.

Operation:

Press the **[Scale]** button on the control panel and then rotate the **[Value]** knob to adjust the image depth. Press the **[Scale]** button again to exit this function.

NOTE : Select appropriate PRF to match the flow velocity. Aliasing may resulted if low PRF is used for high flow velocity or small signal lost may resulted if high PRF is used for low flow velocity.

6.4.3.5 Wall Filter

Filter low frequency noise to reduce the impacts of breathing and other activities.

The filtering value is displayed in the image parameter area.

Operation:

Select **[Wall Filter]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the filtering value.

6.4.3.6 Smooth

Suppress noise and smooth the image.

Operation:

Select **[Smooth]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the smooth level.

6.4.3.7 Persistence

Superimpose and average the images of adjacent frames to remove the noise and enhance the details.

Operation:

Select **[Persistence]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the persistence level.

6.4.3.8 Priority

Set the priority to displays blood flow information by color signals or gray signals.

The larger the value, color signals are prior to display; while the smaller the value, gray signals are prior to display.

Operation:

Select **[Priority]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the color priority value.

6.4.3.9 Color Map

➢ **Color**

Multiple sets of color maps are provided to optimize color flow display. This system provides 21 different maps for users to choose. The ordinary map is marked with “V” while 2D map is marked with “VV”.

Operation:

Select **[Color Map]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to choose the color map.

➢ **PDI**

Provide color image display effect parameters, including energy spectrum and directional energy spectrum. This system provides 8 different effect maps for users to choose. The energy maps are P0-3 while the direction energy maps are dP0-3. Directional energy spectrum also shows the direction information of blood flow.

Operation:

Select **[Color Map]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to choose the color map.

6.4.3.10 Sensitivity

Reflect the ability to reflect minimal detectable blood flow which is used to adjust the accuracy of color flow display. The higher the sensitivity, the more sensitive the response to low-speed blood flow and small blood vessel signals, and the better the image quality.

Operation:

Select **[Sensitivity]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the sensitivity.

6.4.3.11 Flow State

Optimize images of different blood flow states.

Operation:

Select **[Flow State]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the flow state.

6.4.3.12 Dynamic Range (PDI)

Change the display range of the grayscale to adjust the contrast of the image.

Operation:

Select **[Dyn Ra.]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the dynamic range.

6.4.3.13 Line Density

Line density determines the number of the ultrasonic scanning lines of a certain width or angle.

Operation:

Select **[Line Density]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust line density level.

6.4.3.14 Invert

Invert the color scale for blood flow direction.

By default, red color indicates the blood flow towards the probe; while blue color indicates the blood flow away from the probe. When the invert function is enabled, blue color indicates the blood flow towards the probe; while red color indicates the blood flow away from the probe.

Operation:

- Select **[Line Density]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable or disable the invert function.
- **[System Preset]** → **[Image]** → **[Color/Power]**, check **[Auto Invert]** to enable or disable the auto-invert function.

6.4.3.15 Dual Live

Display B and C images of one probe at the same time.

Operation:

Press the **[CFM]** or **[PDI]** button on the control panel to enable or disable the dual live function.

6.4.3.16 B/C Align

Set the maximum width of the B images the same width as the ROI box.

Operation:

Select **[Line Density]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable / disable the function.

6.4.3.17 High Resolution Flow

Enhance the resolution of flow Image.

Operation:

Select **[HR Flow]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable / disable the function.

6.5 Doppler Imaging Mode

Doppler imaging is primarily used to provide blood flow velocity information and to indicate blood flow direction, type (e.g, arterial blood flow, venous blood flow) and properties.

Doppler imaging includes PW (Pulsed Wave Doppler) mode and CW (Continuous Wave Doppler) mode. PW mode displays regional blood flow velocity, direction and properties at a certain depth; CW mode is often used to display high-speed blood flow frequency. The combination of the two modes improves the accuracy of the diagnosis.

6.5.1 Basic Procedure of PW-mode

PW-mode (Pulsed Wave Doppler) is used to learn the movement information of blood flow along a scanning line in a certain area. PW-mode includes common pulse mode and high pulse repetition frequency (HPRF) mode.

To perform a PW-mode imaging:

1. Observe the anatomical structure, adjust the B-mode image and probe to make the target area at the center of the B-mode image.
2. Press the **[PW]** button on the control panel to enter the pre-activated PW-mode.

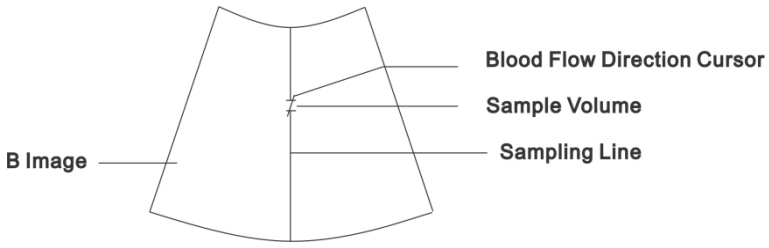


Figure 25 Pre-activated PW-mode

3. Adjust the sampling line and sampling depth to determine the sample volume in the target area.
   - Roll the trackball left and right to adjust the position of the sampling line.
   - Roll the trackball up and down to adjust the sample volume.
4. Adjust the sample volume and the cursor angle of blood flow direction.
   - Press the **[Sample Volume]** button on the control panel and then rotate the **[Value]** to adjust the sample volume. Press the **[Sample Volume]** button again to exit this function.
   - Select **[Angle]** by pressing **[** ◀ **]** or **[** ▶ **]** button and then press the **[Value]** knob to adjust the blood flow direction cursor angle so as to parallel to the blood flow direction.
5. Press the **[PW]** button on the control panel again to enter the PW-mode.
   After entering PW-mode, the image area is divided into two parts: B-mode image at the top and PW-mode image at the bottom.

- The X axis indicates time.
- The Y-axis indicates frequency change, and can also indicate the speed of forward or reverse direction after calibration.
- Press the **[Update]** button on the control panel to toggle between B-mode and pre-activated PW-mode.
- You can adjust the size and depth of sample volume and the cursor angle of the blood flow during exam.
- Select **[Volume]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the volume of the Doppler.

6. Optimize the image. (Refer to “6.5.3 Image Optimization (PW/CW)” for details)
   The parameter area on the right side of the screen provides real-time parameter information of PW-mode. The meanings of each parameter are as follows:

Parameter	PW-Mode
F	Working Frequency (MHz)
G	Gain (dB)
WF	Wall Filter
SVD	Sample Volume Depth
SV	Sample Volume
PRF	Pulse Repetition Frequency
Angle	Correction Angle

7. Perform measurement and calculation items as needed to obtain valid information.

6.5.2 Basic Procedure of CW mode

The CW (Continuous Wave Doppler) mode collects blood flow signals and data along the spectral sampling line and is used to detect high-speed blood flow.

NOTE: CW mode is only available for phased array probes.

To perform a CW mode imaging:

1. Observe the anatomical structure, adjust the B-mode image and probe to make the target area at the center of the B-mode image.
2. Press the **[CW]** button on the control panel to enter the pre-activated CW mode

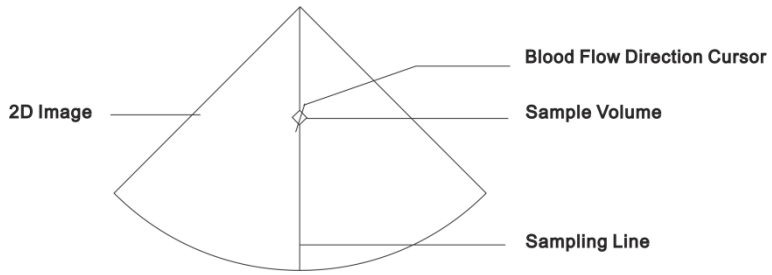


Figure 26 CW Pre-activated Mode

3. Adjust the sampling line and sampling depth to determine the sample volume in the target area.

   - Roll the trackball left and right to adjust the position of the sampling line.
   - Roll the trackball up and down to adjust the sample volume.

4. Adjust the cursor angle of blood flow direction.

   - Select **[Angle]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the blood flow direction cursor angle so as to parallel to the blood flow direction;

5. Press the **[CW]** button on the control panel to enter the CW mode.

   After entering CW mode, the image area is divided into two parts: B-mode image at the top and CW mode image at the bottom

   - The X axis indicates time.
   - The Y-axis indicates frequency change, and can also indicate the speed of forward or reverse direction after calibration.
   - Press the **[Update]** button on the control panel to toggle between B-mode and CW-mode.
   - You can adjust the size and depth of sample volume and the cursor angle of the blood flow during exam.
   - Select **[Volume]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the volume of the Doppler.

6. Optimize the image. (Refer to “6.5.3 Image Optimization (PW/CW)” for details)
   The parameter area on the right side of the screen provides real-time parameter information of CW mode. The meanings of each parameter are as follows:

Parameter	CW Mode
F	Working Frequency (MHz)
G	Gain (dB)
WF	Wall Filter
SVD	Sample Volume Depth

Parameter	CW Mode
PRF	Pulse Repetition Frequency
Angle	Correction Angle

7. Perform measurement and calculation items as needed.

6.5.3 Image Optimization (PW/CW)

6.5.3.1 Gain

Increase or decrease the echo signal strength displayed in the image.

Operation:

In PW/CW mode, rotate the **[Gain]** knob on the control panel to adjust the gain value.

6.5.3.2 Baseline

Calibrate the 0 position of the scale for the best blood flow speed display.

Operation:

Press the **[Base Line]** button on the control panel and then rotate the **[Value]** knob to adjust the image depth. Press the **[Base Line]** button again to exit this function.

6.5.3.3 Image Quality

Adjust the transmission frequency of the probe in Doppler mode. The higher the frequency, the higher the resolution and sensitivity, but the penetrating power is reduced. Select appropriate probe frequency based on the detection depth and tissue texture.

Operation:

- Select **[Image Quality]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select the frequency.
- Options: Pen (Penetration priority), Gen (General imaging), Res (Resolution priority

6.5.3.4 PRF

Adjust the speed range of color flow.

Operation:

Press the **[Scale]** button on the control panel and then rotate the **[Value]** knob to adjust the PRF. Press the **[Scale]** button again to exit this function.

NOTE : Select appropriate PRF to match the flow velocity. Aliasing may result if low PRF is used for high flow velocity or small signal lost may result if high PRF is used for low flow velocity.

6.5.3.5 SV(PW)

Adjust the width of sampling volume.

Operation:

Press the **[Sample Volume]** button on the control panel and then rotate the **[Value]** knob to adjust the SV. Press the **[Sample Volume]** button again to exit this function.

6.5.3.6 Dynamic Range

Change the display range of the grayscale to adjust the contrast of the image.

Operation:

Select **[Dyn Ra.]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the dynamic range.

6.5.3.7 Gray Map

Optimize the images by adjusting the black-white contrast of the image

Operation:

Select **[Gray Map]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the gray map.

6.5.3.8 Speed

Control the imaging speed. The smaller the value, the faster the speed is.

Operation:

Select **[Speed]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the imaging speed.

6.5.3.9 Chrome

Replace grayscale distinction with color distinction to intuitively show grayscale level of the images.

Operation:

Select **[Chrome]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select the chrome color.

6.5.3.10 Angle

Change the direction of the flow cursor angle.

Operation:

Select **[Angle]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the flow cursor angle.

6.5.3.11 Trace Area

Set the trace area of the Doppler wave in the spectrum map.

Operation:

[System preset] → **[Application]** → **[Auto Calculation]** → **[Tracing Area]**, set the

tracing area.

6.5.3.12 Wall Filter

Filter low frequency noise to reduce the impacts of breathing and other activities.

Operation:

Select **[Wall Filter]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the filtering value.

6.5.3.13 T/F Resolution

Obtain quality images by adjusting time resolution and spatial resolution.

Operation:

Select **[T/F Resolution]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the T/F res level.

6.5.3.14 Auto Calculation

Trace the spectral Doppler wave and perform parameter calculations. The results of the automatic calculation will be displayed in the measurement results window.

In the real-time state, the automatic spectrum results obtained from the latest or more cardiac cycles are always displayed; in the frozen and cine replay status, the corresponding measurement results of the traced area are displayed.

Operation:

- Select **[Auto Calc]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable the auto calculation function.
- **[System Preset]** → **[Application]** → **[Auto Calc]** → **[Auto Calcu Cycle]**, set the cardiac cycles for calculation.
- **[System Preset]** → **[Application]** → **[Auto Calc]** → **[Auto Calc Para]**, set the parameter items for automatic calculation.

6.5.3.15 Invert

Flip the directions of the spectrum display.

Operation:

- Select **[Invert]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable / disable the invert function.
- **[System Preset]** → **[Image]** → **[M/PW/CW]**, check **[Auto Invert]** to enable the auto-invert function.(Only applicable for linear probe)

6.5.3.16 Display Format

Change the display format of B image and PW/CW image to facilitate comparison of images.

Operation:

[System Preset] → **[Image]** → **[M/PW/CW]**, select the appropriate display format.

6.5.3.17 Volume

Control and adjust the audio volume produced by the spectral Doppler which helps to determine the blood flow state and properties more effectively.

Operation:

Select **[Volume]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the volume.

6.5.3.18 High Pulse Repetition Frequency (HPRF)

Filter out the redundant low frequency signals produced by non-blood flow movement, e.g.breathing, heartbeat and probe movement.

Operation:

Select **[HPRF]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to to enable / disable HPRF function.

NOTE : Applicable to PW mode only.

6.5.3.19 Steer

Steer control is used to deflect the direction of beam without moving the probe.

Operation:

Press the **[Angle]** button on the control panel and then rotate the **[Value]** knob to adjust adjust the direction of the ultrasonic beam. Press the **[Angle]** button again to exit this function.

NOTE : Applicable to linear probe only.

6.5.3.20 Multi Sync

Display the PW image together with B image or with B+Color image at the same time.

Operation:

Select **[Multi Sync]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to to enable / disable multi sync function.

6.6 Color M-mode

Color M-mode provides information of flow or tissue on the M-mode to indicate cardiac motion state.

For its sensitivities for motion signal changes, this mode provides more detailed diagnostic information.

To perform a Color M-mode imaging:

1. To enter Color M-mode:

- In B+M mode, press the **[CFM]** button to enter the pre-activated CFM mode and then press the **[M]** button on the control panel.
- In B+Color mode, B+Color+PW mode or B+Color+CW mode, double press the **[M]** button on the control panel.

2. Adjust the color ROI box size and position.
   - Move the trackball left and right to adjust the position of sampling line, the color ROI box moves together with the sampling line.
   - When the ROI box displayed a solid line frame, roll the trackball to adjust the position of the ROI box, press the **[Set]** button to confirm.
   - When the ROI box displayed a dotted line frame, roll the trackball to adjust the size of the ROI box, press the **[Set]** button to confirm.
   - Press the **[Set]** button to toggle between position and size adjustment.
3. Optimize the Image.(Refer to “6.3.2 Image Optimization (M)” for details)

7 Image Review and Management

After the image acquisition is complete, you can view and compare the image by splitting display, image zooming, cine replay, etc., or you can perform other operations on the image, such as adding comments and body marks to the image

7.1 Splitting Display

Dual-split display or Quad-split is used for ultrasound images comparison obtained at different timing.

7.1.1 Dual-Split Display

1. In B-mode, short press the **[Update]** button on the control panel to enter the dual-split mode. The image on the left displays the real-time B-image.
2. Short press the **[Update]** button again，the image on the left will be frozen while the image on the right displays the rea-time B image.

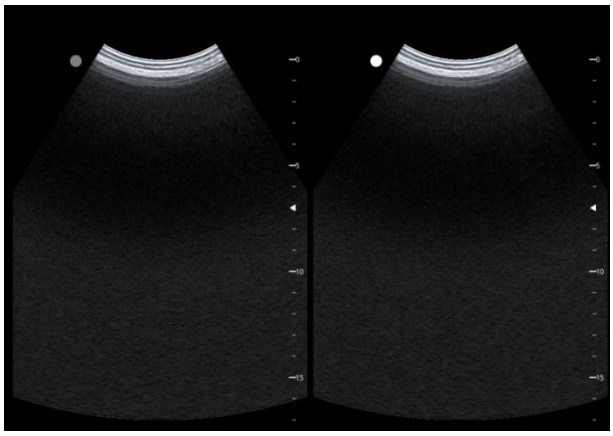


Figure 27 Dual-Split Display

3. Short press the **[Update]** button on the control panel to switch the real-time/frozen status of the left and right images.
4. Press the **[B]** knob on the control panel to exit dual-split display.

7.1.2 Quad-Split Display

1. In the current mode, long press the **[Update]** button on the control panel to enter the Quad-Split display status which divides the image area into four equal areas.

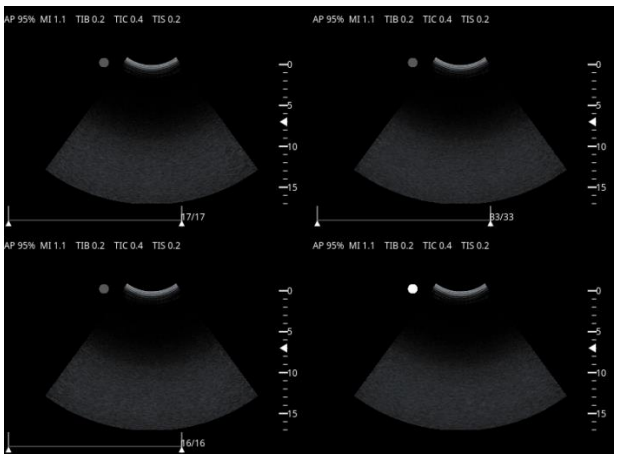


Figure 28 Quad-Split Display

2. Short press the **[Update]** button again to freeze the current image and make the next image into the real-time status.
3. Press the **[B]** knob on the control panel to exit Quad-Split display.

7.2 Image Magnification

Magnify the image to show more details. The system supports global or local magnification of the image.

NOTE :

- **Local zooming is only applicable to real-time images.**
- **Image zooming changes the frame rate which tends to changes the thermal index and position of the focus area and possibly results in different positions of the peak intensity in the acoustic field. As a result, the MI may change.**
- **Adjust the position of the scale or focus as needed.**

7.2.1 Global Zoom

Select **[Zoom]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select the magnification level.

7.2.2 Local Zoom

1. Select **[Zoom]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to enable the local magnification function. A ROI box displays.
2. Roll the trackball to adjust the position and size of ROI.

   - When the ROI box displayed a solid line frame, roll the trackball to adjust the position of the ROI box, press the **[Set]** button to confirm.
   - When the ROI box displayed a dotted line frame, roll the trackball to adjust the size of the ROI box, press the **[Set]** button to confirm.

- Press the **[Set]** button to toggle between position and size adjustment.

3. After ROI adjustment, press the **[Value]** knbo again on the control panel to zoom in the image.
4. Press the **[Value]** knob again to exit image magnification function.

NOTE : Local zooming is only applicable to real-time images.

7.3 Freeze the Image

You can freeze the image for next operation during the scanning at anytime.

1. Press the **[Freeze]** on the control panel to freeze the image. Image zooming, measurement, annotation and optimization of some imaging parameters can be performed in the freeze status.
2. After freezing an image, the system may enter cine review, caliper measurement or application measurement which depends on user's preset. For details, refer to "4.2.3 Image".
3. Press the **[Freeze]** button on the control panel again to unfreeze the image.

NOTE:

- **After freezing an image in Dual-Split display or Quad-Split display mode, the real-time image before freezing is displayed in the activated window by default, while the image saved in the replay area is displayed in other image windows (if there is no replay data, no image is displayed).**
- **In Dual-Split display or Quad-Split display mode, only image of the currently activated window can be unfrozen, the other images remain frozen.**

7.4 Cine Replay

In the real-time status, press the **[Freeze]** button on the control panel to freeze the current image and enter the cine replay tab by default, and the cine progress bar is displayed on the screen. You can reveiw the cine repeatly by automatically by default or manually by rolling the trackball frame by frame.

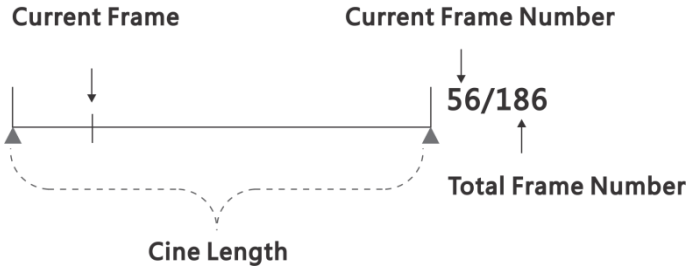


Figure 29 Cine Progress Bar (2D)

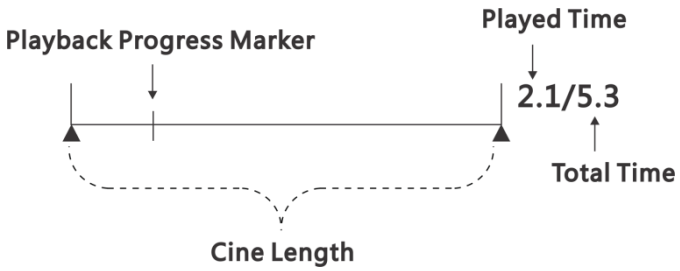


Figure 30 Cine Progress Bar(M/PW/CW/TVD)

Table 22 Cine Review Operation

Item	Description
Save	Click to save cine region.
Reset	Click to reset the first frame and last frame.
Jump to First	Jump to the first frame.
Jump to Last	Jump to the last frame.
Start Frame	Set the start frame.
End Frame	Set the end frame.
Start Time	Set the start time.
End Time	Set the end time.
Replay Speed	Set the replay speed.

NOTE : System defaults to replay cine manually.

7.4.1 Cine Review Region

To set the cine review region, please perform the following steps:

- **2D Mode:**
  1. Select **[Start Frame]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set the start frame of the cine replay region.
  2. Select **[End Frame]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set the end frame of the cine replay region.
- **M/PW/CW/TVD Mode:**
  1. Select **[Start Time]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set the start time of the cine replay region.
  2. Select **[End Time]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set the end time of the cine replay region.

NOTE :
- **The system plays the cine replay region automatically after replay region setting.**
- **Press the [Save Cine] button on the control panel to save the cine replay region to the system.**

7.4.2 Manual Replay

After enter the cine tab, roll the trackball to review the cine frame by frame. The progress bar shows the position of the current frame.

NOTE : When reviewing the cine, image parameters can be adjust for better observation.

7.4.3 Auto Replay

- **Method 1**

Select **[Replay Speed]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the review speed and enable / disable the auto replay.

- **Method 2**

Roll the trackball quickly to activate the automatic replay function. Cines are played backwards by rolling the trackball to the left quickly and are played forwards by rolling the trackball to the right quickly.

NOTE : The system plays the cine review region automatically after review region has been set.

7.5 Annotation

Annotation function provides comment, arrow and body mark functions to the image. Comment and arrows are available to the ultrasound images in freeze and real-time status.

NOTE : Users can preset annotation via [System Preset] → [Application]. Refer to "4.2.4 Application" for details.

7.5.1 Comment

Users can enter text content directly or add preseted comment item to images.

7.5.1.1 Add Comment

To add a comment, please perform the following steps:

1. Press the **[Comment]** button on the control panel in any modes to activate comment function.
2. Set comment language, comment library and comment size.
   - Select **[English]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to switch text language between Chinese and English.
   - Select **[Exam]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set comment item library.

- Select **[Font Size]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set text size.

3. Click comment item you want to add on the right, roll the trackball to move the comment item to the desired position, press the **[Set]** button.
4. If there is no applicable comment item, roll the trackball to move the comment item to the desired position and enter the comment through keyboard, and press the **[Set]** button.
5. To add more comments, repeat Step 3 or 4.
6. Press the **[Comment]** button on the control panel again to exit comment function.

7.5.1.2 Edit Comment

1. Move the cursor over the comment item to activate the item. Activated comment item or text is highlight in green.
2. Press the **<←>** key to delete undesirable characters and enter new comments directly. After the modification, move the cursor away from the text comment to complete the modification.

7.5.1.3 Move Comment

1. Move the cursor to the text comment to be moved, press the **[Set]** button, the text comment is highlighted with green box.
2. Roll the trackball to move the text comment to the desire position, press the **[Set]** button.

7.5.1.4 Change Font Size

Select **[Font Size]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set text size. Or you can change the font size through Preset screen (press **[Preset]**). Refer to “4.2.4 Application” for details.

7.5.1.5 Hide/Display Comment

Select **[Text Hide]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to hide or display comments.

7.5.1.6 Delete Comment

- **Delete Selected Comment**
  1. Move the cursor over the comment to be deleted, press the **[Set]** button.
  2. Press the **[Clean]** button on the control panel to delete the selected comment.
- **Delete Recently-added Comment**

  Press the **[Clean]** button on the control panel to delete recently-added comment in reverse order.
- **Delete All Comments**

  Long press the **[Clean]** button on the control panel to delete all comments.

7.5.2 Arrow

7.5.2.1 Add Arrow

To add an arrow, please perform the following steps:

1. Press the **[Comment]** button on the control panel in any modes to activate comment function, click the arrow icon on the right to activate the arrow annotation function, and then rotate the **[Value]** knob to adjust the direction of the arrow.
2. Select **[Arrow Size]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to change the arrow size.
3. Move the cursor to the desire position; press the **[Set]** button.

7.5.2.2 Hide/Display Arrow

Select **[Text Hide]** by pressing **[◀]** or **[▶]** button and then press the **[Value]** knob to hide or display arrows.

7.5.2.3 Delete Arrow

- **Delete Recently-added Arrow**

Press the **[Clean]** button on the control panel to delete the recently-added arrow in reverse order.

- **Delete All Arrows**

Long press the **[Clean]** button on the control panel to delete all arrows.

7.5.3 Body Mark

7.5.3.1 Add Body Mark

To add a body mark, please perform the following steps:

1. Press the **[Body Mark]** button on the control panel to activate body mark function.
2. Click the body mark you want to add on the right to display the body mark.
3. Select **[Angle]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the direction of the body mark, press the **[Set]** button.
4. Select **[Exam]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select body mark libray.
5. Press the **[Body Mark]** on the control panel again to exit body mark function.

NOTE : Click new body mark on right to replace current body mark.

7.5.3.2 Move Body Mark

1. Move the cursor over the body mark to be moved, press the **[Set]** button.
2. Move the trackball to the desire position and press the **[Set]** button to place the body mark.

7.5.3.3 Delete Body Mark

Press the **[Clean]** button on the control panel to delete the body mark.

8 Measurement

Measurement includes general measurement and application measurement. The system supports measurement in real-time, freeze, Dual-Split display, Quad-Split display, zoom in/out and cine review status.

Warning

- **Before making a measurement of the target area, make sure that the target area and image to be measured are correct and qualified to avoid misdiagnosis.**
- **Before performing Doppler color flow image measurement, do not let the probe emit direction perpendicular to the direction of blood flow, otherwise incorrect blood flow information may be displayed.**

NOTE : During the measurement, if the system has been powered off, all unsaved data will lose.

8.1 Basic Operating Procedure

To perform a measurement, please perform the following steps:

1. Activate measurement function.
   - Caliper measurement: in the real-time or frozen status, press the **[Caliper]** button on the control panel to activate the general measurement funciton.
   - Application measurement: in the real-time or frozen status, click **[Meas]** after the general measurement function has been activated.
2. Select measurement item.
   - Roll the trackball to select the measurement item and press the **[Set]** button.
3. Perform a measurement:
   - Move the cursor to the target area, press the **[Set]** button, a measurement cursor appears. At the same time, the result window displays measurement results and calculation data.
4. Adjust the position of result window (if needed).
   - After measurement, place the cursor on the title bar of the result window to change the cursor into a hand cursor. Press the **[Set]** button and roll the trackball at the same time to move the result window.
5. After the measurement is completed, press the **[Caliper]** button on the control panel to exit the general / application measurement function.

8.2 General Measurement

8.2.1 2D General Measurement

2D mode general measurement is applicable for general measurement of 2D mode such as B-mode, Color mode, PDI mode.

8.2.1.1 Distance

Measure the distance between two points.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Distance]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point and press the **[Set]** button.
4. Move the cursor to the end point and press the **[Set]** button.
5. Results are displayed in the result window.

8.2.1.2 Depth

Measure the distance from the center of sector to the cursor (for surface probe) or the distance from probe surface to the cursor in the direction of ultrasonic beam (for linear and convex array probe).

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Depth]** in the measurement menu, and the cursor appears.
3. Move the cursor to the desired position and press the **[Set]** button.
4. Results are displayed in the result window.

8.2.1.3 Curve Length

Measure the length of a curve. Available measurement method includes Trace and Spline.

- **Trace Len**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Trace Len]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point of the trace line and press the **[Set]** button.
4. Roll the trackball to trace the outline of the target and press the **[Set]** button to fix the end point of the trace line.
5. Results are displayed in the result window.

- **Trace Len (Spline)**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Trace Len (Spline)]** in the measurement menu, and the cursor appears.

3. Move the cursor to the start point of the target area and press the **[Set]** button.
4. Move the cursor along the target area to fix the second point and press the **[Set]** button.
5. Repeat step 4. A maximum of 12 points can be fixed.
6. Press the **[Set]** button twice to set the end point of the spline.
7. Results are displayed in the result window.

8.2.1.4 Angle

Measure the angle between two intersecting lines. Range 0~180°.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Angle]** in the measurement menu, and the cursor appears.
3. Set two line segments as described in “8.2.1.1 Distance”.
4. The system automatically calculates the angle between the two line segments.
5. Results are displayed in the result window.

8.2.1.5 Area & Circumference

Measure the area and circumference of an enclosed area. Available measurement method includes Trace, Ellipse, Cross and Spline.

- **Trace**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Trace]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point of the target area and press the **[Set]** button.
4. Roll the trackball to trace the outline of the target and press the **[Set]** button to fix the end point of the trace line.
5. Results are displayed in the result window.

- **Ellipse**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Ellipse]** in the measurement menu, and the cursor appears.
3. Move the cursor to set the start point of the first axis of the ellipse and press the **[Set]** button.
4. Move the cursor to set the end point of the first axis of the ellipse and press the **[Set]** button.
5. Roll the trackball to size the measured axis as needed and press the **[Set]** button.
6. Results are displayed in the result window.

- **Spline**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Spline]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point of the target area and press the **[Set]** button.
4. Move the cursor along the target area to fix the second point and press the **[Set]** button.
5. Repeat step 4. A maximum of 12 points can be fixed.
6. Press the **[Set]** button twice to complete the measurement.
7. Results are displayed in the result window.

➢ **Cross**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Cross]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point of the target area and press the **[Set]** button.
4. Move the cursor to the end position of the fixed axis and press the **[Set]** button. An irregular circle appears on the screen.
5. Roll the trackball to set the start point of the second axis of the circle and press the **[Set]** button.
6. Roll the trackball to set the end point of the second axis of the circle and press the **[Set]** button.
7. Results are displayed in the result window.

8.2.1.6 Volume

Measure the volume of the target object. Available measurement method includes 3 Dist, Ellipse and Ellipse Dist.

➢ **3 Dist**

To obtain the volume by measuring the vertical section area of the target object.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Volume]** in the measurement menu, and the cursor appears.
3. Measures the length (D_1), width (D_2), and height (D_3) of the target object.
4. The system automatically calculates the volume. The length, width, height, and volume of the target object are displayed in the result window.

    - Formula: Volume (cm^3) = $\pi / 6 \times D_1$ (cm) $\times D_2$ (cm) $\times D_3$ (cm)

    - D_1, D_2, and D_3 correspond to the length, width, and height of the target object.

➢ **Volume (Ellipse)**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Volume (Ellipse)]** in the measurement menu, and the cursor appears.
3. Move the cursor to set the start point of the first axis of the ellipse and press the **[Set]** button.
4. Roll the trackball to set the end point of the first axis of the circle and press the

[Set] button.

5. Move the cursor to adjust the second axis of the ellipse, and press the **[Set]** button to complete the volume ellipse measurement.
6. The system automatically calculates the volume. Results are displayed in the result window.

   - Formula: Volume (cm^3) = π/6×a(cm)×b^2(cm)
   - Where, “a” corresponds to the first axis of the ellipse, and “b” corresponds to the second axis of the ellipse.

➢ **Volume (E+Dist)**

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Volume (E+Dist)]** in the measurement menu, and the cursor appears.
3. Measure the area of the vertical section as described in “8.2.1.5 Area & Circumference”.
4. Move the cursor to set the start point of the third axis of the ellipse and press the **[Set]** button.
5. Move the cursor to set the end point of the third axis of the ellipse and press the **[Set]** button.
6. The system automatically calculates the volume. The area, height, and volume of the target object are displayed in the result window.

   - Formula: Volume (cm^3) = π/6×a(cm)×b(cm)×m(cm)
   - Where, “a” corresponds to the first axis of the ellipse, and “b” corresponds to the second axis of the ellipse, “m” corresponds to the third axis of the ellipse.

8.2.1.7 Double Dist

Measure the distance between two mutually perpendicular lines.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Double Dist]** in the measurement menu, and the cursor appears.
3. Move the cursor to set the start point of the first line segment and press the **[Set]** button.
4. Move the cursor to the end point of the line segment and press the **[Set]** button. A line perpendicular to the line segment is displayed on the screen.
5. Move the trackball to adjust the start point of the vertical line segment and press the **[Set]** button.
6. Move the trackball to adjust the end point of the vertical line segment and press the **[Set]** button.
7. Results are displayed in the result window.

8.2.1.8 Parallel

Measure the distance between five parallel lines on the ultrasound image.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Parallel]** in the measurement menu, and the cursor and two lines perpendicular to each other appear.
3. Move the cursor to set the start point of the first parallel and press the **[Set]** button.
4. Move the cursor along the vertical line and press the **[Set]** button to set the second parallel.
5. Repeat step 4 to set the third, fourth, fifth parallel as needed.
6. Results are displayed in the result window.

8.2.1.9 Ratio (D)

Measure the lengths of any two lines and calculates their ratio.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Ratio (D)]** in the measurement menu, and the cursor appears.
3. Set two line segments as described in “8.2.1.1 Distance”.
4. The system automatically calculates the ratio, and the results are displayed in the result window.

8.2.1.10 Ratio (Area)

Measure the areas of any two enclosed areas and calculates their ratio.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Ratio (Trace)]**, **[Ratio (Ellipse)]**, **[Ratio (Spline)]** or **[Ratio (Cross)]** in the measurement menu, and the cursor appears.
3. Use the area measurement method (choose one of trace, ellipse, spline, cross) to set two closed areas.
4. The system automatically calculates the ratio, and the results are displayed in the result window.

8.2.1.11 B Hist

Measures and calculates the gray scale distribution of the ultrasonic echo signals in an enclosed region.

Available measurement method includes B Hist (Trace), B Hist (Ellipse), B Hist (Spline) and B Hist (Rectangle).

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.

2. Click **[Hist (Trace)]**, **[Hist (Ellipse)]**, **[Hist (Spline)]** or **[Hist (Rectangle)]** in the measurement menu, and the cursor appears.
3. Set up an enclosed area with the area measurement method as described in “8.2.1.5 Area & Circumference”.
4. The system automatically calculates the gray distribution of the ultrasonic echo signal in this area and displays it at the top of the screen.

8.2.1.12 B Profile

Measure and calculates the gray distribution of the ultrasonic echo signals across a line.

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[B Profile]** in the measurement menu, and the cursor appears.
3. Set a line with the distance measurement method as described in “8.2.1.1 Distance”.
4. The system automatically calculates the gray distribution of the ultrasonic echo signal on the line and displays it at the top of the screen.

8.2.1.13 Color Vel

Measure the color flow velocity in Color mode.

Perform the following steps:

Perform the following steps:

1. Press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Color Vel]** in the measurement menu, and the cursor appears.
3. Move the cursor to the desired point for blood flow velocity measurement and press the **[Set]** button.
4. Select **[Angle]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to align the floating line to make it consistent with the direction of blood flow.
5. Results are displayed in the result window.

8.2.1.14 Volume Flow

Measure the blood flow through a blood cross section per unit time. Refer to “8.2.3.7 Vol Flow” for details.

8.2.1.15 IMT

Measure the intima-media thickness of the carotid artery. Refer to “8.3.4.3 Vascular Study and Calculation” for details.

8.2.2 M General Measurement

M-mode general measurement is applicable for general measurement of M-mode.

8.2.2.1 Distance (M)

Measure the distance between two points on the sampling line at a certain time.

Perform the following steps:

1. In M-mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Distance (M)]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point and press the **[Set]** button.
4. Move the cursor to the end point and press the **[Set]** button.
5. Results are displayed in the result window.

8.2.2.2 Time (M)

Measure the time interval between two points.

Perform the following steps:

1. In M-mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Time (M)]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point and press the **[Set]** button.
4. Move the cursor to set the end point in horizontal direction and press the **[Set]** button.
5. Results are displayed in the result window.

8.2.2.3 Slope

Measures the depth and time between two points and calculates the slope.

Perform the following steps:

1. In M-mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Slope]** in the measurement menu, and the cursor appears.
3. Move the cursor to set the first point and press the **[Set]** button.
4. Move the cursor to set the second point and press the **[Set]** button.
5. Results are displayed in the result window.

8.2.2.4 HR (M)

Measures the time of N (N≤7) cardiac cycles and calculates the heart rate in M-mode image.

Perform the following steps:

1. Set the cardiac cycle.
   - Enter the Preset screen, select **[Preset]**→**[System Preset]** →**[Application]**
   - Select the number of cardiac cycles from the **[Cardiac Cycle]** drop-down list.
   - Click **[Save]** to save current setting and return to the Home screen.
2. In M-mode, press the **[Caliper]** button on the control panel to start measurement.
3. Click **[HR (M)]** in the measurement menu, and the cursor appears.

4. Move the cursor to the start point and press the **[Set]** button.
5. Move the cursor to set the end point in horizontal direction and press the **[Set]** button.
6. Results are displayed in the result window.

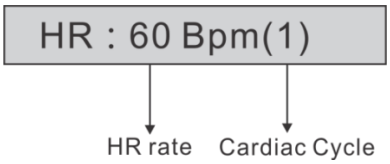


Figure 31 HR Result

NOTE : During the HR measurement, the number of cardiac cycles between the start and end points must be consistent with the preset. Otherwise, misdiagnosis may occur.

8.2.2.5 Velocity

Calculate the average velocity by measuring the distance and time between two points.

1. In M-mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Velocity]** in the measurement menu, and the cursor appears.
3. Move the cursor to the desired position and press the **[Set]** button.
4. Results are displayed in the result window.

8.2.3 Doppler General Measurement

Doppler mode general measurement is applicable for general measurement of PW, CW mode.

8.2.3.1 Time (D)

Measure the time interval between two points.

Perform the following steps:

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Time (D)]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point and press the **[Set]** button.
4. Move the cursor to set the end point in horizontal direction and press the **[Set]** button.
5. Results are displayed in the result window.

8.2.3.2 HR (D)

Measures the time of N (N≤7) cardiac cycles and calculates the heart rate in Doppler mode image. The measurement procedure is the same as that of HR (M). Refer to “8.2.2.4 HR (M)” for details.

8.2.3.3 Vel

Measure the velocity at a certain point on the Doppler image.

Perform the following steps:

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Vel]** in the measurement menu, and the cursor appears.
3. Move the cursor, the real time velocity of the position is displayed in the result window. Move the cursor to the desired position and press the **[Set]** button.
4. Results are displayed in the result window.

8.2.3.4 Acceleration

Measure the velocity and time interval between two points on the Doppler image to calculate the acceleration, differential pressure, speed difference, and spectrum correction angle.

Perform the following steps:

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Acceleration]** in the measurement menu, and the cursor appears.
3. Move the cursor to the first point and press the **[Set]** button.
4. Move the cursor to the second point and press the **[Set]** button.
5. The acceleration, differential pressure, speed difference, and spectrum correction angle between the two points are displayed in the result window.

8.2.3.5 D Trace

Trace one or several Doppler waveform on the PW mode image to obtain speed and pressure gradient.

The Doppler spectrum diagram is shown below:

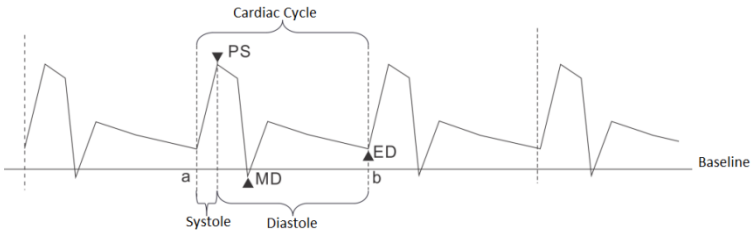


Figure 32 Doppler Spectrum

Perform the following steps:

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[D Trace]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point and press the **[Set]** button.
4. Roll the trackball to draw a trace line along the spectrum Doppler waveform to

the end position, and press the **[Set]** button to complete the trace. The measurement result is displayed in the result window.

The parameters displayed in the result window are described as follows:

Parameter	Description	
PS	Peak Systolic Velocity	The maximum velocity of red blood cells passing through the sampling volume
ED	End-diastolic velocity	The blood flow velocity at the end of the cardiac cycle
MD	Min-diastolic velocity	The minimum velocity of the cardiac cycle
Vel	/	Blood flow velocity
Average velocity	/	$\mathrm{TAMAX(cm/s)} = \int_{T_a}^{T_b} V(t)dt \,/\, (T_b - T_a)$ Where V is the maximum velocity $\mathrm{TAMEAN(cm/s)} = \int_{T_a}^{T_b} V(t)dt \,/\, (T_b - T_a)$ Where V is the average velocity
PPG	Peak Pressure Gradient	PPG(mmHg)=4×PS(m/s)^2
Average Pressure Gradient	Average Pressure Gradient	$\mathrm{MPG(mmHg)} = \int_{T_a}^{T_b} 4(V(t))^2 dt \,/\, (T_b - T_a)$ Where V is the peak systolic velocity $\mathrm{MMPG(mmHg)} = \int_{T_a}^{T_b} 4(V(t))^2 dt \,/\, (T_b - T_a)$ Where V is the average systolic velocity
VTI	Velocity-Time Integral	$VTI(m) = \int_{T_a}^{T_b} V(t)dt$
AT	Acceleration Time	Acceleration time from end-diastolic velocity to peak systolic velocity
DT	Deceleration Time	Deceleration Time
HR	Heart rate	Beats per minute in a cardiac cycle
S/D	/	S/D=PS(m/s) /ED(m/s)
D/S	/	D/S = ED(m/s) /PS(m/s)
PI	Pulsatility Index	PI = |(PS(m/s)-ED(m/s)) /TAMAX(m/s) |
RI	Resistive Index	RI = |(PS(m/s)-ED(m/s)) /PS(m/s) |
θ	/	Correction Angle

Parameter	Description	
PV	Peak Velocity	The maximum velocity of red blood cells passing through the sampling volume and it also applicable to venous vessels

8.2.3.6 PS/ED

Measures the velocity of peak systolic point (PS) and end diastolic (ED) on the Doppler spectrum.

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[PS/ED]** in the measurement menu, and the cursor appears.
3. Move the cursor to the peak systolic velocity on the Doppler spectrum and press the **[Set]** button.
4. Move the cursor to the end diastolic velocity on the Doppler spectrum and press the **[Set]** button.
5. The RI, S/D and correction between the two points are displayed in the result window.

8.2.3.7 Vol Flow

Measure the blood flow through a blood cross section per unit time.

Perform the following steps:

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Vol Flow]** in the measurement menu to display the sub-menu of volume flow.
3. Click **[Vas Area]** in the measurement menu, and the cursor appears.
4. Move the cursor to the start point of the target area on B-image and press the **[Set]** button.
5. Move the cursor to the end point of the target area on B-image and press the **[Set]** button.
6. The flow area is displayed in the result window.

   NOTE : Steps 4 to 5 can also be performed in B-mode.
7. Click **[TAMEAN]** or **[TAMAX]** in the measurement menu, and the cursor appears.
8. Move the cursor to the start point of the target area on Doppler Spectrum and press the **[Set]** button.
9. Move the cursor to the end point of the target area on Doppler Spectrum and press the **[Set]** button.
10. The system automatically generates trace lines. Results are displayed in the result window.

The parameters displayed in the result window are described as follows:

Parameter	Description	Formula
Vas Area	Dist	Vas Area=π × Vas Diam (cm)2/ 4
	Trace	See “8.2.1.5 Area & Circumference”
TAMEAN	Vol Flow(Area)-TAMEAN	Vol Flow(A) (ml/min) = |Vas TAMEAN (cm/s)| × Vas Area (cm2) × 60 (s) Vas TAMEAN - Time Averaged Mean Velocity, obtained from Vas Trace measurement
TAMAX	Vol Flow(Area)-TAMAX	Vol Flow(A) (ml/min) = |Vas TAMAX (cm/s)| × Vas Area (cm2) × 60 (s) Vas TAMAX - Time Averaged Maximum Velocity, obtained from Vas Trace measurement

8.2.3.8 Ratio (Vel)

Measures two D velocity and calculates their ratio for blood analysis.

Perform the following steps

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Ratio (Vel)]** in the measurement menu, and the cursor appears.
3. Move the cursor to fix the two points for velocity measurement and press the **[Set]** button.
4. Move the cursor, the real time velocity of the position is displayed in the result window.
5. The velocity ratio of the two points is displayed in the result window.

    - Formula: Vel Ratio (No unit) = | Vel 1(cm/s)/Vel 2 (cm/s) |

8.2.3.9 Ratio (VTI)

Measure two VTI values and calculates their ratio.

Perform the following steps:

1. In PW/CW mode, press the **[Caliper]** button on the control panel to start measurement.
2. Click **[Ratio (VTI)]** in the measurement menu, and the cursor appears.
3. Move the cursor to the start point of VTI1 and press the **[Set]** button.
4. Move the cursor to the end point of VTI1 and press the **[Set]** button.
5. Repeat step 3~4 to fix the VTI2.
6. The VTI1, VTI2, and VTI ratio of the two points are displayed in the result window

    - Formula: VTI Ratio (No unit) = | VTI 1(cm)/VTI 2 (cm) |

8.3 Application Measurement

Application measurement package includes the following measurement item.

Table 23 Application Measurement Package

Application Measurement	Measurement Item
ABD (Abdomen)	Applicable for measurements of abdominal organs (liver, spleen, gallbladder, pancreas, kidney) and abdominal vessels in adults, children and newborns.
Gynecology	Applicable for measurement of uterus, ovaries and follicles.
OB	Applicable for measurement of fetal development indicators, GA and EDD estimation. And to evaluate the fetal development through fetal growth curve and fetal biophysical profile.
CARD (Cardiology)	Applicable for measurement of heart and other parameters of adults, children, newborns.
Urology	Applicable for measurement of prostate, seminal vesicle, kidney, residual urine volume and testis.
SMP (Small Parts)	Applicable for measurement of small organs such as thyroid and parathyroid gland, testis, prostate, breast, parotid gland and lymph.
Orthopedics	Applicable for measurement of hip joint.
VAS (Vascular)	Applicable for measurement of carotid, cerebral, upper and lower extremities vessels, etc.
EM (Emergency)	Applicable for measurement of EM general practice.

8.3.1 Abdomen

8.3.1.1 2D Abdomen Measurement

The measurement items, calculation items and measurement method for 2D abdomen measurement are shown in the table below.

Table 24 2D Abdomen Measurement

Items	Description	Methods or Formula
Liver	/	/
CHD	/	See “8.2.1.1 Distance”
CBD	/	See “8.2.1.1 Distance”
GB L	Gallbladder Length	See “8.2.1.1 Distance”
GB H	Gallbladder Height	See “8.2.1.1 Distance”
GB wall th	Gallbladder wall thickness	See “8.2.1.1 Distance”

Items	Description	Methods or Formula
Renal L	Renal Length	See “8.2.1.1 Distance”
Renal H	Renal Height	See “8.2.1.1 Distance”
Renal W	Renal Width	See “8.2.1.1 Distance”
Renal Vol	Renel Volumn	See “8.3.6.3 Urology Study and Calculation”
Cortex	Renal Cortical Thickness	See “8.2.1.1 Distance”
Adrenal L	Adrenal Length	See “8.2.1.1 Distance”
Adrenal H	Adrenal Height	See “8.2.1.1 Distance”
Adrenal W	Adrenal Width	See “8.2.1.1 Distance”
Portal V Diam	Portal Vein Diameter	See “8.2.1.1 Distance”
Panc duct	Pancreatic duct	See “8.2.1.1 Distance”
Panc head	Pancreatic head	See “8.2.1.1 Distance”
Panc body	Pancreatic body	See “8.2.1.1 Distance”
Panc tail	Pancreatic tail	See “8.2.1.1 Distance”
Aorta Diam	Aorta Diameter	See “8.2.1.1 Distance”
Pre-BL L	Pre-void Bladder Length	See “8.2.1.1 Distance”
Pre-BL H	Pre-void Bladder Height	See “8.2.1.1 Distance”
Pre-BL W	Pre-void Bladder Width	See “8.2.1.1 Distance”
Pre-BL Vol	Pre-void Bladder Volume	See “8.3.6.3 Urology Study and Calculation”
Post-BL L	Post-void Bladder Length	See “8.2.1.1 Distance”
Post-BL H	Post-void Bladder Height	See “8.2.1.1 Distance”
Post-BL W	Post-void Bladder Width	See “8.2.1.1 Distance”
Post-BL Vol	Post-void Bladder Volume	See “8.3.6.3 Urology Study and Calculation”
Ureter	/	See “8.2.1.1 Distance”
Voided volume	/	See “8.3.6.3 Urology Study and Calculation”

8.3.1.2 Doppler Abdomen Measurement

The measurement items, calculation items and measurement method for Doppler abdomen measurement are shown in the table below.

Table 25 Doppler Abdomen Measurement

Items	Description	Methods or Formula
M Renal A	Main Renal Artery	See “8.2.3.5 D Trace”
Segment A	Segmental Artery	See “8.2.3.5 D Trace”
Interlobar A	Interlobar Artery	See “8.2.3.5 D Trace”
Arcuate A	Arcuate Artery	See “8.2.3.5 D Trace”
Renal A	Renal Artery	See “8.2.3.5 D Trace”
Aorta	/	See “8.2.3.5 D Trace”
Celiac Axis	/	See “8.2.3.5 D Trace”
SMA	Superior Mesenteric Artery	See “8.2.3.5 D Trace”
Hepatic A	Hepatic Artery	See “8.2.3.5 D Trace”
C Hepatic A	Common Hepatic Artery	See “8.2.3.5 D Trace”
Splenic A	Splenic Artery	See “8.2.3.5 D Trace”
IVC	Inferior Vena Cava	See “8.2.3.5 D Trace”
Portal V	Portal Vein	See “8.2.3.5 D Trace”
Lt Hepatic V	Left Hepatic Vein	See “8.2.3.5 D Trace”
M Hepatic V	Middle Hepatic Vein	See “8.2.3.5 D Trace”
Rt Hepatic V	Right Hepatic Vein	See “8.2.3.5 D Trace”
Splenic V	Splenic Vein	See “8.2.3.5 D Trace”
SMV	Superior Mesenteric Vein	See “8.2.3.5 D Trace”

8.3.2 Obstetrics

Note: Before performing obstetric measurements, please make sure that the system date is accurate, otherwise, the GA and EDD will be calculated incorrectly.

8.3.2.1 2D Obstetrics Measurement

The measurement items, calculation items and measurement method for 2D obstetrics measurement are shown in the table below.

Table 26 2D Obstetrics Measurement

Item	Description	Methods or Formula

Item	Description	Methods or Formula
BPD	Biparietal Diameter	See “8.2.1.1 Distance”
OFD	Occipital Frontal Diameter	See “8.2.1.1 Distance”
HC	Head Circumference	See “8.2.1.5 Area & Circumference”
AC	Abdominal Circumference	See “8.2.1.5 Area & Circumference”
FL	Femur Length	See “8.2.1.1 Distance”
HUM	Humerus Length	See “8.2.1.1 Distance”
PL Thickness	Placental Thickness	See “8.2.1.1 Distance”
NT	Nuchal Translucency	See “8.2.1.1 Distance”
TCD	Cerebellum Diameter	See “8.2.1.1 Distance”
Cist Magna	/	See “8.2.1.1 Distance”
AF1	Amniotic Fluid	See “8.2.1.1 Distance”
AF2	Amniotic Fluid	See “8.2.1.1 Distance”
AF3	Amniotic Fluid	See “8.2.1.1 Distance”
AF4	Amniotic Fluid	See “8.2.1.1 Distance”
AFI	Amniotic Fluid Index	AF1+AF2+AF3+AF4
CLAV	Clavicle Length	See “8.2.1.1 Distance”
HUM	Humerus Length	See “8.2.1.1 Distance”
RAD	Radius Length	See “8.2.1.1 Distance”
Ulna	Ulna Length	See “8.2.1.1 Distance”
Tibia	Tibia Length	See “8.2.1.1 Distance”
FIB	Fibula Length	See “8.2.1.1 Distance”
BPD	Biparietal Diameter	See “8.2.1.1 Distance”
OFD	Occipital Frontal Diameter	See “8.2.1.1 Distance”
HC	Head Circumference	See “8.2.1.5 Area & Circumference”
AC	Abdominal Circumference	See “8.2.1.5 Area & Circumference”
GS	Gestational Sac Diameter	See “8.2.1.1 Distance”
YS	Yolk Sac	See “8.2.1.1 Distance”

Item		Description	Methods or Formula
CRL		Crown Rump Length	See “8.2.1.1 Distance”
BPD		Biparietal Diameter	See “8.2.1.1 Distance”
Facial Angle		/	See “8.2.1.1 Distance”
Anteroposterior Abdominal Diameter		Anteroposterior Abdominal Diameter	See “8.2.1.1 Distance”
TAD		Abdominal Transversal Diameter	See “8.2.1.1 Distance”
TTD		Transverse trunk diameter	See “8.2.1.1 Distance”
FTA		Fetal Trunk Cross-sectional Area	See “8.2.1.5 Area & Circumference”
THD		Thoracic Diameter	See “8.2.1.1 Distance”
HrtC		Heart Circumference	See “8.2.1.5 Area & Circumference”
HrtA		Heart area	See “8.2.3.5 D Trace”
TC		Thoracic circumference	See “8.2.3.5 D Trace”
Vertebrae		Length of Vertebrae	See “8.2.1.1 Distance”
HW		Hemisphere Width	See “8.2.1.1 Distance”
OOD		Outer Orbital Diameter	See “8.2.1.1 Distance”
IOD		Inter Orbital Diameter	See “8.2.1.1 Distance”
Orbit		Orbit	See “8.2.1.1 Distance”
Ear		Ear Length	See “8.2.1.1 Distance”
Facial Angle		/	See “8.2.1.4 Angle”
MP		Middle Phalanx Length	See “8.2.1.1 Distance”
Foot		Foot Length	See “8.2.1.1 Distance”
Umb VD		Umbilical Vein Diameter	See “8.2.1.1 Distance”
F-kidney		Fetal kidney Length	See “8.2.1.1 Distance”
Fetal heart		/	See “8.3.3 Cardiology”
LV Long Axis	AV Diam	Aorta Valve Diameter	See “8.2.1.1 Distance”
	Ao Asc Diam	Ascending Aorta Diameter	See “8.2.1.1 Distance”
Aortic Arch	AV Diam	Aorta Valve Diameter	See “8.2.1.1 Distance”
	Ao Asc Diam	Ascending Aorta Diameter	See “8.2.1.1 Distance”

Item		Description	Methods or Formula
	Ao Desc Diam	Descending Aorta Diameter	See “8.2.1.1 Distance”
	IVC Diam	Inferior vena cava Diameter	See “8.2.1.1 Distance”
Ao Short Axis	PV Diam	Pulmonary valve Diameter	See “8.2.1.1 Distance”
	RPA Diam	Right pulmonary Artery Diameter	See “8.2.1.1 Distance”
	LPA Diam	Left pulmonary Artery Diameter	See “8.2.1.1 Distance”
	MPA Diam	Main Pulmonary Artery Diameter	See “8.2.1.1 Distance”
Ao Obl,Short Axis	Duct Art Diam	Ductus Arteriosus Diameter	See “8.2.1.1 Distance”
4C	TV Diam	Tricuspid valve Diameter	See “8.2.1.1 Distance”
	RVIDd	Right Ventricular Internal Diameter at End-diastole	See “8.2.1.1 Distance”
	RV Diam	Right Ventricular Diameter	See “8.2.1.1 Distance”
	RV Area	Right Ventricular Area	See “8.2.3.5 D Trace”
	MV Diam	Mitral Valve diameter	See “8.2.1.1 Distance”
	LVIDd	Left Ventricular Internal Diameter at End-diastole	See “8.2.1.1 Distance”
	LV Diam	Left Ventricular Diameter	See “8.2.1.1 Distance”

8.3.2.2 M Obstetrics Measurement

The measurement items, calculation items and measurement method for M obstetrics measurement are shown in the table below.

Table 27 M Obstetrics Measurement

Item	Sub-items	Methods or Formula
FHR	Fetal Heart Rate	See “8.2.2.4 HR (M)”
LVIDd	Left ventricular short-axis diameter at end diastole	See “8.2.2.1 Distance (M)”
LVIDs	Left ventricular short-axis diameter at end systole	See “8.2.2.1 Distance (M)”
RVIDd	Right ventricular short-axis diameter at end diastole	See “8.2.2.1 Distance (M)”
RVIDs	Right ventricular short-axis diameter at end systole	See “8.2.2.1 Distance (M)”

Item	Sub-items	Methods or Formula
IVSd	Interventricular septal thickness at en diastole	See “8.2.2.1 Distance (M)”
IVSs	Interventricular septal thickness at en systole	See “8.2.2.1 Distance (M)”

8.3.2.3 Doppler Obstetrics Measurement

The measurement items, calculation items and measurement method for Doppler obstetrics measurement are shown in the table below.

Table 28 Doppler Obstetrics Measurement

Item	Sub-items	Methods or Formula
FHR	Fetal Heart Rate	See “8.2.3.2 HR (D)”
Umb A	Umbilical Artery	See “8.2.3.5 D Trace”
Duct Veno	Ductus Veno	See “8.2.3.5 D Trace”
Placenta A	Placenta Artery	See “8.2.3.5 D Trace”
MCA	Middle Cerebral Artery	See “8.2.3.5 D Trace”
Fetal Ao	Fetal Aorta	See “8.2.3.5 D Trace”
Asc Aorta	Ascending Aorta	See “8.2.3.5 D Trace”
Desc Aorta	Descending Aorta	See “8.2.3.5 D Trace”
Ut A	Uterine Artery	See “8.2.3.5 D Trace”
Ovarian A	Ovarian Artery	See “8.2.3.5 D Trace”

8.3.2.4 Multi-fetus Exam

This system supports multi-fetus (up to 4) exam.

NOTE:
- **Set the number of fetuses before multi-fetus exam.**
- **Confirm that the fetal you want to measure is displayed on the image. Select [Fetus] by pressing [◀] or [▶] button and then rotate the [Value] knob to select the target fetus.**

Perform the following steps:

1. Press the **[Patient]** button on the control panel to enter the Patient screen.
2. Select the **[OB]** tab and set the fetus number.
3. Perform measurement to the fetus respectively. The measurement results in the result window are marked with fetus label **[A]**, **[B]** or **[C]**.
4. In the Obstetric report, select **[Fetus A]**, **[Fetus B]**, or **[Fetus C]** to switch among results of different fetuses.

8.3.2.5 Obstetrics Report

This section mainly introduces the Fetal Growth Curve and Fetal Biophysical Profile of OB reports. For details about report reviewing, printing and exporting etc., please refer to“9 Report”

- **Fetal Growth Curve**

The fetal growth curve is to compare the fetal measurement data with the standard growth curve to determine whether the fetal development is normal.

Perform the following steps:

1. Press the **[Patient]** button on the control panel to enter the Patient screen.
2. Click the **[Obstetrics]** tab, and enter the relevant information as needed.
3. Measure one or more fetal growth parameters.
4. Press the **[Report]** button on the control panel to enter the obstetric report, and click **[Fetal Growth Curve]**.

- **Fetal Biophysical Profile**

The fetal biophysical profile is obtained by experiment and measuring the fetal growth indicators of the fetus to evaluate state of the fetus. Click **[Analyze]** on the obstetric report page to display the fetal scores.

The scoring criteria are based on Vintzileos formula, as shown in table below.

Table 29 Fetal Scores

Fetal growth index	0 score	2 score	Observation time	Remarks
FHR	<2, or Reactive FHR ≤15bpm	Reactive FHR ≥15bpm, duration≥15s, ≥2 times	30 minutes	The score(s) can be manually input into the system.
FM	≥2 fetal movements	FM ≥3 times (Continuous	30 minutes	
FBM	No FBM or duration≤30s	FBM≥1 times; duration≥30s	30 minutes	
FT	Limbs stretch, no bend, fingers loose	Limbs and spine stretch-bend ≥1 times	/	
AF	No AF, or AF volume <2×2cm	One or more AF volume > 2×2cm	/	/

Table 30 Fetal Scoring Results Criteria

Total scores	Growth condition
8-10 scores	Normal, chronic asphyxia risk low
4-6 scores	Chronic asphyxia risk suspicious
0-2 scores	Chronic asphyxia risk high

8.3.3 Cardiology

8.3.3.1 2D Cardiology Measurement

The measurement items, calculation items and measurement method for 2D cardiology measurement are shown in the table below.

Table 31 2D Cardiology Measurement

Items	Description	Methods or Formula
LV Major	Left Ventricular major Diameter	See “8.2.1.1 Distance”
LV Minor	Left Ventricular minor Diameter	See “8.2.1.1 Distance”
LA Major	Left Atrium major Diameter	See “8.2.1.1 Distance”
LA Minor	Left Atrium minor Diameter	See “8.2.1.1 Distance”
LA Diam	Left Atrium Diameter	See “8.2.1.1 Distance”
RV Major	Right Ventricular major Diameter	See “8.2.1.1 Distance”
RV Minor	Right Ventricular minor Diameter	See “8.2.1.1 Distance”
RA Major	Right Atrium major Diameter	See “8.2.1.1 Distance”
RA Minor	Right Atrium minor Diameter	See “8.2.1.1 Distance”
RVDd(2D)	Right Ventricular Diameter at end-diastole	See “8.2.1.1 Distance”
RVAWd(2D)	Right Ventricular Anterior wall thickness at end-diastole	See “8.2.1.1 Distance”
Ao Diam (2D)	Aorta Diameter	See “8.2.1.1 Distance”
Ao Arch Diam(2D)	Aorta arch Diameter	See “8.2.1.1 Distance”
Ao Asc Diam (2D)	Ascending Aorta Diameter	See “8.2.1.1 Distance”
Ao Desc Diam (2D)	Descending Aorta Diameter	See “8.2.1.1 Distance”
LVOT Diam	Left Ventricular Outflow Tract Diameter	See “8.2.1.1 Distance”
MPA Diam	Main pulmonary Artery Diameter	See “8.2.1.1 Distance”
RVOT Diam	Right Ventricular Outflow Tract Diameter	See “8.2.1.1 Distance”
IVC Diam (Expir)	Inferior vena cava expiration Diameter	See “8.2.1.1 Distance”
IVC Diam (Insp)	Inferior vena cava inspiration	See “8.2.1.1 Distance”

Items	Description	Methods or Formula
	Diameter	
Simp SP (A4C)	/	See “8.3.3.4 Cardiology Study and Calculation”
Simp SP (A2C)	/	See “8.3.3.4 Cardiology Study and Calculation”
Simpson BP	/	See “8.3.3.4 Cardiology Study and Calculation”
Teichholz (2D)	/	See “8.3.3.4 Cardiology Study and Calculation”
LV Mass (Cube 2D)	/	See “8.3.3.4 Cardiology Study and Calculation”
LV Mass (T-E)	/	See “8.3.3.4 Cardiology Study and Calculation”
LV Mass (A-L)	/	See “8.3.3.4 Cardiology Study and Calculation”
LV Vol (A-L)	/	See “8.3.3.4 Cardiology Study and Calculation”
LV Vol (Simp)	/	See “8.3.3.4 Cardiology Study and Calculation”
RA Vol (Simp)	/	See “8.3.3.4 Cardiology Study and Calculation”
AV Diam	Aorta Valve Diameter	See “8.2.1.1 Distance”
ACS (2D)	Aortic Valve Cusp Separation	See “8.2.1.1 Distance”
AVA	Aortic Valve Area	See “8.2.1.5 Area & Circumference”
AVA VTI	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA AR	/	See “8.3.3.4 Cardiology Study and Calculation”
MV Diam	Mitral Valve diameter	See “8.2.1.1 Distance”
MVA	Mitral Valve area	See “8.2.1.5 Area & Circumference”
MCS (2D)	Mitral Valve Cusp Separation	See “8.2.1.1 Distance”
MV EPSS (2D)	Distance between point E and Interventricular Septum when mitral valve is fully open	See “8.2.1.1 Distance”
MVA (VTI)	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA MR	/	See “8.3.3.4 Cardiology Study

Items	Description	Methods or Formula
		and Calculation”
PV Diam	Pulmonary valve Diameter	See “8.2.1.1 Distance”
PISA PR	/	See “8.3.3.4 Cardiology Study and Calculation”
TV Diam	Tricuspid valve Diameter	See “8.2.1.1 Distance”
TVA	Tricuspid Valve Area	See “8.2.1.5 Area & Circumference”
PISA TR	/	See “8.3.3.4 Cardiology Study and Calculation”
RVSP	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA MR	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA AR	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA TR	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA PR	/	See “8.3.3.4 Cardiology Study and Calculation”
VSD Diam	Ventricular Septal defect Diameter	See “8.2.1.1 Distance”
ASD Diam	Atrial Septal defect Diameter	See “8.2.1.1 Distance”
PDA Diam	Patent ductus Arteriosus Diameter	See “8.2.1.1 Distance”
PFO Diam	Patent Oval Foramen Diameter	See “8.2.1.1 Distance”

8.3.3.2 M Cardiology Measurement

The measurement items, calculation items and measurement method for M cardiology measurement are shown in the table below.

Table 32 M Cardiology Measurement

Items	Description	Methods or Formula
LA/AO(M)	/	/
Diastole (Teich M)	End-diastolic Left Ventricular Measurement	See “8.3.3.4 Cardiology Study and Calculation”
Systole (Teich M)	End-systolic Left Ventricular Measurement	See “8.3.3.4 Cardiology Study and Calculation”
HR (Teich M)	Heart Rate	See “8.3.3.4 Cardiology

Items	Description	Methods or Formula
		Study and Calculation”
ACS(M)	Aortic valve Cusp Separation	See “8.2.2.1 Distance (M)”
RVOT Diam	Right Ventricular outflow tract Diameter	See “8.2.2.1 Distance (M)”
RVDd (M)	Right Ventricular Diameter at end- diastole	See “8.2.2.1 Distance (M)”
LVPEP (M)	Left Ventricular pre-ejection period	See “8.2.2.2 Time (M)”
LVET (M)	Left Ventricular ejection time	See “8.2.2.2 Time (M)”
RVPEP (M)	Right Ventricular pre-ejection period	See “8.2.2.2 Time (M)”
RVET (M)	Right Ventricular ejection time	See “8.2.2.2 Time (M)”
Teichholz (M)	/	See “8.3.3.4 Cardiology Study and Calculation”
Cube (M)	/	See “8.3.3.4 Cardiology Study and Calculation”
Gibson (M)	/	See “8.3.3.4 Cardiology Study and Calculation”
LV Mass (cube-M)	/	See “8.3.3.4 Cardiology Study and Calculation”
ACS (M)	Aortic valve Cusp Separation	See “8.2.2.1 Distance (M)”
LVPEP (M)	Left Ventricular pre-ejection period	See “8.2.2.2 Time (M)”
LVET (M)	Left Ventricular ejection time	See “8.2.2.2 Time (M)”
MV DE	Amplitude of the Mitral Valve DE wave	See “8.2.2.1 Distance (M)”
MV E-F Slope	Mitral Valve E-F slope	See “8.2.2.3 Slope”
MV EPSS (M)	Distance between point E and the interventricular septum	See “8.2.2.1 Distance (M)”
MV E Amp	Amplitude of the Mitral Valve E wave	See “8.2.2.1 Distance (M)”
MV A Amp	Amplitude of the Mitral Valve A wave	See “8.2.2.1 Distance (M)”
MV C-O dur	/	See “8.2.2.2 Time (M)”
LV Tei Index (M)	/	See “8.3.3.4 Cardiology Study and Calculation”
RVPEP (M)	Right Ventricular pre-ejection period	See “8.2.2.2 Time (M)”

Items	Description	Methods or Formula
RVET (M)	Right Ventricular ejection time	See “8.2.2.2 Time (M)”
RVOT Diam	Right Ventricular outflow tract Diameter	See “8.2.2.1 Distance (M)”

8.3.3.3 Doppler Cardiology Measurement

The measurement items, calculation items and measurement method for Doppler cardiology measurement are shown in the table below.

Table 33 Doppler Cardiology Measurement

Items	Description	Methods or Formula
AV Vmax	Aorta Valve Maximum Velocity	See “8.2.3.3 Vel”
AV VTI	Aorta Valve Velocity-Time Integral	See “8.2.3.5 D Trace”
AVA (VTI)	/	See “8.3.3.4 Cardiology Study and Calculation”
AV AccT	Aorta Valve Acceleration Time	See “8.2.3.1 Time (D)”
LVOT Vmax	Left Ventricular Outflow Tract Velocity	See “8.2.3.3 Vel”
LVOT VTI	Left Ventricular Outflow Tract Velocity-Time Integral	See “8.2.3.5 D Trace”
LVET (Doppler)	Left Ventricular Ejection Time	See “8.2.3.1 Time (D)”
LVPEP (Doppler)	Left Ventricular Pre-ejection Period	See “8.2.3.1 Time (D)”
AR Vmax	Aorta Valve Maximum Velocity	See “8.2.3.3 Vel”
AR VTI	Aortic Valve Regurgitation Velocity-Time Integral	See “8.2.3.5 D Trace”
AR DecT	Aortic Valve Regurgitation Deceleration Time	See “8.2.3.4 Acceleration”
AR PHT	Aortic Valve Regurgitation Pressure Half Time	See “8.2.3 Doppler General Measurement”
PISA AR	/	See “8.3.3.4 Cardiology Study and Calculation”
MV E Vel	Mitral Valve E-Vel	See “8.2.3.5 D Trace”
MV A Vel	Mitral Valve A-Vel	See “8.2.3.5 D Trace”
MV E Dur	Mitral Valve E-wave Duration	See “8.2.3.1 Time (D)”
MV A Dur	Mitral Valve A-wave Duration	See “8.2.3.1 Time (D)”
MVA (VTI)	/	See “8.3.3.4 Cardiology Study and Calculation”

Items	Description	Methods or Formula
MV (VTI)	Mitral Valve Velocity-Time Integral	See “8.2.3.5 D Trace”
MV AccT	Mitral Valve Acceleration Time	See “8.2.3.4 Acceleration”
MV DecT	Mitral Valve Deceleration Time	See “8.2.3.4 Acceleration”
IVRT	Isovelocity Relaxation Time	See “8.2.3.1 Time (D)”
IVCT	Isovelocity Compression Time	See “8.2.3.1 Time (D)”
LV Tei Index (Doppler)	/	See “8.3.3.4 Cardiology Study and Calculation”
MR Vmax	Mitral Valve Regurgitation Maximum Velocity	See “8.2.3.3 Vel”
MR VTI	Mitral Valve Regurgitation Velocity-Time Integral	See “8.2.3.5 D Trace”
dP/dt	/	/
PISA	/	See “8.3.3.4 Cardiology Study and Calculation”
RVOT Vmax	Right Ventricular Outflow Tract Maximum Velocity	See “8.2.3.3 Vel”
RVOT VTI	Right Ventricular Outflow Tract Velocity-Time Integral	See “8.2.3.5 D Trace”
PV Vmax	Pulmonary Valve Maximum Velocity	See “8.2.3.3 Vel”
PV VTI	Pulmonary Valve Velocity- Time Integral	See “8.2.3.5 D Trace”
PV AccT	Pulmonary Valve Acceleration Time	See “8.2.3.4 Acceleration”
MPA Vmax	Main Pulmonary Artery Maximum Velocity	See “8.2.3.3 Vel”
LPA Vmax	Left Pulmonary Artery Maximum Velocity	See “8.2.3.3 Vel”
RPA Vmax	Right Pulmonary Artery Maximum Velocity	See “8.2.3.3 Vel”
RVET (Doppler)	Right Ventricular Ejection Time	See “8.2.3.1 Time (D)”
RVPEP (Doppler)	Right Ventricular Pre-ejection Period	See “8.2.3.1 Time (D)”
PAEDP	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA PR	/	See “8.3.3.4 Cardiology Study and Calculation”
TV Vmax	Tricuspid Valve Maximum	See “8.2.3.3 Vel”

Items	Description	Methods or Formula
	Velocity	
TV E Vel	Tricuspid Valve E-wave Flow Velocity	See “8.2.3.3 Vel”
TV A Vel	Tricuspid Valve A-wave Flow Velocity	See “8.2.3.3 Vel”
TV VTI	Tricuspid Valve Velocity-Time Integral	See “8.2.3.5 D Trace”
RVSP	/	See “8.3.3.4 Cardiology Study and Calculation”
RV Tei Index	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA TR	/	See “8.3.3.4 Cardiology Study and Calculation”
PVein S Vel	Pulmonary Vein S-wave Flow Velocity	See “8.2.3.3 Vel”
PVein D Vel	Pulmonary Vein D-wave Flow Velocity	See “8.2.3.3 Vel”
PVein A Vel	Pulmonary Vein A-wave Flow Velocity	See “8.2.3.3 Vel”
PVein A Dur	Pulmonary Vein A-wave Duration	See “8.2.3.1 Time (D)”
PVein DecT	Pulmonary Vein Deceleration Time	See “8.2.3.1 Time (D)”
PISA AR	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA MR	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA PR	/	See “8.3.3.4 Cardiology Study and Calculation”
PISA TR	/	See “8.3.3.4 Cardiology Study and Calculation”
ASD Vmax	Atrial Septal Defect Maximum Velocity	See “8.2.3.3 Vel”
VSD Vmax	Ventricular Septal Defect Maximum Velocity	See “8.2.3.3 Vel”
PDA Vel (d)	Patent Ductus Arteriosus Velocity at End-diastole	See “8.2.3.3 Vel”
PDA Vel (s)	Patent Ductus Arteriosus Velocity at End-systole	See “8.2.3.3 Vel”
MV Sa (lateral)	Mitral Valve lateral Systolic motion	See “8.2.3.3 Vel”

Items	Description	Methods or Formula
MV Sa (medial)	Mitral Valve medial Systolic motion	See “8.2.3.3 Vel”
MV Aa (lateral)	Mitral Valve lateral Late diastolic motion	See “8.2.3.3 Vel”
MV Aa (medial)	Mitral Valve medial Late diastolic motion	See “8.2.3.3 Vel”
MV ARa (lateral)	Mitral Valve lateral Acceleration Rate	See “8.2.3.3 Vel”
MV ARa (medial)	Mitral Valve medial Acceleration Rate	See “8.2.3.3 Vel”
MV DRa (lateral)	Mitral Valve lateral Deceleration Rate	See “8.2.3.3 Vel”
MV DRa (medial)	Mitral Valve medial Deceleration Rate	See “8.2.3.3 Vel”
MV Ea (lateral)	Mitral Valve lateral Early diastolic motion	See “8.2.3.3 Vel”
MV Ea (medial)	Mitral Valve medial Early diastolic motion	See “8.2.3.3 Vel”

8.3.3.4 Cardiology Study and Calculation

- **Simpson SP**

Table 34 Simpson SP

Measurement and study	Description	Method and Formula
EDV(Simp SP)	End-diastolic Left Ventricular Volume	$EDV(ml) = \pi \times \frac{LVLd\ apical(cm)}{20} \times \sum_{i=1}^{20} r_i^2\ (cm)$ LVLd apical: left Ventricular Long-axis Length at End-diastole in apical view r_i: radius measured during diastole
ESV(Simp SP)	End-systolic Left Ventricular Volume	$ESV(ml) = \pi \times \frac{LVLs\ apical(cm)}{20} \times \sum_{i=1}^{20} r_i^2\ (cm)$ LVLs apical: left Ventricular Long-axis Length at End-systole in apical view r_i: radius measured during systole

Measurement and study	Description	Method and Formula
EDV Index (Simp SP)	/	EDV Index=EDV/BSA
ESV Index (Simp SP)	/	ESV Index=ESV/BSA
SV	Stroke Volume	SV(ml) = EDV(ml)-ESV(ml)
CO	Cardiac Output	CO(l/min) = SV(ml)×HR(bpm)/ 1000
EF	Ejection Fraction	EF(No unit) = SV(ml)/ EDV(ml)
SI	SV Index	SI(No unit) = SV(ml)/ Body Surface Area (m2)
CI	CO Index	CI(No unit) = CO(l/min)/Body Surface Area (m2)

- **Simpson BP**

Table 35 Simpson BP

Measurement and study	Description	Method and Formula
EDV(Simpson BP)	End-diastolic Left Ventricular Volume	*1
ESV(Simpson BP)	End-systolic Left Ventricular Volume	*2
EDV Index (Simpson BP)	/	EDV Index=EDV/BSA
ESV Index (Simpson BP)	/	ESV Index=ESV/BSA
SV(Simpson BP)	Stroke Volume	SV(ml) = EDV(ml)-ESV(ml)
CO(Simpson BP)	Cardiac Output	CO(l/min) = SV(ml)×HR(bpm)/ 1000
EF(Simpson BP)	Ejection Fraction	EF(No unit) = SV(ml)/ EDV(ml)
SI(Simpson BP)	SV Index	SI(No unit) = SV(ml)/ Body Surface Area (m^2)
CI(Simpson BP)	CO Index	CI(No unit) = CO(l/min)/Body Surface Area (m^2)

- ***1 Means:**

$$EDV(ml) = \pi \times {MAX\{LVLd_{2i}(cm), LVLd_{4i}(cm)\}}/{20} \times \sum_{i=1}^{20}(r_{2i}(cm) \times r_{4i}(cm))$$

- ***2 Means:**

$$ESV(ml) = \pi \times {MAX\{LVLs_{2i}(cm), LVLs_{4i}(cm)\}}/{20} \times \sum_{i=1}^{20}(r_{2i}(cm) \times r_{4i}(cm))$$

- **LV volume (A2C):**

$$EDV\ (2ml) = \pi \times \frac{LVLd_{2i}\ (cm)}{20} \times \sum_{i=1}^{20} r_{2i}^2\ (cm)$$

$$ESV\ (2ml) = \pi \times \frac{LVLs_{2i}\ (cm)}{20} \times \sum_{i=1}^{20} r_{2i}^2\ (cm)$$

- **LV volume (A4C):**

$$EDV\ (4ml) = \pi \times \frac{LVLd_{4i}\ (cm)}{20} \times \sum_{i=1}^{20} r_{4i}^2\ (cm)$$

$$ESV\ (4ml) = \pi \times \frac{LVLs_{4i}\ (cm)}{20} \times \sum_{i=1}^{20} r_{4i}^2\ (cm)$$

Note: When using Simpson BP to measure LV function, be sure to keep the apical four-chamber view and apical two-chamber view perpendicular. Otherwise the measure result will be incorrect.

- **Cube**

Measurement and study	Description	Method and Formula
Diastole	End-diastolic Left Ventricular Measurement	FoldLine in 2D mode or Parallel method in M mode
Systole	End-systolic Left Ventricular Measurement	FoldLine in 2D mode or Parallel method in M mode
LVIDd	Left Ventricular Internal Diameter at End-diastole	Distance in 2D/M General Measurements
LVIDs	Left Ventricular Internal Diameter at End-systole	Distance in 2D/M General Measurements
HR	Heart Rate	Obtained by ECG, input directly or measure manually
IVSd	Interventricular Septal Thickness at End- diastole	Distance in 2D/M General Measurements
LVPWd	Left Ventricular Posterior Wall Thickness at End-diastole	Distance in 2D/M General Measurements
EDV(Cube)	End-diastolic Left Ventricular Volume	EDV(ml)= LVIDd(cm)^3

Measurement and study	Description	Method and Formula
ESV(Cube)	End-systolic Left Ventricular Volume	ESV(ml)= LVIDs(cm)^3
EDV Index (Cube)	/	EDV Index=EDV/BSA
ESV Index (Cube)	/	ESV Index=ESV/BSA
SV (Cube)	Stroke Volume	SV(ml) = EDV(ml)-ESV(ml)
CO (Cube)	Cardiac Output	CO(l/min) = SV(ml)×HR(bpm)/ 1000
EF (Cube)	Ejection Fraction	EF(No unit) = SV(ml)/ EDV(ml)
SI (Cube)	SV Index	SI(No unit) = SV(ml)/ Body Surface Area (m^2)
CI (Cube)	CO Index	CI(No unit) = CO(l/min)/Body Surface Area (m^2)

- **Teichholz**

Measurement and study	Description	Method and Formula
Diastole	End-diastolic Left Ventricular Measurement	FoldLine in 2D mode or Parallel method in M mode
Systole	End-systolic Left Ventricular Measurement	FoldLine in 2D mode or Parallel method in M mode
LVIDd	Left Ventricular Internal Diameter at End-diastole	Distance in 2D/M General Measurements
LVIDs	Left Ventricular Internal Diameter at End-systole	Distance in 2D/M General Measurements
HR	Heart Rate	Obtained by ECG, input directly or measure manually
IVSd	Interventricular Septal Thickness at End-diastole	Distance in 2D/M General Measurements
LVPWd	Left Ventricular Posterior Wall Thickness at End-diastole	Distance in 2D/M General Measurements
IVSs	Interventricular Septal Thickness at End-systole	Distance in 2D/M General Measurements
LVPWs	Left Ventricular Posterior Wall Thickness at End-systole	Distance in 2D/M General Measurements
EDV(Teichholz)	End-diastolic Left Ventricular Volume	EDV(ml)=(7×(LVIDd(cm))^3)/(2.4+LVIDd (cm))
ESV(Teichholz)	End-systolic Left Ventricular Volume	ESV(ml)=(7×(LVIDs(cm))^3)/(2.4+LVIDs (cm))
SV (Teichholz)	Stroke Volume	SV(ml) = EDV(ml)-ESV(ml)

Measurement and study	Description	Method and Formula
CO (Teichholz)	Cardiac Output	CO(l/min) = SV(ml)×HR(bpm)/ 1000
EF (Teichholz)	Ejection Fraction	EF(No unit) = SV(ml)/ EDV(ml)
FS (Teichholz)	Fractional Shortening	FS(No unit) = (LVIDd(cm) – LVIDs [cm]/LVIDd(cm))
MVCF (Teichholz)	Mean Velocity of Circumferential Fiber Shortening	MVCF=(LVId(cm)-LVIDs(cm))/(LVIDd(cm) × EF(s))
SI (Teichholz)	SV Index	SI(No unit) = SV(ml)/ Body Surface Area (m^2)
CI (Teichholz)	CO Index	CI(No unit) = CO(l/min)/Body Surface Area (m^2)

- **Gibson**

Measurement and study	Description	Method and Formula
Diastole	End-diastolic Left Ventricular Measurement	FoldLine in 2D mode or Parallel method in M mode
Systole	End-systolic Left Ventricular Measurement	FoldLine in 2D mode or Parallel method in M mode
LVIDd	Left Ventricular Internal Diameter at End-diastole	Distance in 2D/M General Measurements
LVIDs	Left Ventricular Internal Diameter at End-systole	Distance in 2D/M General Measurements
HR	Heart Rate	Obtained by ECG, input directly or measure manually
IVSd	Interventricular Septal Thickness at End-diastole	Distance in 2D/M General Measurements
LVPWd	Left Ventricular Posterior Wall Thickness at End-diastole	Distance in 2D/M General Measurements
IVSs	Interventricular Septal Thickness at End-systole	Distance in 2D/M General Measurements
LVPWs	Left Ventricular Posterior Wall Thickness at End-systole	Distance in 2D/M General Measurements
EDV(Gibson)	End-diastolic Left Ventricular Volume	EDV(ml)=π/6(098×LVIDd(cm)+5.90)×L VIDd(cm)²
ESV(Gibson)	End-systolic Left Ventricular Volume	ESV(ml)=π/6(1.14×LVIDs(cm)+4.18)× LVIDs(cm)²
EDV Index (Gibson)	/	EDV Index=EDV/BSA
ESV Index (Gibson)	/	ESV Index=ESV/BSA

Measurement and study	Description	Method and Formula
SV (Gibson)	Stroke Volume	SV(ml) = EDV(ml)-ESV(ml)
CO (Gibson)	Cardiac Output	CO(l/min) = SV(ml)×HR(bpm)/ 1000
EF (Gibson)	Ejection Fraction	EF(No unit) = SV(ml)/ EDV(ml)
FS (Gibson)	Fractional Shortening	FS(No unit) = (LVIDd(cm) – LVIDs [cm]/LVIDd(cm))
MVCF (Gibson)	Mean Velocity of Circumferential Fiber Shortening	MVCF=(LVId(cm)-LVIDs(cm))/(LVIDd(cm) × EF(s))
SI (Gibson)	SV Index	SI(No unit) = SV(ml)/ Body Surface Area (m^2)
CI (Gibson)	CO Index	CI(No unit) = CO(l/min)/Body Surface Area (m^2)

- **LV Mass**

Estimate the Index of Left Ventricular Mass (LV Mass-I) by calculating the LV Mass.

LV Mass (Cube)

Measurement and study	Description	Method and Formula
IVSd	Interventricular Septal Thickness at End-diastole	Distance in 2D/M General Measurements
LVIDd	Left Ventricular Internal Diameter at End-diastole	Distance in 2D/M General Measurements
LVPWd	Left Ventricular Posterior Wall Thickness at End-diastole	Distance in 2D/M General Measurements
LV Mass (Cube)	Left Ventricular Mass	*1
LV MASS-I (Cube)	Index of Left Ventricular Mass	*2

*1 Means:

$$LV\ Mass(g) = 1.04 \times ((LVPWd(cm) + IVSd(cm) + LVIDd(cm))^3 - LVId(cm)^3) - 13.6$$

*2 Means:

$$\text{LV Mass-I (No unit)} = \text{LV Mass (g)} \ / \ \text{Body Surface Area (m2)}$$

LV Mass (A-L)

Measurement and study	Description	Method and Formula
LVAd sax Epi	Left Ventricular Epicardial Area at Papillary Muscle level at end-diastole in Short-axis	Distance in 2D/M General Measurements

	view	
LVAd sax Endo	Left Ventricular Endocardial Area at Papillary Muscle level at end-diastole in Short-axis view	Distance in 2D/M General Measurements
LVLd apical	Left Ventricular Long-axis Length at End- diastole in apical view	Distance in 2D/M General Measurements
LV Mass (A-L)	Left Ventricular Mass	*1
LV MASS-I (A-L)	Index of Left Ventricular Mass	*2

*1 Means:

LV Mass(g) = 1.05×5/6×(LVAd sax Epi(cm^2)×(LVLd apical(cm)+t(cm))- LVAd sax Endo (cm^2)×LVL(cm));

$$t(cm) = \sqrt{\left(\frac{LVAdsaxEpi(cm^2)}{\pi}\right)} - \sqrt{\left(\frac{(LVAdsaxEndo(cm^2)}{\pi}\right)}$$

*2 Means:

LV Mass-I (No unit) = LV Mass (g) / Body Surface Area (m^2)

LV Mass (T-E)

Measurement and study	Description	Method and Formula
LVAd sax Epi	Left Ventricular Epicardial Area at Papillary Muscle level at end-diastole in Short-axis view	Area in 2D General Measurements
LVAd sax Endo	Left Ventricular Endocardial Area at Papillary Muscle level at end-diastole in Short-axis view	Area in 2D General Measurements
a	Semi-major axis from widest minor axis radius to apex	Distance in 2D General Measurements
b	Truncated semi-major axis from widest minor axis radius to mitral annulus plane	Distance in 2D General Measurements
LV Mass (T-E)	Left Ventricular Mass	*1
LV MASS-I (T-E)	Index of Left Ventricular Mass	*2

*1 Means:

$$LV\ Mass(g) = 1.05\pi \times \left\{(b+t)^2 \times \left[\frac{2(a+t)}{3} + d - \frac{d^3}{3(a+t)^2}\right] - b^2 \times (\frac{2a}{3} + d - \frac{d^3}{3a^2})\right\}$$

$$t(cm) = \sqrt{\left(\frac{LVAdsaxEpi(cm^2)}{\pi}\right)} - \sqrt{\left(\frac{(LVAdsaxEndo(cm^2)}{\pi}\right)}$$

$$\text{b(cm)} = \sqrt{\frac{LVAdsaxEndo(cm^2)}{\pi}}$$

*2 Means:

LV Mass-I (No unit) = LV Mass (g) / Body Surface Area (m^2)

- **Mitral Valve Area (MVA)**

Mitral Valve Area (MVA) can be calculated by two methods: pressure half time (PHT) or velocity- time integral (VTI).

MVA (VTI)

Measurement and study	Description	Method and Formula
LVOT Diam	Left Ventricular Outflow Tract Diameter	Distance in 2D General Measurements
LVOT VTI	Left Ventricular Outflow Tract Velocity-Time Integral	D trace in Doppler General Measurement
MV VTI	Mitral Valve Velocity-Time Integral	D trace in Doppler General Measurement
MVA(VTI)	Mitral Valve Area	*1

*1 Means:

$$MVA(VTI)(cm^2) = \frac{\pi \times |LVOT\ VTI(cm)| \times LVOT\ Diam(cm^2)^2}{4 \times |MV\ VTI(cm)|}$$

- **AVA (VTI)**

Aortic Valve Area (AVA) can be calculated by velocity-time integral (VTI).

Measurement and study	Description	Method and Formula
LVOT Diam	Left Ventricular Outflow Tract Diameter	Distance in 2D General Measurements
LVOT VTI	Left Ventricular Outflow Tract Velocity-Time Integral	D trace in Doppler General measurements
AV VTI	Aortic Valve Velocity-Time Integral	D trace in Doppler General measurements
AVA(VTI)	Aortic Valve Area	*1

*1 Means:

$$AVA(VTI)(cm^2) = \frac{\pi \times |LVOT\ VTI(cm)| \times LVOT\ Diam(cm^2)^2}{4 \times |AV\ VTI(cm)|}$$

- **LA Vol**

LA Vol (A-L)

Measurement and study	Description	Method and Formula
LA Diam	Left Atrium Diameter	Distance in 2D General Measurements
LAA(A2C)	Left Atrium Area at apical 2-chamber view	Area in 2D General Measurements
LAA(A4C)	Left Atrium Area at apical 4-chamber view	Area in 2D General Measurements
LA Vol(A-L)	Left Atrium Area	*1

*1 Means:

$$LA\ Vol(A-L)(ml) = \frac{8\pi}{3} LAA(A4C)(cm^2) \times LAA(A2C)(cm^2)/LA\ Diam(cm)$$

LA Vol (Simp)

Measurement and study	Description	Method and Formula
LA Vol(A2C)	Left Atrium Volume at apical 2-chamber view	Same as Simpson SP measurement
LA Vol(A4C)	Left Atrium Volume at apical 4-chamber view	Same as Simpson SP measurement

- **RA Vol (Simp)**

Measurement and study	Description	Method and Formula
RA Vol(A4C)	Right Atrium Volume at apical 4-chamber view	Same as Simpson SP measurement

- **LVIMP**

Measurement and study	Description	Method and Formula
MV C-O dur	Mitral Valve close-open Duration	Time in M/Doppler General Measurements
LVET	Left Ventricular Ejection Time	Time in M/Doppler General Measurements
LVIMP	Left Ventricular Index of Myocardial Performance	*1

*1 Means:

$$LVIMP(no\ unit) = \frac{MV\ C-O\ dur(s) - LVET(s)}{LVET(s)}$$

- **RVSP**

Measurement and study	Description	Method and Formula
TR Vmax	Tricuspid Valve Regurgitation	D Vel in Doppler General

Measurement and study	Description	Method and Formula
	Maximum Velocity	Measurements
RAP	Right Atrium Pressure	Enter manually
TR PGmax	Tricuspid Valve Regurgitation Pressure Gradient	*1
RVSP	Right Ventricular Systolic Pressure	*2

*1 Means:

$$TR\ PGmax(mmHg) = 4 \times TR\ Vmax\ (m/s)^2$$

*2 Means:

$$RVIMP(no\ unit) = \frac{TV\ C-O\ dur(s) - RVET(s)}{RVET(s)}$$

- **PAEDP**

Measurement and study	Description	Method and Formula
PR Ved	Pulmonary Valve Regurgitation Velocity at end-Diastole	D Vel in Doppler General Measurements
RAP	Right Atrium Pressure	Enter manually
PR PGed	Pulmonary Valve Regurgitation Pressure Gradient at end-Diastole	/
PAEDP	Pulmonary Pressure at end-Diastole	*1

*1 Means:

$$\text{RVSP(mmHg)} = RAP(mmHg) + 4 \times (TR\ V\ \max(m/s))^2$$

- **RV Tei index(RVIMP)**

Measurement and study	Description	Method and Formula
TV C-O dur	Tricuspid Valve close-open Duration	Time in Doppler General Measurements
RVET	Right Ventricular Ejection Time	Time in Doppler General Measurements
RVIMP	Right Ventricular Index of Myocardial Performance	*1

*1 Means:

$$RVIMP(no\ unit) = \frac{TV\ C-O\ dur(s) - RVET(s)}{RVET(s)}$$

- **LV Tei index(LVIMP)**

Measurement and study	Description	Method and Formula
MV C-O dur	Mitral Valve close-open Duration	Time in Doppler General Measurements
LVET	Left Ventricular Ejection Time	Time in Doppler General Measurements
LVIMP	Left Ventricular Index of Myocardial Performance	*1

*1 Means:

$$LVIMP(no\ unit) = \frac{MV\ C-O\ dur(s) - LVET(s)}{LVET(s)}$$

- **PISA**

PISA (Proximal Isovelocity Surface Area) is used in quantitative analysis of the mitral valve regurgitation (PISA MR), aortic valve regurgitation (PISA AR), tricuspid valve regurgitation (PISA TR), and pulmonary valve regurgitation (PISA PR) in color mode.

PISA MR

NOTE : Only applicable for Color and Doppler modes.

Measurement and study	Description	Method and Formula
MR Rad	Mitral Valve Stenosis Radius	PISA measurement
MR VTI	Mitral Valve Regurgitation Velocity-Time Integral	D Trace in Doppler General Measurements
MR Als.Vel	Mitral Valve Regurgitation Aliasing Maximum Velocity	You can select to use top aliasing velocity or bottom aliasing velocity or input the value directly.
MR Vmax	Mitral Regurgitation Maximum Velocity	Obtained from MR VTI measurement
MR Flow	Mitral Regurgitation Flow	*1
MR Flow Rate	Mitral Regurgitation Flow Rate	*2
MR Fraction	Mitral Valve Regurgitation Fraction	*3
MR EROA	Mitral Valve Effective Regurgitant Orifice Area	*4

*1 Means:

$$MR\ Flow(ml) = \frac{2\pi MR\ Rad(cm)^2 \times MR\ Als.Vel(cm/s)}{|MRV\ max(cm/s)|} \times |MR\ VTI(cm)|$$

*2 Means:

$$MR\ Flow\ Rate(ml/s) = 2\pi\ MR\ Rad(cm)^2 \times MR\ Als.Vel(cm/s)$$

*3 Means:

$$MR\ Fraction\ (no\ unit) = \frac{MR\ Flow(ml)}{MV\ SV(ml)} \times 100\%$$

*4 Means:

$$MR\ EROA(cm)^2 = \frac{2\pi MR\ Rad(cm)^2 \times MR\ Als.Vel(cm/s)}{|MR\ Vmax(cm/s)|}$$

PISA AR

NOTE : Only applicable for Color and Doppler modes.

Measurement and study	Description	Method and Formula
AR Rad	Aortic Valve Stenosis Radius	PISA measurement
AR VTI	Aortic Valve Regurgitation Velocity-Time Integral	D Trace in Doppler General Measurements
AR Als.Vel	Aortic Valve Regurgitation Aliasing Maximum Velocity	You can select to use top aliasing velocity or bottom aliasing velocity or input the value directly.
AR Vmax	Aortic Regurgitation Maximum Velocity	Obtained from AR VTI measurement
AR Flow	Aortic Regurgitation Flow	*1
AR Flow Rate	Aortic Regurgitation Flow Rate	*2
AR Fraction	Aortic Valve Regurgitation Fraction	*3
AR EROA	Aortic Valve Effective Regurgitant Orifice Area	*4

*1 Means:

$$\text{AR Flow(ml)} = \frac{2\pi AR\ Rad(cm)^2 \times AR\ Als.Vel(cm/s)}{|ARV\ \max(cm/s)|} \times |AR\ VTI(cm)|$$

*2 Means:

$$\text{AR Flow Rate(ml/s)} = 2\pi\ \text{AR Rad}(cm)^2 \times AR\ Als.Vel(cm/s)$$

*3 Means:

$$\text{AR Fraction (no unit)} = \frac{AR\ Flow(ml)}{AV\ SV(ml)} \times 100\%$$

*4 Means:

$$\text{AR EROA(cm)}^2 = \frac{2\pi AR\ Rad(cm)^2 \times AR\ Als.Vel(cm/s)}{|AR\ Vmax(cm/s)|}$$

PISA TR

NOTE : Only applicable for Color and Doppler modes.

Measurement and study	Description	Method and Formula
TR Rad	Tricuspid Valve Stenosis Radius	PISA measurement
TR VTI	Tricuspid Valve Regurgitation Velocity-Time Integral	D Trace in Doppler General Measurements
TR Als.Vel	Tricuspid Valve Regurgitation Aliasing Maximum Velocity	You can select to use top aliasing velocity or bottom aliasing velocity or input the value directly.
TR Vmax	Tricuspid Regurgitation Maximum Velocity	Obtained from TR VTI measurement
TR Flow	Tricuspid Regurgitation Flow	*1
TR Flow Rate	Tricuspid Regurgitation Flow Rate	*2
TR Fraction	Tricuspid Valve Regurgitation Fraction	*3
TR EROA	Tricuspid Valve Effective Regurgitant Orifice Area	*4

*1 Means:

$$TR\ Flow(ml) = \frac{2\pi TR\ Rad(cm)^2 \times TR\ Als.Vel(cm/s)}{|TRV\ max(cm/s)|} \times |TR\ VTI(cm)|$$

*2 Means:

$$TR\ Flow\ Rate(ml/s) = 2\pi\ TR\ Rad(cm)^2 \times TR\ Als.Vel(cm/s)$$

*3 Means:

$$TR\ Fraction\ (no\ unit) = \frac{TR\ Flow(ml)}{TV\ SV(ml)} \times 100\%$$

*4 Means:

$$TR\ EROA(cm)^2 = \frac{2\pi TR\ Rad(cm)^2 \times TR\ Als.Vel(cm/s)}{|TR\ Vmax(cm/s)|}$$

PISA PR

NOTE : Only applicable for Color and Doppler modes.

Measurement and study	Description	Method and Formula

Measurement and study	Description	Method and Formula
PR Rad	Pulmonary Valve Stenosis Radius	PISA measurement
PR VTI	Pulmonary Valve Regurgitation Velocity-Time Integral	D Trace in Doppler General Measurements
PR Als.Vel	Pulmonary Valve Regurgitation Aliasing Maximum Velocity	You can select to use top aliasing velocity or bottom aliasing velocity or input the value directly.
PR Vmax	Pulmonary Regurgitation Maximum Velocity	Obtained from PR VTI measurement
PR Flow	Pulmonary Regurgitation Flow	*1
PR Flow Rate	Pulmonary Regurgitation Flow Rate	*2
PR Fraction	Pulmonary Valve Regurgitation Fraction	*3
PR EROA	Pulmonary Valve Effective Regurgitant Orifice Area	*4

*1 Means:

$$PR\ Flow(ml) = \frac{2\pi PR\ Rad(cm)^2 \times PR\ Als.Vel(cm/s)}{|PRV\ max(cm/s)|} \times |PR\ VTI(cm)|$$

*2 Means:

$$PR\ Flow\ Rate(ml/s) = 2\pi\ PR\ Rad(cm)^2 \times PR\ Als.Vel(cm/s)$$

*3 Means:

$$PR\ Fraction\ (no\ unit) = \frac{PR\ Flow(ml)}{PV\ SV(ml)} \times 100\%$$

*4 Means:

$$PR\ EROA(cm)^2 = \frac{2\pi PR\ Rad(cm)^2 \times PR\ Als.Vel(cm/s)}{|PR\ Vmax(cm/s)|}$$

- **TDI**

Measurement and study	Description	Method and Formula
Ea/Aa(medial)	MV medial E-Vel/ A-Vel	$Ea\ /Aa(medial)(no\ unit) = \frac{Ea(medial)}{Aa(medial)}$
ATa(medial)	MV medial E-wave Acceleration Time	Obtained from ARa(medial) measurements
DTa(medial)	MV medial E-wave Deceleration Time	Obtained from DRa(medial) measurements
Ea/Aa(lateral)	MV lateral E-Vel/ A-Vel	$Ea\ /Aa(lateral)(no\ unit) = \frac{Ea(lateral)}{Aa(lateral)}$

Measurement and study	Description	Method and Formula
ATa(lateral)	MV lateral E-wave Acceleration Time	Obtained from ARa(lateral) measurement
DTa(lateral)	MV lateral E-wave Deceleration Time	Obtained from DRa(lateral) measurement

8.3.4 Vascular

8.3.4.1 2D Vascular Measurement

Table 36 2D Vascular Measurement

Items	Description	Methods or Formula
IMT	Intima-Media Thickness	See “8.3.4.3 Vascular Study and Calculation”
Stenosis D	Stenosis Diameter	See “8.3.4.3 Vascular Study and Calculation”
Stenosis A	Stenosis Area	See “8.3.4.3 Vascular Study and Calculation””

8.3.4.2 Doppler Vascular Measurement

Table 37 Doppler Vascular Measurement

Items	Description	Methods or Formula
CCA	Common Carotid Artery	See “8.2.3.5 D Trace”
ICA	Internal Carotid Artery	See “8.2.3.5 D Trace”
ECA	External Carotid Artery	See “8.2.3.5 D Trace”
Vert A	Vertebral Artery	See “8.2.3.5 D Trace”
Subclav A	Subclavian Artery	See “8.2.3.5 D Trace”
ICA/ CCA	/	See “8.2.3.5 D Trace”
Subclav A	Subclavian Artery	See “8.2.3.5 D Trace”
Axill A	Axillary Artery	See “8.2.3.5 D Trace”
Brachial A	Brachial Artery	See “8.2.3.5 D Trace”
Ulnar A	Ulnar Artery	See “8.2.3.5 D Trace”
Radial A	Radial Artery	See “8.2.3.5 D Trace”
Innom A	Innominate Artery	See “8.2.3.5 D Trace”
Subclav V	Subclavian Vein	See “8.2.3.5 D Trace”

Items	Description	Methods or Formula
Axill V	Axillary Vein	See “8.2.3.5 D Trace”
Cephalic V	Cephalic Vein	See “8.2.3.5 D Trace”
Basilic V	Basilic Vein	See “8.2.3.5 D Trace”
Ulnar V	Ulnar Vein	See “8.2.3.5 D Trace”
Radial V	Radial Vein	See “8.2.3.5 D Trace”
Abdominal Aorta	/	See “8.2.3.5 D Trace”
C.Iliac A	Common Iliac Artery	See “8.2.3.5 D Trace”
IIA	Internal Iliac Artery	See “8.2.3.5 D Trace”
Ex.Iliac A	External Iliac Artery	See “8.2.3.5 D Trace”
CFA	Common Femoral Artery	See “8.2.3.5 D Trace”
SFA	Superficial Femoral Artery	See “8.2.3.5 D Trace”
DFA	Deep Femoral Artery	See “8.2.3.5 D Trace”
Pop A	Popliteal Artery	See “8.2.3.5 D Trace”
TP Trunk A	Tibial Peroneal Trunk Artery	See “8.2.3.5 D Trace”
P.Tib A	Posterior TibialArtery	See “8.2.3.5 D Trace”
Dors.Ped A	Dorsalis Pedis Artery	See “8.2.3.5 D Trace”
Peroneal A	Peroneal Artery	See “8.2.3.5 D Trace”
A.Tib A	Anterior TibialArtery	See “8.2.3.5 D Trace”
IVC	Inferior Vena Cava	See “8.2.3.5 D Trace”
C.Iliac V	Common Iliac Vein	See “8.2.3.5 D Trace”
IIV	Internal Iliac Vein	See “8.2.3.5 D Trace”
Ex.Iliac V	External Iliac Vein	See “8.2.3.5 D Trace”
CFV	Common Femoral Vein	See “8.2.3.5 D Trace”
SFV	Superficial Femoral Vein	See “8.2.3.5 D Trace”
DFV	Deep Femoral Vein	See “8.2.3.5 D Trace”
Saph V	Great Saphenous Vein	See “8.2.3.5 D Trace”
Pop V	Popliteal Vein	See “8.2.3.5 D Trace”
TP Trunk V	Tibial Peroneal Trunk Vein	See “8.2.3.5 D Trace”

Items	Description	Methods or Formula
P.Tib V	Posterior Tibial Vein	See “8.2.3.5 D Trace”
Peroneal V	Peroneal Vein	See “8.2.3.5 D Trace”
A.Tib V	Anterior Tibial Vein	See “8.2.3.5 D Trace”
Sural V	Sural Vein	See “8.2.3.5 D Trace”
Soleal V	Soleal Vein	See “8.2.3.5 D Trace”
MCA	Middle Cerebral Artery	See “8.2.3.5 D Trace”
ACA	Anterior Cerebral Artery	See “8.2.3.5 D Trace”
PCA	Posterior Cerebral Artery	See “8.2.3.5 D Trace”
AComA	Ant.communicating br.	See “8.2.3.5 D Trace”
PComA	Post.communicating br.	See “8.2.3.5 D Trace”
BA	Basilar Artery	See “8.2.3.5 D Trace”

8.3.4.3 Vascular Study and Calculation

- **IMT**

IMT (Intima-Media Thickness) refers to the vertical dimension between LI (Lumen-Intima) and MA (Media-Adventia).

Perform the following steps:

1. In 2D mode，press the **[Caliper]** button on the control panel to start measurement.
2. Click **[IMT]** in the measurement menu and the ROI box appears.
3. Press the **[Set]** button and move the trackball together to adjust the vertex position of the ROI box.
4. Roll the trackball to adjust the ROI area and then press the **[Set]** button. Two auto trace lines appear in the ROI box. Results are displayed in the result window.

NOTE:
- **Please freeze the image before starting IMT measurement.**
- **MT measurement is available for linear array image only.**
- **Make sure that you select the right vessel wall (Near/ Far) before IMT measurement; otherwise wrong calculation may result.**

- **Stenosis D**

Measure Normal Diam and Resid Diam, calculates Stenosis D.

$$Stenosis\ D = (D_1 - D_2)/D_1 \times 100\%$$

Where D_1 is Normal Diam and D_2 is Resid Diam.

- **Stenosis A**

Measure Normal Area and Resid Area, calculates Stenosis A.

$$Stenosis\ A = (A_1 - A_2)/A_1 \times 100\%$$

Where A_1 is Normal Area and A_2 is Resid Area.

- **ICA/CCA(PS)**

Measure the flow velocity ratio between ICA and CCA to calculate the stenosis.

Measure PS value of ICA and CCA distal by D trace method of Doppler general measurement, and the system automatically calculates the stenosis.

- **ABI**

Measure the Ankle Systolic Pressure (ASP) and Brachial Systolic Pressure (BSP) on Doppler image to calculate Ankle Brachial Index (ABI)

Formula: ABI = ASP/BSP

8.3.5 Gynecology

8.3.5.1 2D Gynecology Measurement

The measurement items, calculation items and measurement method for 2D gynecology measurement are shown in the table below.

Table 38 2D Gynecology Measurement

Items	Description	Methods or Formula
UT L	Uterine Length	See “8.2.1.1 Distance”
UT H	Uterine Height	See “8.2.1.1 Distance”
UT W	Uterine Width	See “8.2.1.1 Distance”
Endo	Endometrium Thickness	See “8.2.1.1 Distance”
UT Vol	UT Volume	See “8.3.5.2 Gynecology Study and Calculation”
Uterus Body	/	
Cervix L	Uterine Cervix Length	See “8.2.1.1 Distance”
Cervix H	Uterine Cervix Height	
Cervix W	Uterine Cervix Width	
UT-L/ CX-L	Uterine Length /Cervix Length	See “8.3.5.2 Gynecology Study and Calculation”
Ovary L	Ovary Length	See “8.2.1.1 Distance”
Ovary H	Ovary Height	

Items	Description	Methods or Formula
Ovary W	Ovary Width	
Ovary Vol	Ovary Volume	See “8.3.5.2 Gynecology Study and Calculation”
Follicle1~16 L	Follicle 1~16 Length	See “8.2.1.1 Distance”
Follicle1~16 W	Follicle 1~16 Width	
Follicle1~16 H	Follicle1~16 Height	
Follicle Volume	/	See “8.3.5.2 Gynecology Study and Calculation”
Follicle Average Diameter	/	
AF	Amnionic Fluid	See “8.2.1.1 Distance”
AFI	Amnionic Fluid Index	See “8.3.5.2 Gynecology Study and Calculation”

8.3.5.2 Gynecology Study and Calculation

Table 39 Gynecology Study and Calculation

Description	Methods or Formula
UT Vol	Measures the UT L, UT H and UT W, calculates UT Vol and Uterus Body.
Uterus Body	Uterus Body (cm) = UT L (cm) + UT H (cm) + UT W (cm)
UT-L/ CX-L	UT-L/CX-L (No unit) = UT L (cm) / Cervix L(cm)
Ovary Vol	Measure the Ovary L, Ovary H and Ovary W, calculates Ovary Vol
Follicle Volume	See “Table 27 Follicle Study and Calculation” below.
Average Diameter	See “Table 27 Follicle Study and Calculation” below.
AFI	AFI= AF1+AF2+AF3+AF4

Table 40 Follicle Study and Calculation

Item	Method	Formula
Average Diameter	2-distance	$Average\ Diam = (Length + Width)/2$
	3-distance	$Average\ Diam = (Length + Width + Height) / 3$
Follicle Volume	1-distance	$Vol = \pi/6(Length)^3$
	2-distance	$Vol = \pi/6(Length)^2 \times Width$

	3-distance	$Vol = \pi/6\ Length \times Width \times Height$

- Preset the formula for follicle calculation, refer to “4.2.4 Application” for details.

8.3.6 Urology

8.3.6.1 2D Urology Measurements

The measurement items, calculation items and measurement method for 2D Urology measurement are shown in the table below.

Table 41 2D Urology Measurements

Items	Description	Methods or Formula
Renal L	Renal Length	See “8.2.1.1 Distance”
Renal H	Renal Height	See “8.2.1.1 Distance”
Renal W	Renal Width	See “8.2.1.1 Distance”
Renal Vol	Renal Volume	See “8.3.6.3 Urology Study and Calculation”
Cortex	Renal Cortical Thickness	See “8.2.1.1 Distance”
Prostate L	Prostate Length	See “8.2.1.1 Distance”
Prostate H	Prostate Height	See “8.2.1.1 Distance”
Prostate W	Prostate Width	See “8.2.1.1 Distance”
Prostate Vol	Prostate Volume	See “8.3.6.3 Urology Study and Calculation”
Seminal L	Seminal Vesicle Length	See “8.2.1.1 Distance”
Seminal H	Seminal Vesicle Height	See “8.2.1.1 Distance”
Seminal W	Seminal Vesicle Width	See “8.2.1.1 Distance”
Pre-BL L	Pre-void Bladder Length	See “8.2.1.1 Distance”
Pre-BL H	Pre-void Bladder Height	See “8.2.1.1 Distance”
Pre-BL W	Pre-void Bladder Width	See “8.2.1.1 Distance”
Pre-BL Vol	Pre-void Bladder Volume	See “8.3.6.3 Urology Study and Calculation”
Post-BL L	Post-void Bladder Length	See “8.2.1.1 Distance”

Items	Description	Methods or Formula
Post-BL H	Post-void Bladder Height	See “8.2.1.1 Distance”
Post-BL W	Post-void Bladder Width	See “8.2.1.1 Distance”
Post-BL Vol	Post-void Bladder Volume	See “8.3.6.3 Urology Study and Calculation”
Mictur.Vol	Micturated Volume	See “8.3.6.3 Urology Study and Calculation”

8.3.6.2 Doppler Urology Measurement

The measurement items, calculation items and measurement method for Doppler Urology measurement are shown in the table below.

Table 42 Doppler Urology Measurement

Items	Description	Methods or Formula
Testis A	Testis Aorta	See “8.2.3.5 D Trace”
Testis V	Testis Vein	See “8.2.3.5 D Trace”
Epididymis A	Epididymis Aorta	See “8.2.3.5 D Trace”
Epididymis V	Epididymis Vein	See “8.2.3.5 D Trace”

8.3.6.3 Urology Study and Calculation

Table 43 Urology Study and Calculation

Items	Description	Methods or Formula
Renal Vol	Renal Volume	Measure the Renal L, Renal H and Renal W, calculates Renal Vol
Prostate Vol	Prostate Volume	Measure the Prostate L, Prostate H and Prostate W, calculates Prostate Vol
Pre-BL Vol	Pre-void Bladder Volume	Measure the Pre-BL L, Pre-BL H and Pre-BL W, calculates the Pre-BL Vol
Post-BL Vol	Post-void Bladder Volume	Measure the Post-BL L, Post-BL H and Post-BL W, calculates the Post-BL Vol
Mictur.Vol	Micturated Volume	Measure the Pre-BL Vol and Post-BL Vol, calculates the Mictur.Vol

8.3.7 Small Parts

8.3.7.1 2D Small Parts Measurement

The measurement items, calculation items and measurement method for 2D small parts measurement are shown in the table below.

Table 44 2D Small Parts Measurement

Items	Description	Methods or Formula
Thyroid L	Thyroid Length	See “8.2.1.1 Distance”
Thyroid H	Thyroid Height	See “8.2.1.1 Distance”
Thyroid W	Thyroid Width	See “8.2.1.1 Distance”
Thyroid Vol	Thyroid Volume	See “8.3.7.3 SMP Study and Calculation”
Isthmus H	Isthmus height	See “8.2.1.1 Distance”
Thyroid Mass 1~3 d1	/	See “8.2.1.1 Distance”
Thyroid Mass 1~3 d2	/	See “8.2.1.1 Distance”
Thyroid Mass 1~3 d3	/	See “8.2.1.1 Distance”
Testis L	Testicular Length	See “8.2.1.1 Distance”
Testis H	Testicular Height	See “8.2.1.1 Distance”
Testis W	Testicular Width	See “8.2.1.1 Distance”
Testis Vol	Testicular Volume	See “8.3.7.3 SMP Study and Calculation”
Testis Mass1 d1-3	/	See “8.2.1.1 Distance”
Testis Mass2 d1-3	/	See “8.2.1.1 Distance”
Testis Mass3 d1-3	/	See “8.2.1.1 Distance”
Epididymis L	Epididymis Length	See “8.2.1.1 Distance”
Epididymis W	Epididymis Width	See “8.2.1.1 Distance”
Epididymis H	Epididymis Height	See “8.2.1.1 Distance”
Scrotal Wall Thickness	/	See “8.2.1.1 Distance”
Mass1~10 L	Mass Length	See “8.2.1.1 Distance”
Mass1~10 W	Mass Width	See “8.2.1.1 Distance”
Mass1~10 H	Mass Height	See “8.2.1.1 Distance”

Items	Description	Methods or Formula
Nip.-Mass 1~10 Dist.	Distance between nipple and mass	See “8.2.1.1 Distance”
Skin-Mass 1~10 Dist.	Distance between skin and mass	See “8.2.1.1 Distance”

8.3.7.2 Doppler Small Parts Measurement

The measurement items, calculation items and measurement method for Doppler small parts measurement are shown in the table below.

Items	Description	Methods or Formula
STA	Superior Thyroid Artery	See “8.2.3.5 D Trace”
ITA	Inferior Thyroid Artery	See “8.2.3.5 D Trace”

8.3.7.3 SMP Study and Calculation

Table 45 Small Parts Study and Calculation

Items	Description	Methods or Formula
Thyroid Vol	Thyroid Volume	Thyroid Vol (cm^3) = k × Thyroid L(cm) × Thyroid H (cm) × Thyroid W(cm) Where，k= 0.479 or 0.523
Testis Vol	Testicular Volume	Measure the Testis L, Testis H and Testis W, calculates Testis Vol

8.3.8 Orthopedics

8.3.8.1 2D Orthopedics Measurement

Table 46 2D Orthopedics Measurement

Item	Sub-items	Methods or Formula
HIP(Hip Joint Angle)	HIP	See “8.3.8.2 Orthopedics Study and Calculation”
	HIPα	See “8.3.8.2 Orthopedics Study and Calculation”
	HIPβ	See “8.3.8.2 Orthopedics Study and Calculation”
	HIP-Graf	See “8.3.8.2 Orthopedics Study and Calculation”
d/D	/	See “8.3.8.2 Orthopedics Study

Item	Sub-items	Methods or Formula
		and Calculation”

8.3.8.2 Orthopedics Study and Calculation

- **HIP**

HIP (Hip Joint Angle) measurement is used in pediatric orthopedics to provide early diagnosis for infant hip joint dislocation. In this measurement, three straight lines need to be set in turn, which are the baseline (BL), roof line (RL), and inclination line (IL). As well as two angles, which are α (the angle between BL and RL) and β (the angle between BL and IL)

Perform the following steps:

1. Start application measurement.
2. Select **[Side]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to set the HIP orientation.
3. Click **[HIP]** from the measurement menu.
4. The baseline (BL) appears. Use the trackball to move the line to the position of the hip joint. Select **[Angle]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to adjust the baseline angle and then press the **[Set]** button to fix the baseline. The roof line (RL) appears.
5. Repeat step 4 to adjust the roof line (RL) and inclination line (IL). The system automatically calculates the hip joint α and hip joint β and displays them in the result window.
6. Enter patient age and dislocation type will be displayed together.
7. Select **[Hip (α)]** or **[Hip (β)]** to measure the angles of α and β respectively.

- **HIP-Graf**

The measure method is the same as “HIP”.

Dislocation type can be determined through Graf method, as shown in the following table.

Table 47 Graf Method

Dislocation Type	Criteria			Result
	α	β	Patient	
I	α≥60°	β＜77°	All ages	I
II	50°≤α≤59°		Younger than three months of age	IIa
	50°≤α≤59°	β＜55°	Three months of age or older than three months	IIb
	43°≤α≤49°	β≤77°	All ages	IIc
	43°≤α≤49°	β＞77°	All ages	IId
III	α＜43°	β＞77°	All ages	III

IV	Quantitative angle measurement cannot be performed.		All ages	All
	Others	Others	All ages	?????

- **d/D**

Measure the distance between baseline and bottom line of the osseous acetabular and maximum width of hip to estimate the hip osseous acetabular coverage.

Perform the following steps:

1. Start application measurement.
2. Select **[Side]** by pressing **[◀]** or **[▶]** button and then rotate the **[Value]** knob to select the HIP orientation.
3. Click **[d/D]** from the measurement menu and the cursor appears.
4. Move the trackball to measure the maximum width of HIP (D) and the distance between the baseline and bottom line of the osseous acetabular (d). The system automatically calculates d / D and displays the result in the result window.

8.3.9 Emergency

The emergency measurement package contains commonly used measurement items under the corresponding mode.

For the measurement method, please refer to the measurement section of each part.

9 Report

After the measurement is completed, the relevant measurement data will be displayed in the report.

9.1 View the Report

Press the **[Report]** button on the control panel to enter the Report screen of current patient. The default template of the current exam is displayed by default.

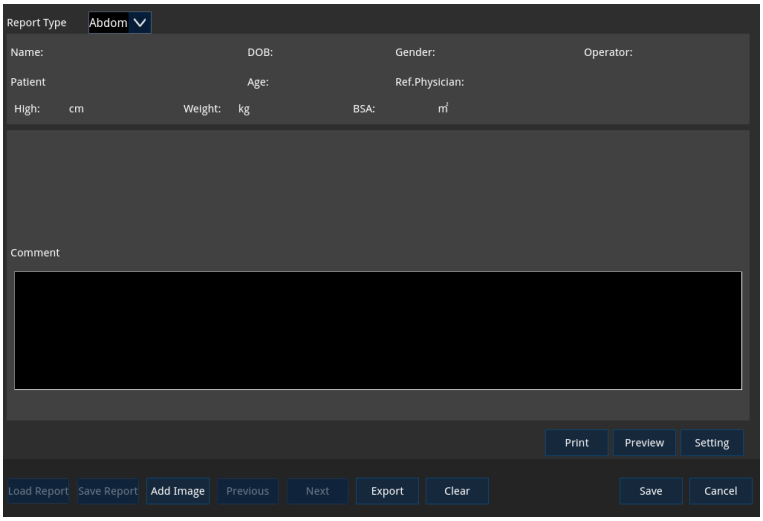


Figure 33 Report Screen

NOTE :

- **The report shows the three latest values and a final value for the measurement.**
- **The report only displays the measurement data displayed by default for the corresponding template.**

Table 48 Button Functions

Item	Description
Print	Click to print the current report
Preview	Click to preview the current report
Setting	Click to open the print Setting Dialog box
Load Report	Click to preview, export or print a saved report
Save Report	Click to save the current report in PDF
Add Image	Click to open the image gallery
Previous/ Next	Click **[Previous]** or **[Next]** to flip the pages if the report has more than one page
Export	Click to open the Export Wizard

Item	Description
Clear	Click to delete comments
Save	Click to save current setting and return to the Home screen
Cancel	Click to cancel all modifications and return to the Home screen

9.2 Edit the Report

9.2.1 Edit the Measurement Data

Caution **Incorrect data may cause misdiagnosis. Please modify the measurement data carefully.**

Note:

- **Only measurement results can be edited; calculation results cannot be edited.**
- **Once the measurement result is modified, the average value and the corresponding calculated value will automatically update.**

Perform the following steps:

1. After the measurement is completed, press **[Report]** on the control panel to enter the Report screen. The corresponding report of current exam displays.
2. To view other patient reports, click the **[Report Type]** drop-down box to select the corresponding report.
3. Click the **[Method]** drop-down box to set the method for calculating the final value. The value is updated and displayed according to the calculation formula selected.

Item	Description
Last	Display the latest value of the measurement
Avg	Display the average value of the measurement
Max	Display the maximum value of the measurement
Min	Display the minimum value of the measurement
Note:	**The calculation formula of GA and standard deviation should be preset for obstetric Report**

4. Move the cursor to the value you want to edit and press the **[Set]** button.
5. Delete the value via **<←>** key on the keyboard and enter the new value.
6. After editing, click **[Save]** to save the current report and return to the Home screen.

9.2.2 Add Comments

Perform the following steps:

1. Move the cursor over the comment box and press the **[Set]** button.

   Note: The comment box is at the bottom of the report page. For reports with more than one page, please click [Next] to view the comments.

2. Enter comments in the comment box.

9.2.3 Add Image

Images saved in the current exam can be added to the report.

Perform the following steps:

1. Click **[Add Image]** to open the Image gallery. The column on the left displays the saved ultrasonic images and the list on the right displays the selected ultrasonic images.
2. Add or remove Images.

Operation	Description
Add Image	1) Select an image from the left column. 2) Click **[>]** to add the selected image of the left column to the right column.
Remove Image	1) Select an image from the right column. 2) Click **[<]** to remove the selected image of the right column to the left column.

3. Click **[Save]** to complete image adding or removal.

9.3 Review the Report

Click **[Review Report]** to view the report.

Note: When reviewing, reports cannot be edited.

9.4 Print the Report

Click **[Print]** to print current report.

Note: Add the printer service prior to printing the report.

9.5 Backup the Report

9.5.1 Load

Click **[Load Report]** to download existed report.

9.5.2 Export

Click **[Export]** to open the Export Wizard and set relevant parameters, click **[OK]** to export the current report.

10 Patient Data Management

After the patient image is acquired and processed, you can store and review the patient image and can backup the patient data to a USB storage device or DICOM server for future viewing.

10.1 Storage

Image and cine are saved to the system by default. You can also choose to save the image and cine to a USB storage device.

Export your data to a removable device or DICOM server is available if needed. Refer to “10.5 Exporting Image/Data” for details.

10.1.1 Image Storage

In freeze or real-time status, press the **[Save Img]** button on the control panel, the system will automatically save the current image to the current patient database. You can also enter the review screen to view the image and cine by pressing the **[File]** button on the control panel.

The system saves the full-screen image by default (including parameters, comments, measurement items, etc.), and you can also set to save only the image area. For details, refer to “4.2.3 Image”.

10.1.2 Cine Storage

In the freeze or real-time status, press the **[Save Cine]** button on the control panel, the system will automatically save the cine to the current patient database.

10.2 Image Viewing

Previous patient images/data can be viewed through the Station screen, and current patient images and data can also be viewed through other screens.

10.2.1 Current Patient

Image and cine of current patient can be viewed through the Review screen and Station screen.

10.2.1.1 Through Review Screen

1. Press the **[File]** button on the control panel to enter the Review screen of current patient.

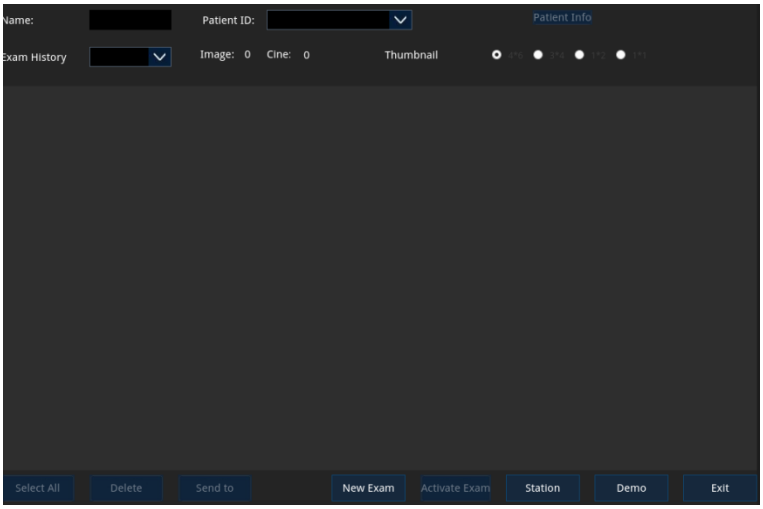


Figure 34 Review Screen

2. Roll the trackball, move the cursor to the desire thumbnail, double-click the **[Set]** button, and the screen displays the image in original size.

10.2.1.2 Though Station Screen

1. Press the **[File]** button on the control panel to enter the Review screen and then click **[Station]** to enter the Station screen. The current patient is selected by default in the patient information list, and the clipboard displays the thumbnail image of the patient.

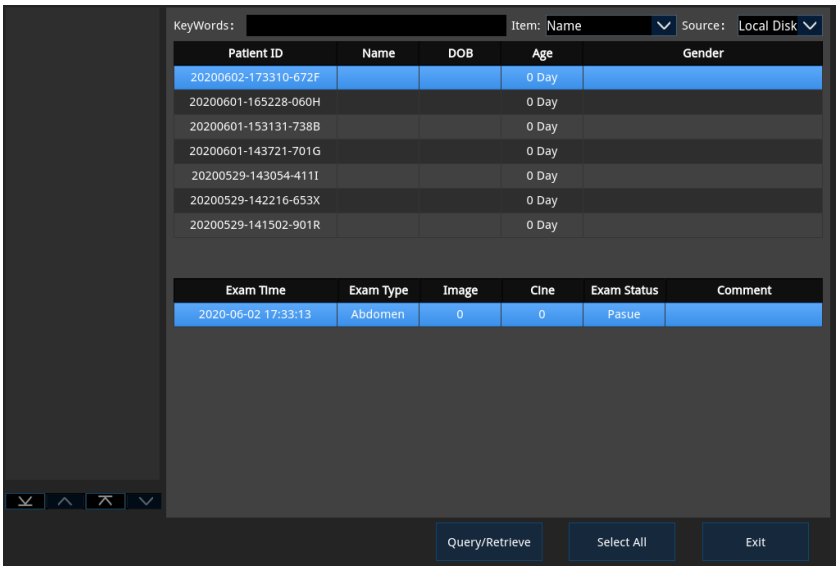


Figure 35 Station Screen

2. Move the cursor to the desired thumbnail image and double-click the **[Set]** button to enter the Home screen to view the image in original size.

10.2.2Previous Patient

To view data of previous patient through Station screen:

1. Press the **[File]** button on the control panel to enter the Review screen and then click **[Station]** to enter the Station screen.
2. Search the target patient.
    - Select the data source and search item, enter the keyword to search the target patient.
    - Drop down the scroll bar on the right side of the patient information list to locate the target patient.
3. Select the target patient and press the **[Set]** button to open the operation menu and perform operations as needed.

10.2.2.1 Patient Information

Open the operation menu and click **[Patient Info]** to enter the Patient screen to check basic information and exam information of current patient.

10.2.2.2 Image

- The clipboard displays the thumbnail image of the patient. Click ⌄ / ⌃ to scroll through the thumbnail images, move the cursor to the desired image, and double-click the **[Set]** button to view the image.
- Or open the operation menu and click **[Review Image]** to enter the Review screen, move the cursor to the desired image and double-click the **[Set]** button to view the image.

10.2.2.3 Report

Open the operation menu and click **[Review Report]** to view the report.

10.3 Delete Image/Data

10.3.1 Certain Patient

To delete certain patient image/data, please perform the following steps:

1. Press the **[File]** button on the control panel to enter the Review screen and then click **[Station]** to enter the Station screen.
2. Search desired patient
    - Select the data source and search item, enter the keyword to search the desired patient.
    - Search the desired patient in the patient list.
3. Select desired patient.
    - Roll the trackball over the desired patient, press the **[Set]** button.

4. Delete patient image/data.

   - Delete image: move the cursor to the image to be deleted, click the delete icon  to delete the image; or open the operation menu and then select **[Review Image]** to enter the Patient screen and delete image.
   - Delete patient data: open the operation menu and select **[Delete Exam]**, and then click **[OK]** in the pop-up dialog box to delete the patient data.

10.3.2 All Patients

To delete all patients' image/data, please perform the following steps:

1. Press the **[File]** button on the control panel to enter the Review screen and then click **[Station]** to enter the Station screen.
2. Click **[Select All]** to select all patients.
3. Open the operation menu, select **[Delete Exam]**, and then click **[OK]** in the pop-up dialog box to delete the patient data.

10.4 Image/Data Recovery

The deleted patient data will be cached in the recycle bin. Due to the space limitations of the hard disk, the recycle bin can only cache the most recently deleted patient data.

To recovery image/data, please perform the following steps:

1. Click  on the status bar to enter the recycle bin screen.
2. Scroll the right slider bar to select desire patient image or data.

   - Click **[Restore]** to restore the selected image/data.
   - Click **[Restore All]** to restore all images and data.
   - Click **[Delete]** to delete the selected image/data.
   - Click **[Delete All]** to delete all images and data.

10.5 Exporting Image/Data

The system supports exporting patient information, image and report to a USB storage device or DICOM server.

NOTE :
- **The data in this system is exported to USB storage devices in image format with different resolution, so the exported image is not the same as**

the image displayed on the monitor.

- **When connecting the external media, please check if the status bar displays the corresponding icon. If the icon is not displayed, re-connect the external media.**

10.5.1Exporting to USB Storage Device

10.5.1.1 Export Patient Data to USB Storage Device

Perform the following steps:

1. Connect the USB storage device to the system via the USB port and the status bar displays the  icon.
2. Enter the Station screen.
3. Select the patient information you want to export.
   - Select the desired patient: search the patient information via the search items in the patient list.
   - Select all patients: click **[Select All]**.
4. Click **[Export Exam]** to open the Export Exam dialog box.
5. Set the export parameter.
   1) Click **[Destination]** drop-down box to select export destination.
   2) Check **[Original Format]** or **[DICOM Format]** to select the export format.
   3) Select the cine zoom mode, cine compression mode, and cine compression ratio.
   4) Set whether to delete local patient exam information after export.
      - Select **[Delete after Exporting]**, and then click **[Delete Exams]** to delete patient data.
      - Select **[Delete after Exporting]**, and then click **[Delete Images]** to delete patient image.
6. Click **[Export]** to export exam.

10.5.1.2 Remove the USB Storage Device

Move the cursor over the status bar icon  , press the **[Set]** button, and click **[Remove]** in the pop-up menu to safely remove the USB storage device.

10.5.2Exporting to DICOM Server

The DICOM Server is purchasable. Please confirm the function is purchased and installed before use. Export patient images to the DICOM server, refer to “11.2.1 DICOM Storage” for details.

11 DICOM

Digital Imaging and Communications in Medicine (DICOM) Standard is an international normative protocol for communication of medical digital images. DICOM service enables you to:

- Search for patient information archived on the DICOM server (working list) and copy the patient information to the device for reviewing.
- Send patient information and images on the system to the DICOM storage server.
- Send the image saved on the ultrasound system to the DICOM print server for image printing.

NOTE : The DICOM Server is purchasable. Please confirm the function is purchased and installed before use.

11.1 DICOM Preset

11.1.1 DICOM Local Preset

Preset the network properties for DICOM server connection.

Enter the DICOM local preset screen via **[Preset]** → **[Network Preset]** → **[DICOM Local]**.

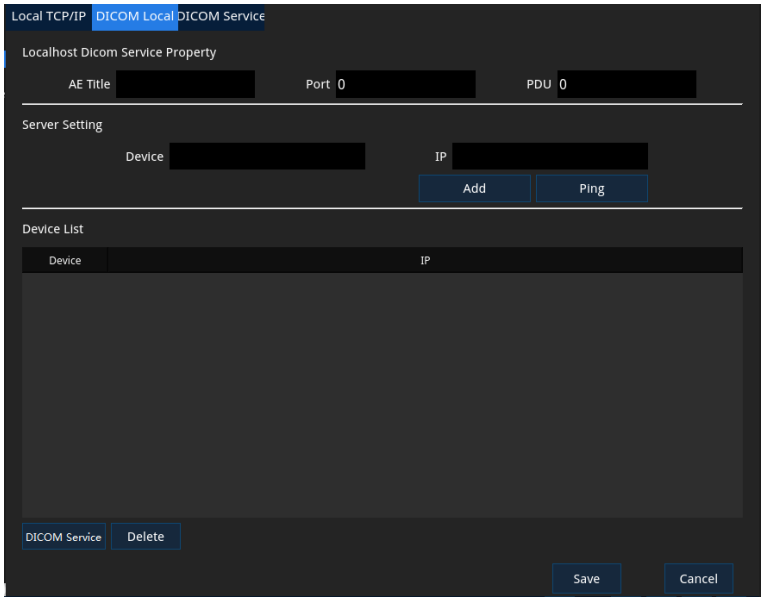


Figure 36 DICOM Local Preset

Table 49 DICOM Local Preset

Item	Description

Item	Description
AE TITLE	Application Entity title which is used for device identification. The AE title should be consistent with that of the acceptable SCU preset in the server.
Port	Always the same as the server port.
PDU	The maximum PDU data package size.
Device	Name of the device supporting DICOM services.
IP	IP address of the DICOM Server.
Add	Add the server to the server list.
Ping	Check network connectivity between the system and DICOM server.
Device List	Display the added devices.
DICOM Service	Set the DICOM servers. For details, refer to “11.1.2 Service Preset”.
Delete	Remove the selected server from the device list.

To connect DICOM server, perform the following steps:

1. Use a network cable to connect the device to the LAN where the DICOM server is located.
2. Set the local network. (Refer to “4.5 Network Preset” for details)
3. Set DICOM server properties.
    - Enter the AE title, port, PDU, device name and IP address.
4. Click **[Add]** to add the server to the device list.
5. Click **[Ping]** to check the connection, the prompt information is displayed in the status bar at the bottom of the screen.
6. Click **[Save]** to save current setting and return to the Home screen.

NOTE : The AE Title should be consistent with the SCU AE Title preset in the server (PACS/RIS/HIS), for example, if the AE Title preset of the printer server is “Printer”, and the SCU AE Title is “Machine”, then the AE Title of local should be “Machine” in the figure above, while the AE Title of the printer server should be “Printer”.

11.1.2Service Preset

The service preset is mainly used to add or delete DICOM services in a DICOM server, set the service name, port address, and so on.

DICOM service consists of Storage, Print, Worklist, MPPS, Storage Commitment, and Query/Retrieve.

11.1.2.1 Storage

Storage server connection properties and image storage format settings can be found in

the Storage Service Preset screen.

Enter the Storage Service Preset screen via **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[Storage]**.

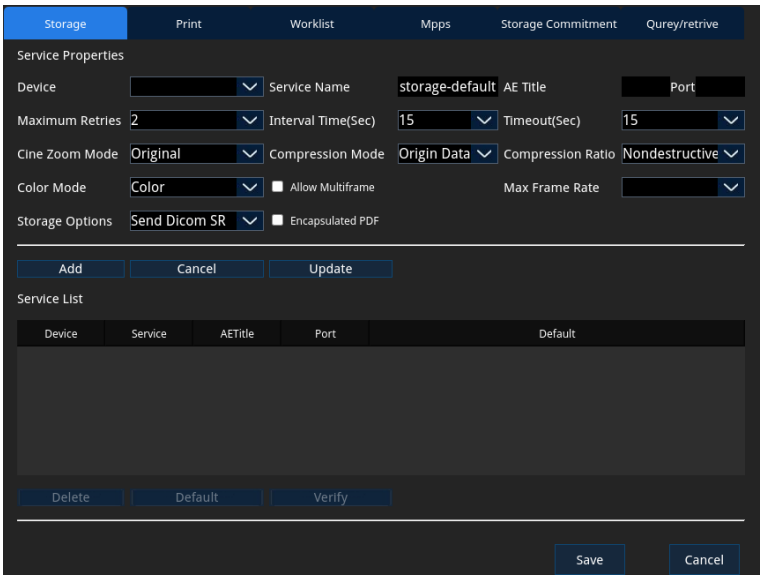


Figure 37 DICOM Service-Storage

Table 50 DICOM Service-Storage

Item	Description
Device	Click the drop-down box to select an added device.
Service Name	Enter a service name.Default is storage-default.
AE Title	Enter the AE title. The AE Title here should be consistent with that of the storage server.
Port	Enter the port number for the storage server.
Maximum Retries	Set the maximum retries.
Interval Time (Sec)	Set the interval time for connection retry.
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service.
Cine Zoom Mode	Select the cine zoom mode.
Compression Mode	Select the compression mode.
Compression Ratio	Select the compression ratio.
Color Mode	Select the color mode.
Allow Multiframe	Select if support multiframe saving.
Max Frame Rate	Set the frame range of transferring cin file into DCM multiframe file.
Storage Options	Enable or disable structured reporting sending.

Item	Description
Encapsulated PDF	Select whether to encapsulate PDF reports in DICOM standard format.
Add	Add a server to the server list.
Cancel	Cancel parameter preset.
Update	Select a server in the service list, change the parameters and click **[Update]** to update the parameters of the server.
Service list	Display the connected storage server list.
Delete	Remove the selected server from the device list
Default	Select an item in the server list as the default server, and the default server is marked with a “Y”.
Verify	Verify the network connectivity between the system and storage server.

- **Preset Storage Server**

To preset a storage server, please perform the following steps:

1. Click **[Device]** drop-down box to select an added device.
2. Enter AE Title which is consistent with that of the storage server, port and other properties.
3. Select certain service in the service list; click **[Verify]** to verify the network connectivity.
4. Click **[Save]**, the system saves the settings and returns to the Home screen.

NOTE : Not all SCP support verification. Please confirm whether the SCP supports the verification before verification.

- **Change Server Parameters**

1. Double click the server you want to change parameter to display parameter dialog.
2. Change the parameters as needed, and click **[Update]** to update and save the current parameters.

- **Set Default Server**

Select a server in the service list, click **[Default]** and the default server is marked with a “Y”.

11.1.2.2 Print

Service and print attributes, and print server connection can be found in print service screen. Print server setting is similar to storage server setting, refer to “11.1.2.1 Storage” for details.

Enter the print service preset screen via **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[Print]**.

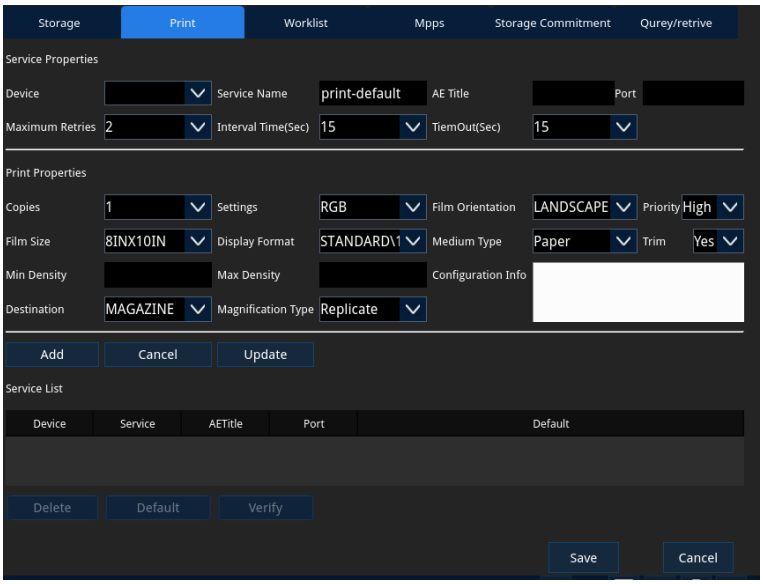


Figure 38 DICOM Service-Print

Table 51 DICOM Service-Print

Item	Description
Device	Click the drop-down box to select an added device.
Service name	Enter a service name. Default is print-default.
AE Title	Enter the AE title. The AE Title here should be consistent with that of the worklist server.
Port	Enter the port number for the print server.
Maximum Retries	Set the maximum retries.
Interval Time (Sec)	Set the interval time for connection retry.
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service.
Copies	Copies of each page.
Settings	Set the printer type of the printer.
Film Orientation	Set the film orientation.
Priority	Set the priority of color printing.
Film Size	Set the film size.
Display Format	Specify the quantity of images per page to print. E.g. STANDARD\2, 3 means 6 images are printed for each page.
Medium Type	Set the medium type of the printer.
Trim	Set whether to print the trim box around each image of the film.
Min Density	Enter the minimum density of the film.

Item	Description
Max Density	Enter the maximum density of the film.
Configuration Info	Enter configuration information.
Print Target	Set where the file is exposed.
Magnification Type	Set the magnification type for image printing.
Add	Add a server to the server list.
Cancel	Cancel parameter preset.
Update	Select a server in the service list, change the parameters and click **[Update]** to update the parameters of the server.
Service list	Display the connected print server list.
Delete	Remove the selected server from the device list
Default	Select an item in the server list as the default server, and the default server is marked with a“Y”.
Verify	Verify the network connectivity between the system and the print server.

Set the print attribute related parameters based on the actual printer requirements, for example:

- If the printer does not support **[Film Size]** as 8N*10N, do not set this size to the printer film size.
- As to **[Medium Type]**, Blue Film or Clear Film is usually used for black and white printing, and Paper is usually used for color printing. For details, please refer to the printer conformance statement.
- Other parameters can be reminded as default. If the printer has special requirements, please change the parameters according to the requirements of the printer.

11.1.2.3 Worklist

Worklist server connection properties and relevant settings can be found in the worklist service preset screen.Worklist server setting is similar to storage server setting, refer to “11.1.2.1 Storage” for details.

Enter the worklist service preset screen via **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[Worklist]**.

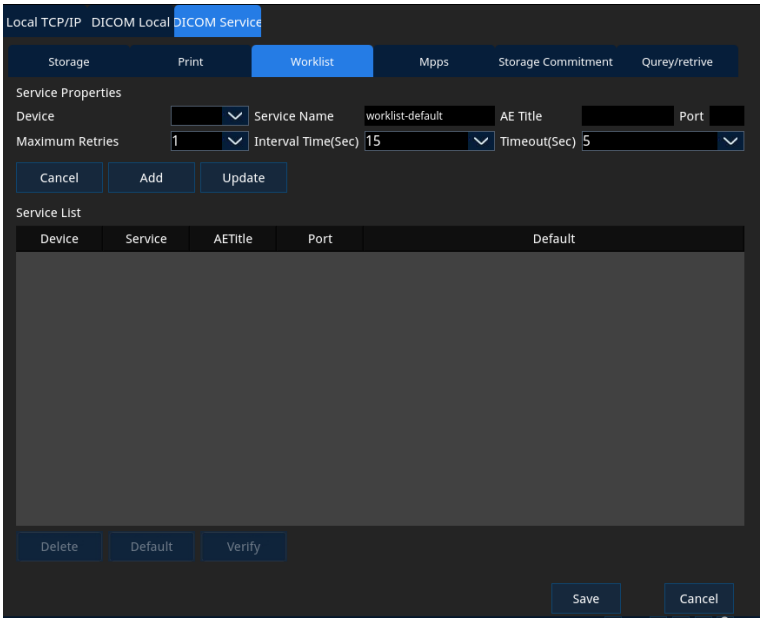


Figure 39 DICOM Service-Worklist

Table 52 DICOM Service-Worklist

Item	Description
Device	Click the drop-down box to select an added device.
Service name	Enter a service name. Default is worklist-default.
AE Title	Enter the AE title. The AE Title here should be consistent with that of the worklist server.
Port	Enter the port number for the worklist server.
Maximum Retries	Set the maximum retries.
Interval Time (Sec)	Set the interval time for connection retry.
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service.
Add	Add a server to the server list.
Cancel	Cancel parameter preset.
Update	Select a server in the service list, change the parameters and click **[Update]** to update the parameters of the server.
Service list	Display the connected worklist server list.
Delete	Remove the selected server from the device list
Default	Select an item in the server list as the default server, and the default server is marked with a “Y”.
Verify	Verify the network connectivity between the system and the worklist server.

11.1.2.4 MPPS

MPPS server connection properties and relevant settings can be found in the MPPS service preset screen. MPPS server setting is similar to storage server setting, refer to “11.1.2.1 Storage” for details.

Enter the MPPS service preset screen via **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[MPPS]**.

NOTE : When using MPPS, you need to set the MPPS server as the default server.

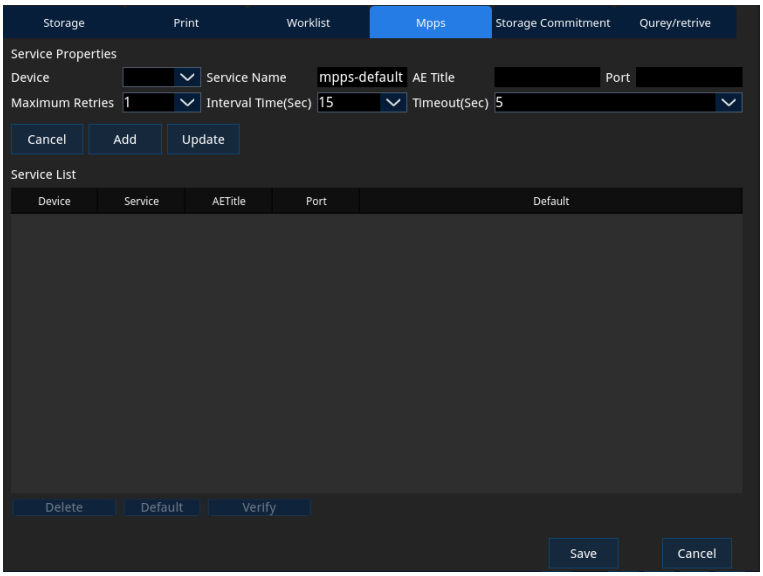


Figure 40 DICOM Service-MPPS

Table 53 DICOM Service-MPPS

Item	Description
Device	Click the drop-down box to select an added device.
Service name	Enter a service name. Default is mpps-default.
AE Title	Enter the AE title. The AE Title here should be consistent with that of the mpps server.
Port	Enter the port number for the mpps server.
Maximum Retries	Set the maximum retries.
Interval Time (Sec)	Set the interval time for connection retry.
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service.
Add	Add a server to the server list.
Cancel	Cancel parameter preset.
Update	Select a server in the service list, change the parameters and click **[Update]** to update the parameters of the server.

Item	Description
Service list	Display the connected mpps server list.
Verify	Verify the network connectivity between the system and the mpps server.

11.1.2.5 Storage Commitment Preset

Storage Commitment server connection properties and relevant settings can be found in the storage commitment service preset screen. Storage commitment server setting is similar to storage server setting, refer to “11.1.2.1 Storage” for details.

Enter the MPPS service preset screen via **[Preset] → [Network Preset] → [DICOM Service] → [Storage Commitment]**.

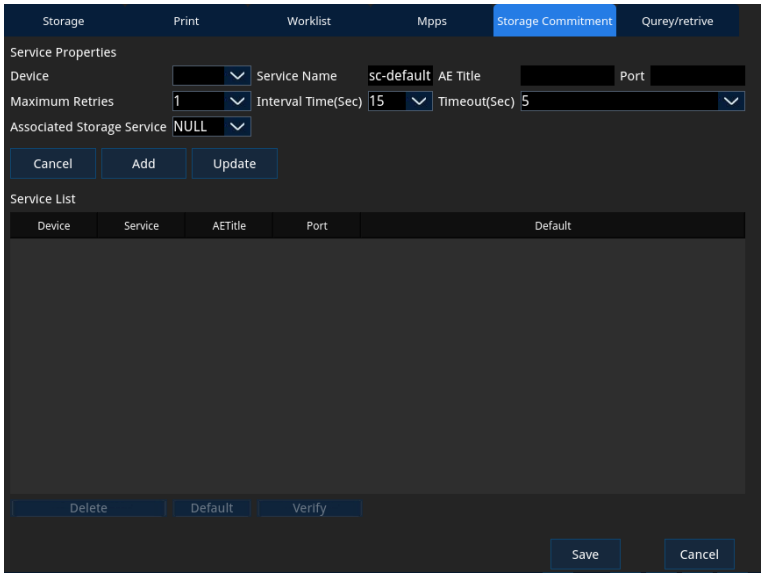


Figure 41 DICOM Service-Storage Commitment

Table 54 DICOM Service-Storage Commitment

Item	Description
Device	Click the drop-down box to select an added device.
Service Name	Enter a service name. Default is sc -default.
AE Title	Enter the AE title. The AE Title here should be consistent with that of the storage commitment server.
Port	Enter the port number for the storage commitment server.
Maximum Retries	Set the maximum retries.
Interval Time (Sec)	Set the interval time for connection retry.
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service.
Associated Storage Service	The associated storage server should be preset before storage commitment, only after the exam is sent out, can storage

Item	Description
	commitment be created.
Cancel	Cancel parameter preset.
Add	Add a server to the server list.
Update	Select a server in the service list, change the parameters and click **[Update]** to update the parameters of the server.
Service list	Display the connected storage commitment server list.
Delete	Remove the selected server from the device list
Default	Select an item in the server list as the default server, and the default server is marked with a “Y”.
Verify	Verify the network connectivity between the system and storage commitment server.

11.1.2.6 Query / Retrieve Preset

Query/Retrieve server connection properties and relevant settings can be found in the Query/Retrieve service preset screen. Query/Retrieve server setting is similar to storage server setting, refer to “11.1.2.1 Storage” for details.

Enter the Query/Retrieve service preset screen via **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[Query/Retrieve]**.

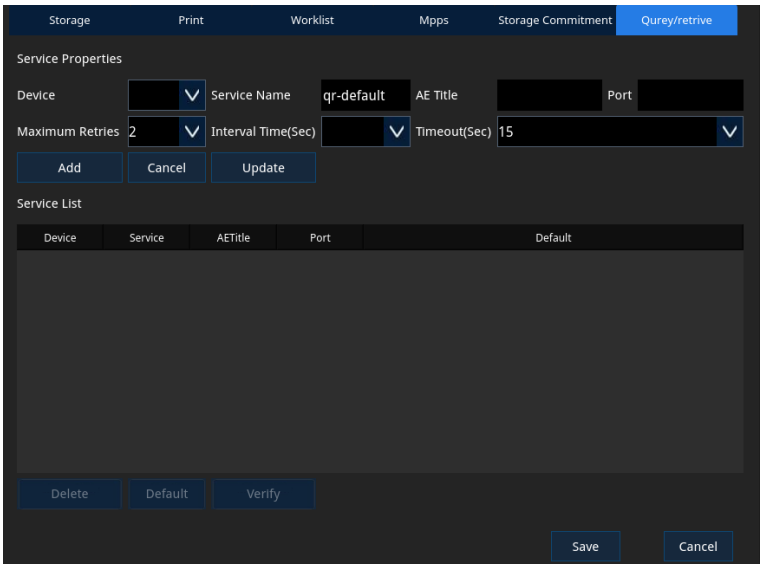


Figure 42 DICOM Service-Query/Retrieve

Table 55 DICOM Service-Query/Retrieve

Item	Description
Device	Click the drop-down box to select an added device.
Service Name	Enter the service name. Default is qr -default.

Item	Description
AE Title	Enter the AE title. The AE Title here should be consistent with that of the query/retrieve server.
Port	Enter the port number for the query/retrieve server.
Maximum Retries	Set the maximum retries.
Interval Time (Sec)	Set the interval time for connection retry.
Timeout (Sec)	Refers to the amount of time after which the system will stop trying to establish a connection to the service.
Add	Add a server to the server list.
Cancel	Cancel parameter preset.
Update	Select a server in the service list, change the parameters and click **[Update]** to update the parameters of the server.
Service List	Display the connected query/retrieve server list.
Delete	Remove the selected server from the device list
Default	Select an item in the server list as the default server, and the default server is marked with a“Y”.
Verify	Verify the network connectivity between the system and query/retrieve server.

11.2 DICOM Service

After completed all DICOM presets, you are ready for DICOM image storage, DICOM image printing, work list, MPPS, storage delegation and query/acquisition services.

NOTE : Before using DICOM services, please perform verification to ensure that the system is properly connected to the DICOM server.

11.2.1DICOM Storage

DICOM storage service sends patient image or data to storage server for remote storage.

Perform the following steps:

1. Save images. Refer to “10.1 Storage” for details.
2. Send images/data to the DICOM storage server via following screens:

   - Press **[File]** button on the control panel to enter the Review screen. Move the cursor over the thumbnail you wan to send, click  icon on the image or click **[Send]** to send the selected images.

   - Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen. Select desire patient, open the operation menu

and click **[Send Exam]** or move the cursor over the thumbnail you wan to send, click  icon on the image.

3. A sending dialog box pops up. Select DICOM and storage server as needed.
4. Click **[OK]** to send the image/ data to the storage server.

11.2.2DICOM Print

DICOM Print service sends patient image to print server for remote printing. Preset the print server before using DICOM Print service.

Perform the following steps:

1. Save images. Refer to “10.1 Storage” for details.
2. Send image to DICOM Print Server via following screens

   - Press **[File]** button on the control panel to enter the Review screen. Move the cursor over the thumbnail you wan to send, click  icon on the image or click **[Send]** to send the selected images.

   - Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen. Select desire patient, open the operation menu and click **[Send Exam]** or move the cursor over the thumbnail you wan to send, click  icon on the image.

3. A sending dialog box pops up. Select DICOM and print server as needed.
4. Click **[OK]** to send the image/ data to the print server.

11.2.3DICOM Worklist

The DICOM Worklist Service is used to query or retrieve patient information stored in the server, which can be imported into the ultrasound system for viewing and performing new exam. Preset the DICOM Worklist server before using DICOM Worklist service.

To retrieve Patient information (DICOM), perform the following steps:

1. Press the **[Patient]** button on the control panel to enter the patient information screen. Click **[Worklist]** to display Worklist screen.

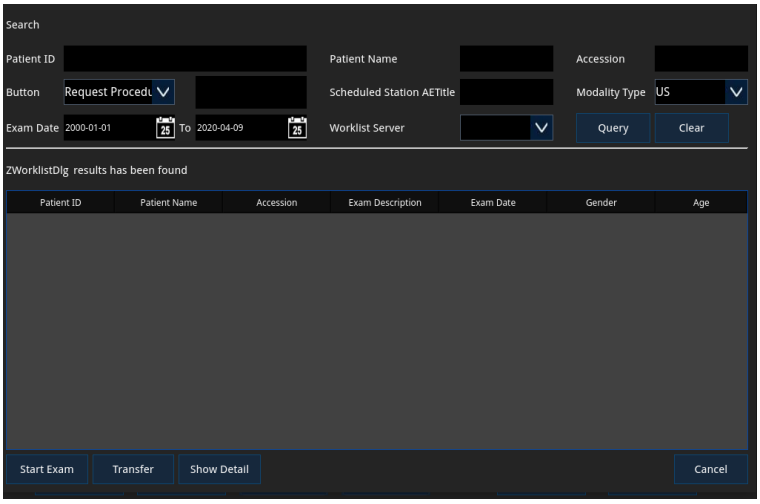


Figure 43 Worklist Screen

2. Query patient information:

   1) Set search condition among patient ID, patient name, accession number, keyword, scheduled station AE Title, device type, exam date, worklist server and other information to search for patients.

   2) Click **[Query]** to display patient information which meets the search conditions in the lower part of the screen.

3. Select desired patient record in the displayed patient list:

   - **[Start Exam]**: click to return to the Home screen and start a new exam for the selected patient.
   - **[Transfer]**: click to import the selected patient information into the **[Patient Information]** screen for editing. After editing, click **[Save]** to start a new exam.
   - **[Show Detail]**: click to view the detailed patient information.
   - **[Cancel]**: click to exit worklist screen and return to the Patient Information screen.

11.2.4DICOM MPPS

MPPS is used to send patient exam status to the MPPS server, which facilitates the other systems to obtain the exam progress in time. Preset the DICOM MPPS server before using DICOM MPPS service.

When MPPS preset is done, the patient exam status will be sent to the MPPS server as follows:

- When start a new exam, the ultrasound system sends an “N-CREATE” message to the MPPS server.
- After the normal image acquisition completes, the ultrasound system sends an “N-SET COMPLETED” message to the MPPS server.
- When the image acquisition is abnormally terminated, the ultrasound system sends “N-SET DISCONTINUED” to the MPPS server.

11.2.5DICOM Storage Commitment

After the patient exam information or the structured report on the ultrasound system is sent to the storage server, the ultrasound system can detect whether the information transmission is successful through the storage commitment server. Preset the DICOM Storage Commitment server before using DICOM Storage Commitment service.

11.2.5.1 Send Patient Exam to DICOM Storage Server

Perform the following steps:

1. After completing the exam, press the **[Patient]** button on the control panel to enter the Patient Information screen and click **[EndExam]**.
2. Press the **[File]** button on the control panel to enter the Station screen.
3. Select the desired patient in the patient list and open the operation menu, click **[Send Exam]**.
4. A sending dialog box pops up. Select DICOM and storage server as needed.
5. Click **[OK]**, the image and data will be sent to the DICOM storage server, and the storage commitment server will prompt sending status in the prompt bar.

11.2.5.2 Auto Send Patient Exam to DICOM Storage Server

Send images automatically to the DICOM storage server and perform storage commitment when the exam is done.

Set the auto function via **[Preset]** → **[System Preset]** → **[General]** → **[Send after Exam]**.

When the exam completes, the system prompts whether the exam information was successfully sent to the DICOM storage server.

11.2.6DICOM Query / Retrieve

The query/retrieve server is used to query and retrieve the patient exam information from the designated server, so as to remotely obtain other exam information of the patient.

Preset the query/retrieve server before using DICOM query/retrieve service.

To query / retrieve patient information, please perform the following steps:

1. Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen.
2. Click **[Query/Retrieve]** to enter query/retrieve screen.
3. Select the source server for patient information, and the destination server (retrieve location) in **[Server&Service]**.
4. Enter query information, such as a patient ID, patient name, serial number, keyword, or the time period to screen the patient.

    - Click **[Clear]** to clear the entered query conditions.

5. Click **[Query]** and the qualified patients are displayed in the patient list.

- If the list is more than one page, roll the right slider bar of the list to find the patient information.
- Move the trackball and press the **<Ctrl>** + **[Set]** button to select more than one patients.
- Click **[Select All]** to select all patients.
- Click **[Cancel All]** to cancel several selected or all patients selected in the list.

6. Click **[Retrieve]**, the system will retrieve the selected patient record to the target server or local, a progress bar displays and the patient information displays in the patient list after completion. Or click **[Exit]** to stop retrieving the patient record.
7. After completing retrieve, click **[Exit]** to see the retrieved patient records in the Station screen.

11.3 Structured Report

The system provides a common structured report that supports DICOM storage, DICOM storage commitment, and export to external storage devices in DCM format.

11.3.1.1 Send Structured Report to DICOM

NOTE : Structured reports cannot be sent separately and can only be sent with DICOM images.

Perform the following steps:

1. Select “Send images and data together to the DICOM storage server” option.
   - Setting path: **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[Storage]** → **[Storage Option]** → **[Send DICOM SR]**.
2. After the setting is done, when the image is sent to the DICOM storage server, the structured report is also sent together.

11.3.1.2 Send Structured Report to DICOM via Station Screen

Perform the following steps:

1. Select “Send images and data together to the DICOM storage server” option.
   - Setting path: **[Preset]** → **[Network Preset]** → **[DICOM Service]** → **[Storage]** → **[Storage Option]** → **[Send DICOM SR]**.
2. After completing the exam, press the **[Patient]** button on the control panel to enther the Patient Information screen, click **[End the Exam]**.
3. Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen. Select target patient in the patient list.
4. Click **[Send Exam]** to pop up the sending exam dialog box.

5. Select DICOM and storage server as needed and click **[OK]** to confirm.

11.3.1.3 Export Structured Report to External Storage

Structured reports cannot be exported separately and can only be exported with patient data. When export patient data, if there is a structured report, the structured report will be exported to the external storage device as well.

Perform the following steps:

1. After completing the exam, press the **[Patient]** button on the control panel to enther the Patient Information screen, click **[End the Exam]**.
2. Press **[File]** button on the control panel to enter the Review screen, and then click **[Station]** to enter the Station screen.
3. Select target patient and open the operation menu, click **[Send Exam]** to pop up the sending exam dialog box.
4. Select **[Disk]**, check **[Export Report]** as needed and click **[OK]** to start exporting.

12 Probe and Biopsy

Prior to the exam, the user must fully understand the function of the probe and biopsy bracket.

To ensure the performance and safety of the probe and the biopsy bracket, regular cleaning, disinfection, and maintenance shall be taken.

12.1 Probe

This section mainly introduces the general operation of the probe. For details, please refer to the instruction manual of each probe.

12.1.1 Structure of Probe

The ultrasonic probes suitable for this system are all electronic scanning probes, which generates high-resolution images by transmitting ultrasonic waves into the human body and receiving echoes. The system also supports surface probes and intracavitary probe.

The basic structure of the probe is shown in the figure below. The orientation mark on the probe is consistent with the direction indicated by the probe mark “ ” on the ultrasonic image.

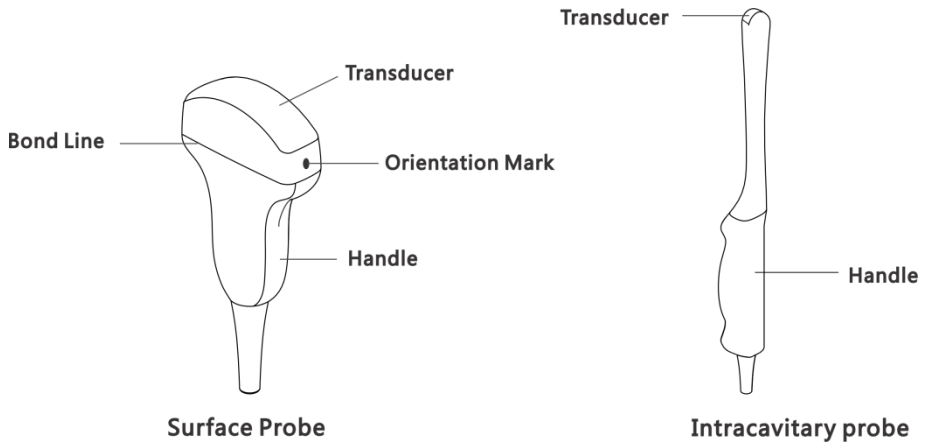


Figure 44 Structure of Probe

12.1.2 Option Probes

Imaging probes used for exam may affect the amount of radiation in the system.

The following probes have been tested in accordance with the requirements of the CISPR 11 and confirmed to meet the radiation standards of Group 1 Class A products.

Table 56 Option Probes

No.	Probe Model	Nominal/ Testing Frequency	Probe Type	Applicable Site	Scope of clinical Application
1	TC50	3.5MHz	Abdominal convex array probe (R=50)	Surface	Abdomen, Gynecology and Obsterics
2	TC10	6.5MHz	Cavity convex array probe (R=10)	Transvaginal	Gynecology and Obsterics
3	TL40	7.5MHz	High-frequency linear array probe (L=40)	Surface	Superficial organ
4	TP16	3.0MHz	Phased array probe	Surface	Cardiology

TC50, TC10, TL40 probes all support B-mode, B + B-mode, 4B-mode, B / M mode, M mode, Color mode, PD mode, PW mode and B + Color + PW mode; TP16 supports CW mode in addition to the above modes.

12.1.3Probe Usage

Warning

- **DO NOT use any probe not provided by the manufacturer, otherwise the host and probe will be damaged. In serious cases, fire and other accidents may result.**
- **Use the probe with care. Stop use immediately if the probe appears to be malfunctioning. Otherwise, electric shock and burns may result.**
- **Carefully inspect the probe sheath for damage or breakage before using. Do not use a protective cover with holes or cracks to prevent infection.**
- **DO NOT use mineral oils, oily coupling agents, gels with any type of detergent or softener, and other unapproved materials to replace coupling agent supplied or recommended by the manufacturer. Otherwise, probe damage may result.**

Perform the following steps:

1. Check the probe. The probe may have potential damage during use and cleaning. Therefore, the following checks should be performed on the probe before use to ensure:
   - No cracks on the probe
   - No cracks on the front part of the probe
   - No scratch on the lens surface
   - No expansion on the lens surface

- No cracks or any other damage on the cable sheath
- No cracks or any other damage on the connector
- No bent or broken pins
- No cable damage

2. Connect the probe to the ultrasound system. Refer to “3.6.1 Connect the Probe” for details.
3. A protective probe sheath should be selected when using an intracavity probe and the proper sterility method should be used throughout the operating procedure.
   1) Remove the package, take out and unfold the probe sheath.
   2) Add an appropriate amount of coupling gel to the probe sheath.
   3) Insert the probe into the sheath.
   4) Fit the sheath by hand and ensure the cover is free from creases and bubbles.
   5) Secure the sheath with an elastic band.
   6) Check the probe sheath to ensure there is no hole or crack.

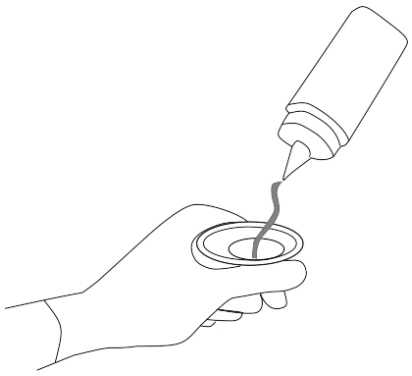


Figure 45 Add Coupling Gel into the Probe Sheath

4. Recognize the direction of probe and perform the exam.
5. After completing each exam, clean and disinfect the probe as required. Remove the probe sheath and dispose the sheath in accordance with the medical specifications for biohazardous waste.

12.1.4Probe Cleaning

After completing each exam, the probe and reusable parts should be thoroughly disinfected or sterilized as required.

Warning

- **Prior to clean the probe, disconnect the probe from the ultrasonic system to avoid electric shock.**
- **When clean the probe, avoid impacting the probe with sharp or hard objects.**
- **Always wear sterile gloves and to prevent infection.**

After each exam, the probe should be cleaned as required:

1. Disconnect the probe from the ultrasound system (refer to “3.6.2 Remove the Probe” for details) and remove the probe sheath and bracket.
2. Rinse the probe with running water and remove all foreign matters. A soft cotton ball or gauze is also preferred to wipe the surface of the probe. If the stain is dry on the surface of the probe, extend the rinse time or scrub with a gauze. Avoid using a brush, for it may damage the probe.
3. Wipe off the water on the probe with a sterile cloth after washing and naturally dry for later use.

12.1.5Probe Disinfection

After each exam, the probe and reusable parts should be thoroughly disinfected or sterilized as required.

Warning

- **It is recommended to use the disinfectant listed in this manual and ensure that its concentration and probe immersion time meet the recommended requirements. Fail to do so may damage the probe and void the probe warranty; if the user has special purpose and requirements, ensure that the formulated solution concentration and probe immersion time are appropriate for the intended clinical use.**
- **The probe must be disinfected with a liquid chemical disinfectant that complies with local regulations.**
- **DO NOT use high pressure steam or ethylene oxide to contact with the probe.**
- **DO NOT sterilize the probe by heating under any circumstances. If the temperature exceeds 66 ℃, the probe will be damaged.**
- **DO NOT allow any disinfectant to air dry on the probe.**
- **Before disinfecting the probe, please pay attention to the expiration date of the disinfectant and never use expired disinfectant.**
- **Always wear sterile gloves and to prevent infection.**

12.1.5.1 Disinfection Level Definition

The disinfection category can be divided into the following two categories based on the application of the probe.

Table 57 Disinfection Category

Disinfection level	Application scope	Application probe
High Level Disinfection	Contact with mucous membranes or damaged skin	Intraoperative probe
low level disinfection	Only contact with intact skin	Surface probe

12.1.5.2 Immersion Disinfection Limit

Never immerse the probe deeper than the line shows below for sterilization.

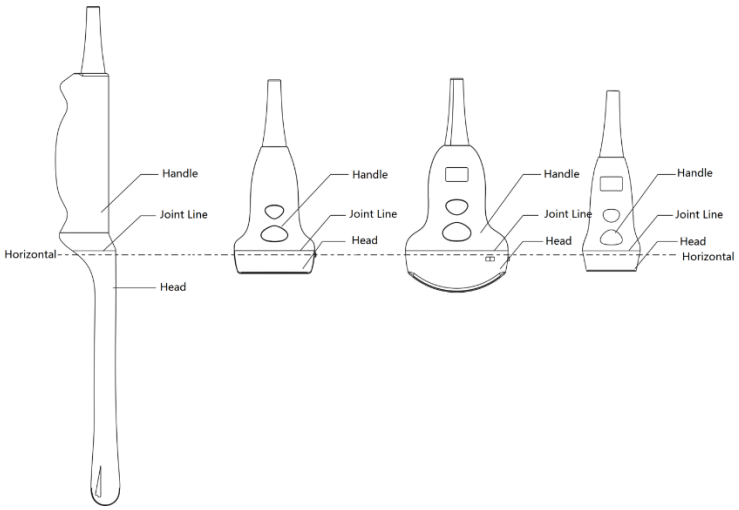


Figure 46 Immersion limitation for Different Probe Type

12.1.5.3 Disinfection for Surface Probe

After each exam, the surface probe should be disinfected as required.

Perform the following steps:

1. Rinse the probe. Refer to “12.1.4 Probe Cleaning” for details.
2. Disinfect the probe according to the low-level disinfection method recommended in the table below.

Table 58 Low-level Disinfection

Disinfectant	Manufacturer	Active ingredient	Concentration	Manner of contact	Contact time
Cidex	J&J	Glutaraldehyde	2.4%	Wipe/soak	<20min
ResertXLHLD	STERIS	Hydrogen Peroxide	2.0%	Wipe/soak	<8min
Glutaraldehyde	HUANKAI Inc.	Glutaraldehyde	2.0-2.2%	Wipe/soak	<20min
T-spray Ⅱ	Pharm. Inc.	Quaternary ammonium salt	/	Spray / wipe	<10min
T-spray	Pharm. Inc.	Quaternary ammonium salt	/	Spray / wipe	<10min

3. When reach the recommended disinfection time, remove the probe from the solution or stop spraying or wiping the probe.
4. Rinse the disinfectant on the probe with running water and dry the probe with a sterile cloth.

NOTE :
- **The recommended disinfectants listed in this manual are recommended because they are chemically compatible with the materials of the products to be sterilized, not because of their biological effects. For the biological effects of disinfectants, please refer to the guidance and recommendations provided by the disinfectant manufacturer, the US Food and Drug Administration, and the US Centers for Disease Control.**

- **If the disinfectant recommended in this manual is not selected, prepare the solution according to the disinfectant manufacturer's instructions.**

12.1.5.4 Disinfection for Intracavitary Probe

Before and after each exam, the intracavitary probe should be disinfected as required.

Perform the following steps:

1. Rinse the probe. Refer to "12.1.4 Probe Cleaning" for details.
2. Disinfect the probe according to the high-level disinfection method recommended in the table below.

Table 59 High-level Disinfection

Disinfectant	Manufacturer	Active Ingredient	Concentration	Manner of	Contact time
Cidex	J&J	Glutaraldehyde	2.4%	Soak	45-50min
ResertXLHLD	STERIS	Hydrogen Peroxide	2.0%	Soak	8min
Glutaraldehyde	HUANKAI Inc.	Glutaraldehyde	2.0-2.2%	Soak	45-50min

3. When reach the recommended disinfection time, remove the probe from the solution or stop spraying or wiping the probe.
4. Rinse the disinfectant on the probe with running water and dry the probe with a sterile cloth.

NOTE :

- **The recommended disinfectants listed in this manual are recommended because they are chemically compatible with the materials of the products to be sterilized, not because of their biological effects. For the biological effects of disinfectants, please refer to the guidance and recommendations provided by the disinfectant manufacturer, the US Food and Drug Administration, and the US Centers for Disease Control.**
- **If the disinfectant recommended in this manual is not selected, prepare the solution according to the disinfectant manufacturer's instructions.**

12.1.6Probe Maintenance

The probe should be used, stored or transported under the conditions of "Appendix A Technical Specifications".

12.1.6.1 Probe Transportation

To properly store the probe for transportation, please perform the following steps:

1. Prior to place the probe in the shipping container, make sure the probe is cleaned and sanitized to avoid contaminating the liner foam of the shipping container.
2. Carefully place the probe in the probe box.
3. Ensure the probe is totally in the box before covering the probe box.
4. Wrap the probe box in a plastic material with air bag (such as foam) and place the wrapped probe box into the cardboard box.

12.1.6.2 Probe Storage

To protect the probe, follow the guidelines below:

- Place the probe in the probe holder when the probe is temporarily idle.
- If the probe is not used for a long time, clean and disinfect the probe to ensure that the probe is completely dry before storing in the probe box.
- Prior to place the probe, make sure the probe holder is clean and dry.
- Separately store the probe from other medical devices.

12.2 Biopsy Guidance

Warning

- **Physicians who use this system for biopsy must undergo professional ultrasound guidance training and strictly observe the operation requirements of biopsy to avoid unnecessary harm to patients.**
- **Before a biopsy procedure is performed, confirm that the needle-guided bracket is in good condition, and the biopsy guide line and the bracket must be calibrated.**
- **The biopsy guide line displayed on the ultrasound image is for reference only. During biopsy procedure, the operator should always monitor the position of the needle and confirm the correct needle position.**
- **DO NOT freeze the image during the biopsy procedure to avoid positioning errors.**
- **The operator should maintain a high concentration of attention during the biopsy procedure to avoid medical accidents.**
- **Sterile gloves should be worn when performing biopsy procedure.**
- **Never reuse the biopsy needle.**
- **A sterilized probe with sheath must be used during the biopsy procedure.**

Calibrate the guide line is necessary before each biopsy procedure or changing biopsy angle.

Perform the following steps:

1. Install the needle-guided bracket.
2. Place the head of the probe in a liquid tank with sterile water.
3. Insert the puncture needle along the needle-guided bracket until the tip of the puncture needle is at the maximum depth of the water.
4. In B-mode, select **[Biopsy]** by pressing the **[◀]** or **[▶]** button on the control panel and then press the **[Value]** knob to enter the Biopsy screen. Use **[◀]** or **[▶]** button to switch between B mode menu and biopsy menu.
5. Select desired item in the biopsy menu by by pressing the **[◀]** or **[▶]** button on the control panel and then press the **[Value]** knob to activate the item.

Item	Description
Biopsy Kit	Select bracket kit and angle
Calibrate	Click to enter the biopsy calibration screen
Double Line	Click to enable / disable double guide line function
Line Type	Select the biopsy guide line type
Exit	Exit the biopsy screen

6. Select **[Biopsy Kit]** by pressing the **[◀]** or **[▶]** button on the control panel and then rotate the **[Value]** knob to select appropriate kit and angle.
7. Select **[Calibrate]** by pressing the **[◀]** or **[▶]** button on the control panel and then press the **[Value]** knob to enter the Biopsy Calibration screen.
8. Verify that the needle displayed on the ultrasound image matches the guide line. If not, adjust the guide line angle and position.

   - Select **[Pos]** by pressing the **[◀]** or **[▶]** button on the control panel and then rotate the **[Value]** knob to adjust the guide line position.
   - Select **[Angle]** by pressing the **[◀]** or **[▶]** button on the control panel and then rotate the **[Value]** knob to adjust the guide line angle.

9. After calibration, select **[Save]** by pressing the **[◀]** or **[▶]** button on the control panel and then press the **[Value]** knob to to save the adjustment.

   - To restore the factory settings, select **[Restore]** by pressing the **[◀]** or **[▶]** button on the control panel and then press the **[Value]** knob.
   - In the Biopsy screen, select **[Restore]** by pressing the **[◀]** or **[▶]** button on the control panel and then press the **[Value]** knob to return to B-mode.

13 System Maintenance

To avoid the long-term exposure to dust and moisture which may result in poor performance and safety of the system, routine system maintenance should be performed by the user.

Warning **When cleaning the system, pay special attention not to let liquid enter any part of the system. Otherwise, electric shock may result. If liquid is accidentally into the system, stop cleaning the system immediately and shut down the system, contact the manufacturer Customer Service Department or sales representative.**

NOTE :

- **Before cleaning procedure, shut down the system and unplug the power cord. Otherwise, electric shock may result.**
- **Maintenance shall be taken regularly to ensure the performance of the system, and ensure that the system is well grounded and meets the safety requirements.**
- **Except for the basic cleaning and maintenance described in this section, only personnel authorized by the manufacturer may perform other maintenance.**

13.1 External Cleaning

Perform the following steps:

1. Shutdown and unplug the system.
2. Apply a few drops of 75% alcohol to moist a piece of lint-free cloth.
3. Gently wipe the console with the lint-free cloth.

   NOTE : Do not use cleaners or other cleaning fluids to clean the surface of the monitor.
4. Use a cotton swab to remove dirt from the control panel buttons to ensure that solid material does not fall into the console.
5. If blood or other infectious materials contact with the buttons or other parts of the system, wipe them with a 70% isopropyl alcohol solution.

13.2 Safety Check

To guarantee a high degree of operational reliability, regular inspection of the system by the maintenance and operating personnel is necessary for the following:

Table 60 Safety Checklist

No.	Item	Check item
1	Electrical safety	Inspect the cables for being broken or cracked.
		Check the grounding impedance.

No.	Item	Check item
		Check the leakage current.
		Check the patient leakage current.
		Check the patient auxiliary leakage current.
2	Mechanical Safety	Check the appearance.
		Check the control panel and keyboard.
		Check the knob and button.
		Check the ports.
3	Image Recording	Check display of each mode.
		Check parameter of each mode.
		Check image and record.

NOTE : Liquid or other substances penetrating into the electronic components under the panel may result intermittent failure of the control panel and keyboard. Visually inspect for potential problems.

13.3 Troubleshooting

Table 61 Troubleshooting

No.	Failure	Measure
1	Power-on failure	● Check if the power cord is properly plugged into the power connector. ● Check if the AC power is turned on.
2	No display on the monitor	● Check if the monitor is getting power.
3	The buzzer alarms and the button do not function	● Check if there is any button stuck on the control panel. If so, press the button to release the stuck button, and check if there is dirt under the stuck button and clean it promptly.
4	Abnormal image quality	● Check if the appropriate probe and mode are selected. ● Check if the relevant parameters are adjusted. For details, please refer to“6 Optimizing the Image”. ● Check the related settings. For details, see “4.2.2 General”.
5	Missing of application measurement item	● Check if the selected probe is applicable for current exam. ● Check if the application item is added.

When the above failures occur, and the corresponding measures still cannot solve, please contact the manufacturer or authorized personnel for further support. In the case of more difficult problems with individual functions, please contact the manufacturer or authorized

personnel.

13.4 Disposal

When the system, probe, needle-guide bracket and other accessories reach the end of their service period, they shall be disposed according to the regulations on waste electrical and electronic equipment (WEEE) or local regulations.

Refer to manufacturer or supplier for information on disposal or recycle.

The manufacturer does not assume liability for any damage caused by unauthorized handling of the system without consulting.

13.5 After Sales Service

Service should only be performed by a qualified technical personnel authorized by the manufacturer.

Annex A. Technical Specifications

Standard Reference	IEC 60601-1:2005/A1:2012	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance
	IEC 60601-1-2:2014	General requirements for basic safety and essential performance-Collateral standard: Electromagnetic compatibility-Requirements and tests
	EN 62304:2006/AC:2008	Medical device software - Software life-cycle processes
	IEC 60601-2-37:2007+AMD1:2015	Medical electrical equipment-Part 2-37: Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment
	ISO10993-1:2009/AC:2010	Biological evaluation of medical devices –part 1:Guidance on Selection of Tests
	EN ISO 13485:2016	Medical devices - Quality management systems - Requirements for regulatory purposes
	EN ISO14971:2012	Medical devices-Application of risk management to medical devices
	EN1041:2008	Information supplied by the manufacturer with medical devices
	EN ISO 15223-1:2016	Medical devices - Symbols to be used with medical device labels, labelling and information to be supplied
	EN 62366:2008	Medical devices - Application of usability engineering to medical devices
	EN 60601-1-6:2010	Medical electrical equipment - Part 1-6: General requirements for basic safety and essential performance - Collateral standard: Usability
	/	Provisions on the Management of Instructions and Labels of Medical Devices (CFDA Notice No.6)
Safety Classification	Electrical shock	Class I equipment with internal power supply
	Degree of shock	Type BF Equipment
	Operating mode	Continuous
	EMC	CISPR 11 Class A
	Installation and usage	Mobile equipment
	Degree of protection, ingress	Console : IPX0 Probe : IPX7
	Flammable mixtures	Not for use in presence of flammable anesthetic mixture with oxygen or nitrous oxide.

		Store the product in a dry and well-ventilated room. External grounding protection must be used to reduce possible external AC interference.	
Environment Requirements	/	Operating	Transport and storage
	Relative humidity	25%~80%	10%~95%, Non-condensing
	Ambient temperature	5℃~+40℃	-20℃~+55℃
	Atmospheric pressure	70kPa~106kPa	50kPa~106kPa
Hardware/ Software	Hardware Configuration	1) CPU: Intel Atom E3845 2) Graphics card: Intel integrated graphics support 3) Chip: Intel Atom(Bay Trail) 4) Memory: 8G DDR3L 5) Hard disk: 500GB mechanical hard disk	
	Software Configuration	Operating system: Xubuntu 16.04.2 LTS 64 bit Kernel version: 4.8.0	
	Software version	Issue version: V2	
Network	Data type	Healthy data	Device data
	Function	Electronic data interchange (bidirectional)	Electronic data interchange (unidirectional)
	Used for	Clinical images and patient information	Software upgrade
	Exchange method	Wired network (10M / 100M / 1000M adaptive), USB	USB
	Safety software	/	/
Specification	Monitor	12.1"LCD	
	Dimension	470*370*380mm	
	Weight	About 7.5kgs	
Power Requirement	Power supply	AC 100V-240V	
	Power supply frequency	50Hz/60Hz	
	Output Voltage	19V	
Battery	Voltage	14.52V	
	Capacity	2600mAh	

Annex B. EMC Statement

WARNING:

Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this the Ultrasound machine could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the Ultrasound machine, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result

NOTE

The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Guidance and manufacturer´s declaration – electromagnetic emission –for all EQUIPMENT AND SYSTEMS

<table>
<tr><td>1</td><td colspan="3">Guidance and manufacturer´s declaration – electromagnetic emission</td></tr>
<tr><td>2</td><td colspan="3">The ulyrasound machine is intended for use in the electromagnetic environment specified below. The customer or the user of ultrasound machine should assure that it is used in such an environment.</td></tr>
<tr><td>3</td><td>Emissions test</td><td>Compliance</td><td>Electromagnetic environment - guidance</td></tr>
<tr><td>4</td><td>RF emissions

CISPR 11</td><td>Group 1</td><td>The ultrasound machine uses RF energy only for its internal function. There for, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td></tr>
<tr><td>5</td><td>RF emissions
CISPR 11</td><td>Class A</td><td rowspan="3">The ultrasound machine is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.</td></tr>
<tr><td>6</td><td>Harmonic emissions
IEC 61000-3-2</td><td>Class A</td></tr>
<tr><td>7</td><td>Voltage fluctuations

flicker emissions

IEC 61000-3-3</td><td>Complies</td></tr>
</table>

The approved annex which meets the electromagnetic standard:

Accessories for Ultrasound System may affect their radiation levels. The accessories listed in this section have been tested in accordance with international standards for use in Ultrasound System and have been verified to meet radiation standards. Please use only the attachments listed in this section.

The user should ensure the electromagnetic compatibility of the Ultrasound System when attaching accessories to Ultrasound System. Unless otherwise specified, use only EMC compliant equipment.

No.	Item	Cable length	Shield or not
1	Power cable	2 m	No
2	Probe cable	<3 m	Yes

Warning

- This equipment is only used by professional medical staff. The equipment/system may cause radio interference or disrupt the operation of nearby equipment. Mitigation measures may be necessary, such as recalibrating the direction, resetting the device or shielding the appropriate site.

Guidance and manufacturer's declaration – electromagnetic immunity –for all EQUIPMENT and SYSTEMS

Guidance and manufacturer´s declaration – electromagnetic immunity			
The ultrasound machine is intended for use in the electromagnetic environment specified below. The customer or the user of the ultrasound machine should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	± 8air kV contact ± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV	± 8 kV contact ± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrostatic transient / burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.

Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0 % UT; 0,5 cycle g) At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0 % UT; 1 cycle and 70 % UT; 25/30 cycles Single phase: at 0° 0 % UT; 250/300 cycle	0 % UT; 0,5 cycle g) At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0 % UT; 1 cycle and 70 % UT; 25/30 cycles Single phase: at 0° 0 % UT; 250/300 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the ultrasound machine requires continued operation during power mains interruptions, it is recommended that the ultrasound machine be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a. c. mains voltage prior to application of the test level.			

Guidance and manufacturer´s declaration – electromagnetic immunity –for EQUIPMENT and SYSTEM

<table>
<tr><td colspan="4">Guidance and manufacturer´s declaration – electromagnetic immunity</td></tr>
<tr><td colspan="4">The ultrasound machine is intended for use in the electromagnetic environment specified below. The customer or the user of the ultrasound machine should assure that it is used in such an environment.</td></tr>
<tr><td>Immunity test</td><td>IEC 60601 test level</td><td>Compliance level</td><td>Electromagnetic environment - guidance</td></tr>
<tr><td>Conducted RF

IEC 61000-4-6

Radiated RF

IEC 61000-4-3</td><td>3 Vrms

150 kHz to 80 MHz

6 V in ISM and amateur radio bands between 0,15 MHz and 80 MHz

10 V/m

80 MHz to 2.7 GHz

385MHz-5785MHz Test specifications for ENCLOSURE PORT IMMUNITY to</td><td>3V

150 kHz to 80 MHz

6 V in ISM and amateur radio bands between 0,15 MHz and 80 MHz

10 V/m

80 MHz to 2.7 GHz

385MHz-5785MHz Test specifications for ENCLOSURE PORT IMMUNITY to</td><td>Portable and mobile RF communications equipment should be used no closer to any part of the ultrasound machine, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.

Recommended separation distance
$d = [\frac{3.5}{V_1}]\sqrt{P}$

$d = [\frac{12}{V_2}]\sqrt{P}$

$d = [\frac{3.5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz

$d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2.7 GHz

where p is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m).b</td></tr>
</table>

	RF wireless communication equipment (Refer to table 9 of IEC 60601-1-2:2014)	RF wireless communication equipment (Refer to table 9 of IEC 60601-1-2:2014)	Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,a should be less than the compliance level in each frequency range.b Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic is affected by absorption and reflection from structures, objects and people.

a The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

b Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ultrasond machine is used exceeds the applicable RF compliance level above, the ultrasound machine should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the ultrasound machine.

c Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3V/m.

Recommended separation distances between portable and mobile RF communications equipment and the EQUIPMENT or SYSTEM - for EQUIPMENT and SYSTEMS

Recommended separation distances between

portable and mobile RF communications equipment and the ultrasound machine

The ultrasound machine is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ultrasound machine can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ultrasound machine as recommended below, according to the maximum output power of the communications equipment

Rated maximum output of transmitter W	Separation distance according to frequency of transmitter m			
	150 kHz to 80 MHz outside ISM and amateur radio bands $d = [\frac{3.5}{V_1}]\sqrt{P}$	150 kHz to 80 MHz in ISM and amateur radio bands $d = [\frac{12}{V_2}]\sqrt{P}$	80 MHz to 800 MHz $d = [\frac{3.5}{E_1}]\sqrt{P}$	800 MHz to 2.7 GHz $d = [\frac{7}{E_1}]\sqrt{P}$
0.01	0.12	0.20	0.035	0.07
0.1	0.38	0.63	0.11	0.22
1	1.2	2.00	0.35	0.70
10	3.8	6.32	1.10	2.21
100	12	20.00	35	70

For transmitters rated at a maximum output power not listed above the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Annex C. Toxic and Hazardous Substances or Elements

Parts	Toxic and harmful substances or elements					
	Plumbum (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium 6(Cr6+)	PBB	PBDE
Plastic case	○	○	○	○	○	○
Metal bracket	○	○	×	×	○	○
Keyboard silicone	○	○	○	○	○	○
Trackball	×	○	○	○	○	○
Cables	×	○	○	○	○	○
PCBA	×	○	○	○	○	○
Hard disk	○	○	○	○	○	○

○：Means that the content of the toxic and harmful substance in all homogeneous materials of the part is below the limit specified in local standard.

×：It means that the content of the toxic and harmful substance in at least one homogeneous material of the part exceeds the limit requirement specified in local standard.

For products sold since the date of sale, this table shows that products in our supply chain may contain these substances. Note: all listed components may or may not be included in the products sold.

Annex D. Acoustic Output Report

■ TC50(IEC60601-2-37:2007)

B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					Aaprt ≤ 1 cm^2	Aaprt > 1 cm^2		
Maximum index value			1.48	0.15				0.17
Associated acoustic parameters	p_{ra}		2.35					
	P			7.34				7.34
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		2.72					
	$d_{eq\ (zb)}$							
	f_{awf}		2.50	4.00				2.50
	Dim of A_{aprt}	X		3.46				3.46
		Y		0.90				0.90
Other information	t_d		0.812					
	prr		990					
	p_r @ max. I_{pi}		3.21					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		193					
	Focal Length	X cm		13.0				13.0
		Y cm		5.0				5.0
Operating control conditions	Focus position		3cm	13cm			13cm	13cm
	Display depth		6cm	21cm			21cm	21cm
	Acoustic power		100%	100%			100%	100%
	Focus number		one	1			1	1
	Working frequency		Pen	Res			Res	Pen
	Scan Line Mode		Lower-density line and minimum scan angle					

PW mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.22			0.42	3.66	2.27
Associated acoustic parameters	p_{ra}		1.93					
	P						72.9	72.9
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					22.3		
	z_s					1.10		
	z_{bp}					2.22		
	z_b						2.35	
	z@max. $I_{pi,\alpha}$		1.47					
	$d_{eq\ (zb)}$						0.26	
	f_{awf}		2.5			2.5	3.5	3.1
	Dim of A_{aprt}	X				13.5	0.77	0.38
		Y				8.76	0.90	0.90
Other information	t_d		1.86					
	p_{rr}		697					
	p_r @ max. I_{pi}		2.57					
	d_{eq} @ max. I_{pi}						0.25	
	$I_{pa,\alpha}$ @max. MI		219					
	Focal Length	X cm				13.0		
		Y cm				5.00		
Operating control conditions	Focus position		2cm	3cm			13cm	2cm
	Display depth		6cm	6cm			21cm	6cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		697	5699			697	5699
	Working frequency		Pen	Pen			Res	Gen
	SV		0.5mm	0.5mm			0.5mm	0.5mm

B+M mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.27	0.26			1.22	0.91
Associated acoustic parameters	p_{ra}		2.01					
	P						25.9	25.9
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					17.1		
	z_s					1.48		
	z_{bp}					2.98		
	z_b						2.01	
	z@max. $I_{pi,\alpha}$		2.76					
	$d_{eq\ (zb)}$						0.31	
	f_{awf}		2.5			2.0	2.0	
	Dim of A_{aprt}	X				10.6	0.58	
		Y				22.5	0.90	
Other information	t_d		0.76					
	p_{rr}		1000					
	p_r @ max. I_{pi}		2.17					
	d_{eq} @ max. I_{pi}						0.29	
	$I_{pa,\alpha}$ @max. MI		201					
	Focal Length	X		17.0		17.0		
		Y		5.0		5.0		
Operating control conditions	Focus position		3cm	2cm			17cm	2cm
	Display depth		6cm	6cm			21cm	6cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		1000	2000			1000	2000
	Working frequency		Pen	HPen			HPen	HPen
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+B/PDI+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.04	0.36				0.47
Associated acoustic parameters	p_{ra}		2.07					
	P			20.1				20.1
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		1.91					
	$d_{eq\ (zb)}$							
	f_{awf}		4.0					
	Dim of A_{aprt}	X						
		Y						
Other information	t_d		0.68					
	p_{rr}		2380					
	p_r @ max. I_{pi}		2.74					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		287					
	Focal Length	X cm						
		Y cm						
Operating control conditions	B Focus/Color Sampling Gate position		2cm	11cm			11cm	11cm
	Display depth		6cm	21cm			21cm	21cm
	Acoustic power		100%	100%			100%	100%
	Color PRF(Hz)		2380	2270			2270	3060
	B Working frequency		Res	Res			Gen	Gen
	C Working frequency		Res	Res			Gen	Gen
	Color Sampling Gate Width		minimum	minimum				
	Scan Line Mode		Lower-density line and minimum scan angle for B-mode and Color Sensitivity:2 for Color-mode					

PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.25	0.74			2.84	0.83
Associated acoustic parameters	p_{ra}		1.97					
	P						63.0	63.0
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					39.1		
	z_s					1.10		
	z_{bp}					2.22		
	z_b						3.12	
	z@max. $I_{pi,\alpha}$		1.89					
	$d_{eq\ (zb)}$						0.22	
	f_{awf}		2.5			3.1	3.5	
	Dim of A_{aprt}	X				9.29	0.96	
		Y				9.18	0.90	
Other information	t_d		0.67					
	p_{rr}		9100					
	p_r @ max. I_{pi}		2.23					
	d_{eq} @ max. I_{pi}						0.22	
	$I_{pa,\alpha}$ @max. MI		183					
	Focal Length	X cm		13.0		13.0		
		Y cm		5.00		5.00		
Operating control conditions	B Focus/SV position		2cm	4cm			13cm	17cm
	Display depth		6cm	21cm			21cm	21cm
	Acoustic power		100%	100%			100%	100%
	PW PRF(Hz)		690	4476			3756	690
	B Working frequency		Pen	Gen			Res	Gen
	PW Working frequency		Pen	Gen			Res	Gen
	PW SV		0.5mm	0.5mm				
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+PW+B mode

Index label			MI	TIS			TIB	MI
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.32	0.77			3.00	2.28
Associated acoustic parameters	p_{ra}		2.09					
	P				60.6		60.6	16.2
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						2.35	
	z@max. $I_{pi,\alpha}$		1.45					
	$d_{eq\ (zb)}$						0.26	
	f_{awf}		2.5		2.5		3.5	
	Dim of A_{aprt}	X			2.99		0.77	
		Y			6.89		0.90	
Other information	t_d		1.85					
	p_{rr}		698					
	p_r @ max. I_{pi}		2.23					
	d_{eq} @ max. I_{pi}						0.25	
	$I_{pa,\alpha}$ @max. MI		197					
	Focal Length	X cm			3.00			
		Y cm			5.00			
Operating control conditions	B Focus /PW SV /Color SG position		2cm	3cm			3cm	2cm
	Display depth		6cm	6cm			6cm	6cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		PW:698 C:14370	PW:12660 C:476			PW:698 C:11020	PW:15830 C:476
	B Working frequency		Pen	Res			Res	Res
	PW Working frequency		Pen	Pen			Res	Gen
	Color Working frequency		Pen	Res			Res	Res
	PW SV/Color SG		SV=0.5mm SG minimum					
	Scan Line Mode		Lower-density line and minimum scan angle					

■ TC50(IEC61157:2007)

Mode / Parameter	B	M	B+M	PW
System settings	AP:100% Focus:13cm Display:21cm	AP:100% Focus:9cm Display:21cm	AP:100% Focus:17cm Display:21cm	AP:100% Focus:13cm Display:21cm
pr (MPa)	2.38±0.40	2.30±0.38	2.31±0.39	2.23±0.37
Ispta (mW/cm2)	35.85±11.83	132.93±43.87	152.98±50.48	176.19±58.35
Iob (mW/cm2)	1.86±0.62	12.08±4.02	6.86±2.28	34.76±11.56
Power output (mW)	5.80±0.47	25.05±1.79	21.33±1.52	60.07±4.29
Output beam dimentions(ø)(mm)	19.90	16.25	19.90	14.83
Zp (mm)	2.70±0.25	2.70±0.25	2.70±0.25	1.45±0.25
W12 (//)(mm)	3.46±0.13	7.79±0.13	3.46±0.13	13.52±0.13
W12 (⊥) (mm)	0.90±0.13	10.45±0.13	0.90±0.13	8.76±0.13
fawf (MHz)	2.50±0.13	2.50±0.13	2.50±0.13	2.50±0.13
prr (Hz)	-	2000.00±1.00	1000.00±1.00	700.00±1.00
srr (Hz)	30.00±1.00	-	50.00±1.00	-
Ztt (mm)	1.13	1.13	1.13	1.13
Zts (mm)	contact	contact	contact	contact
Acoustic output freeze	Yes	Yes	Yes	Yes
Inclusive modes	-	-	-	B+PW/Color+PW+B

■ TP16(IEC60601-2-37:2007)

B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.36	0.41				0.68
Associated acoustic parameters	p_{ra}		1.83					
	P			32.9				32.9
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		1.36					
	$d_{eq\ (zb)}$							
	f_{awf}		1.8	2.0				3.0
	Dim of A_{aprt}	X		1.74				1.26
		Y		1.16				1.16
Other information	t_d		1.26					
	p_{rr}		2590					
	p_r @ max. I_{pi}		2.03					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		101					
	Focal Length	X cm		14.0				9.00
		Y cm		5.00				5.00
Operating control conditions	Focus position		2cm	14cm			14cm	9cm
	Display depth		20cm	20cm			20cm	20cm
	Acoustic power		100%	100%			100%	100%
	Focus number		1	1			1	1
	Working frequency		HPen	Pen			Pen	HRes
	Scan Line Mode		Lower-density line and minimum scan angle					

PW mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.36			1.29	2.97	2.54
Associated acoustic parameters	p_{ra}		2.15					
	P						114	114
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					90.9		
	z_s					1.10		
	z_{bp}					2.04		
	z_b						4.10	
	z@max. $I_{pi,\alpha}$		3.12					
	$d_{eq\ (zb)}$						0.37	
	f_{awf}		2.5			2.5	2.5	2.5
	Dim of A_{aprt}	X				5.89	1.08	1.38
		Y				9.77	1.16	1.16
Other information	t_d		1.38					
	p_{rr}		699					
	p_r @ max. I_{pi}		2.86					
	d_{eq} @ max. I_{pi}						0.34	
	$I_{pa,\alpha}$ @max. MI		277					
	Focal Length	X cm				9.00		
		Y cm				5.00		
Operating control conditions	Focus position		3cm	7cm			9cm	11cm
	Display depth		5cm	20cm			20cm	20cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		699	5699			5699	5699
	Working frequency		Res	Res			Res	Res
	SV		0.5mm	0.5mm			0.5mm	0.5mm

B+M mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.58	0.46			0.79	1.08
Associated acoustic parameters	p_{ra}		2.13					
	P						28.6	28.6
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					24.7		
	z_s					1.10		
	z_{bp}					2.04		
	z_b						3.97	
	z@max. $I_{pi,\alpha}$		1.36					
	$d_{eq\ (zb)}$						0.47	
	f_{awf}		1.8			2.0	3.0	
	Dim of A_{aprt}	X				8.85	1.20	
		Y				10.4	1.16	
Other information	t_d		1.22					
	p_{rr}		500					
	p_r @ max. I_{pi}		2.34					
	d_{eq} @ max. I_{pi}						0.45	
	$I_{pa,\alpha}$ @max. MI		135					
	Focal Length	X cm		9.00		9.00		
		Y cm		5.00		5.00		
Operating control conditions	Focus position		2cm	8cm			9cm	9cm
	Display depth		20cm	20cm			20cm	20cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		500	1000			500	500
	Working frequency		HPen	HPen-Gen			HRes	HRes
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+B /PDI+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.23	0.61				0.94
Associated acoustic parameters	p_{ra}		2.13					
	P			53.3				53.3
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		3.10					
	$d_{eq\ (zb)}$							
	f_{awf}		3.0					
	Dim of A_{aprt}	X						
		Y						
Other information	t_d		1.52					
	p_{rr}		1190					
	p_r @ max. I_{pi}		2.78					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		261					
	Focal Length	X cm						
		Y cm						
Operating control conditions	B Focus/ Color Sampling Gate position		3cm	10cm			10cm	5cm
	Display depth		5cm	20cm			20cm	20cm
	Acoustic power		100%	100%			100%	100%
	Color PRF(Hz)		1190	1200			1200	1133
	B Working frequency		Gen	Res			Res	Gen
	C Working frequency		Gen	Res			Res	Gen
	Color Sampling Gate Width		minimum	minimum				
	Scan Line Mode		Lower-density line and minimum scan angle for B-mode and Color Sensitivity:2 for Color-mode					

PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.05	1.22			2.75	2.72
Associated acoustic parameters	p_{ra}		1.81					
	P						120	120
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					96.8		
	z_s					1.19		
	z_{bp}					2.04		
	z_b						4.70	
	z@max. $I_{pi,\alpha}$		4.23					
	$d_{eq\ (zb)}$						0.42	
	f_{awf}		3.0			2.5	2.5	
	Dim of A_{aprt}	X				8.57	1.26	
		Y				10.3	1.16	
Other information	t_d		1.41					
	p_{rr}		699					
	p_r @ max. I_{pi}		2.67					
	d_{eq} @ max. I_{pi}						0.40	
	$I_{pa,\alpha}$ @max. MI		231					
	Focal Length	X cm		9.00		9.00		
		Y cm		5.00		5.00		
Operating control conditions	B Focus/SV position		7cm	9cm			9cm	9cm
	Display depth		20cm	20cm			20cm	20cm
	Acoustic power		100%	100%			100%	100%
	PW PRF(Hz)		699	2305			2305	2305
	B Working frequency		Gen	Gen			Gen	Gen
	PW Working frequency		Res	Res			Res	Res
	PW SV		0.5mm	0.5mm				
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.37	1.40			2.58	2.11
Associated acoustic parameters	p_{ra}		2.74					
	P				81.2		81.2	59.4
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						3.28	
	z@max. $I_{pi,\alpha}$		1.51					
	$d_{eq\ (zb)}$						0.44	
	f_{awf}		4.0		2.5		2.5	
	Dim of A_{aprt}	X			4.78		0.84	
		Y			11.0		1.16	
Other information	t_d		0.47					
	p_{rr}		7010					
	p_r @ max. I_{pi}		3.16					
	d_{eq} @ max. I_{pi}						0.39	
	$I_{pa,\alpha}$ @max. MI		409					
	Focal Length	X cm			3.00			
		Y cm			5.00			
Operating control conditions	B Focus/PW SV/Color SG position		3cm	3cm			3cm	3cm
	Display depth		20cm	5cm			5cm	5cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		PW: 699 C:7077	PW: 8713 C:365			PW: 699 C:11454	PW: 699 C:10817
	B Working frequency		Res	Gen			Res	Gen
	PW Working frequency		Gen	Res			Res	Res
	Color Working frequency		Res	Gen			Res	Gen
	PW SV/Color SG		SV=0.5mm SG minimum					
	Scan Line Mode		Lower-density line and minimum scan angle					

CW mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			0.092			0.92	3.23	2.16
Associated acoustic parameters	p_{ra}		0.13					
	P						103	103
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					85.3		
	z_s					1.20		
	z_{bp}					1.78		
	z_b						3.50	
	z@max. $I_{pi,\alpha}$		3.08					
	$d_{eq\ (zb)}$						0.49	
	f_{awf}		2.0			2.0	2.0	2.0
	Dim of A_{aprt}	X				0.96	0.96	6.15
		Y				1.16	1.16	10.2
Other information	t_d							
	p_{rr}		200000					
	p_r @ max. I_{pi}		0.16					
	d_{eq} @ max. I_{pi}						0.44	
	$I_{pa,\alpha}$ @max. MI		0.41					
	Focal Length	X cm				5.00		
		Y cm				5.00		
Operating control conditions	Focus position		5cm	5cm			5cm	5cm
	Display depth		0cm	0cm			0cm	0cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		200000	200000			200000	200000
	Working frequency		3.3MHz	3.3MHz			3.3MHz	3.3MHz

■ TP16(IEC61157:2007)

Mode / Parameter	B	M	B+M	PW	CW
System settings	AP:100% Focus:14cm Display:20cm	AP:100% Focus:9cm Display:20cm	AP:100% Focus:9cm Display:20cm	AP:100% Focus:9cm Display:20cm	AP:100% Focus:5cm Display:0cm
pr (MPa)	1.60±0.27	2.43±0.41	1.77±0.30	1.95±0.32	0.11±0.02
Ispta (mW/cm2)	80.12±26.58	149.32±49.46	117.40±38.95	274.08±90.56	354.25±117.14
Iob (mW/cm2)	14.78±4.87	52.38±17.42	18.23±6.74	64.27±21.37	76.14±25.32
Power output (mW)	29.83±1.68	76.55±5.47	26.64±4.72	93.93±6.71	84.79±6.06
Output beam dimentions(ø)(mm)	16.03	13.64	13.64	13.64	11.91
Zp (mm)	1.35±0.25	1.66±0.25	1.38±0.25	3.12±0.25	3.08±0.25
W12 (//)(mm)	1.74±0.13	9.26±0.13	1.26±0.13	5.89±0.13	5.00±0.13
W12 (⊥) (mm)	1.16±0.13	10.63±0.13	1.16±0.13	9.77±0.13	1.16±0.13
fawf (MHz)	2.00±0.08	1.99±0.08	1.98±0.08	2.59±0.10	1.99±0.07
prr (Hz)	-	1000.00±1.00	500.00±1.00	5700.00±1.00	200000.00±1.00
srr (Hz)	305.00±1.00	-	125.00±1.00	-	-
Ztt (mm)	2.15	2.15	2.15	2.15	2.15
Zts (mm)	contact	contact	contact	contact	contact
Acoustic output freeze	Yes	Yes	Yes	Yes	Yes
Inclusive modes	-	-	-	B+PW/Color+PW+B	

■ TL40(IEC60601-2-37:2007)

B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.29	1.65				0.94
Associated acoustic parameters	p_{ra}		2.88					
	P			59.3				59.3
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		1.63					
	$d_{eq\ (zb)}$							
	f_{awf}		5.0	7.5				7.5
	Dim of A_{aprt}	X		2.76				2.76
		Y		0.70				0.70
Other information	t_d		0.258					
	p_{rr}		4100					
	p_r @ max. I_{pi}		3.91					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		566					
	Focal Length	X cm		12.0				12.0
		Y cm		3.0				3.0
Operating control conditions	Focus position		1.5cm	12cm			12cm	12cm
	Display depth		15cm	15cm			15cm	15cm
	Acoustic power		100%	100%			100%	100%
	Focus number		1	1			1	1
	Working frequency		Pen	Gen			Pen	Gen
	Scan Line Mode		Lower-density line and minimum scan angle					

PW mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.52			0.656	2.55	1.06
Associated acoustic parameters	p_{ra}		3.23					
	P						27.9	27.9
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					25.2		
	z_s					1.00		
	z_{bp}					1.90		
	z_b						0.954	
	z@max. $I_{pi,\alpha}$		0.347					
	$d_{eq\ (zb)}$						0.171	
	f_{awf}		4.5			5.0	5.0	5.0
	Dim of A_{aprt}	X				17.1	0.72	0.36
		Y				4.30	0.70	0.70
Other information	t_d		0.901					
	p_{rr}		698					
	p_r @ max. I_{pi}		3.40					
	d_{eq} @ max. I_{pi}						0.171	
	$I_{pa,\alpha}$ @max. MI		358					
	Focal Length	X cm				12.0		
		Y cm				3.0		
Operating control conditions	Focus position		0.5cm	1cm			12cm	0.5cm
	Display depth		3cm	3cm			15cm	3cm
	Acoustic power		100%	100%			100%	100%
	Focus number		698	5699			698	5699
	Working frequency		Pen	Res			Res	Pen
	Scan Line Mode		0.5mm	0.5mm			0.5mm	0.5mm

B+M mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.18	1.08			1.08	0.702
Associated acoustic parameters	p_{ra}		2.73					
	P						4.68	4.68
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					7.15		
	z_s					1.00		
	z_{bp}					2.35		
	z_b						1.59	
	z@max. $I_{pi,\alpha}$		1.62					
	$d_{eq\ (zb)}$						0.152	
	f_{awf}		5.3			5.0	6.0	
	Dim of A_{aprt}	X				16.0	0.72	
		Y				3.88	0.70	
Other information	t_d		0.496					
	p_{rr}		2400					
	p_r @ max. I_{pi}		3.57					
	d_{eq} @ max. I_{pi}						0.152	
	$I_{pa,\alpha}$ @max. MI		271					
	Focal Length	X cm		12.0		12.0		
		Y cm		3.00		3.00		
Operating control conditions	Focus position		1.5cm	1.5cm			12cm	12cm
	Display depth		16cm	16cm			16cm	16cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		500	1000			1000	1000
	Working frequency		HGen	Pen			Gen	Gen
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+B/PDI+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.64	1.58				1.62
Associated acoustic parameters	p_{ra}		3.67					
	P			59.8				59.8
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		1.09					
	$d_{eq\ (zb)}$							
	f_{awf}		5.0					
	Dim of A_{aprt}	X						
		Y						
Other information	t_d		0.352					
	p_{rr}		2700					
	p_r @ max. I_{pi}		4.41					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		683					
	Focal Length	X cm						
		Y cm						
Operating control conditions	B Focus/Color Sampling Gate position		1cm	12cm			12cm	12cm
	Display depth		3cm	15cm			15cm	15cm
	Acoustic power		100%	100%			100%	100%
	Color PRF(Hz)		2700	2040			2040	2040
	B Working frequency		Res	Pen			Pen	Pen
	C Working frequency		Res	Pen			Pen	Pen
	Color Sampling Gate Width		minimum	minimum				
	Scan Line Mode		Lower-density line and minimum scan angle for B-mode and Color Sensitivity:2 for Color-mode					

PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.43	0.348			2.69	0.97
Associated acoustic parameters	p_{ra}		3.19					
	P						27.5	27.5
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]					12.5		
	z_s					1.00		
	z_{bp}					1.90		
	z_b						0.954	
	z@max. $I_{pi,\alpha}$		0.345					
	$d_{eq\ (zb)}$						0.16	
	f_{awf}		5.0			6.2	4.5	
	Dim of A_{aprt}	X				16.5	0.72	
		Y				2.93	0.70	
Other information	t_d		0.907					
	p_{rr}		699					
	p_r @ max. I_{pi}		3.34					
	d_{eq} @ max. I_{pi}						0.16	
	$I_{pa,\alpha}$ @max. MI		354					
	Focal Length	X cm		12.0		12.0		
		Y cm		3.00		3.00		
Operating control conditions	B Focus/SV position		0.5cm	1cm			12cm	12cm
	Display depth		3cm	15cm			15cm	15cm
	Acoustic power		100%	100%			100%	100%
	PW PRF(Hz)		699	5070			699	699
	B Working frequency		Pen	Res			Pen	Res
	PW Working frequency		Pen	Res			Pen	Res
	PW SV		0.5mm	0.5mm				
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.46	1.74			1.97	2.35
Associated acoustic parameters	p_{ra}		3.27					
	P				16.2		16.2	58.1
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						0.954	
	z@max. $I_{pi,\alpha}$		0.341					
	$d_{eq\ (zb)}$						0.129	
	f_{awf}		5.0		5.0		5.0	
	Dim of A_{aprt}	X			1.2		0.72	
		Y			6.44		0.70	
Other information	t_d		0.902					
	p_{rr}		699					
	p_r @ max. I_{pi}		3.40					
	d_{eq} @ max. I_{pi}						0.129	
	$I_{pa,\alpha}$ @max. MI		353					
	Focal Length	X cm			1.00			
		Y cm			3.00			
Operating control conditions	B Focus/ PW SV/ Color SG position		0.5cm	1cm			1cm	0.5cm
	Display depth		3cm	3cm			3cm	3cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		PW:699 C:12470	PW:22995 C:249			PW:699 C:16799	PW:699 C:8799
	B Working frequency		Pen	Res			Gen	Gen
	PW Working frequency		Pen	Res			Res	Res
	Color Working frequency		Pen	Res			Gen	Gen
	PW SV/Color SG		SV=0.5mm SG minimum					
	Scan Line Mode		Lower-density line and minimum scan angle					

■ TL40 (IEC61157:2007)

Mode / Parameter	B	M	B+M	PW
System settings	AP:100% Focus:12cm Display:16cm	AP:100% Focus:12cm Display:16cm	AP:100% Focus:12cm Display:16cm	AP:100% Focus:12cm Display:16cm
pr (MPa)	2.60±0.43	2.72±0.45	2.50±0.42	2.79±0.47
Ispta (mW/cm2)	13.11±4.33	107.88±35.57	61.79±20.43	187.83±62.38
Iob (mW/cm2)	30.52±10.04	5.08±1.69	12.03±4.75	18.24±6.07
Power output (mW)	58.97±3.01	9.81±0.70	23.23±5.22	22.98±1.64
Output beam dimentions(ø)(mm)	15.68	15.68	15.68	12.67
Zp (mm)	1.65±0.25	2.04±0.25	1.67±0.25	0.35±0.25
W12 (//)(mm)	2.76±0.13	16.84±0.13	2.76±0.13	17.13±0.13
W12 (⊥) (mm)	0.70±0.13	3.28±0.13	0.70±0.13	4.30±0.13
fawf (MHz)	5.00±0.19	5.00±0.21	5.00±0.15	4.50±0.16
prr (Hz)	-	2000.00±1.00	1000.00±1.00	700.00±1.00
srr (Hz)	34.00±1.00	-	16.00±1.00	-
Ztt (mm)	0.87	0.87	0.87	0.87
Zts (mm)	contact	contact	contact	contact
Acoustic output freeze	Yes	Yes	Yes	Yes
Inclusive modes	-	-	-	B+PW/Color+PW+B

■ TC10(IEC60601-2-37:2007)

B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.30	0.068				0.14
Associated acoustic parameters	p_{ra}		3.19					
	P			3.18				3.18
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		1.12					
	$d_{eq\ (zb)}$							
	f_{awf}		6.0	4.7				4.5
	Dim of A_{aprt}	X		1.30				0.78
		Y		0.50				0.50
Other information	t_d		0.29					
	p_{rr}		4000					
	p_r @ max. I_{pi}		3.67					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		276					
	Focal Length	X cm		12.0				4.5
		Y cm		3.0				3.0
Operating control conditions	Focus position		1cm	12cm			12cm	4.5cm
	Display depth		3cm	15cm			15cm	15cm
	Acoustic power		100%	100%			100%	100%
	Focus number		1	1			1	1
	Working frequency		Gen	HRes			HRes	Pen
	Scan Line Mode		Lower-density line and minimum scan angle					

PW mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			0.99		1.80		0.61	2.11
Associated acoustic parameters	p_{ra}		2.48					
	P				7.83		7.83	7.83
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						1.0	
	z@max. $I_{pi,\alpha}$		1.53					
	$d_{eq\ (zb)}$						0.207	
	f_{awf}		6.2		4.6		4.6	4.6
	Dim of A_{aprt}	X			13.4		0.25	0.17
		Y			4.36		0.50	0.50
Other information	t_d		0.69					
	p_{rr}		679					
	p_r @ max. I_{pi}		3.53					
	d_{eq} @ max. I_{pi}						0.198	
	$I_{pa,\alpha}$ @max. MI		179					
	Focal Length	X cm			12.0			
		Y cm			3.0			
Operating control conditions	Focus position		2cm	1cm			12cm	1cm
	Display depth		15cm	3cm			15cm	3cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		679	5699			5300	23990
	Working frequency		HRes	Pen			Pen	Pen
	SV		0.5mm	0.5mm			0.5mm	0.5mm

B+M mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.30	0.475			0.842	1.10
Associated acoustic parameters	p_{ra}		3.07					
	P				10.8		10.9	10.9
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						1.02	
	z@max. $I_{pi,\alpha}$		1.21					
	$d_{eq\ (zb)}$						0.218	
	f_{awf}		5.6		6.2		6.2	
	Dim of A_{aprt}	X			13.5		0.25	
		Y			4.77		0.50	
Other information	t_d		0.339					
	p_{rr}		1000					
	p_r @ max. I_{pi}		3.66					
	d_{eq} @ max. I_{pi}						0.218	
	$I_{pa,\alpha}$ @max. MI		220					
	Focal Length	X cm		12.0	12.0			
		Y cm		3.0	3.0			
Operating control conditions	Focus position		1cm	1cm			12cm	0.5cm
	Display depth		3cm	3cm			15cm	3cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		1000	2000			500	2000
	Working frequency		Gen	HPen			HRes	HPen
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+B/PDI+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1$ cm²	$A_{aprt} > 1$ cm²		
Maximum index value			1.45	0.141				0.23
Associated acoustic parameters	p_{ra}		3.08					
	P			7.39				7.39
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b							
	z@max. $I_{pi,\alpha}$		1.09					
	$d_{eq\ (zb)}$							
	f_{awf}		4.5					
	Dim of A_{aprt}	X						
		Y						
Other information	t_d		0.933					
	p_{rr}		1680					
	p_r @ max. I_{pi}		3.79					
	d_{eq} @ max. I_{pi}							
	$I_{pa,\alpha}$ @max. MI		356					
	Focal Length	X cm						
		Y cm						
Operating control conditions	B Focus/Color Sampling Gate position		1cm	12cm			12cm	12cm
	Display depth		15cm	15cm			15cm	15cm
	Acoustic power		100%	100%			100%	100%
	Color PRF(Hz)		1680	2290			2290	2290
	B Working frequency		Pen	Pen			Pen	Pen
	C Working frequency		Pen	Pen			Pen	Pen
	Color Sampling Gate Width		minimum	minimum				
	Scan Line Mode		Lower-density line and minimum scan angle for B-mode and Color Sensitivity:2 for Color-mode					

PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.36	1.07			1.69	1.64
Associated acoustic parameters	p_{ra}		2.89					
	P				22.2		22.2	22.2
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						1.47	
	z@max. $I_{pi,\alpha}$		1.02					
	$d_{eq\ (zb)}$						0.214	
	f_{awf}		4.5		4.6		4.6	
	Dim of A_{aprt}	X			13.4		0.25	
		Y			4.34		0.50	
Other information	t_d		0.42					
	p_{rr}		983					
	p_r @ max. I_{pi}		3.25					
	d_{eq} @ max. I_{pi}						0.193	
	$I_{pa,\alpha}$ @max. MI		311					
	Focal Length	X cm		12.0	12.0			
		Y cm		3.0	3.0			
Operating control conditions	B Focus/SV position		1cm	1cm			12cm	0.5cm
	Display depth		15cm	3cm			15cm	3cm
	Acoustic power		100%	100%			100%	100%
	PW PRF(Hz)		2936	15610			2939	16510
	B Working frequency		Pen	Pen			Pen	Pen
	PW Working frequency		Pen	Pen			Pen	Pen
	PW SV		0.5mm	0.5mm				
	Scan Line Mode		Lower-density line and minimum scan angle					

Color+PW+B mode

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					A_{aprt} ≤ 1 cm^2	A_{aprt} > 1 cm^2		
Maximum index value			1.21	0.28			1.52	1.58
Associated acoustic parameters	p_{ra}		2.85					
	P				20.7		20.7	11.6
	min [$P_{\alpha(zs)}$, $I_{ta,\alpha(zs)}$]							
	z_s							
	z_{bp}							
	z_b						1.38	
	z@max. $I_{pi,\alpha}$		1.04					
	$d_{eq\ (zb)}$						0.226	
	f_{awf}		5.5		4.6		5.6	
	Dim of A_{aprt}	X			2.88		0.25	
		Y			4.53		0.50	
Other information	t_d		0.423					
	p_{rr}		589					
	p_r @ max. I_{pi}		3.51					
	d_{eq} @ max. I_{pi}						0.206	
	$I_{pa,\alpha}$ @max. MI		319					
	Focal Length	X cm			1.00			
		Y cm			3.00			
Operating control conditions	B Focus/PW SV/Color SG position		1cm	1cm			1cm	0.5cm
	Display depth		3cm	3cm			3cm	3cm
	Acoustic power		100%	100%			100%	100%
	PRF(Hz)		PW:589 C:20557	PW:14230 C:527			PW:699 C:17957	PW:14240 C:528
	B Working frequency		Pen	Pen			Pen	Pen
	PW Working frequency		Pen	Pen			Res	Pen
	Color Working frequency		Pen	Pen			Pen	Pen
	PW SV/Color SG		SV=0.5mm SG minimum					
	Scan Line Mode		Lower-density line and minimum scan angle					

■ TC10(IEC61157:2007)

Mode / Parameter	B	M	B+M	PW
System settings	AP:100% Focus:12cm Display:16cm	AP:100% Focus:12cm Display:16cm	AP:100% Focus:12cm Display:16cm	AP:100% Focus:12cm Display:16cm
pr (MPa)	2.67±0.45	2.79±0.47	2.65±0.44	2.24±0.37
Ispta (mW/cm2)	2.55±0.84	67.62±22.38	71.36±23.61	77.37±25.54
Iob (mW/cm2)	2.91±1.06	28.60±9.51	13.83±4.60	9.89±3.29
Power output (mW)	1.90±0.32	18.65±1.33	9.02±0.64	6.45±0.46
Output beam dimentions(ø)(mm)	9.11	9.11	9.11	9.11
Zp (mm)	1.00±0.25	1.00±0.25	1.12±0.25	1.55±0.25
W12 (//)(mm)	1.30±0.13	13.63±0.13	1.30±0.13	13.44±0.13
W12 (⊥) (mm)	0.50±0.13	4.81±0.13	0.50±0.13	4.36±0.13
fawf (MHz)	4.50±0.21	4.50±0.21	4.50±0.21	4.60±0.22
prr (Hz)	-	1000.00±1.00	500.00±1.00	5300.00±1.00
srr (Hz)	6.00±1.00	-	22.00±1.00	-
Ztt (mm)	0.97	0.97	0.97	0.97
Zts (mm)	contact	contact	contact	contact
Acoustic output freeze	Yes	Yes	Yes	Yes
Inclusive modes	-	-	-	B+PW/Color+PW+B