SAMSUNG MEDISON

SAMSUNG MEDISON
DIAGNOSTIC ULTRASOUND SYSTEM

HM70A
User Manual

Volume 1

WARRANTY

Samsung Medison provides the following warranty to the purchaser of this unit. This warranty is valid for a period of one year from the date of installation and covers all problems caused by faulty workmanship or faulty material. Samsung Medison will, as sole and exclusive remedy and at no charge, replace any such defective unit returned to Samsung Medison within the designated warranty period.

The warranty does not cover damages and loss caused by outside factors including, but not limited to, fire, flood, storm, tidal wave, lightning, earthquake, theft, abnormal conditions of operation, and intentional destruction of the equipment. Damage caused by equipment relocation is not covered.

The warranty is void in cases where the equipment has been damaged as a result of an accident, misuse, abuse, dropping, or when attempts to modify or alter any part or assembly of the equipment have taken place.

Parts with cosmetic defects or deterioration will not be replaced. Replacement of batteries, training materials, and supplies are not covered.

Samsung Medison will not be responsible for incidental or consequential damages of any kind arising from or connected with the use of the equipment.

Samsung Medison will not be responsible for any loss, damage, or injury resulting from a delay in services rendered under the warranty

This limited warranty is in lieu of all other warranties expressed or implied, including warranties of merchant ability or fitness for any particular use. No representative or other person is authorized to represent or assume for Samsung Medison any warranty liability beyond that set forth herein.

Defective equipment shipped from you to Samsung Medison must be packed in the replacement cartons. Shipping and insurance costs are the responsibility of the customer. To return defective material to Samsung Medison contact the Samsung Medison Customer Service Department.

Samsung Medison or a local distributor will make available, upon request, circuit diagrams, a component parts list, descriptions, calibration instructions and other information which will assist your appropriately qualified technical personnel to repair those parts of the equipment which are designed by Samsung Medison as repairable.

CAUTION: United State federal law restricts this device to sale by or on the order of physicians.

SAMSUNG MEDISON

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SAMSUNG MEDISON
DIAGNOSTIC ULTRASOUND SYSTEM

Version 1.01

HM70A

User Manual

English

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PROPRIETRAY INFORMATION AND SOFTWARE LICENSE

The Customer shall keep confidential all proprietary information furnished or disclosed to the Customer by Samsung Medison, unless such information has become part of the public domain through no fault of the Customer. The Customer shall not use such proprietary information, without the prior written consent of Samsung Medison, for any purpose other than the maintenance, repair or operation of the goods.

Samsung Medison's systems contain Samsung Medison's proprietary software in machine-readable form. Samsung Medison retains all its rights, title and interest in the software except that purchase of this product includes a license to use the machine-readable software contained in it. The Customer shall not copy, trace, disassemble or modify the software. Transfer of this product by the Customer shall constitute a transfer of this license that shall not be otherwise transferable. Upon cancellation or termination of this contract or return of the goods for reasons other than repair or modification, the Customer shall return to Samsung Medison all such proprietary information.

Safety Requirements

Classifications:

- Type of protection against electrical shock: Class I
- Degree of protection against electrical shock (Patient connection): Type BF or CF Applied Part
- Degree of protection against harmful ingress of water: Ordinary equipment
- Degree of safety of application in the presence of a flammable anesthetic material with air or with oxygen or nitrous oxide: Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- Mode of operation: Continuous operation

Electromechanical safety standards met:

- Medical Electrical Equipment, Part 1: General Requirements for Basic Safety and Essential Performance **[IEC 60601-1:2005/A1:2012]**
- Medical Electrical Equipment, Part 1-2: General Requirements for Basic Safety and Essential Performance- Collateral Standard: Electromagnetic Compatibility - Requirements and Tests **[IEC 60601-1-2:2007]**
- Medical Electrical Equipment, Part 1-6: General Requirements for Basic Safety and Essential Performance- Collateral Standard: Usability **[IEC 60601-1-6:2010]**
- Medical Electrical Equipment, Part 2-37: Particular Requirements for the Basic Safety and Essential Performance of Ultrasonic Medical Diagnostic and Monitoring Equipment **[IEC 60601-2-37:2007]**
- Medical Electrical Equipment, Part 1: General Requirements for Safety **[IEC 60601-1:1988 with A1:1991 and A2:1995]**
- Medical Electrical Equipment, Part 1-1: General Requirements for Safety - Collateral Standard: safety Requirement for Medical Electrical Systems **[IEC 60601-1-1:2000]**
- Medical Electrical Equipment, Part 1-2: General Requirements for Safety - Collateral Standard: Electromagnetic Compatibility - Requirements and Test **[IEC 60601-1-2:2001, A1:2004]**
- Medical Electrical Equipment, Part 1-4 : General Requirements for Safety - Collateral Standard: Programmable Electrical Medical Systems **[IEC 60601-1-4:1996, A1:1999]**

- Medical Electrical Equipment, Part 2-37: Particular Requirements for Safety - Ultrasonic Medical Diagnostic and Monitoring Equipment **[IEC 60601-2-37: 2001 with A1:2004, A2:2005]**
- Medical Devices – Application of Risk Management to Medical Devices **[ISO 14971:2007]**
- Medical Electrical Equipment, Part 1: General Requirements for Safety **[UL 60601-1:2003]**
- Medical Electrical Equipment - Part 1: General Requirements for Safety **[CAN/CSA C22.2 No. 601.1-M90:1990, with R2003, with R2005]**
- Biological Evaluation of Medical Devices, Part 1:Evaluation and Testing within a risk management process **[ISO 10993-1 : 2009]**
- Standard Means for the Reporting of the Acoustic Output of Medical Diagnostic Ultrasonic Equipment **[IEC 61157:2007]**

Declarations

C US

CSA mark with the indicators "C" and "US" means that the product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards.

CE 0123

This is manufacturer's declaration of product compliance with applicable EEC directive(s) and the European notified body.

CE

This is manufacturer's declaration of product compliance with applicable EEC directive(s).

GMP

This is the GMP symbol for Korean Good Manufacturing Practice quality system regulation.

Precautions For Use

You should be familiar with all of these areas before attempting to use this manual or your ultrasound system.

- Please keep this user guide close to the product as a reference when using the system.
- For safe use of this product, you should read 'Chapter 1. Safety' and 'Chapter 4. Maintenance' in this manual, prior to starting to use this system.
- This manual does not include diagnosis results or opinions. Also, check the measurement reference for each application's result measurement before making the final diagnosis.
- This product is an ultrasound scanner and cannot be used from a user's PC. We are not responsible for errors that occur when the system software is run on a user's PC.
- Only medical doctors or persons supervised by medical doctors should use this system. Persons who are not qualified must not operate this product.
- The manufacturer is not responsible for any damage to this product caused by carelessness and/or neglect by the user.
- Please note that orders are based on the individually agreed specifications and may not contain all features listed in the User Manual.
- It might be possible that some features, options or probes are NOT available in some countries.
- All references to standards / regulations and their revisions are valid for the time of publication of the User Manual.
- The figures in the User Manual for illustrational purposes only and may be different from what you see on the screen or device.
- Information contained in this User Manual is subject to change without prior notice.
- Products that are not manufactured by Samsung Medison are marked with the trademark of their respective copyright holders.
- The headings below describe vitally important precautions necessary to prevent hazards.

DANGER: Describes precautions necessary to prevent user hazards of great urgency. Ignoring a DANGER warning will risk life-threatening injury.

WARNING: Used to indicate the presence of a hazard that can cause serious personal injury, or substantial property damage.

CAUTION: Indicates the presence of a hazard that can cause equipment damage.

NOTE: A piece of information useful for installing, operating and maintaining a system. Not related to any hazard.

Revision History

The revision history of this User Manual is as follows:

VERSION	DATE	NOTE
v1.01.00-00	2014.11.20	Initial Release

Product Upgrade and Manual Update

Samsung Medison Ultrasound is committed to innovation and continued improvement. Upgrades may be announced that consist of hardware or software improvements. Updated manuals will accompany those system upgrades.

Verify that Check if this version of the manual is correct for the system version. If not, please contact the Customer Service Department.

If You Need Assistance

If you need any assistance with the equipment, like the service manual, please contact the Samsung Medison Customer Service Department or one of their worldwide customer service representatives, immediately.

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****Reference Manual**

A Reference Manual (English) is supplied with this product.

Chapter 1

Safety

Chapter 1

Purpose of Use

Diagnostic Ultrasound System and transducers are intended for diagnostic ultrasound imaging and fluid analysis of the human body.

The clinical applications include: Fetal, Abdominal, Pediatric, Small Organs, Neonatal Cephalic, Adult Cephalic, Trans-rectal, Trans-vaginal, Muscular-Skeletal (conventional, superficial), Cardiac Adult, Cardiac Pediatric and Peripheral-vessel.

NOTE: For detailed information on applications and presets, please refer to 'Chapter 2. Introduction' and 'Chapter 5. Probes' in this user manual.

Contraindications

This product must not be used for ophthalmological applications, or any other use that involves the ultrasound beam passing through the eyeball.

CAUTION:

- Federal law restricts this device to sale by or on the order of a physician.
- The method of application or use of the device is described in the manual 'Chapter 6. Starting Diagnosis' and 'Chapter 7. Diagnosis Modes'.

Safety Information

Please read the following safety information before using this product. It is relevant to the ultrasound system, the probes, the recording devices, and any of the optional equipment.

This product is intended for use by, or by the order of, and under the supervision of, a licensed physician who is qualified for direct use of medical devices.

Safety Symbols

The International Electrotechnical Commission (IEC) has established a set of symbols for medical electronic equipment, which classify a connection or warn of potential hazards. The classifications and symbols are shown below.

Symbols	Description	Symbols	Description
	WARNING: The accompanying information must be followed to prevent serious accidents and/or damage to property.		Data Input/Output port
	CAUTION: The accompanying information helps to prevent minor accidents and/or damage to property.		Input port
	Refer to the User Manual.		Output port
	Follow the User Manual.		Print remote output
	CAUTION: Risk of electric shock		Foot Switch Port
	Type BF applied part (Classification based on degree of protection against electric hazard)		ECG port
	Defibrillation-proof type CF applied part (Classification based on degree of protection against electric hazard)		USB port
	Power on/off		Network port

Symbols	Description	Symbols	Description
	Power on		Microphone Port
	Power off		Probe port
	Power ON for part of the product	IPX1	Protected against vertically falling water drops
	Power Off for part of the product	IPX7	Protected against the effects of temporary immersion in water
V~	Alternating current voltage source	IPX8	Protected against the effects of continuous immersion in water
	Direct current voltage source		CAUTION: Electrostatic sensitive devices (ESD)
	Dangerous voltage (Indicates dangerous voltages over 1000V AC or 1500V DC)		Do not sit on the product.
	Protective earth (ground)		Do not push the product.
	Equipotentiality		Do not lean against the product.
	Data output port		Be mindful of the space. Do not place a finger, and or any part of your body in the space.
	Data input port		

Symbols

Symbols	Description	Symbols	Description
EC REP	Authorized Representative In The European Community		Manufacturer

LABEL

Phrases containing the words 'warning' and/or 'caution' are displayed on the product's surface in order to protect it.

Electrical Safety

This equipment is categorized as a Class I device with Type BF or Type CF (ECG) applied parts.

Prevention of Electric Shocks

WARNING:

- Electric shocks may result if this system, including all of its externally mounted recording and monitoring devices, is not properly grounded.
- Never open the cover of the product. This product uses levels of voltage that are potentially dangerous. All internal component repairs and part replacements must be performed by Samsung Medison's service department.
- Always check the product's casing, cables, cords, and plugs for damage before using the product. Disconnect the power source and do not use the equipment if the housing is damaged (for example cracked or chipped), or if the cable is worn.
- Always disconnect the system from the wall outlet prior to cleaning the system.
- All patient contact devices, such as the probe, must be detached from the patient prior to using a high-voltage defibrillator.
- Never use the product in the presence of flammable or anesthetic gas. There is a risk of explosion.
- Avoid installing the system in such a way that it is difficult for the operator to disconnect it from the power source.
- The AC Adapter and the Extended Battery are specified as part of this product. When using an AC Adapter and Extended Battery, only use an AC Adapter and an Extended Battery that are recommended by Samsung Medison. (AC Adapter: BridgePower Corp., BPM200S19F02; Extended Battery: Elentec Co., Ltd., EE1630SMA)
- Do not use together with HF surgical equipment. HF surgical equipment may be damaged, which may result in fire.
- The System must only be connected to a supply mains with protective earth to avoid risk of electric shock.

CAUTION:

- The system has been designed for 100-240VAC; you should select the input voltage of any connected printer and VCR. Prior to connecting a peripheral power cord, verify that the voltage indicated on the power cord matches the voltage rating of the peripheral device.
- An isolation transformer protects the system from power surges. The isolation transformer continues to operate when the system is in standby.
- Do not immerse the cable in liquids. The power cord is not waterproof.
- Do not allow the interior of the system to be exposed to, or immersed in, liquid. In such cases, fire, electric shock, injury, or damage to the product may occur.
- The auxiliary socket outlets installed on this system are rated 100-120VAC and 200-240VAC with a maximum total load of 450VA. Use these outlets only for supplying power to equipment that is intended to be part of the ultrasound system. Do not connect additional multiple-socket outlets or extension cords to the system.
- Connecting a device that is not listed in this manual to the auxiliary socket outlet may cause an electrical hazard.
- Do not touch the SIP/SOP terminal on the product while diagnosing the patient. There is a risk of electric shock from leakage current.

Additional equipment connected to medical electrical equipment must comply with the respective IEC standards (e.g. IEC 60950/EN 60950 for data processing equipment, IEC 60601-1/EN 60601-1 for medical devices). Furthermore, all components of the product shall comply with the requirements for medical electrical systems (IEC 60601-1-1/EN 60601-1-1). All persons connecting accessory equipment to the signal input or output ports of medical electrical equipment should make sure that the accessory complies with IEC 60601-1-1/EN 60601-1-1.

ECG-Related Information

WARNING:

- This product does not provide an ECG monitoring function. Therefore, it does not recognize unsuitable ECG signals.
- Do not use ECG electrodes for HF surgical equipment. HF surgical equipment may be damaged, which may result in fire.
- Do not use ECG electrodes during cardiac pacemaker procedures or any procedures that involve other types of electrical stimulators.
- Do not use ECG leads and electrodes in an operating room.

ESD

Electrostatic discharge (ESD), which is commonly referred to as static shock, is a naturally occurring phenomenon. ESD is most prevalent during conditions of low humidity, including during heater or air-conditioner use. The static shock or ESD is a discharge of the electrical energy build-up from a charged individual to a lesser or non-charged individual or object. An ESD occurs when an individual with an electrical energy build-up comes in contact with conductive objects such as metal doorknobs, file cabinets, computer equipment, and even other individuals.

CAUTION:

- The level of electrical energy discharged from a system user or patient to an ultrasound system can be significant enough to cause damage to the system or probes.
- Always perform the ESD preventive procedure before using connectors bearing the ESD warning symbol.
  - Apply anti-static spray to carpets or linoleum.
  - Use anti-static mats.
  - Ground the product to the patient's table or bed.
- It is highly recommended that the user be given training on ESD-related warning symbols and preventive procedures.

EMI

Although this system has been manufactured in compliance with existing EMI (ElectroMagnetic Interface) requirements, use of this system in the presence of an electromagnetic field can cause degradation of the ultrasound image or product damage.

If this occurs often, Samsung Medison suggests a review of the environment in which the system is being used, to identify possible sources of electromagnetic emissions. These emissions could be from other electrical devices used within the same room or an adjacent room. Communication devices such as cellular phones and pagers can cause these emissions. The existence of radios, TVs, or microwave transmission equipment nearby can also cause interference.

CAUTION: In cases where EMI is causing disturbances, it may be necessary to relocate this system.

EMC

The testing for EMC(Electromagnetic Compatibility) of this system has been performed according to the international standard for EMC with medical devices (IEC 60601-1-2). In Europe, the IEC standard was adopted as the European norm (EN 60601-1-2).

Guidance and Manufacturer's Declaration - Electromagnetic Emission

This product is intended for use in the electromagnetic environment specified below. The user is to ensure that the product is used in the following environment.

Emission test	Compliance	Electromagnetic environment - guidance
RF Emission CISPR 11	Group 1	The Ultrasound System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emission CISPR 11	Class A	The Ultrasound System is suitable for use in all establishments other than domestic, and may be used in domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes, provided the following warning is heeded: Warning: This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the Ultrasound System or shielding the location.
Harmonic Emission IEC 61000-3-2	Class A	
Flicker Emission IEC 61000-3-3	Complies	

Approved Cables, Probes and Peripherals for EMC

Cables

Cables connected to this product may affect its emissions; use only the cable types and lengths listed in the table below.

Cable	Type	Length
DVI	Shielded	Normal
USB	Shielded	Normal
LAN(RJ45)	Twisted pair	Any
MIC	Unshielded	Any
Printer Remote	Unshielded	Any
Audio R.L	Shielded	Normal
Foot Switch	Shielded	2.99m

Probes

The image probe used with this product may affect its emission. The probe listed in 'Chapter 5. Probes' when used with this product, have been tested to comply with the group1 Class A emission as required by International Standard CISPR 11.

Peripherals

Peripherals used with this product may affect its emissions.

CAUTION: When connecting other customer-supplied accessories to the system, it is the user's responsibility to ensure the electromagnetic compatibility of the system.

WARNING: The use of cables, probes, and peripherals other than those specified may result in increased emission or decreased Immunity of the Ultrasound System.

Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6KV Contact ±8KV air	±6KV Contact ±8KV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2KV for power supply lines ±1KV for input/output lines	±2KV for power supply lines ±1KV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1KV differential mode ±2KV common mode	±1KV differential mode ±2KV common 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	<5% *U*т for 0.5 cycles (>95% dip in *U*т) 40% *U*т for 5 cycles (60% dip in *U*т) 70% *U*т for 25 cycles (30% dip in *U*т) <5% *U*т for 5 s (<95% dip in *U*т)	<5% *U*т for 0.5 cycles (>95% dip in Uт) 40% *U*т for 5 cycles (60% dip in *U*т) 70% *U*т for 25 cycles (30% dip in *U*т) <5% *U*т for 5 s (<95% dip in *U*т)	Mains power quality should be that of a typical commercial or hospital environment. If the user of this product requires continued operation during power mains interruptions, it is recommended that this product be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: *U*т is the A.C. mains voltage prior to application of the test level.			

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V	Portable and mobile RF communications equipment should be used no closer to any part of the Ultrasound System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	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 meters (m). 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 80MHz and 800MHz, 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.

[a] 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 Ultrasound System is used exceeds the applicable RF compliance level above, the Ultrasound System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Ultrasound System, or using a shielded location with a higher RF shielding effectiveness and filter attenuation.

[b] Over the frequency range 150kHz to 80MHz, field strengths should be less than 3 V/m.

Recommended distance between wireless communication device and this product

This product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of this product can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this product as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter [W]	Separation distance according to frequency of transmitter [m]		
	150kHz to 80MHz $d = 1.2\sqrt{p}$	80MHz to 800MHz $d = 1.2\sqrt{p}$	800MHz to 2.5GHz $d = 2.3\sqrt{p}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (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 80MHz and 800MHz, 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.

Electromagnetic environment – Guidance

It is recommended to use ultrasound systems in shielded locations offering RF shielding effectiveness, with shielded cables. Field strengths outside the location shielded from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3V/m.

It is essential to verify that the actual shielding effectiveness and filter attenuation of the shielded location meet the minimum specifications.

CAUTION: If the system is connected to other customer-supplied equipment, such as a local area network (LAN), Samsung Medison cannot guarantee that the remote equipment will work correctly in the presence of electromagnetic emission phenomena.

Avoiding Electromagnetic Interference

Typical interference on Ultrasound Imaging Systems varies depending on Electromagnetic phenomena. Please refer to the following table:

Imaging Mode	ESD[1]	RF[2]	Power Line[3]
2D	Change of operating mode, system settings, or system reset. Brief flashes in the displayed or recorded image.	For sector imaging probes, white radial bands or flashes in the centerlines of the image. For linear imaging probes, white vertical bands, sometimes more pronounced on the sides of the image.	White dots, dashes, diagonal lines, or diagonal lines near the center of the image.
M		Increase in the image background noise or white M mode lines.	White dots, dashes, diagonal lines, or increase in image background noise.
Color		Color flashes, radial or vertical bands, increase in background noise, or changes in color image.	Color flashes, dots, dashes, or changes in the color noise level.
Doppler		Horizontal lines in the spectral display or tones, abnormal noise in the audio, or both.	Vertical lines in the spectral display, popping type noise in the audio, or both.

1. ESD caused by discharging of electric charge build-up on insulated surfaces or persons.
2. RF energy from RF transmitting equipment such as portable phones, hand-held radios, wireless devices, commercial radio and TV, and so on.
3. Conducted interference on powerlines or connected cables caused by other equipment, such as switching power supplies, electrical controls, and natural phenomena such as lightning.

A medical device can either generate or receive electromagnetic interference. The EMC standards describe tests for both emitted and received interference.

Samsung Medison's ultrasound systems do not generate electromagnetic interference in excess of the referenced standards.

An Ultrasound System is designed to receive signals at radio frequency and is therefore susceptible to interference generated by RF energy sources. Examples of other sources of interference are medical devices, information technology products, and radio and television transmission towers. Tracing the source of radiated interference can be a difficult task. Customers should consider the following in an attempt to locate the source:

- Is the interference intermittent or constant?
- Does the interference show up only with one transducer operating at the same frequency or with several transducers?
- Do two different transducers operating at the same frequency have the same problem?
- Is the interference present if the system is moved to a different location in the facility?

The answers to these questions will help determine if the problem resides with the system or the scanning environment. Please answer each question, and then contact the Samsung Medison service department.

Mechanical Safety

Precautions for Use

CAUTION:

- Do not apply excessive force to the product.
- Install and use the product at a stable location. Use of the Samsung Medison cart (sold separately) is recommended.
- Do not use the product with it placed on your lap. You might get burned.
- Never attempt to modify the product in any way.
- Read the instructions on safe operation of the product if using the product after a prolonged period of non-use.
- Make sure that other objects, such as pieces of metal, do not enter the system.
- Do not block the ventilation slots.
- Do not store the product inside a bag or any other enclosed space while it is powered on.
- Do not pull on the power cord to unplug the product. Doing so might damage the cord and cause the product to short-circuit, or the cord itself to break. Unplug the cord by pulling on the plug itself.
- Excessive bending or twisting of cables, or parts that are applied to the patient, may cause failure or intermittent operation of the system.
- Improper cleaning or sterilization of parts that are applied to the patient may cause permanent damage.
- Servicing the product, including repairs and the replacement of parts, must be done by qualified Samsung Medison service personnel. Assuming that the product is used in accordance with the guidelines contained in this manual and maintained by qualified service personnel, the expected lifespan of the product is approximately 7 years.

Please refer to 'Chapter 4. Maintenance' for detailed information on protection, cleaning, and disinfecting the equipment.

Moving the Equipment

Firmly grip the handle on the front of the product and move the product slowly. Alternatively, you can use the Samsung Medison cart (sold separately).

CAUTION: Power off the product and disconnect all cables before moving it.

NOTE: If using the recommended cart, avoid leaving the cart unattended on an uneven surface. If you must leave the cart on an uneven surface, engage the brakes attached to the casters.

Biological Safety

WARNING:

- Ultrasound waves may have damaging effects on cells and, therefore, may be harmful to the patient. If there is no medical benefit, minimize the exposure time and maintain the ultrasound wave output level at low. Please refer to the ALARA principle.
- Do not use the system if an error message appears on the video display indicating that a hazardous condition exists. Note the error code, turn off the power to the system, and call the Samsung Medison service department in your area.
- Do not use a system that exhibits erratic or inconsistent updating. Discontinuities in the scanning sequence are an indication of a hardware failure that should be corrected before use.
- The system limits the maximum contact temperature to 43 degree Celsius, and the ultrasonic waves output observes American FDA regulations.

ALARA Principle

Performing diagnoses using an ultrasound device is defined by the "As Low As Reasonably Achievable" (ALARA) principle. The decision as to what is reasonable should be left to the judgment and insight of qualified personnel. No set of rules can be formulated that would be sufficiently complete to dictate the correct response for every circumstance. By keeping ultrasound exposure as low as possible while obtaining diagnostic images, users can minimize ultrasonic bioeffects.

Since the threshold for diagnostic ultrasound bioeffects is undetermined, it is the sonographer's responsibility to control the total energy transmitted into the patient. The sonographer must reconcile exposure time with diagnostic image quality. To ensure diagnostic image quality and limit exposure time, the ultrasound system provides controls that can be manipulated during the exam to optimize the results of the exam.

The ability of the user to abide by the ALARA principle is important. Advances in diagnostic ultrasound, not only in the technology but also in the applications of the technology, have resulted in the need for more and better information to guide the user. This important information is based on a variety of ultrasound output data, and plays an important role in putting the ALARA principle into effect.

There are numerous variables that affect the way in which the output display indices can be used to implement the ALARA principle. These variables include mass, body size, location of the bone relative to the focal point, attenuation in the body, and ultrasound exposure time. Among these, exposure time is the variable that one must pay the most attention to. For, unlike other variables, exposure time is entirely controlled by the operator of the ultrasound system.

Applying ALARA

The system-imaging mode used depends upon the information needed. 2D-mode and M-mode imaging provide anatomical information, while Doppler, Power, and Color imaging provide information about blood flow. Scanned modes like 2D-mode, Power, or Color, disperse or scatter the ultrasonic energy over an area, while unscanned modes like M-mode or Doppler concentrate ultrasonic energy. Understanding the nature of the imaging mode being used allows the sonographer to apply the ALARA principle with informed judgment. The probe frequency, system set-up values, scanning techniques, and operator experience aid the sonographer in meeting the definition of the ALARA principle. The decision as to the amount of acoustic output is, in the final analysis, up to the system operator. This decision must be based on the following factors: type of patient, type of exam, patient history, ease or difficulty of obtaining diagnostically useful information, and the potential localized heating of the patient due to probe surface temperatures. Prudent use of the system occurs when patient exposure is limited to the lowest index reading for the shortest amount of time necessary to achieve acceptable diagnostic results.

Although a high index reading does not mean that a bioeffect is actually occurring, a high index reading should be taken seriously. Every effort should be made to reduce the possible effects of a high index reading. Limiting exposure time is an effective way to accomplish this goal.

There are several system controls that the operator can use to adjust the image quality and limit the acoustic intensity. These controls are related to the techniques that an operator might use to implement ALARA. These controls can be divided into three categories: direct, indirect, and receiver controls.

Direct Controls

Application selection and the output intensity control directly affect acoustic intensity. There are different ranges of allowable intensity or output based on your selection. Selecting the correct range of acoustic intensity for the application is one of the priorities required during any exam. For example, peripheral vascular intensity levels are not recommended for fetal exams. Some systems automatically select the proper range for a particular procedure, while others require manual selection. Ultimately, the user bears the responsibility for proper clinical use. This Samsung Medison system provides both automatic and user-definable settings.

Output has a direct impact on acoustic intensity. Once the application has been established, the output control can be used to increase or decrease the intensity output. The output control allows you to select intensity levels less than the defined maximum. Prudent use dictates that you select the lowest output intensity consistent with good image quality.

Indirect Controls

The indirect controls are those that have an indirect effect on the acoustic intensity. These controls affect the imaging mode, pulse repetition frequency, focus depth, pulse length, and probe selection.

The choice of imaging mode determines the nature of the ultrasound beam. 2D-mode is a scanned mode; Doppler is a stationary or unscanned mode. A stationary ultrasound beam concentrates energy on a single location. A moving or scanned ultrasound beam disperses the energy over a wide area and the beam is only concentrated on a given area for a fraction of the time necessary in unscanned mode.

The pulse repetition frequency or rate refers to the number of ultrasound bursts of energy over a specific period of time. The higher the pulse repetition frequency, the more pulses of energy in a given period of time. Several controls affect pulse repetition frequency: Focal depth, display depth, sample volume depth, color sensitivity, number of focal zones, and sector width controls.

The focus of the ultrasound beam affects the image resolution. Maintaining or increasing the resolution at a different focal zone involves the adjustment of numerous outputs from the focal zone. This output adjustment is one of the system's optimization features. Different exams require different focal depths. Setting the focus to the proper depth improves the resolution of the structure of interest.

Pulse length is the time during which the ultrasonic burst is turned on. The longer the pulse, the greater the time-average intensity value. The greater the time-average intensity, the greater the likelihood of temperature increase and cavitations. Pulse length, burst length, and pulse duration refer to the output pulse duration in pulsed Doppler mode. Increasing the Doppler sample volume increases the pulse length.

Probe selection affects intensity indirectly. Tissue attenuation changes with frequency. The higher the probe operating frequency, the greater the attenuation of the ultrasonic energy. Higher probe operating frequencies require greater output intensity to scan at a deeper depth. To scan deeper at the same output intensity, a lower probe frequency is required. Using more gain and output beyond a point, without corresponding increases in image quality, can mean that a lower frequency probe is needed.

Receiver Controls

Receiver controls are used by the operator to improve image quality. These controls have no effect on output. Receiver controls only affect how the ultrasound echo is received. These controls include gain, TGC, dynamic range, and image processing. The important thing to remember, relative to output, is that receiver controls should be optimized before increasing output. For example; before increasing output, optimize gain to improve image quality.

Additional Considerations

Ensure that scanning time is kept to a minimum, and ensure that only medically required scanning is performed. Never compromise quality by rushing an exam. A poor exam will require a follow-up, which ultimately increases the scanning time. Diagnostic ultrasound is an important tool in medicine, and, like any tool, should be used efficiently and effectively.

Output Display Features

The system output display comprises two basic indices: a mechanical index and a thermal index. The thermal index consists of the following indices: soft tissue (TIs), bone (TIb) and cranial bone (TIc). One of these three thermal indices will be displayed at all times. Which one is determined by the system preset or user choice, depending upon the application at hand.

The mechanical index is continuously displayed over the range of 0.0 to 1.9, in increments of 0.1. The thermal index consists of the three indices, and only one of these is displayed all the time. Each probe application has an appropriate default selection. The TIb or TIs is continuously displayed over the range of 0.0 to maximum output, based on the probe and application, in increments of 0.1.

The default setting of the application-specific nature is also an important factor of index selection. A default setting is a system control state which is preset by the manufacturer or the operator. The system has default index settings for the probe application. The default settings are applied automatically by the ultrasound system when the power is turned on, new patient data is entered into the system database, or a change of application takes place.

The decision as to which of the three thermal indices to display should be based on the following criteria:

Appropriate index for the application: TIs is used for imaging soft tissue, and TIb for a focus at or near a bone. Elements such as fluid, bone, and blood flow may act as artifacts that increase or decrease the TI. A highly attenuating tissue path, for example, may cause the potential for local zone heating to be lower than the thermal index displays.

The selection of scanned modes or unscanned modes of operation also affect the thermal index. For scanned modes, heating tends to be near the surface; for unscanned modes, the potential for heating tends to be deeper in the focal zone.

Always limit ultrasound exposure time. Do not rush the exam. Ensure that the indices are kept to a minimum, and that exposure time is limited without compromising diagnostic sensitivity.

Mechanical Index (MI) Display

Mechanical bioeffects are threshold phenomena that occur when a certain level of output is exceeded. The threshold level varies, however, with the type of tissue. The potential for mechanical bioeffects varies with peak pressure and ultrasound frequency. The MI accounts for these two factors. The higher the MI value, the greater the likelihood of mechanical bioeffects occurring. However, there is no specific MI value that means that a mechanical effect will actually occur. The MI should be used as a guide for implementing the ALARA principle.

Thermal Index (TI) Display

The TI informs the user of the potential for temperature increase occurring at the body surface, within body tissue, or at the point of focus of the ultrasound beam on bone. The TI is an estimate of the temperature increase in specific body tissues. The actual amount of any temperature rise is influenced by factors such as tissue type, vascularity, and mode of operation. The TI should be used as a guide for implementing the ALARA principle.

The bone thermal index (TIb) informs the user about potential heating at or near the focus after the ultrasound beam has passed through soft tissue or fluid, such as the skeletal structure of a 2-3 month old fetus. The cranial bone thermal index (TIc) informs the user about the potential heating of bone at or near the surface, for example, the cranial bone. The soft tissue thermal index (TIs) informs the user about the potential for heating within soft homogeneous tissue. TIc is displayed when you select a trans-cranial application.

You can select whether to display the TI at Setup > Display > Display > Option > TI Display.

Mechanical and Thermal indices Display Precision and Accuracy

The Mechanical and Thermal Indices on the system are precise to 0.1 units.

The MI and TI display accuracy estimates for the system are given in the Acoustic Output Tables section of this manual. These accuracy estimates are based on the variability ranges of probes and systems, inherent acoustic output modeling errors, and the measurement variability, as described below.

The displayed values should be interpreted as relative information to help the system operator achieve the ALARA principle through prudent use of the system. The values should not be interpreted as actual physical values of investigated tissue or organs. The initial data that is used to support the output display is derived from laboratory measurements based on the AIUM measurement standard. The measurements are then put into algorithms to calculate the displayed output values.

Many of the assumptions used in the process of measurement and calculation are conservative in nature. Over-estimation of actual *in situ* exposure, for the vast majority of tissue paths, is built into the measurement and calculation process. For example, the acoustic output values measured underwater are de-rated using a conservative, industry standard, attenuation coefficient of 0.3dB/cm-MHz.

Conservative values for tissue characteristics were selected for use in the TI models. Conservative values for tissue or bone absorption rates, blood perfusion rates, blood heat capacity, and tissue thermal conductivity were selected.

A steady state temperature rise is assumed in the industry standard TI models, and the assumption is made that the ultrasound probe is held steady in one position long enough for a steady state to be reached.

A number of factors are considered when estimating the accuracy of display values: Hardware variations, algorithm accuracy estimation, measurement variability and variability among probes and systems are significant factors. Probe deviation results from piezoelectric crystal efficiencies, process-related impedance differences, and sensitive lens focusing parameter variations. Differences in the system pulse voltage control and efficiencies are also a contributor to variability. There are inherent uncertainties in the algorithms used for estimating acoustic output values over the range of possible system operating conditions and pulse voltages. Inaccuracies in laboratory measurements are related to differences in hydrophone calibration and performance, positioning, alignment and digitization tolerances, and variability among test operators.

The conservative assumptions of the output estimation algorithms of linear propagation, at all depths, through a 0.3dB/cm-MHz attenuated medium are not taken into account in the calculation of the accuracy estimate displayed. Neither linear propagation nor uniform attenuation at the 0.3dB/cm-MHz rate occurs in underwater measurements, or in most tissue paths in the body. In the body, different tissues and organs have dissimilar attenuation characteristics. In water, there is almost no attenuation. {In the body, and particularly in underwater measurements, non-linear propagation and saturation losses occur as pulse voltages increase.

The display accuracy estimates take into account the variability ranges of probes and systems, inherent acoustic output modeling errors, and the measurement variability. Display accuracy estimates are measured according to AIUM measurement standards but not based on errors caused during the measurement or inherent errors. They are also independent of the effects of non-linear loss on the measured values.

Control Effect – Controls Affecting the Indices

As various system controls are adjusted, the TI and MI values may change. This will be most apparent as the Power control is adjusted; however, other system controls will also affect the on-screen output values.

Power

The power controls the system's acoustic output. Two real-time output values are on the screen: a TI and a MI. They change as the system responds to Power adjustments.

In combined modes, such as simultaneous Color, 2D-mode, and pulsed Doppler, the individual modes each add to the total TI. Each mode is a vital contributor to this total; the displayed MI will be from the mode with the largest peak pressure.

2D Mode Controls

2D-mode size

Narrowing the sector angle may increase the frame rate. This will increase the TI. The pulse voltage may be automatically adjusted down by the software controls to keep the TI below the system maximum. A decrease in pulse voltage will decrease MI.

Zoom

Increasing the zoom magnification may increase frame rate. This will increase the TI. The number of focal zones may also increase automatically to improve the resolution. This action may change the MI, since the peak intensity can occur at a different depth.

Number of Focal Zones

Increasing the number of focal zones may change both the TI and MI by changing the frame rate or focal depth automatically. Lower frame rates decrease the TI. The MI displayed will correspond to the focal zone with the largest peak intensity.

Focus

Changing the focal depth will change the MI. Generally, higher MI values will occur when the focal depth is near the natural focus of the probe (transducer).

Color and Power Controls

Color Sensitivity

Increasing the color sensitivity increases the TI and the time spent for scanning color images. Color pulses are the dominant pulse type in this mode.

Color Sector Width

Narrower color sector width will increase the color frame rate, and so the TI will increase. The system may automatically decrease the pulse voltage to stay below the system maximum.
A decrease in pulse voltage will decrease the MI. If pulsed Doppler is also enabled, then pulsed Doppler will remain as the primary mode and the TI change will be small.

Color Sector Depth

Deeper color sector depth may automatically decrease color frame rate, or select a new color focal zone or color pulse length. The TI will change due to the combination of these effects. Generally, the TI will decrease with increased color sector depth. The MI will correspond to the peak intensity of the dominant pulse type, which is a color pulse. If pulsed Doppler is also enabled, then pulsed Doppler will remain as the primary mode and the TI change will be small.

Scale

Using the SCALE control to increase the color velocity range may increase the TI. The system will automatically adjust the pulse voltage to stay below the system maximum. A decrease in pulse voltage will also decrease MI.

2D-mode size

A narrower 2D-mode sector width in Color imaging will increase color frame rate. The TI will increase. MI will not change. If pulsed Doppler is also enabled, then pulsed Doppler will remain as the primary mode and the TI change will be small.

M Mode and Doppler Controls

Simultaneous and Update Methods

Use of combination modes affects both the TI and MI through the combination of pulse types. During Simultaneous mode, the TI is an ancillary element. During Auto-update and Duplex, the TI will display the dominant pulse type. The displayed MI will be from the mode with the largest peak pressure.

Sample Volume Depth

When Doppler sample volume depth is increased, the Doppler PRF may automatically decrease. A decrease in PRF will decrease the TI. The system may also decrease the pulse voltage to remain below the system maximum. A decrease in pulse voltage will decrease MI.

Other

2D, Color, M-Mode, PW and CW Modes

When a new imaging mode is selected, both the TI and the MI will change to their default settings. Each mode has a corresponding pulse repetition frequency and maximum intensity point. In combined or simultaneous modes, the TI is the sum of the contribution from the modes enabled, and the MI is the value for the focal zone of the mode with the largest de-rated intensity. If a mode is turned off and then reselected, the system will return to the previously selected settings.

Probes

Each probe model available has unique specifications for the contact area, beam shape, and center frequency. Settings are initialized when you select a probe. Samsung Medison's factory defaults vary with probe, application and mode. Defaults that are below the FDA limits have been chosen for intended use.

Depth

An increase in the 2D-mode depth will automatically decrease the 2D-mode frame rate. This would decrease the TI. The system may also automatically choose a deeper 2D-mode focal depth. A change of focal depth may change the MI. The MI displayed is that of the zone with the largest peak intensity.

Application

Acoustic output defaults are set when you select an application. Samsung Medison's factory defaults vary with probe, application and mode. Defaults that are below the FDA limits have been chosen for intended use.

Related Guidance Documents

For more information on ultrasonic bioeffects and related topics, refer to the following:

- Medical Ultrasound Safety (AIUM, 2009). (A copy of this AIUM Clinical User Education Brochure is shipped with each system.)
- AIUM Consensus Report on Potential Bioeffects of Diagnostic Ultrasound: Executive Summary, J. Ultrasound in Medicine, 2008, Vol. 27, Num. 4.
- WFUMB. Symposium on Safety of Ultrasound in Medicine: Conclusions and Recommendations on Thermal and Non-thermal Mechanisms for Biological Effects. Ultrasound in Med. & Biol; 1998, 24: Supplement 1.
- Bioeffects and Safety of Diagnostic Ultrasound (AIUM, 1993)
- Guidelines for the safe use of diagnostic ultrasound equipment. (BMUS, 2009)
- Information for Manufacturers Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers (U.S. FDA – 2008)
- Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment. (IEC, 2007)
- Acoustic Output Labeling Standard for Diagnostic Ultrasound Equipment (AIUM, 2008)
- Standard Means for the Reporting of the Acoustic Output of Medical Diagnostic Ultrasonic Equipment. (IEC, 2007)
- Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices On Diagnostic Ultrasound Equipment (AIUM / NEMA, 2004)
- Ultrasonics - Field characterization - Test methods for the determination of thermal and mechanical indices related to medical diagnostic ultrasonic fields (IEC, 2005)
- Measurement and Characterization of Medical Ultrasonic Fields up to 40 MHz. (IEC, 2007)
- Ultrasonics-Power Measurements - Radiation Force Balances and Performance Requirements. (IEC, 2006)
- Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment. (AIUM / NEMA, 2004)

Acoustic Output and Measurement

Since the first usage of diagnostic ultrasound, the possible human biological effects (bioeffects) of ultrasound exposure have been studied by various scientific and medical institutions. In October 1987, the American Institute of Ultrasound in Medicine(AIUM) ratified a report prepared by its Bioeffects Committee (Bioeffects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med., Sept. 1988: 1988: Vol.7, No.9 Supplement), sometimes referred to as the Stowe Report, which reviewed available data on possible effects of ultrasound exposure. Another report, "Bioeffects and Safety of Diagnostic Ultrasound", dated January 28, 1993, provides more up to date information. In addition, periodically updated reports on biological effects, results, and guidelines on safe usage have been published by groups such as WFUMB (World Federation of Ultrasound in Medicine and Biology), AIUM, and BMUS.

The Acoustic output for this system has been measured and calculated in accordance with the Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices On Diagnostic Ultrasound Equipment (AIUM / NEMA, 2004) and the Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment (AIUM / NEMA, 2004).

In Situ, De-rated, and Water Value Intensities

All intensity parameters are measured in water. Since water does not absorb acoustic energy, these water measurements represent the largest possible value. Biological tissue absorbs acoustic energy. The true value of the intensity at any point depends on the amount and type of tissue, and the frequency of the ultrasound that passes through the tissue. The intensity value in the tissue, *In Situ* has been estimated using the following formula:

In Situ = Water $[e^{-(0,23\ alf)}]$

where: *In Situ* = *In Situ* Intensity Value

Water = Water Value Intensity

e = 2.7183

a = Attenuation Factor

Tissue	a(dB/cm-MHz)
Brain	.53
Heart	.66
Kidney	.79
Liver	.43
Muscle	.55

l = skin line to measurement depth (cm)

f = Center frequency of the transducer/system/mode combination(MHz)

Since the ultrasonic path during an examination is likely to pass through varying lengths and types of tissue, it is difficult to estimate the true *In Situ* intensity. A 0.3 de-rating factor is used for general reporting purposes. Therefore, the commonly reported *In Situ* value uses the following formula:

In Situ (*derated*) = Water [$e^{-(0,069\ lf)}$]

Since this value is not the true *In Situ* intensity, the term "de-rated" is used.

The maximum de-rated and maximum water values do not always occur under the same operating conditions. Therefore, the reported maximum water and de-rated values may not be related to the *In Situ* (de-rated) formula. For example, a multi-zone array transducer has the greatest water value intensities in its deepest zone. The same transducer may have its largest de-rated intensity in one of its shallowest focal zones.

Terms and Symbols Related to Acoustic Output and Measurement

The terms and symbols used in the acoustic output tables are defined in the following paragraphs.

A_{aprt}	-12dB OUTPUT BEAM AREA, ultrasonic beam area induced by -12dB output beam size (unit: cm^2)
d_{eq} at max. I_{pi}	EQUIVALENT BEAM DIAMETER, the acoustic beam's diameter at the location where the PULSE-INTENSITY INTEGRAL is maximal, expressed as an equivalent beam area (unit: cm)
$d_{eq(z_b)}$	EQUIVALENT BEAM DIAMETER, the acoustic beam's diameter at Zb location, expressed as an equivalent beam area (unit: cm^2)
Dim of A_{aprt}	-12dB OUTPUT BEAM DIMENSIONS, the dimensions of an ultrasound beam (whose pulse beam width is -12dB) from a specific direction that is perpendicular to the transducer output plane and the beam alignment axis (unit: cm)
f_{awf}	ACOUSTIC WORKING FREQUENCY, the arithmetic average of f1 and f2 that are farthest from each other among the frequencies of the pressure spectrum of the acoustic signal whose amplitudes are lower than the peak amplitude, i.e. maximum amplitude, by 3dB (unit: MHz)
Focal Length	The focal length in a direction parallel to the beam alignment axis in the defined operational state of the ultrasound system (unit: cm).
$I_{pa,a}$ at max. MI	The average attenuated pulse strength at the location where Mechanical Index (MI) is maximal (unit: W/cm^2)
$I_{ta,a}(z)$	Attenuated time average strength at a specific focal length (z) (unit: mW/cm^2)

MI	MECHANICAL INDEX, a variable representing potential cavitations within the human body (unit: N/A)
P	OUTPUT POWER, time average power of an ultrasonic transducer's emissions into a free field through specified media such as water (unit: mW)
$P_{\alpha}(z)$	ATTENUATED OUTPUT POWER, the power of ultrasonic output calculated at a specific distance from the transducer after attenuation occurs (unit: mW)
$P_{r,\alpha}$	ATTENUATED PEAK-RAREFACTIONAL ACOUSTIC PRESSURE, the peak rarefactional acoustic pressure calculated at a specific distance after attenuation occurs (unit: MPa)
P_r at max. I_{pi}	The peak rarefactional acoustic pressure at the location where PULSE-INTENSITY INTEGRAL is maximal (unit: MPa)
prr	PULSE REPETITION RATE, the inverse number of the time interval between two contiguous acoustic pulse (unit: Hz)
TIB	BONE THERMAL INDEX, a thermal index for a focal zone formed near a bone after the ultrasound beam passes through soft tissue, e.g. applied to a fetus (2nd or 3rd trimester) or to the head of a neonate (through the fontanel) (unit: N/A)
TIC	CRANIAL BONE THERMAL INDEX, a thermal index for an ultrasound beam entering the body and passing through a bone, e.g. skull of children or adults (unit: N/A)
TIS_{scan}	Soft tissue thermal index in scanning mode (unit: N/A)
$TIS_{non\text{-}scan}$	Soft tissue thermal index in non-scanning mode (unit: N/A)
t_d	PULSE DURATION (unit: us)
$z\_at\_max\_Ipi,\alpha$	The location where PULSE-INTENSITY INTEGRAL is maximal (unit: cm)
z_b	DEPTH FOR BONE THERMAL INDEX (unit: cm)
z_{bp}	BREAK-POINT DEPTH, which is EQUIVALENT APERTURE DIAMETER multiplied by 1.5 (unit: cm)
z_s	DEPTH FOR SOFT-TISSUE THERMAL INDEX, the distance from a plane where the product of minimum attenuated output power, ATTENUATED SPATIAL-PEAK TEMPORAL-AVERAGE INTENSITY, and $1cm^2$ is maximal at the distance range that is equal to, or greater than, the equivalent aperture diameter multiplied by 1.5, when the beam dimension of -12dB output is defined along the beam alignment axis (unit: cm)

Acoustic Measurement Precision and Uncertainty

The Acoustic Measurement Precision and Acoustic Measurement Uncertainty are described below.

Quantity	Precision	Total Uncertainty
Ipi, α (attenuated pulse intensity integral)	3.2%	+21% to -24%
P (acoustic power)	6.2%	+/- 19%
$P_{r,\alpha}$ (attenuated rarefaction pressure)	5.4%	+/- 15%
f_{awf} (acoustic working frequency)	< 1%	+/- 4.5%

Systematic Uncertainties

For the pulse intensity integral, de-rated rarefaction pressure (Pr.3), center frequency and pulse duration, the analysis includes considerations of the effects on accuracy of:

Hydrophone calibration drift or errors.

Hydrophone / Amp frequency response.

Spatial averaging.

Alignment errors.

Voltage measurement accuracy, including.

- Oscilloscope vertical accuracy.
- Oscilloscope offset accuracy.
- Oscilloscope clock accuracy.
- Oscilloscope Digitization rates.
- Noise.

The acoustic power is measured using a Radiation Force for systematic uncertainties through the use of calibrated NIST acoustic power sources.

We also refer to a September 1993 analysis carried out by a working group of the IEC technical committee 87 and prepared by K. Beissner, as a first supplement to IEC publication 1161.

The document includes analysis and discussion of the sources of error/measurement effects due to:

- Balance system calibration.
- Absorbing (or reflecting) target suspension mechanisms.

- Linearity of the balance system.
- Extrapolation to the moment of switching the ultrasonic transducer (compensation for ringing and thermal drift).
- Target imperfections.
- Absorbing (reflecting) target geometry and finite target size.
- Target misalignment.
- Ultrasonic transducer misalignment.
- Water temperature.
- Ultrasonic attenuation and acoustic streaming.
- Coupling or shielding foil properties.
- Plane-wave assumption.
- Environmental influences.
- Excitation voltage measurement.
- Ultrasonic transducer temperature.
- Effects due to nonlinear propagation and saturation loss.

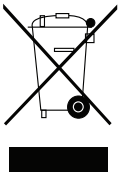
Training

The users of this ultrasound system must familiarize themselves with the ultrasound system to optimize the performance of the device and to detect possible malfunctions. It is recommended that all users receive proper training before using the device. You can receive training on the use of the product from the Samsung Medison service department, or any of the customer support centers worldwide.

Protecting the Environment

CAUTION:

- To dispose of the system or accessories that have come to the end of their lifespan, contact the vendor or follow appropriate disposal procedures.
- You are responsible for complying with the relevant regulations for waste disposal.
- The lithium ion battery used in the product must be replaced by a Samsung Medison service engineer or an authorized dealer.



Correct Disposal of This Product (Waste Electrical & Electronic Equipment)

Applicable in countries with separate collection systems

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Battery Pack

Familiarize yourself with the instructions below before using the battery pack:

WARNING:

- Comply with all instructions concerning charging and discharging the battery pack and the temperature at which it should be stored. For details on temperature range, refer to 'Chapter 4. Maintenance'.
- When connecting the battery pack, be aware of the polarity of the electrodes. Mixing up the polarity can cause the battery pack to short-circuit.
- Do not allow the battery pack's electrodes to come into contact with metallic objects.
- Do not disassemble or modify the battery pack.
- Do not expose the battery pack to heat or set it on fire.
- Do not store or use the battery pack in the vicinity of a heat-generating device or an open flame. Make sure not to subject the battery pack to temperatures in excess of 60°C.
- Do not leave the battery pack in direct sunlight.
- Do not handle the battery pack using sharp objects.
- Do not subject the battery pack to impact. Do not step on the battery pack.
- If the battery pack has been damaged, do not use it.
- Do not try to solder or repair the battery pack.
- Do not connect the battery pack to an electrical outlet.
- If you are planning not to use this product for more than a month, remove the battery pack from the system and store it separately.

CAUTION:

The battery pack can damage the product if it explodes, catches on fire, or starts to produce smoke. See below for more information.

- Do not submerge the battery pack in water or allow it to get wet.
- Do not place the battery pack inside a microwave oven, an electric oven, or a pressurized container.
- If the battery pack begins to leak, produce an odor, or generate heat, do not store or use it in the vicinity of an inflammable material.
- Do not use the battery pack if you notice abnormal signs such as an odor, heat, or deformation.

Extended Battery (Optional)

Familiarize yourself with the following information before using the Extended Battery:

WARNING:

- When using the Extended Battery, be sure to comply with the battery's charging, discharging, and storage temperatures. For details on the temperature range, refer to 'Chapter 4. Maintenance and Storage'.
- When connecting the Extended Battery, pay attention to the polarity of the electrodes. Mixing up the polarity can cause the battery to short-circuit.
- Do not allow the Extended Battery's electrodes to come into contact with metallic objects.
- Do not disassemble or modify the Extended Battery.
- Do not expose the Extended Battery to heat or set it on fire.
- Do not store or use the Extended Battery in the vicinity of a heating appliance or an open flame. Make sure not to subject the Extended Battery to temperatures in excess of 60°C.
- Do not leave the Extended Battery in direct sunlight.
- Do not handle the Extended Battery while using sharp objects.
- Do not subject the Extended Battery to impact, or step on the battery.
- If the Extended Battery has been damaged, do not use it.
- Do not attempt to solder or repair the Extended Battery.
- Do not connect the Extended Battery directly to an electrical outlet.
- If you are planning to not use this product for more than a month, remove the Extended Battery from the system and store it separately.

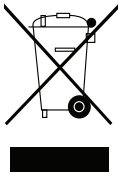
CAUTION:

The Extended Battery can damage the product if it explodes, catches on fire, or starts to produce smoke. For related information, refer to the following.

- Do not submerge the Extended Battery in water, or allow it to get wet.
- Do not place the Extended Battery inside a microwave oven, an electric oven, or a pressurized container.
- If the Extended Battery begins to leak, produce an odor, or generate heat, do not store it or use it in the vicinity of flammable materials.
- Do not use the Extended Battery if you notice suspicious signs such as an odor, heat, or deformation.

For more information on the care of the battery pack and the Extended Battery, refer to 'Chapter 4. Maintenance and Storage'.

For instructions on connecting the Extended Battery to CART, please refer to the installation guide supplied with HM70A.



Correct Disposal of Batteries in This Product

Applicable in countries with separate collection systems

This marking on the battery, manual or packaging indicates that the batteries in this product should not be disposed of with other household waste at the end of their working life. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66. If batteries are not properly disposed of, these substances can cause harm to human health or the environment.

To protect natural resources and to promote material reuse, please separate batteries from other types of waste and recycle them through your local, free battery return system.

State of California Proposition 65 Warning (US only)

WARNING: This product contains chemicals known to the State of California to cause cancer and reproductive toxicity.

Chapter 2

Introduction

Specification

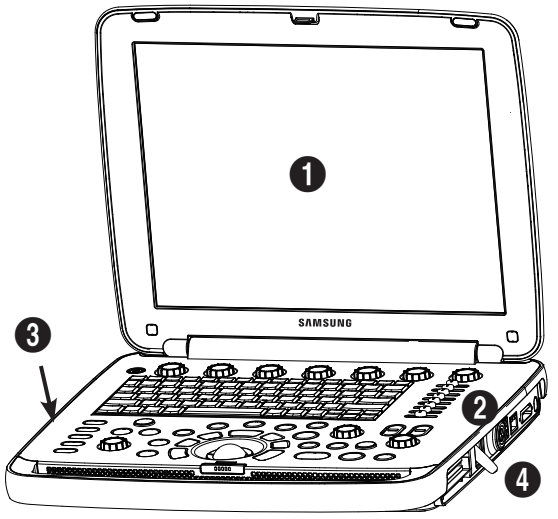
Physical Dimensions	SYSTEM : Height: 63.8mm, Width: 383.5mm, Depth: 355mm Weight: 6.1kg (Including battery) CART : Height: 823.8 mm (Maximum 1003.8 mm), Width: 541.4 mm, Depth: 526 mm Weight: 30 kg Weight: Approx. 55kg (with Safe Working Load)
Imaging modes	2D Imaging mode M Imaging mode Color Doppler Imaging (CDI) mode Power Doppler Imaging (PDI) mode S-Flow mode Power Pulse Inversion Imaging Pulse Wave (PW) Spectral Doppler imaging mode Continuous Wave (CW) Doppler imaging mode Tissue Doppler Imaging (TDI) mode Tissue Doppler Wave (TDW) mode Elastoscan(E) mode 3D imaging mode 4D imaging mode Dual modes Quad Modes Combined modes Simultaneous mode
Gray Scale	256 (8 bits)
Focusing	Transmit focusing, maximum of eight points (four points simultaneously selectable) Digital dynamic receive focusing (continuous)
Probes (Type BF / IPX7)	Curved Linear Array: C2-6, CF4-9, SC1-6, CA1-7AD, CA2-8AD Linear Array: L4-7, L5-13, L7-16, LA3-16AD, LA5-18B Phased Array: PE2-4, P3-8 Endocavity Curved Linear Array: EVN4-9 Volume Probe: VN4-8 CW Probe: CW2.0, CW4.0, DP2B
Probe connections	3 (Three probe connector)
Battery Pack	Width: 130mm, Length: 251mm, Height: 12mm, Weight: 450 g
AC Adapter	Width: 81mm, Length: 218mm, Height: 47mm, Weight: 1.1 kg
Extended Battery	Width: 208mm, Length: 326.3mm, Height: 84mm, Weight: 3.87kg

Monitor	15 inch LCD monitor (LED Backlight unit) called "LCD monitor" henceforth
ECG	Type CF
Input / Output Connections	Video (DVI-I) port Network port USB port
Image Storage	Maximum 2,030 frames for CINE memory Maximum 8,192 Lines for LOOP memory Image filing system
Application	Abdomen, Obstetrics, Gynecology, Musculoskeletal, Small Parts, Vascular, Cardiac, Pediatric, TCD, Urology
Electrical Parameters	Input: 100-240VAC, 3.5A, 50-60Hz Output: 19VDC, 10.5A, 200VA Battery: 14.8VDC, 5000mAh, Min. 30 Extended Battery: 19VDC, 10.5A, 28.5Ah
Measurement Packages	Obstetrics, Gynecology, Cardiology, Carotid, Fetal Echo, UE Artery, LE Artery, UE Vein, LE Vein, Radiology, TCD, Thyroid, Breast, Testicle, Superficial, Pediatric Hips, MSK * Refer to Chapter 8 for additional information
Signal processing (Pre-processing)	TGC control Mode-independent gain control Acoustic power control (adjustable) Dynamic aperture Dynamic apodization Dynamic range control (adjustable) Image view area control M-mode sweep speed control
Signal processing (Post-processing)	Frame average Edge Enhancement / Blurring Gamma-scale windowing Image orientation (left/right and up/down, rotation) White on black/black on white Zoom
Measurement	Trackball operation of multiple cursors 2D mode: Linear measurements and area measurements using elliptical approximation or trace M mode: Continuous readout of distance, time, and slope rate Doppler mode: Velocity and trace

Auxiliary	USB ECG USB Foot Switch (IPX 8) External Monitor External DVD Multi USB Video Printer USB Laser Printer USB Hard Disk Drive USB Flash Memory Media
User Interface	English, German, French, Italian, Spanish, Russian, Chinese, Portuguese
Pressure Limits	Operating: 700 - 1060hPa Storage: 700 - 1060hPa
Humidity Limits	Operating: 30 - 75% Storage & Shipping: 20 - 90%
Temperature Limits	Operating: 10 - 35°C Storage & Shipping: -25 - 60°C

Product Configuration

This product consists of monitor, control panel, console, peripheral devices, and probes.



❶ Monitor
❷ Control Panel
❸ Console
❹ Probe Port

[Figure 2.1 Product Components]

Tips!

Principles of Operation

Medical ultrasound images are created by computer and digital memory from the transmission and reception of mechanical high-frequency waves applied through a probe. The mechanical ultrasound waves spread through the body, producing an echo where density changes occur. For example, in the case of tissue, an echo is created where a signal passes from an adipose tissue region to a muscular tissue region. The echoes return to the probe where they are converted back into electrical signals.

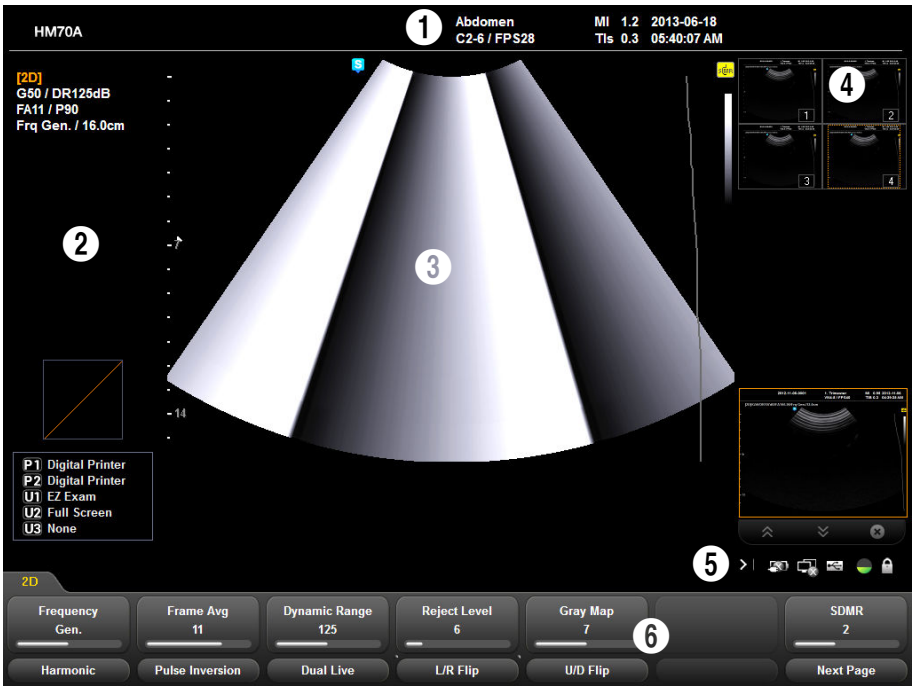
These echo signals are highly amplified and processed by analog and digital circuits having filters with many frequency and time response options, transforming the high-frequency electrical signals into a series of digital image signals which are stored in memory. Once in memory, the image can be displayed in real-time on the image monitor. All signal transmission, reception and processing characteristics are controlled by computer.

Monitor

Ultrasound images and other information are displayed on the color LCD monitor.

Screen Layout

The monitor displays ultrasound images, operation menus and a variety of other information. As shown below, the screen consists of ❶ Title area, ❷ Image Information area, ❸ Image area, ❹ Preview area, ❺ User Information area, and ❻ Soft Menu.



[Figure 2.2 Monitor Display]

Title Area

Displays patient name, hospital name, application, frame rate and depth, probe information, and date and time.

Image Information Area

Displays information for the image in each diagnostic mode such as Gain and Frame Average, as well as Post Curve and User Key. If the Utility key on the keyboard is pressed, the Utility menu is displayed. In BodyMarker mode, the BodyMarkers are displayed.

Image Area

This is where the ultrasound image is displayed. In addition, TGC, Annotation, and various measurements are displayed.

Preview Area

Thumbnail images are displayed here. Up to 14 thumbnails can be displayed per page. Click a thumbnail to enlarge.

User Information Area

The user information area provides a variety of information necessary for system use. Information such as current system status, image information, selectable items, etc. are displayed.

Tips!

When there are two Soft Menus

Indicates that the battery is not installed, and the AC power is connected. For more information on battery status, refer to the 'Battery Pack' section in this chapter.

Displays the network status.

Displays the connection status of portable disks. Double-clicking the icon will display the *Storage Manager* screen.

Shows the system's total hard disk space and the available disk space.

Shows Caps Lock status. Pressing the Caps Lock key on the keyboard will alternate between engaged and disengaged states, which will allow you to enter text in capital or lowercase letters, respectively.

Soft Menu

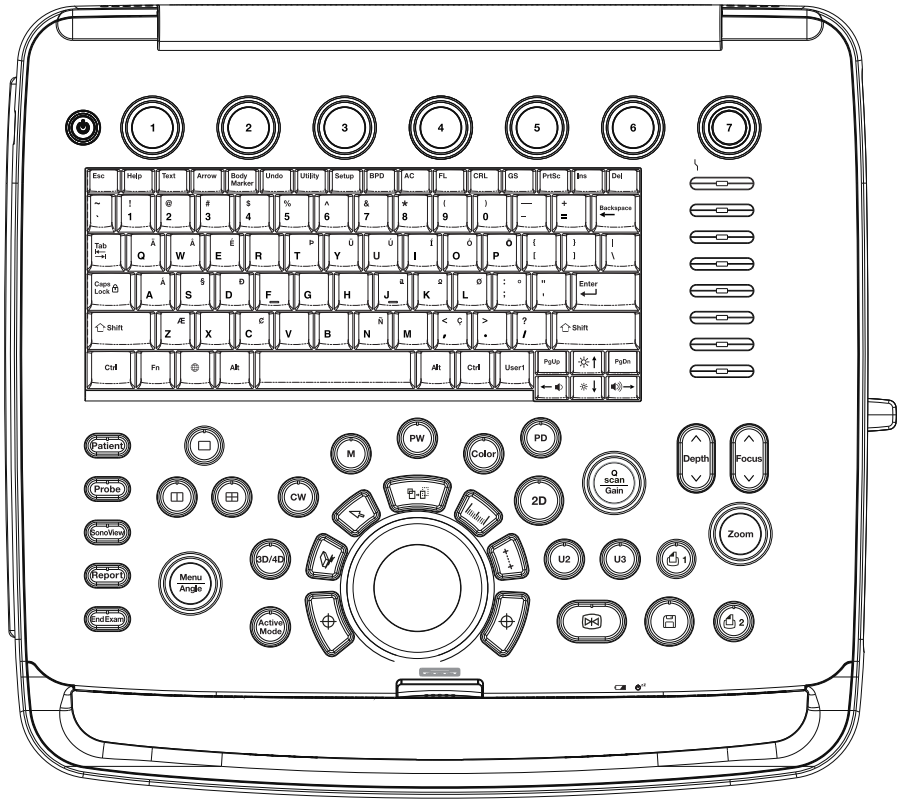
The menu options that are displayed change depending on the status of the system. To add or remove a soft menu item, press the corresponding dial-button on the control panel.

Screen Brightness Adjustment

Use the up and down arrow keys on the keyboard. However, you cannot adjust the screen brightness in text mode.

Control Panel

The control panel is used to operate the system.



[Figure 2.3 Control Panel]

The control panel consists of a keyboard, soft menus, buttons, dials, dial-buttons, sliders, and a trackball.

A dial-button can be used as both a dial and a button.

Functions of the Control Panel

The following are the descriptions and instructions for the controls on the control panel. For more information on controls with multiple functions, see Chapter 3 and later in this manual.

On/Off	Button	Turns the system on/off.
Patient	Button	Displays the *Patient Information* screen for patient selection and information entry.
Probe	Button	Displays the *Probe Selection* screen to select or change the probe and application.
SonoView	Button	Launches SonoView, an image filing program.
Report	Button	Displays the report screen that shows the measurement results of the current application and other information.
End Exam	Button	Finishes the exam of the currently selected patient and resets the related data.
Single	Button	Changes to Single mode. Available in Dual or Quad mode
Dual	Button	Launches Dual mode, in which two independent images may be compared.
Quad	Button	Launches Quad mode, in which four independent images may be compared.
Menu / Angle	Dial-button	▶ Menu: Pressing the dial-button changes the soft menu page. Press the button while the measurement or utility menu is shown. ▶ Angle: Adjusts the angle of the sample volume in Spectral Doppler mode. It is also used to adjust the BodyMarker's probe cursor, or the angle of an arrow. ▶ Quick Preset : You can press the dial-button before starting an exam to use the Quick Preset feature. You can quickly set up applications that are supported by the currently connected probe.
2D	Button	Press this button to start 2D mode.
Color	Button	Press this button to start/stop Color Doppler mode.
PW	Button	Press this button to start/stop PW Spectral Doppler mode.
M	Button	Start or end M Mode.

CW	Button	Press this button to start/stop CW Spectral Doppler mode. Available only with the phased array probe.
3D/4D	Button	Starts or ends 3D/4D mode.
PD	Button	Press this button to start/stop Power Doppler mode.
Active Mode	Button	In combined mode, pressing this button changes the soft menu. Each press of the button changes the soft menu to the one that relates to the next diagnosis mode in the set.
 **Set/Exit**	Button	Select the item or value by using the trackball. Assign Exit feature to the button, then pressing the button will exit the current function and return to the previous function.
 **Clear**	Button	Deletes text, Indicator, BodyMarker, measurement result, etc. from the image.
 **Pointer**	Button	An arrow marker appears to point to parts of the displayed image in scan mode.
 **Change**	Button	This is used to change the current trackball function.
 **Calculator**	Button	Start measurements for the application.
 **Caliper**	Button	Start taking basic measurements such as distance, circumference, area, and volume.
Q Scan / Gain	Dial-button	▶ Q Scan: Pressing the dial-button activates Quick Scan. The Q Scan mark will appear at the top of an image. It can be used only in specific applications of specific probes. ▶ Gain: Rotating the dial-button adjusts the gain under the current diagnosis mode.
Depth	Button	Adjusts the scanning depth of the image.
Focus	Button	You can adjust the focus point.
Zoom	Button	You can magnify an image.
U2/U3	Button	This button is used to assign user-defined functions. The function of each button can be set in Setup > User Defined Key.
 **Print 1/2**	Button	Prints an image on the screen using the printer connected to the system. The function of each button can be assigned in Setup > Peripherals.

Save	Button	Saves the displayed image or report to the database.
Freeze	Button	Pauses/resumes scanning.
Trackball	Trackball	Moves the cursor on the screen. Also scrolls through Cine images.
TGC	Slider	Allows you to adjust TGC values for each depth by using 8 sliders. TGC stands for Time Gain Compensation.

CAUTION: Too great a difference in the gain value settings of adjacent TGC sliders may cause stripes in an image.

■ Soft Menu

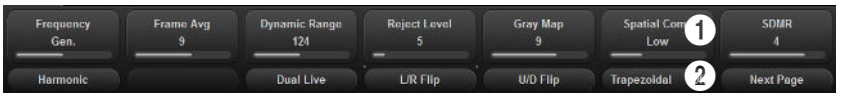
Soft Menu 1 ~ 7	**Dial-button**	Executes the function assigned to the relevant number in the current soft menu. Items displayed in the menu will vary depending on the current status of the system. Rotate or press the dial-button to adjust the items.

Tips!

Using the Soft Menu Dial-Button

The soft menu consists of a top menu at the top of the screen and a sub-menu at the bottom of the screen.

- ▶ Top Menu (❶): Rotate the dial-button to select an option.
- ▶ Sub Menu (❷): Press the dial-button to select the option.



[Figure 2.4 Soft Menu]

Tips!

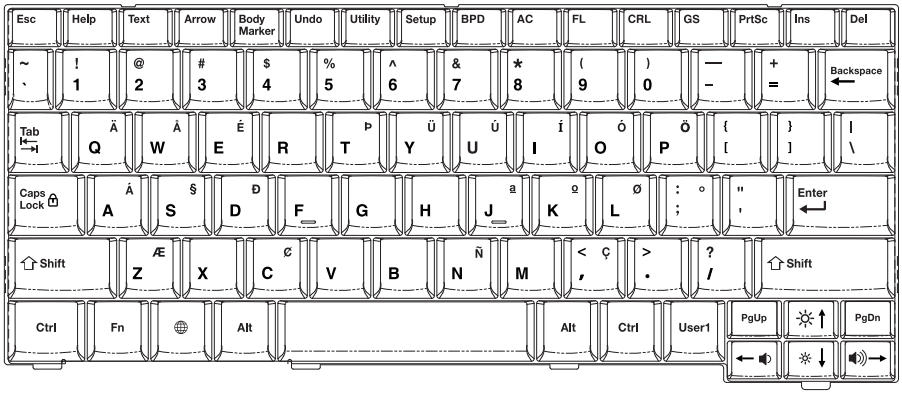
Soft Menu Dial-Buttons 4 through 6

Soft menu dial-buttons **4** through **6** perform the following in 3D view:

- ▶ Soft Menu Dial-Button **4**: Rotates the image in the direction of the X-axis.
- ▶ Soft Menu Dial-Button **5**: Rotates the image in the direction of the Y-axis.
- ▶ Soft Menu Dial-Button **6**: Rotates the image in the direction of the Z-axis.

Keyboard

The keyboard lets the user input text and use function keys to execute various functions directly.



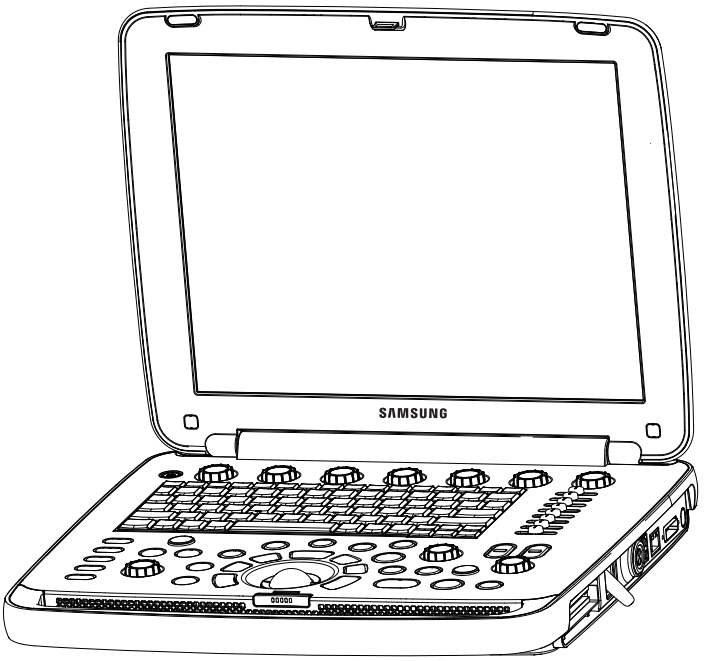
[Figure 2.5 Keyboard]

Help	Displays the Help Manual on the screen.
Text	Activates text mode. However, with the check box under Utility > Setup > Annotate > Text Setup > Quick Text selected, you can enter text right away without pressing this button.
Arrow	Initiates Arrow mode.
BodyMarker	Start BodyMarker mode.
Undo	Undo the last task. Only available in Text and Arrow modes.
Utility	Displays the Utility menu on the screen.
Setup	The *Setup* screen will be displayed.
BPD	Start BPD measurement.
AC	Start AC measurement.
FL	Start FL measurement.
CRL	Start CRL measurement.
GS	Start GS measurement.
Space Bar	Each press of the bar removes items from the screen in the order of TGC → Gray Scale Bar/Color Bar. When all of the items have been removed from the screen, pressing the space bar once more will display both items on the screen.
	Used to adjust the monitor's brightness level.
	Used to adjust the volume while in spectral Doppler mode.

Console

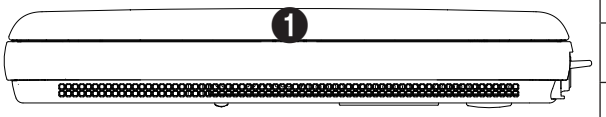
The console is made up mostly of ultrasound imaging components on the inside, and various connectors and a handle on the outside.

The console's sections and components are described below:

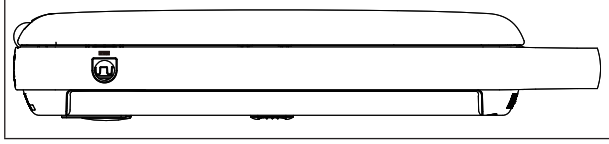


[Figure 2.6 Console Configuration]

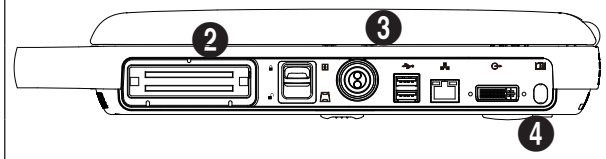
Console – Front

	❶	Monitor lock
		Battery indicator
		Power indicator

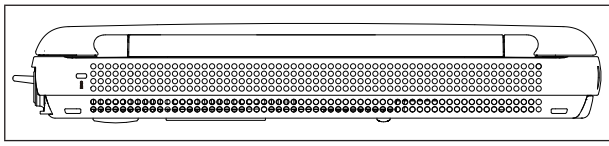
Console – Left Side

	⎓	Power Port

Console – Right Side

	❷	Probe Port
	🔒 🔓	Probe Lock Switch
	❸	CW probe port
	⇕	USB port
	品	Network Port
	⊖→	Video (DVI-I) port
	❹	Trig Port: Not used

Console – Rear

	🔒	Security Lock Port (Kensington Lock)

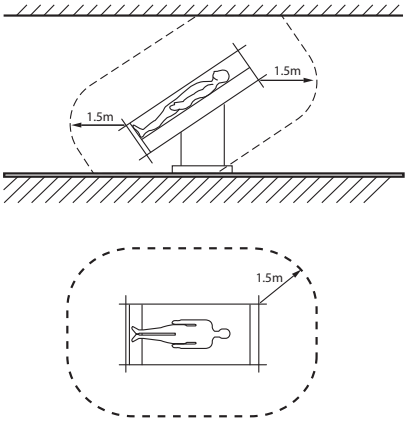
NOTE: For instructions on connecting an AC adapter to the power port, refer to 'Chapter 6. Starting Diagnosis'.

Peripheral Devices

Peripheral devices can be connected to their corresponding ports on the left or rear sides of the product.

CAUTION:

- Do not install peripheral devices that are not listed in this manual within the patient environment. If you install an unlisted device in the patient environment, it may cause an electrical hazard.
- Do not connect additional peripheral devices to socket of the auxiliary socket. Doing so may decrease the safety level.



[Figure 2.7 Patient Environment]

CAUTION:

- When using a peripheral device via a USB port, always turn the power off before connecting/disconnecting the device. Connection/disconnection of USB devices while the power is on may lead to malfunction of the system and the USB devices.
- Do not connect additional Peripheral Devices to the auxiliary socket outlets. Connecting to the auxiliary socket outlet may decrease safety level.

NOTE: For instructions on using a specific peripheral, refer to the device's User Manual.

The following products are recommended:

DVD-Multi

Samsung SE-208AB

Video Printer

- Color: SONY UP-D25MD
- Black and White: Mitsubishi P95DE, SONY UP-D897

Laser printer

- Color: Samsung CLP-615ND
- Black and White: Samsung ML-2955DW

CAUTION:

- You must install a printer and drivers that are compatible with the English version of Microsoft Windows 7™ . Contact Samsung Medison customer support division for inquiries about printer driver installation.
- When connecting the printer, ensure that the printer is configured under Microsoft Windows™ or system setup, and has been chosen as the default printer.

USB to Serial (RS-232C) Converter

USB to Serial Converter (RS-232C) with FTDI Chipset (FTDI FT232BM Compatible)

ECG

ECG-USB1, USB Type

Foot Switch

3 Button, USB Type

WLAN Card

Wireless LAN Card: Netis WF2120 Driver

NOTE: For detailed information on connecting to a wireless network, please refer to 'Setup > DICOM > Network Configuration' in 'Chapter 3. Utilties'.

Other

Removable Flash Memory media

NOTE:

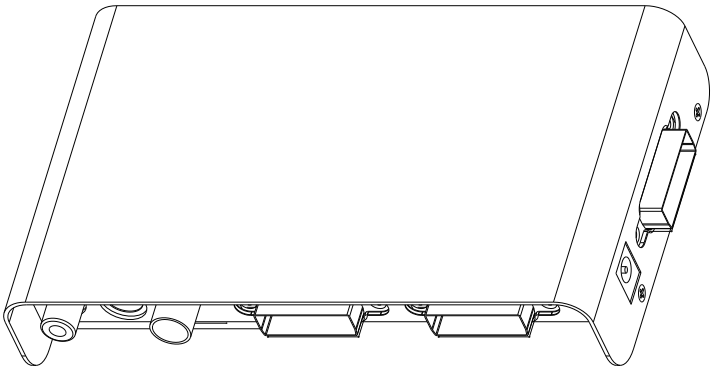
- If you are using USB 1.1 flash memory, the system may fail to recognize the device. Remove the flash memory from the console and equip again with an appropriate device.
- To remove a USB storage device from the system, go to Utility > Storage Manager.
- When using a flash memory device which supports functions other than saving files, please check first to see if it is possible to save the file on a desktop PC.
- Do not use flash memory media which contain anti-virus programs or are defective. Otherwise, the product may fail to work properly.

Video Out

The optional Video Out device connects to the system to provide digital and analog video outputs.

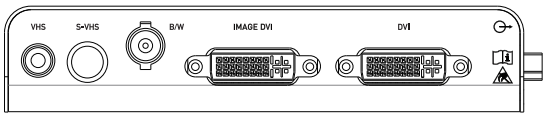
The Video Out device features the AC adapter input and the DVI video input port on the right side, and the VHS, S-VHS, B/W, IMAGE DVI, and DVI signal output ports on the front.

The Video Out device is categorized as follows:



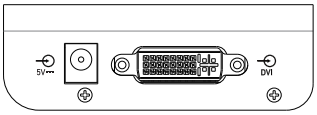
[Figure 2.8 Configuration of Video Out]

Video Out – Front



VHS	Composite video output port
S-VHS	S-VHS video output port
B/W	Black and White video output port (Not recommended)
IMAGE DVI	IMAGE DVI video output port
DVI	DVI video output port

Video Out – Right Side



5V	AC adapter connection port
DVI	Video input port

Connect the Video Out device in the following order:

1. Connect the AC adapter to the AC adapter connection port on the right side of the Video Out device.
2. Connect the video port on the right side of the console to the video input port on the right side of Video Out with a DVI cable.
3. Connect the video output port for the video signal you need on the front of the Video Out device to an external device (such as a monitor).

WARNING:

- The interior of the product contains high-voltage components; to reduce the risk of electric shock, do not disassemble or modify the Video Out device.
- While the Video Out device is durable, it needs to be protected from mechanical impacts. Exposing the device to severe impacts, such as dropping it, may damage the circuits.
- Only use the AC adapter specified by Samsung Medison (BridgePower Corp., BPM010S05N04) for the Video Out device.

CAUTION:

- Always turn off the system before connecting or disconnecting the Video Out device. Otherwise, you may damage the Video Out device.
- Do not manipulate the Video Out device while you are examining a patient. There is a risk of electric shock from leakage current.
- Disconnect and safely store the AC adapter while the Video Out device is not in use.

NOTE:

- This device only provides input and output of video signals; input or output of audio signals is not provided.
- Using the Video Out device may degrade the imaging performance.

Battery Pack and Extended Battery

The Battery Pack and the Extended Battery for this product are lithium ion batteries. Use the Battery Pack and the Extended Battery if you are not using the AC Adapter to power the product, or the power supply is not reliable.

WARNING:

- If the low battery message appears while you are using the product, immediately save the diagnosis information and connect the AC Adapter. If you continue to use the system without connecting it to an AC power source, it will display a warning message and automatically shut down.
- If the AC power source is not reliable or the product has not been grounded properly, you should use the Battery Pack and the Extended Battery.
- The Battery Pack and the Extended Battery have been manufactured specifically for HM70A. Be sure to use only the Battery Pack and the Extended Battery recommended by Samsung Medison. (Battery Pack: Elentec Co., Ltd., MS105; Extended Battery: Elentec Co., Ltd.)
- When using the Extended Battery, make sure to mount it on the CART.

The length of the time the product can run on the Battery Pack and the Extended Battery will vary depending on the diagnostic mode and the peripherals connected.

If the battery level runs low while using the product, connect the AC Adapter to recharge the Battery Pack and the Extended Battery. If you want to replace the Battery Pack or the Extended Battery with a spare, shut down the system before replacing the battery.

NOTE:

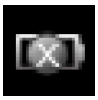
- 4D Mode can only be used when the AC Adapter is connected.
- Before using the Battery Pack and the Extended Battery, be sure to read the battery safety information in 'Chapter 1. Safety'.
- The battery will continue to discharge even when the power is turned off. You should therefore remove the Battery Pack and the Extended Battery from the product or connect the AC Adapter when the product is not in use.
- For more information on replacing and maintaining the Battery Pack and the Extended Battery, refer to 'Chapter 4. Maintenance and Storage'.
- If you use both the Battery Pack and the Extended Battery at the same time to operate the product, the power from the Extended Battery will be used first.

Battery Icons

Battery icons indicate the status of the battery pack and are shown in the user information area of the screen. While using the battery pack as the power source, use the battery icons to check the remaining battery level.

See below for more information on battery icons:

Icon	State	Note
	Battery level is between 81 and 100%	AC adapter is connected (Battery pack is being recharged)
	Battery level is between 61 and 80%.	
	Battery level is between 41 and 60%.	
	Battery level is between 21 and 40%.	
	Battery level is between 11 and 20%.	
	Battery level is between 1 and 10%.	
	Battery level is 0%. (Charging battery to safe level)	

Icon	State	Note
	Battery level is between 81 and 100%.	AC adapter is not connected
	Battery level is between 61 and 80%.	
	Battery level is between 41 and 60%.	
	Battery level is between 21 and 40%.	
	Battery level is between 11 and 20%.	
	Battery level is between 0 and 10%.	
	Indicates that neither the AC adapter nor the battery pack is connected, or there is a battery-related error.	

The meaning of each Extended Battery icon is as follows:

Display	Status	Note
Blinking green LED	Charging	AC Adapter is connected (charging Extended Battery)
Green LED is lit	Charging complete	
4 LEDs are lit	90 to 100% charge remaining	The AC Adapter is not connected (discharging Extended Battery)
3 LEDs are lit	60 to 89% charge remaining	
2 LEDs are lit	40 to 59% charge remaining	
1 LED is lit	15 to 39% charge remaining	
1 blinking LED	Remaining charge is 15% or less	

Probes

Probes are devices that generate ultrasound waves and process reflected wave data for the purpose of image formation.

NOTE: For information on probes, refer to 'Chapter 5. Probes' and the 'Reference Manual'.

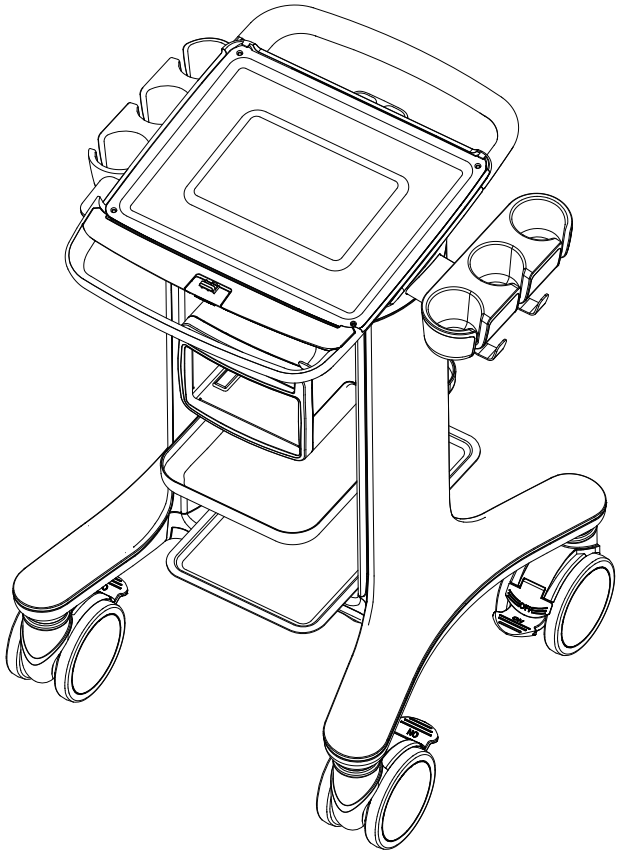
Be sure to connect or disconnect probes when the power is off to ensure the safety of the system and the probes.

1. Lift up the probe's lockdown switch and disconnect the probe.
2. Connect the probe to the probe port.
3. Push down the probe's lockdown switch to lock it in place.

HM70A CART(Optional)

NOTE: The HM70A CART is an optional feature of this product.

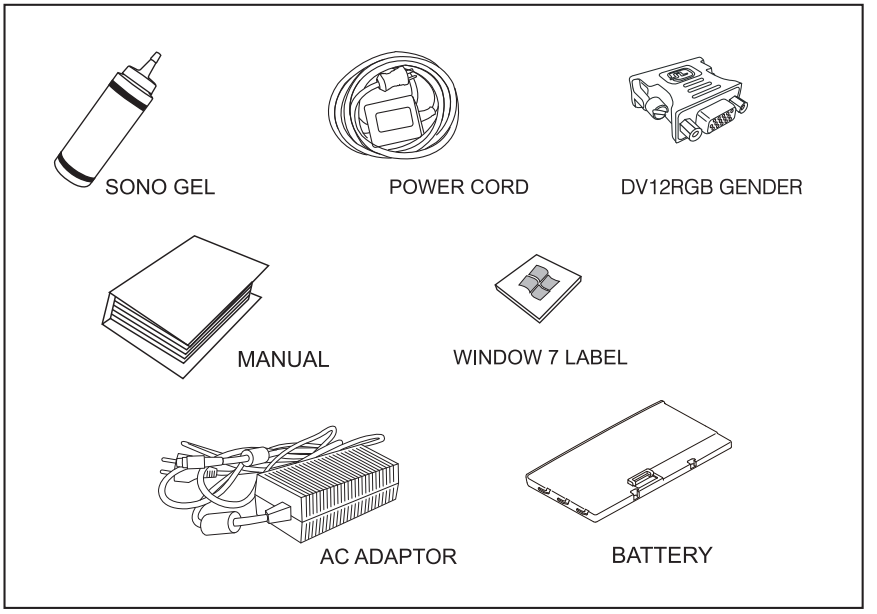
The HM70A CART is a convenient platform for transportation and operation of the product. This CART is only intended to be used with the HM70A. For instructions on transporting or installing the cart, please refer to the installation guide supplied with HM70A.



[Figure 2.9 HM70A CART]

Accessories

An accessory box containing the items below is supplied with the product. We recommend that you use the accessory that comes with this product.



[Figure 2.10 Accessories]

Optional Functions

This product has the following optional functions:

- 4D
- 3D XI
- CW Function
- Cardiac Measurement
- DICOM
- Spatial Compound
- XI STIC
- Auto IMT
- Elastoscan
- Panoramic
- HDVI
- VolumeNT/IT
- ADVR

For further information about the above options, please refer to the relevant chapters in this manual.

Chapter 3

Utilities

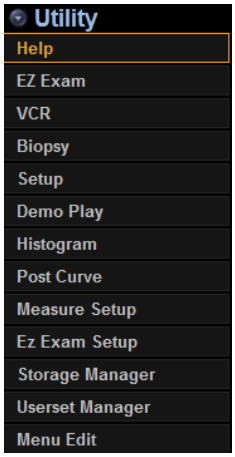
Chapter 3

Utilities

Press the **Utility** key on the keyboard. The Utility Menu and its associated soft menus appear on the screen. With these menus, you can configure the system and use the Biopsy and Histogram functions.

Utility Menu

Use the **Menu/Angle** dial-button to select the item you want to use from the Utility Menu.



[Figure 3.1 Utility Menu]

Utility Soft Menu

Used to change the application or preset.

[Figure 3.2 Utility Soft Menu]

Applications

A list of applications supported for the current probe is displayed. Rotate the Soft Menu dial-button **1** to select the application that you wish to change.

App. Load

Press the Soft Menu dial-button **1** to load the selected application.

Presets

Displays the supported presets for the current application. Select a preset by rotating the Soft Menu dial-button **2**.

User preset

Displays the supported User preset for the current application. Rotate the dial-button **3** to select a User preset.

Pre. Load

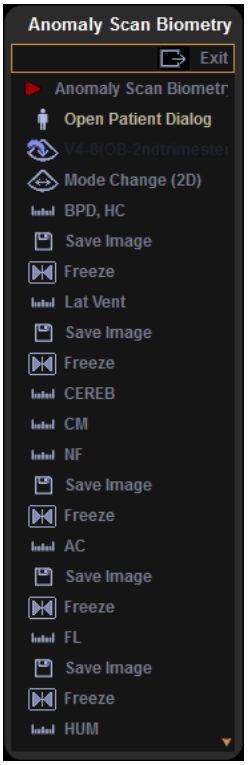
Pressing the Soft Menu dial-button **2** applies the selected userset to the system.

HELP

Select **Help** from the Utility Menu. The help text stored in the system will be displayed on the monitor screen.

EZ Exam

Select **EZ Exam** from the Utility menu. The screen will switch to the *EZ Exam* screen. You may save the exams you use frequently, so you can load them quickly for easy use. For instructions on setting up EZ Exam, refer to EZ Exam Setup in this chapter.



[Figure 3.3 EZ Exam]

ECG

Select **ECG** from the **Utility** menu. The image of cardiac pulsation will be displayed; this will be displayed in the menu only if the application is set to Cardiac. In a Multi Image Mode such as Dual or Quad, ECG Cine can be used for each image.

Starting and Ending ECG

Press the Soft Menu dial-button **1** to turn ECG on or off.

ECG Setup

Trigger

Rotate the Soft Menu dial-button **2** to select a value between 0 and 5.

ECG Invert

Press the Soft Menu dial-button **2** to turn ECG Invert on or off.

Size

Select a value between 50 and 200 by rotating the Soft Menu dial-button **3**.

Loop

In Loop mode, you may press the Soft Menu dial-button **3** to go to Loop and configure settings.

Position

Rotate the Soft Menu dial-button **4** to change the position; selecting a higher value will place the ECG higher on the screen.

Auto Gain

Press the Soft Menu dial-button **4** to set up.

Gain

Adjust the brightness of an image. Rotate the dial-button clockwise to increase the gain. Rotate the Soft Menu dial-button **5** to select a value between 10 and 100.

Trigger Time

Select a value between 0 and 1000 msec by rotating the Soft Menu dial-button **6**.

Exit

Press the Soft Menu dial-button **7** to finish configuring the settings.

CAUTION:

- If the ECG is less then 30Hz, the Heart Rate (HR) may not be displayed.
- In CW Mode, when ECG is active, the error ratio of the Heart Rate (HR) should be within 2%.

ADVR (Optional)

Select **VCR** from the Utility Menu. The screen will switch to the *VCR* screen.

CAUTION: Check the capacity of the media before recording.

Recording

Records a video in USB or DVD format. A USB storage device or an ODD, respectively, is required; the default setting is DVD.

Recording to DVD

▶ Record

1. Select DVD as the Recording Method, and select VCR from the Utility menu.
2. Select the **Rec** button from the soft menu; the message 'Preparing to Record' will be displayed, and recording will begin.
3. The recording file will be saved to the DVD; a file with the extension *.mpg will be created whenever recording starts.

NOTE:

▶ You can use User 1, User 2, and User 3 on the control panel to perform the record function.

▶ In Setup > User Defined Key > User Key Setup > User Key 1, User Key 2, User Key 3, you may select Record.

▶ Stop

Pressing the **Stop Rec** button will stop the recording and open a window asking whether you want to write the saved file. Select **Yes** to export the recording file to DVD; select **No** to stop recording without exporting the file.

▶ Export

Once DVD recording is complete, you can press **Export** to save the recording file to a DVD; this can be done only when an external DVD-ROM is connected.

▶ DVD Reset

You can delete a recording file.

■ Recording to USB

▶ Record

1. Select USB as the Recording Method, and select VCR from the Utility menu.
2. Select the **Rec** button from the soft menu to specify the folder to save your recording file in. After selecting the path, press the **Save** button to start recording.

▶ Stop

Press the **Stop Rec** button to stop recording.

NOTE:

- ▶ For more information on the recommended media, refer to 'Peripheral Devices' in 'Chapter 2 Introduction'.
- ▶ In Setup > User Defined Key > ADVR Recording Method > Recording To, you may select DVD or USB as the Media Type for real-time recording.
- ▶ When exporting after recording the ADVR DVD, DVDs are only supported; CDs are not supported.
- ▶ The type of DVD media is not limited when performing a DVD Export.

Biopsy

Select **Biopsy** from the utility menu.

NOTE: The biopsy option is not available with the phased array probe.

Editing the Biopsy Guideline

Before using the biopsy option, you must specify the biopsy guideline. This is to ensure accurate results.

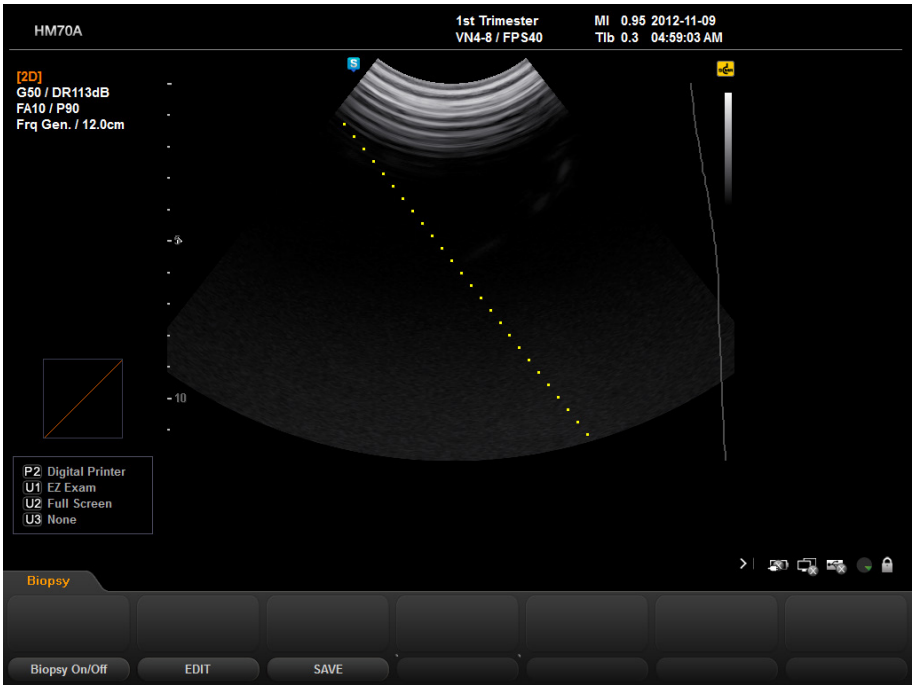
NOTE:

- Note that the biopsy guideline cannot be edited when the Trapezoidal function is in use for the Linear Probe.
- If the system is rebooted, the biopsy guideline settings are restored to the default.

Starting and Finishing a Biopsy

NOTE: Make sure to adjust the biopsy guideline before using the biopsy feature.

1. Press the Soft Menu dial-button **1** Biopsy On/Off. A warning message will appear.
2. Click **OK** and the biopsy guideline will appear on the screen.
   - If the guideline shown on the screen is not correct, press the Soft Menu dial-button **2** Edit to change it.
3. Insert a needle along the guideline. And then perform the biopsy as desired.
4. When you have finished the biopsy, press the Soft Menu dial-button **1** Biopsy On/Off again. The biopsy is complete.



[Figure 3.4 Biopsy]

Setup

This mode is used for system settings. It does not affect image output. The setup may be modified depending on specific needs or preferences.

1. Select **Setup** from the utility menu or on the keyboard.
2. The *Setup* screen will be displayed. Select a tab that has items to specify.

Tips!

Selecting a tab

You can select a desired tab in either one of two ways. Select the method that suits you.

- ▶ Rotate the **Menu/Angle** dial-button to make a selection.
- ▶ Use the trackball and the **Set** button to select a tab.

3. Specify settings for each item.
4. When you have finished, press **Exit**.

General

In the *Setup* screen, select the **General** tab. From this tab, you can configure the general system settings.

Title

You can specify the information that is displayed in the title area on the screen.

■ Institute

Enter the name of the hospital/institution where the product is installed.

NOTE: These special characters cannot be entered: # [" : ? | ₩

■ Department

Enter the name of the department of the hospital/institution where the product is installed.

Date

The current date is displayed. To change the date, click  .

NOTE:

- You cannot change the date and time when a patient ID has been registered. To change the date and time, you should finish the current examination by pressing the **End Exam** button on the control panel.
- You can select a year from 2006 to 2027.

Tips!

How to set the date and time

1. Click  next to the Date (or Time) field.
2. Use the trackball and the **Set** button to configure the date and time.
3. When the date and time have been properly set, click **Apply** to apply changes. Click **OK** to close the Date and Time window. Click **Cancel** or the **Exit** button to cancel.

Date Format

Used to configure the date format. Select a format by using the combo button. The selected date format will be applied to various date fields in *Patient Information*.

Time

The current time is displayed.

Time Format

Select a time display format. Select a format by using the combo button.

Store Clip

Store Clip Method

Specify the method and range in which an image is acquired and saved.

You can select ECG Beat, Time or Manual. Note that ECG Beat can be selected only when ECG is on.

- ECG Beat: Specify the heart beat as 1–8 beats.
- Time: Specify it as 1–4 seconds.
- Manual: Saves images until press the **Save** button again.

Cine Loop Period

- Retrospective: When the **Save** button on the control panel is pressed during scanning, the preceding images are saved.
- Prospective: When the **Save** button on the control panel is pressed during scanning, the subsequent images are saved.

NOTE: To set up the **Store Clip** function for the foot switch, go to Utility > Setup > Peripherals > Foot Switch.

Control

Trackball Speed for Scan Mode

Used to specify the trackball's speed in scan mode. Select Slow, Normal, or Fast.

Trackball Speed for Measurement

Used to specify the trackball's speed during measurement. Select Slow, Normal, or Fast. Slower speeds allow more precise measurements.

Scan Mode

Simultaneous Mode

You can decide whether to enable Simultaneous Mode in Spectral Doppler Mode, using the following three options:

- Allow B/PW: Select this if you do not wish to use Simultaneous Mode in 2D/C/PW Modes, but do wish to use it in 2D/PW Mode.
- Allow B/C/PW: Select this if you wish to use simultaneous mode for both 2D/PW and for 2D/C/PW.
- Off: Select this if you do not wish to use Simultaneous Mode.

Dual Mode

Select whether to activate the selected area in Dual Mode. When you select 'Change Window', the selected screen is always activated in Dual Mode.

Dual Live

Select the position of the Color Doppler Mode in Dual Live Mode.

- Left / Top: Color Doppler Mode is positioned at the upper left corner.
- Right / Bottom: Color Doppler Mode is positioned at the lower right corner.
- Dual Live Left-Right Dual Only: The Top-Bottom Dual button disappears if you select this checkbox.

Freeze Action

Select a function to execute when the **Freeze** button on the control panel is pressed. Available options are BodyMarker, Caliper, Measure and None.

End Exam Action

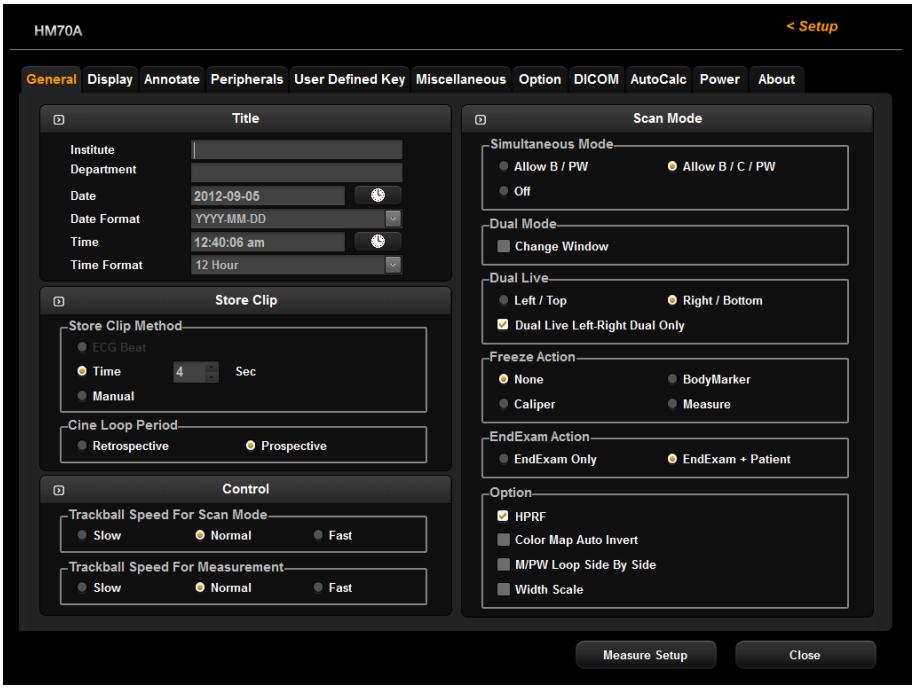
Used to assign a task to the control panel's **End Exam** button.

- End Exam Only: Pressing the **End Exam** button exits Exam Mode and switches to the *B Mode Scan* screen.
- End Exam + Patient: Pressing the **End Exam** button switches to the *Patient Information* screen.

Option

Used to determine which options will be used in Scan Mode. Use the trackball and the **Set** button to select and check or uncheck an item.

- HPRF: Select whether to activate HPRF (High Pulse Repetition Frequency), which is supported in PW Spectral Doppler Mode. Check the checkbox to use the HPRF function.
- Color Map Auto invert: Check this checkbox to automatically highlight the Color Map. This is only applied when you change Steer in 2D/C/D Mode, C Mode, or DPDI Mode in PD Mode.
- M/PW Loop Side By Side: Add Loop Side By Side display in M Mode or Power Spectral Doppler Mode.
- Width scale: Automatically fit the image size to the screen size when the depth of a 2D image is adjusted. Please note that this can be only used with linear probes.



[Figure 3.5 Setup - General]

Display

Select the **Display** tab in the *Setup* screen. Configure the settings for displaying images.

Display

Option

Select the items that you wish to have displayed on the screen. Use the trackball and the **Set** button to select and check or uncheck an item.

- Post Map: Choose whether to display the Post Map.
- TGC Line: Select whether or not to display the TGC Line. When TGC Line is Off, the TGC line appears when you set the TGC line, but then disappears after three seconds.
- Name + Birthday: Select whether to display the name and date of birth underneath the patient ID.
- Image Info: Show or hide the image information. If the image information intrudes too much on the screen, disable this option to hide it.
- Name + Age: Select whether to display the name and age under the patient ID.
- Name + Age+ Gender: Select whether to display the patient ID, name, age and gender.
- TI(Thermal Index) Display: Specify the TI to display on the screen as TIs (Soft tissue Thermal Index), TIb (Bone Thermal Index), or TIc (Cranial Bone Thermal Index).

Doppler Axis

Select the units of measurement for the axis scale in Spectral Doppler Mode.

- Velocity: Specify the Doppler axis scale unit as cm/s (m/s).
- Frequency: Specify the Doppler axis scale unit as kHz.

LMP / GA / EDD Display

Specify how the LMP, GA and EDD entered in the *Patient Information* screen will be displayed on the monitor screen. Select two from LMP, GA, and EDD.

- Information Bar (Replace ID): Replace the ID in the title area.
- Information Bar (Replace Name): Show the patient name in the title area.

- Information Bar (Replace App.): Show the application in the title area.
- Measure Result: Display the measurement result along with the selected LMP, GA or EDD.
- None: None of the options are displayed on the screen.

Font

Font

Specify the target for which you want to set the font. Choose from Document Font and Measure Result Font.

Font Name

Select the font type to use.

Font Size

Select the font size to use.

Font Color

Select the font color to use.

Preview

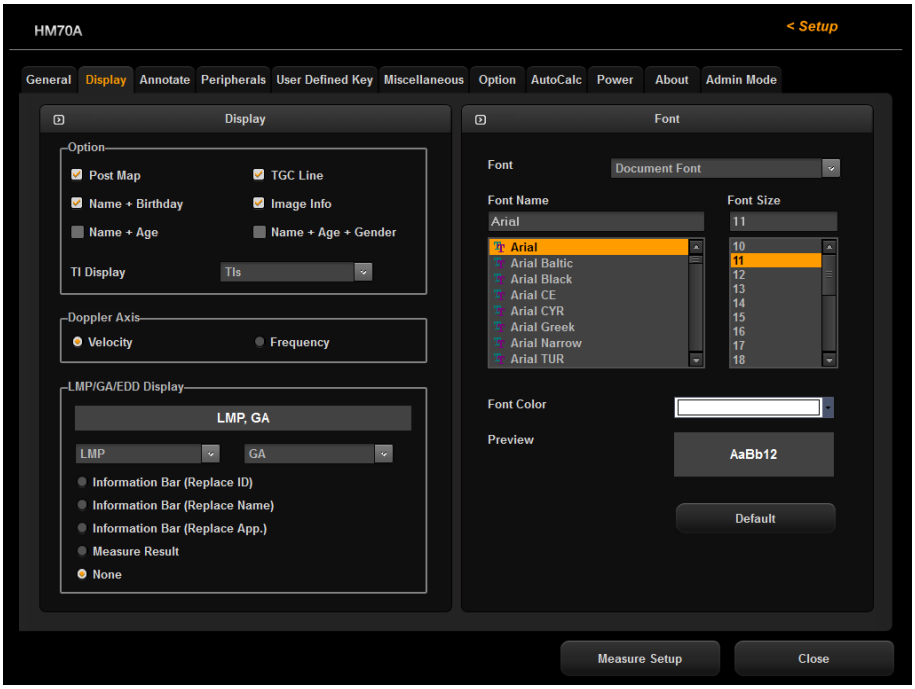
Previews the font selection.

Default

Uses the system's default fonts. The default settings are as follows:

	Document Font	Measure Result Font
Font Name	Arial	Arial
Font Size	11	11
Font Color	White	Yellow

NOTE: Certain fonts may not appear correctly on the screen.



[Figure 3.6 Setup - Display]

Annotate

Select the **Annotate** tab in the *Setup* screen. Specify display-related options.

BodyMarker

Size

Used to specify the BodyMarker picture size. Select Small, Medium, or Large.

Option

BodyMarker Auto Active: Select whether to activate the BodyMarker mode automatically when the active image area is changed.

BodyMarker Edit

▶ BodyMarker list

The list varies depending on the group selected from Group. 'Current page/Total pages' is displayed below. If there are two or more pages in total, you can change pages by using ⇨ or ⇦.

▶ BodyMarker list for the probe or preset currently being used

'Current page/Total pages' is displayed below. If there are two or more pages in total, you can change pages by using ⇨ or ⇦.

NOTE: You can add or save between 1 and 100 BodyMarkers in each list.

▶ Adding a BodyMarker

Select a BodyMarker from the left list and double-click it. The selected BodyMarker will be added to the right list. The right list cannot have duplicated BodyMarkers. If this occurs, a warning message will pop-up.

▶ Removing a BodyMarker

Select a BodyMarker from the right list and double-click it.

▶ Saving and Canceling the BodyMarker list

Click **Save** to save the list. Click **Close** to cancel.

▶ Resetting the BodyMarker list

Click **Reset**. This restores the system's default settings.

Text Setup

Used to configure text input-related options.

Quick Text

If the checkbox is selected, the Quick Text function is enabled. With Quick Text enabled, pressing any keyboard key immediately activates text input mode.

NOTE:

- The Quick Text checkbox is checked by system default.
- With Quick Text disabled, pressing the keyboard's **Text** button activates text input mode.

Auto Text Erase

If this checkbox is checked, all of the text that has been entered is deleted at once when you return to scan mode by pressing the **Freeze** button.

Boot up Caps Lock on

If this checkbox is checked, Boot up Caps Lock On is turned on. This means that when text is entered, it is entered in capital letters.

Autotext

If an abbreviation is entered, the system retrieves and enters a full word automatically. When this option is selected, you can enter text more easily and quickly. For example, if you input "AC", the system will search for the full word and display it on the screen as "Abdominal Circumference".

To enable Auto Text, check the **AutoText** checkbox by using the trackball. Otherwise, uncheck the checkbox.

If this option is selected, an abbreviation list appears on the screen when text is entered.

A list of abbreviations for this function is stored on the system. You can add a new abbreviation or edit the existing abbreviations as desired.

Tips!

Editing the Abbreviation List

To enable the abbreviation list stored in the system, click **the Autotext Edit** button. The system will switch to the Autotext Edit screen.

To save the changes and finish editing, click the **Close** button.

▶ Modifying a word

1. Use the trackball and the **Set** button to select a word to modify from the list. An abbreviation for the selected word and its full version are displayed under Abbreviation and Full Word at the bottom of the screen.
2. Modify the word in the Abbreviation and Full Word columns. The abbreviation list is updated in real time.

▶ Adding a word

1. Click the **New** button.
2. Enter the words that you wish to add in the Abbreviation and Full Word fields at the bottom of the screen. The word will be added to the abbreviation list.

▶ Deleting a word

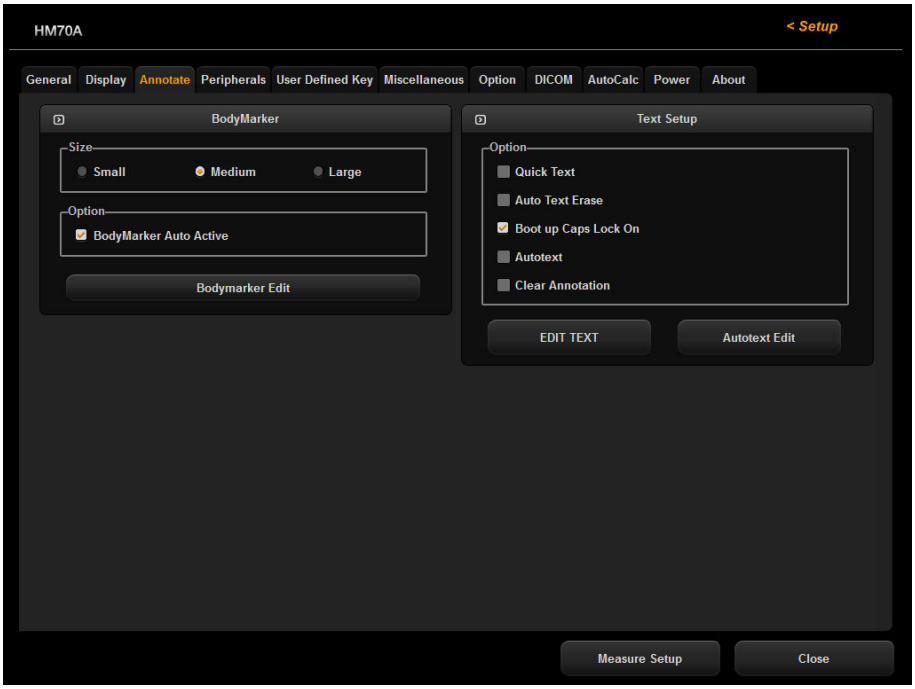
1. Use the trackball and the **Set** button to select a word to delete from the list. An abbreviation for the selected word and its full version are displayed under Abbreviation and Full Word at the bottom of the screen.
2. Click the **Delete** button. The following warning message will appear
3. To delete the selected word, click **OK**. The word will be deleted from the abbreviation list. Click **Cancel** to cancel.

▶ Selecting Autotext Delay Time

Specify the time taken by the system to automatically convert an abbreviation into a full word and display it on the screen. Set the delay time from 0.1 to 5 seconds in Autotext Delay Time at the bottom of the screen.

■ Clear Annotation

Check this checkbox to delete the entered annotation when you change the mode.



[Figure 3.7 Setup - Annotate]

Peripherals

Select the **Peripherals** tab on the *Setup* screen. You can configure the settings for the mounted peripherals, keys, and buttons.

Print Setup

Printer Orientation

NOTE: This option is available only for an Echo printer that uses roll paper.

Set the type and page orientation of the Echo printer.

- Printer Settings: Select the printer to use by using the combo button.
- Portrait: When printed, the long side of the page is vertical.
- Landscape: When printed, the long side of the page is horizontal.

Print Key

Used to assign printers to the control panel's **Print 1** and **Print 2** buttons.

Measure Report print

Select the relevant check box to print the measurement report in an A4/ Letter format.

Local Printing Area

Set the area that will be printed.

- Video Out (640*610): Prints the full monitor screen (640x610).
- Image Only: Prints the image area only.

Printing Image Adjustment

Used to adjust the image print quality. Select the image type and adjust Gamma, Brightness, and Contrast.

NOTE: This is only supported by some digital printers.

Foot Switch

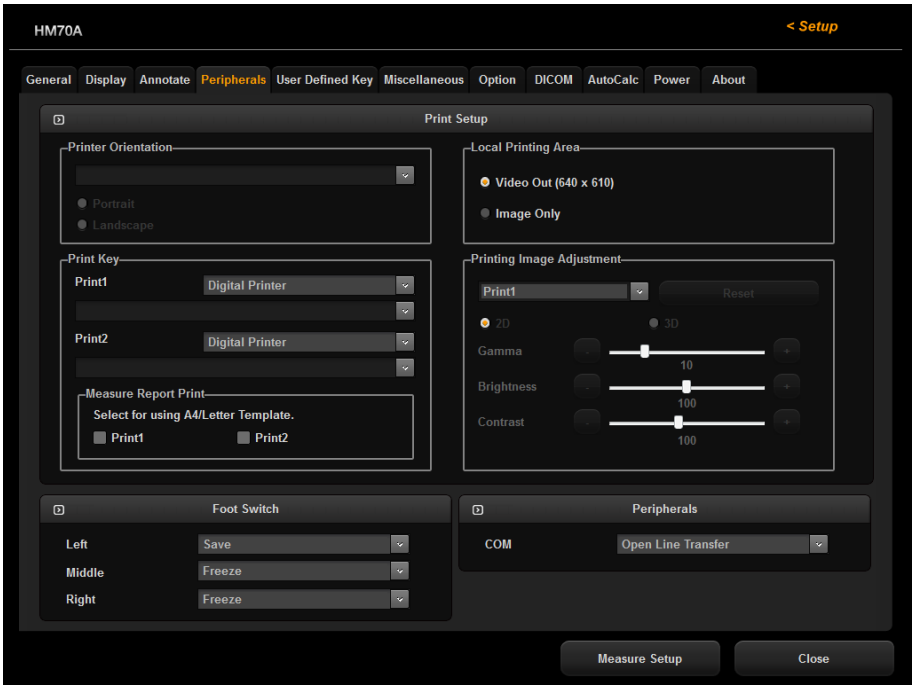
Set the functions of the left and right pedals of the foot switch. The functions that can be set are shown below. Freeze, Update, Record, Print1, Save, Store Clip, Volume Start.

Peripherals

COM

Configure a device to connect to a serial port. Choose between Open Line Transfer and Reserved. If you select Reserved, the COM port will not be used.

To complete the device connection after selecting Open Line Transfer, you need to reboot the system.



[Figure 3.8 Setup - Peripherals]

NOTE: The Samsung ML_2955 printer shares the drive with the Samsung ML_2950 and is displayed as Samsung ML_2950. Also, as before, the Samsung CLP615ND is displayed as Samsung CLP620ND.

User Defined Key

Select the **User defined Key** tab in the *Setup* screen. You can set the functions of the keys and buttons on the product.

Set / Exit Key Setup

Set / Exit Key Switch

Set the functions of the buttons to the left and right of the trackball on the control panel.

- Set / Exit: The left button is set to **Set** and the right button is set to **Exit**.
- Exit / Set: The left button is set to **Exit** and the right button is set to **Set**.

Set Key Action

Change Window: Select the checkbox to set the Change window function.

Printer Key

Printer Key

- Print Only: Prints the image.
- Print + Image Save: Prints and saves the image.

Save Key Setup

Save Key

- Image Save: Performs Image Save; does not perform Store Clip.
- Store Clip: Performs Store Clip; does not perform Image Save.
- Image Save / Store Clip: Saves the image in Freeze state; sets the Store Clip function in Live mode.

User Key Setup

User Key

Assign functions to the **User key1**, **User key2**, and **User key3** buttons on the control panel.

The functions that can be set are shown below. None, EZ Exam, Full Screen, TDI Mode, TDW Mode, Store Clip, Save, Record, M Line, Dual, Quad, Dual Live, Change Window, Probe Change, Application Change, Biopsy, Annotaion, BodyMarker, Simultaneous, EFW Measure, EFW Result, BPD, HC, AC, FL, APTD, TTD, FTA, GS, CRL.

Zoom Navigation Box Setup

Read-Zoom Box Reference Position

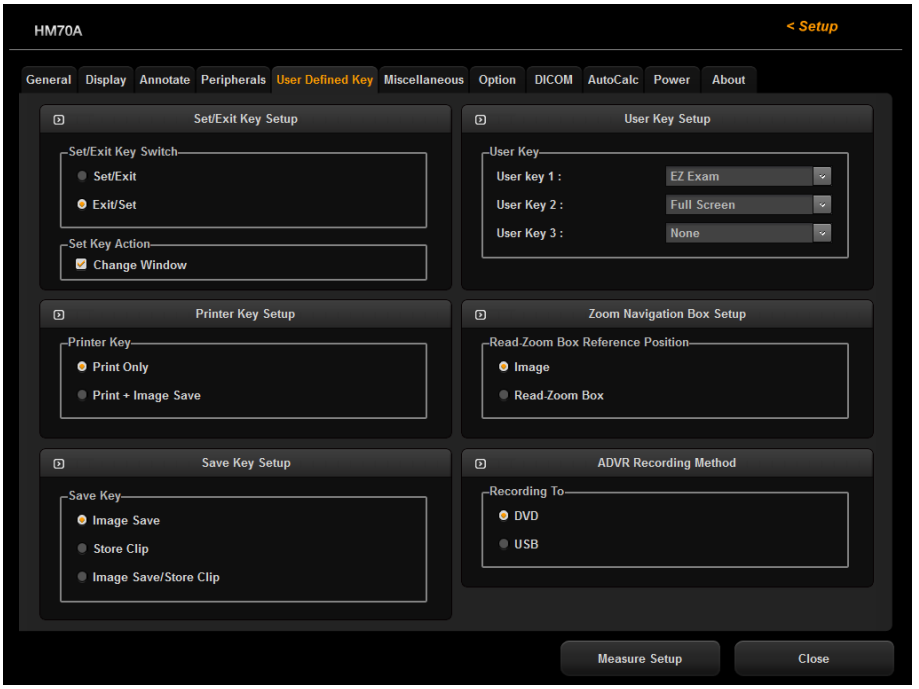
Select the position of the Read-Zoom Box Reference.

You may select either Image or Read-Zoom Box.

ADVR Recording Method

Recording To

Select a media type for real-time recording. You may select either DVD or USB.



[Figure 3.9 Setup - User Defined Key]

Miscellaneous

Select the **Miscellaneous** tab on the *Setup* screen. You can set E-mail, Text, Network Status, etc.

E-mail

Enter the details of the server that this product should use to send/receive e-mails.

Mail (SMTP) Server

Configure the e-mail server.

Port No.

Enter the port number.

ID

Enter the log-on ID for the e-mail server to use.

Password

Enter the log-on password for the e-mail server to use.

Buzzer Control

Set the volume of the buzzer, dial-button and battery sound.

Buzzer Sound

Generate a buzzer sound when a button or dial-button is used. Set this to on or off using the trackball. When this is set to on, the buzzer sounds each time a button or dial-button is used. Select a volume between 0 and 100.

Battery Sound

Beeps when the battery power is low. Use the trackball to select the volume between Low, Mid and High.

System Login Control

User Account:

- User must enter a password to use this system: Select the checkbox to set a password. If the user account is set, the login window is displayed when the system boots.
- Current password: Enter the current password.
- New password (4-character minimum): Enter a new password of at least 4 characters length.
- Confirm new password: Enter the new password again.

RMS Control

Tips!

Service Application

This is the application for RMS; it is divided into Log, Service, Transfer, Diagnostics, and Utility tabs. When the application is first run, the user may only view the Log and Service tabs. The Transfer, Diagnostics, and Utility tabs can be viewed by a logged-in Service Engineer; they are not available to users.

Log

The various logs generated by the equipment, pertaining to the frequency of use, errors, system information, etc., can be viewed.

- DICOM: A separate log pertaining to DICOM is also kept; logs pertaining to DICOM transmission may not be viewed at present.
- Diagnostics: You may view the Error Log which is generated when performing a hardware diagnosis.
- Error: Information is provided on errors that have occurred in the equipment; you may select Error Image to view the circumstances in which the errors have occurred.
- Utilization: Specific utilization information such as Application, Probe, and Preset may be viewed.

Service

Provides a Remote Desktop feature, which allows a remote connection to a Service Engineer. The user clicks on a Service Engineer displayed on the screen to select the engineer. If the user cannot find a Service Engineer upon logging on, the user may press the Refresh button to refresh the screen and find a Service Engineer who has logged on since then.

Transfer

Shows how to remotely download the log data and other information saved on the device.

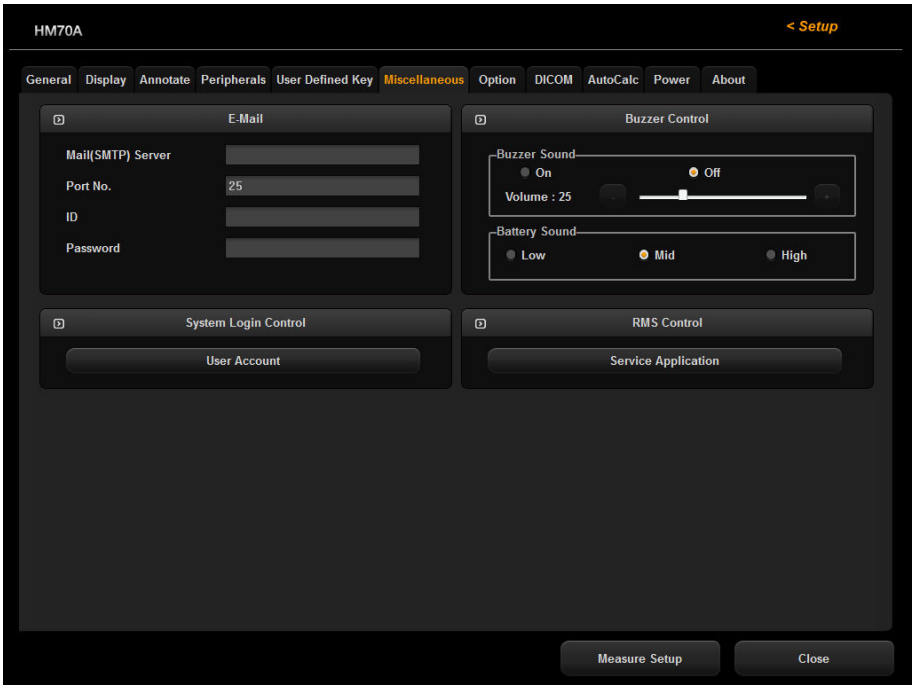
Diagnostics

- PC Status: Shows the system information such as CPU load and temperature.
- Self Diagnostics: Run a diagnostic of the system hardware. The system needs to shut down before the diagnostic can be run.
- Verify the system's test pattern.

Utility

This is the preparatory stage for starting a Remote Service; inspections, upgrades, and the system are controlled from this tab.

- Control Panel: Press the button to move to the control panel.
- Virtual Key: Use the button to control the device and the touch panel.
- Upgrade: Perform a version upgrade by using the RMS software file. Alternatively, you may perform a remote software upgrade by accessing the RMS Server.



[Figure 3.10 Setup - Miscellaneous]

Option

Select the **Option** tab on the *Setup* screen. Sets or releases the use of the optional software or hardware.

Options

The list of optional software will appear.

NOTE: To purchase optional software, please contact the software's distributor.

Option

This shows the types of optional software that can be installed on the product.

Status

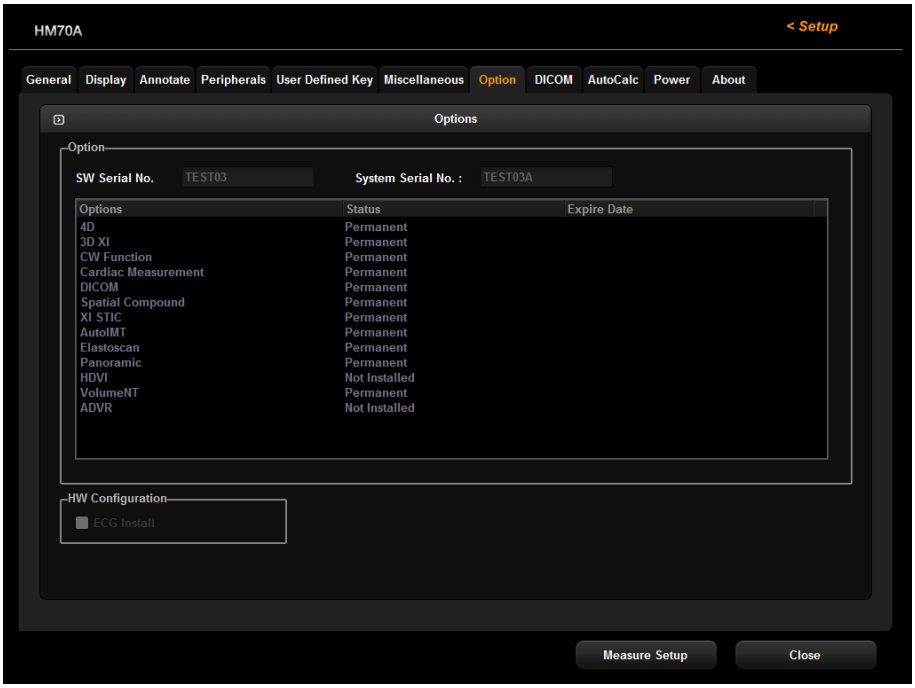
This shows the current status of optional software.

- Not Installed: Hardware is not connected.
- Unregistered: The software license has not been registered yet.
- Installed: Hardware is installed but cannot be used yet.
- Permanent: The hardware or software can be used for an unlimited period.
- Restricted: The hardware or software can be used only for a certain period of time.
- Expired: Use of the software is restricted, and it cannot be used because the specified period of use has expired.

HW Configuration

The list of optional hardware will appear. Currently, only ECG is supported.

Select a hardware item to use by using the checkbox. Reboot the system to complete the settings.



[Figure 3.11 Setup - Option]

* Actual options may vary.

DICOM

Select the **DICOM** tab on the *Setup* screen. Used to configure DICOM (Digital Imaging and Communication in Medicine) operation and server.

NOTE:

- DICOM is an optional feature in this product.
- For more information, please refer to the server's user manual, or the DICOM Conformance Statement.

DICOM Configuration

Information about the DICOM server used by the system is displayed.

You can change the information, or add or delete a server. The server information is used to identify the DICOM for the system within a network. It is also used to transfer data to other DICOM servers.

NOTE: For the IP Address, AE Title, and Port No. settings, contact your organization's network administrator.

AE Title

Enter the name of the DICOM AE (Application Entity). The title is used to identify devices that use DICOM within a network. (e.g.: US1, US2, etc.)

Station Name

Enter the name of the system. Along with AE Title, it is often used to identify the system in the DICOM network. (e.g.: Q31, Q32, etc.)

Port No.

Enter the port number on the server being used.

DICOM Send Format

Specify the storage format for the 2D or Color Mode images for which the DICOM services will be used. Select either Color or Gray using the Combo button. If you select Gray, images are saved in grayscale format.

NOTE: DICOM Send Format settings begin to apply when an image is saved. For example, if it is set to Gray, saving an image will save it in grayscale format.

DICOM Compression

Select whether to compress the still images for the DICOM service. Select Uncompressed or JPEG Baseline using the Combo button. When you select Uncompressed, the images are saved without compression.

NOTE: The DICOM Compression setting is applied when the image is saved. For example, if it is set to JPEG Baseline, saving the image will compress it.

Store SR at End of Exam

Select whether to store SR at the end of the exam. When you select this checkbox, SR is automatically stored at the end of the exam. Otherwise, it is not stored.

Network Configuration

Local Area Connection

The TCP/IP Properties window will open to allow you to configure the IP.

Wireless Network Connection

Use a USB adapter to connect the system to a wireless network. Click the icon 

on the screen. Turn the wireless network function on or off.

NOTE: The Wireless Network Connection settings window is enabled only when the system is connected to a wireless USB adapter.

- SSID: Displays the name of the connected wireless network. SSID stands for Service Set IDentifier.
- Authentication: Displays the authentication method for the wireless network.
- Encryption: Displays the data encryption method for communicating with the wireless network.

- Security Key: Enter the password for the network if one is required.
- Show characters: Select the checkbox to show characters when you enter the password for the network.

Tips!

Connecting to a Wireless Network

1. Use the trackball and the **Set** button to press the **Scan** button.
2. Select a wireless network to connect to.
3. Press the **Connect** button to connect the system to the wireless network.
4. Press the **Disconnect** button to disconnect the system from the wireless network.
5. Press the **Close** button to complete the setup.

Adding DICOM Services

Click **Add** on the screen. A screen is displayed where you can enter a DICOM service to add. After adding a service, click Save to **save** the information. Click **Cancel** to cancel.

Services

Select the type of service to use via DICOM. The supported DICOM servers are Storage, Print, Worklist, PPS, SC and Storage SR.

Alias

Enter the name of the DICOM server.

AE Title

Enter the AE title of the DICOM server. Consult your network administrator before specifying this option.

Transfer Mode

Select a transfer method:

- Batch: Send all saved images when you click the **End Exam** key.
- Send As You Go: Send an image whenever you press the **Save** button to save it.
- Manual: Send an image selected from the Exam List or in SonoView.

Connect Timeout

The connection will time out if there is no response within the configured time period. You can specify this time period in seconds.

IP Address

Enter the IP address of the server being used. Consult your network administrator before specifying this option.

Port No.

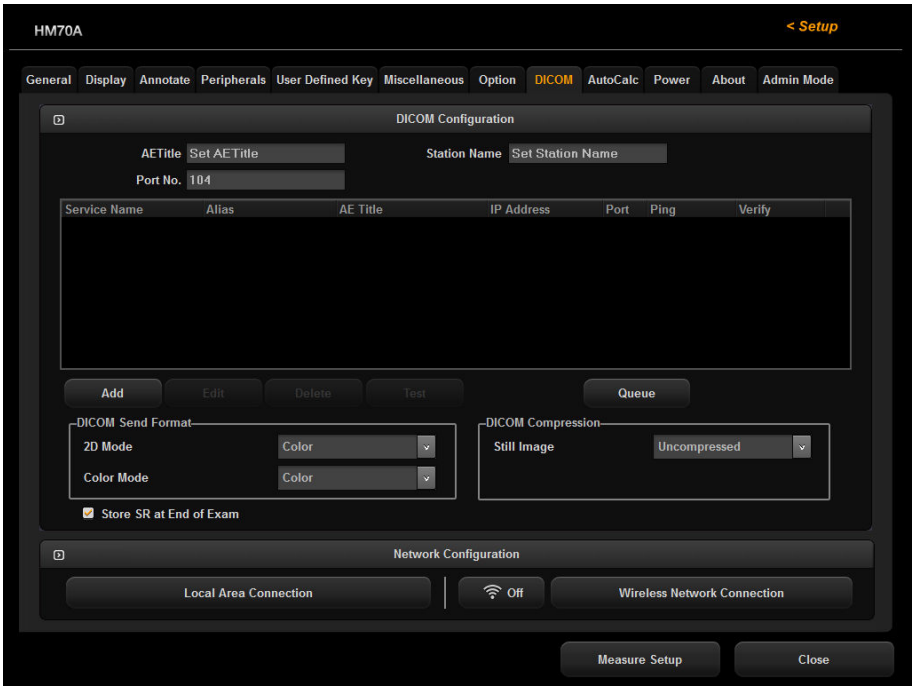
Enter the port number on the server being used. Consult your network administrator before specifying this option.

Retry Interval

Specify how many seconds the system will wait before it retries a failed transmission. You can specify this time period in seconds.

Maximum Retries

Specify how many times a failed transmission will be retried.



[Figure 3.12 Setup - DICOM]

Storage Server Information

Select STORAGE under **Services**. Configure the Image Storage Service using DICOM.

■ Storage Options

▶ Send Cine Loops: Check this checkbox to send Cine Loops.

▶ Include Pixel Spacing: In addition to the area information used in ultrasonography, the area information used in CT or radiography is also included. Measurements can be taken from a PACS system that does not support ultrasonic area information.

NOTE: However, only 2D and 2D Color Mode images are supported. In Dual and Quad Mode, the depths of the included images must be identical.

▶ Include 3D Volume: Select whether to send 3D volume data together with the 3D images.

NOTE: Only select this option if you use a storage service that supports the 3D volume data format used by Samsung Medison Co., Ltd.

■ VOI LUT Setup

Configure VOI LUT (Value Of Interest, Look Up Table). Adjust the brightness and contrast of a DICOM image when saving it. The saved image can be viewed with any PACS device that has DICOM VOI LUT implemented.

▶ Window Center: Enter a value for the DICOM Tag (0028, 1050) setting. The setting value indicates the brightness of the image that is displayed by the storage service. The image will get darker if the value is set to 128 or higher. Note that this function can be used only when it is supported by the storage service.

▶ Window Width: Enter a value for the DICOM Tag (0028, 1051) setting. The setting value indicates the contrast of an image that is displayed by the storage service. Relative to 256, higher values result in lower contrast. Note that this function is available only when it is supported by the storage service.

Print Server Information

Select 'PRINT' under **Services**. Configure the Print Service using DICOM.

NOTE:

- You can configure a printer connected to the DICOM network only.
- Depending on the printer, some of the following functions may not be available. Before configuring a printer, please refer to the printer's user manual, or the DICOM Conformance Statement.

Color

Specify whether to use color for printing. Select Grayscale or RGB.

Format

Specify the paper layout. Select 1x1, 1x2, 2x2, 2x3, 3x3, 3x4, 3x5, 4x4, 4x5, or 4x6.

Orientation

Specify the orientation of the paper. Select either Landscape or Portrait.

Magnification

Specify the type of interpolation to use to resize an image to print. Select **Replicate**, **Bilinear**, **Cubic**, or **None**.

Border Density

Select the border color of the printed image. Select Black or White.

Empty Density

Select the background color for the printed area. Select Black or White.

Min Density

Specify the minimum brightness of an image to print. If this option is not specified, the default value is applied.

Max Density

Specify the maximum brightness of an image to print. If this option is not specified, the default value is applied.

Medium Type

Specify the material type for the printout. Select Paper, Clear Film, Blue Film, Mammo Clear Film, or Mammo Blue Film.

Film Size

Specify the paper size. Select from 8 inch x 10 inch, 5 inch x 11 inch, 10 inch x 12 inch, 10 inch x 14 inch, 11 inch x 14 inch, 11 inch x 17 inch, 14 inch x 14 inch, 14 inch x 17 inch, 24cm x 24cm, 24cm x 30cm, A4 and A3.

Destination

Specify the paper pathway. Select Magazine or Processor.

Smoothing Type

This option is available only when **Magnification** is set to **CUBIC**. Enter a value for the printer which is specified in the DICOM Conformance Statement.

Priority

Specify a priority for the print command. Select High, Med, or Low.

Copies

Enter the number of copies between 1 and 99.

Configuration Info

Enter the configuration information of the printer. Please refer to the DICOM Conformance Statement for the printer.

Worklist Server Information

Select **WORKLIST** under **Services**. Configure the Modality Worklist Service using DICOM.

■ Show Worklist first when the patient screen opens.

When you check this checkbox, the *Worklist* window appears when you press the control panel's **Patient** button. Otherwise, the *Study Information* window appears.

■ Update Method

Specify the update method for Worklist.

▶ Only on user Request: Update the worklist only when the user wishes to.

Tips!

To update a worklist, set Search Source to **Worklist** in the **Search** tab on the *Patient Information* screen, and then click **Search**.

▶ On Startup and Every: Update the worklist when the system boots up, and then automatically update it at specified intervals.

■ Scheduled Station AE Title

Specify the range of AE Titles to retrieve from the Worklist server in a hospital.

▶ Any: Retrieve the patient list stored in all AE Titles in the server.

▶ This System: Retrieve the patient list in the AE Title specified under the DICOM tab.

▶ Another: Retrieve the patient list stored in the AE Title specified by the user.

NOTE: This option is available only when the Worklist server is enabled.

■ Start Date

Specify the range of dates to search.

▶ Today: Retrieve the patient list for the current date.

▶ Range: Retrieve the patient list for 'n' days before and 'n' days after the current date.

▶ Past Week: Retrieve the patient list for 7 days before the current date.

- Past Month: Retrieve the patient list for a month before the current date.
- Custom Date: Specify a certain date and retrieve the patient list for that date.

Study Description Prioirity

Specify the sorting order for when an exam is retrieved from the worklist server under Patient Information > Patient > Description. The list is sorted in order of high to low priority. Select an item that you wish to rearrange, and change its position by using the **Up** and **Dn** buttons.

Modality Type

These options are used to specify the modality of exams retrieved from the worklist server.

- Any: Retrieves all registered worklist exams, regardless of their modality.
- US: Retrieves ultrasound exams only.
- Another: Allows you to specify the modality and retrieve matching exams only. Leaving it blank means "Any".

PPS Server Information

Select PPS (Performed Procedure Step) under **Services**. Configure the Modality Performed Procedure Step Service using DICOM.

The configuration options are the same as those for the storage server.

Always complete exams.

When you check this checkbox, exams are always reported in complete condition. If you click the **Cancel** button without checking this checkbox, the cancel message is sent to the RIS server.

SC Server Information

Select SC (Storage Commitment) under **Services**. Configure the Storage Commitment Service using DICOM. The Storage Commitment Service is used after a diagnosis is finished and all saved images and reports are transferred.

Associated Storage Server

Select an Image Storage server to connect to.

Storage SR Server Information

Select Storage SR (Storage Structured Report) under **Services**. Configure the Report Storage Service using DICOM.

The configuration options are the same as those for the storage server.

Editing DICOM Information

Select a service and click **Edit** on the screen. The information on the selected service will appear.

After changing the information, click **Save** to save the changes. Click **Cancel** to cancel.

Deleting DICOM Services

Select a service and click Delete on the screen. You will be prompted with a confirmation message. Click OK to delete the selected service. Click **Cancel** to cancel.

Testing DICOM Servers

Select a service and click **Test** on the screen. The connection with the selected service is tested and the results are shown under Ping and Verify. If the result is Normal, it indicates that the connection is functioning as it should be.

Managing DICOM

Click **Queue** on the screen to switch to the *DICOM Job Status* screen. You can review the current job status using the Job ID, Patient ID, etc.

The following describes the elements of the *DICOM Job Status* screen.

- Job ID: Displays the job ID.
- Patient ID: Displays the patient ID.
- Alias: Displays the alias set in the *DICOM Configuration* screen.
- Type: Displays the job type. The available job types are Storage, Print, Storage SR, MPPS Start, MPPS End, and Storage CMT.

- Instances: Displays the number of instances. What this denotes differs depending on the job type. For Storage and Print, it means the number of images. For Storage SR, it means the amount of measurement data. For MPPS Start, it is always displayed as 0.
- Data/Time: Displays the date and time when the job was created.
- Status: Displays the current status of the job.

Status	Description
Fail	The job failed.
Transfer	The job is in progress.
Imperfect	Job suspended while being processed. The status will be switched to the Ready state immediately.
Wait	The job is waiting for execution.
Wait Resp	The job is waiting for a response.
Hold	The job is waiting for a retry. This occurs when the job has failed, but the maximum retry count has not yet been reached.
Ready	The job is waiting for execution. There is no connection to the network.
Not Ready	The Ready state is not complete. This occurs when MPPS (Modality Performed Procedure Step) End occurs before MPPS Start has been completed. Or when a Storage or Print batch job has not completed.

Network Status

The network connection status is displayed. When connected, 'Connected' is displayed. When disconnected, 'Disconnected' is displayed.

Number of Jobs

Displays the number of jobs listed in the *DICOM Job Status* screen.

Log

Displays the *DICOM Log* window.

Retry

Performs the selected job again. This button is enabled only when the status of the selected job is Fail or Wait Resp.

Retry All

Retries all jobs for which the status is Fail.

Delete

Deletes the selected job. This button is enabled only when the status of the selected job is Fail, Imperfect, Wait Resp, or Not Ready.

Clear

Deletes all jobs.

DICOM Log

Click **Log** on the *DICOM Job Status* window to display the *DICOM Log* window. This is used to manage the history of all DICOM services performed on this product.

Log Settings

Used to specify the log file management method.

- Delete Archived Log Afterwards: Used to specify how long to keep the log file. Enter the required number of days. If the specified time has elapsed after the log file was created, the file is deleted from the system.
- Log File Maximum Size: Specify the maximum size of a log file that can be archived. The entered value must be a number in units of Kilobytes. A log file that is larger than the specified size is not archived on the system and is deleted immediately.

DICOM Log

Displays a list of log files with their information.

- Select All: Selects all log files.
- Delete Selected Files: Deletes the selected log files.
- Copy Selected Files: Copies the selected log files to external storage media.
- View Selected File: Displays the details of the selected log file on the screen.
- Refresh: Updates the information of a log file.

AutoCalc

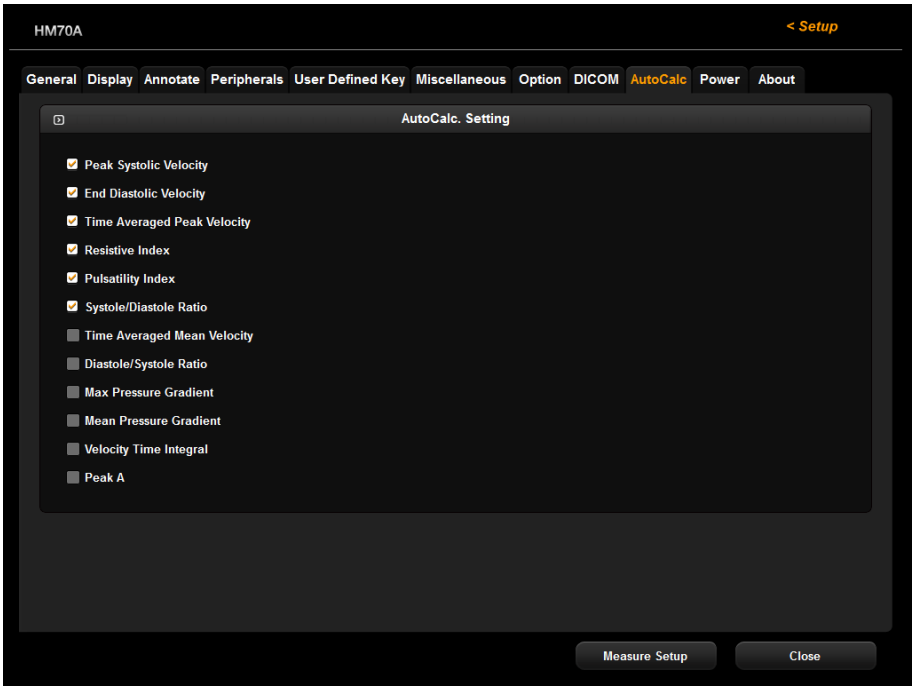
Select the **AutoCalc** tab on the *Setup* screen. AutoCalc is a Spectral Doppler Mode feature that automatically performs specific calculations based on measured values.

NOTE: The specified items will appear on the screen only when the **AutoCalc** button on the soft menu is pressed in Spectral Doppler Mode.

AutoCalc. Setting

Add and remove automatic calculations by using the check boxes. You can select up to six values.

When the Peak Systolic Velocity and End Diastolic Velocity values are 0, not all the results are displayed on the screen. In addition, the result value for Time Averaged Mean Velocity is displayed only when Mean Trace is turned on.



[Figure 3.13 Setup - AutoCalc.]

Power

Power Plan Setting

Power Plan Selection

Select Balanced (recommended), High Performance, or Power Saver. Your choice will affect the timer settings for the system to Dim the display, Turn off the display, and Put the computer to sleep while the system is plugged in or running on the battery.

- Dim the Display : You can adjust monitor to decrease brightness automatically when the product is not used for a specified duration.
- Turn off the display : The system is powered off automatically when the product is not used for a specified duration.
- Put the computer to sleep : You may put the system into sleep mode when the product is not used for a specified duration.

Operation Setting

Power Button Setting

Configure settings for the **Power** button.

- Show Selection Dialog : Press the **Power** button and then select Shut Down, Sleep, or Cancel by using the cursor.
- Shut Down : Press the **Power** button, shut down the system.
- Sleep : Press the **Power** button, you may put the system into sleep mode.

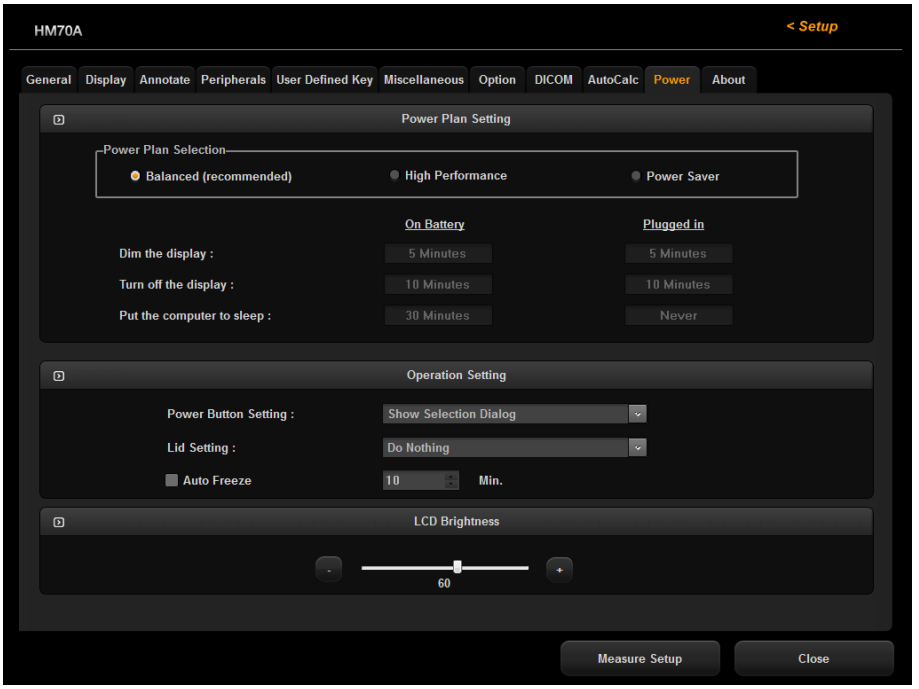
Lid Setting

Select which action to perform when the lid is closed. Select from Do Nothing, Shut Down, or Sleep.

- Auto Freeze: The Scan Mode is frozen automatically when the product is not used for a specified duration. Select a duration between 1 and 60 minutes.

LCD Brightness

Select a screen brightness between 5-100.



[Figure 3.14 Setup - Power]

About

Select the **About** tab on the *Setup* screen. Information about the system software version and licence will be displayed.

Information Type

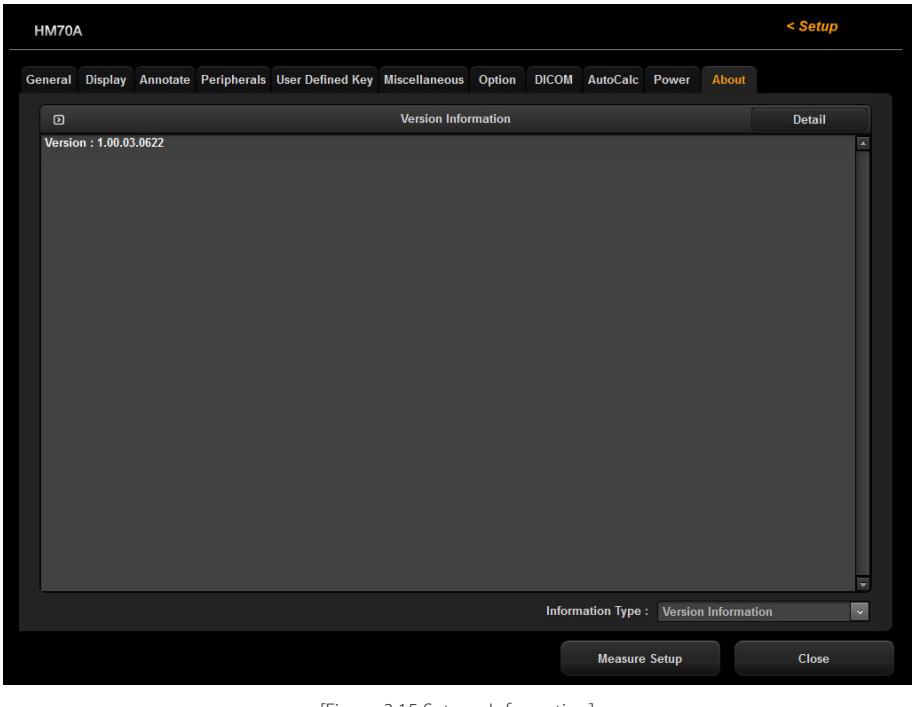
Click the combo button to select the information.

Version Information

Click **Detail** to view more detailed information about the product version.

Licence Information

Select **Licence Information** to display licence information.



[Figure 3.15 Setup - Information]

* The actual system version may differ from the software version shown in the above image.

Histogram

A histogram is a type of graph representing the distribution of echoes.

1. Select **Histogram** from the utility menu.
2. Specify an area that the histogram is to cover. Use the trackball and the **Set** button to select the area.
3. The histogram is shown on the left side of the screen.

[Figure 3.16 Histogram]

Histogram Settings

Specify the position or type of a histogram.

Move Hist.

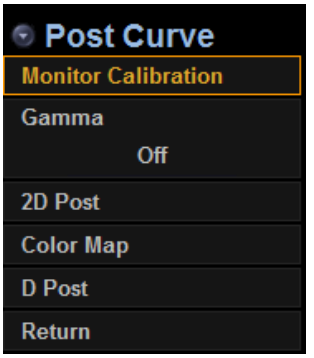
Press the Soft Menu dial-button **1** and then change the position of the histogram by using the trackball. Press **Set** to move the histogram to its new position.

Histogram Type

Rotate the Soft Menu dial-button **1** and select the histogram type. Select either Ellipse or Rectangle.

Post Curve

Select **Post Curve** from the Utility Menu. Here you can set various post maps and gamma values.



[Figure 3.17 Post Curve]

Monitor Calibration

Select **Monitor Calibration** from the post curve menu to access the related settings.

Brigthness

Used to adjust the screen brightness. Use the **Menu/Angle** dial-button to select a value between 0 and 100. The selected value applies only to the image shown on the screen.

Contrast

Used to adjust the screen contrast. Use the **Menu/Angle** dial-button to select a value between 0 and 100. The selected value applies only to the image shown on the screen.

Default

Pressing the **Menu/Angle** dial-button resets the setting to Type 1.

Edit

Used to adjust the user type RGB curve.

NOTE: Activated only when **Curve** is set to User1 through 3.

Selecting this option changes the soft menu.

Picker Pos

Used to specify a point on the curve. Rotate the Soft Menu dial-button **1** to reposition the point. The point is yellow in color.

Insert

Pressing the Soft Menu dial-button **1** inserts a new point between the current point and the next point.

Delete

Pressing the Soft Menu dial-button **2** deletes the selected point.

Save

Pressing the Soft Menu dial-button **3** saves the current RGB curve.

Color

Select a curve. Rotate the Soft Men dial-button **2** to select Red, Green, or Blue.

Return

Press the Soft Menu dial-button **6** to finish setting up the current Post Map and return to the previous stage of the current menu.

Exit

Pressing the Soft Menu dial-button **7** finalizes the current task and exits the Edit screen.

Curve

Select the type of curve. Use the **Menu/Angle** dial-button to select Type 1–5, or User 1–3. You can edit user type curves by using the menu's **Edit** option.

Gamma

Select **Gamma** from the post curve menu.

Use the **Menu/Angle** dial-button to adjust the brightness and contrast levels. Select **Off**, **Weak**, **Medium**, or **Hard**. **Weak** makes the screen brighter and **Hard** makes it darker.

2D Post

Select **2D Post** from the post curve menu.

Post Curve

Select a post curve. Use the **Menu/Angle** dial-button to select a value between 0 and 9.

Chroma Map

Press the **Menu/Angle** dial-button to turn the Chroma Map on or off. When turned on, the colors of the image displayed on the screen can be changed to meet individual preferences.

Chroma Map

Configure the Chroma Map; use the **Menu/Angle** dial-button to select Type 1–13, or User 1–3. Selecting a user type activates the **Chroma Edit** option on the 2D post menu.

Chroma Edit

Used to customize chroma colors.

To adjust the colors, use the Soft Menu dial-buttons **2**, **3** and **4**. You can select a value between 0 and 255.

Return

Returns to the previous step of the current menu, after the current Post Map setting has been completed.

Color Map

Select **Color Map** from the post curve menu.

Color Map

Select a color map type. Use the **Menu/Angle** dial-button to select a value between 0 and 15.

Tag

Press the **Menu/Angle** dial-button to turn this function on or off. When turned on, the colors at a specific part (tag) of the image displayed on the screen can be changed to meet individual preferences.

Tag Pos

Select the position of the Tag; use the **Menu/Angle** dial-button to select a value between 0 and 248. Changing the Tag Pos may change the Tag Width.

Tag Width

Used to specify the width of the tag. Use the **Menu/Angle** dial-button to select a value between 8 and 256. Changing the Tag Width may change the Tag Pos.

D Post

Select **D Post** from the post curve menu. Configuration options are the same as with 2D Post.

M Post

Select **M Post** from the post curve menu. Configuration options are the same as with 2D Post.

Measurement Settings

Select **Measure Setup** from the utility menu. Specify the various setup options for taking measurements. The setup may be modified depending on specific needs or preferences.

1. Select **Measure Setup** from the utility menu.
2. When the *Measure Setup* screen appears, select the tab that contains the setting you wish to configure.
3. Specify settings for each item.
4. Press **Close** or **Exit** to finish.

Tips!

Selecting a tab

You can select a desired tab in either one of two ways. Select the method that suits you.

- Use the trackball and the **Set** button to select a tab.
- Rotate the **Menu/Angle** dial-button to make a selection.

General

Select the **General** tab on the *Measure Setup* screen. You can specify basic measurement options.

General

Select the sub-tab **General** under the **General** tab. You can specify basic measurement options.

Cursor & Method

Line Marker Type

Specify the shape of the caliper cursor displayed on the screen. Either Cross Hair or Arrow Head can be selected.

Circ. and area method

Specify the method for measuring circumference and area. Either Ellipse or Trace can be selected.

By default, the selected method appears when the **Caliper** button is pressed. Therefore, you can start measurement more easily by specifying the most commonly used measurement method. For more information on Ellipse and Trace, refer to the Circumference and Area Measurement section in 'Chapter 8. Measurements and Calculations'.

Apply Auto Resizing Line Marker

Select whether to automatically reduce the marker cursor size when the distance between the start point and the moving point is 50 pixels or less at the time of measurement.

Line Type

From the following three options, select the line pattern to use when measuring a distance.

Dotted Line

Displays a dotted line.

Hidden Dotted Line

Displays only the start and end points of the line.

Hidden Dotted line after Set

Displays a dotted line while measuring, then after the line has been finalized with the **Set** button, the dotted line will disappear.

Tips!

Selecting Line Type

If you select Hidden Dotted Line or Hidden Dotted Line after SET, you can keep images from being interfered with by a measurement line.

Start Point of Measurement

Select the position at which the measurement cursor appears. Set the start point for measurement.

- End Point of the Last: The cursor appears at the end point of the last measurement.
- Start Point of the Last: The cursor appears at the start point of the last measurement.
- Center of the Region: The cursor appears in the center of the image area.

Display

Specify items to display on screen during measurement. Select the checkboxes of the items you wish to use.

General

- Show Enlarged Image Box: Doubles the size of an image, shows it during measurement and displays the current position. In Color Doppler mode, you can select between 2D mode image and Color Doppler mode image by pressing the space bar on the keyboard.
- Show Measured Value in Menu: Choose whether or not to display the measured value in the Measurement menu.

Guideline

- Display the Doppler Guideline: Choose whether or not to display the Cross Line while measuring various items on a frozen spectrum. This function is useful for estimating a rough value.
- Display the M-Mode Guideline: Choose whether or not to display the Cross Line while measuring various items in the Freeze state of M mode. This function is useful for estimating a rough value.

Clear Function on UnFreeze

- Clear Measure 2D Mode Result On Unfreeze: Specify whether or not to clear measurement results from the screen when switching to Scan Mode after performing measurements in 2D mode.
- Clear Measure M/D Mode Result On Unfreeze: Specify whether or not to clear measurement results from the screen when switching to Scan Mode after performing measurements in M mode and Doppler mode.

Measurement Unit

Specify the measurement units. For a small object, it is more convenient to use 'mm' for Dist. When blood flow is fast, it is better to use 'm/s' for Vel.

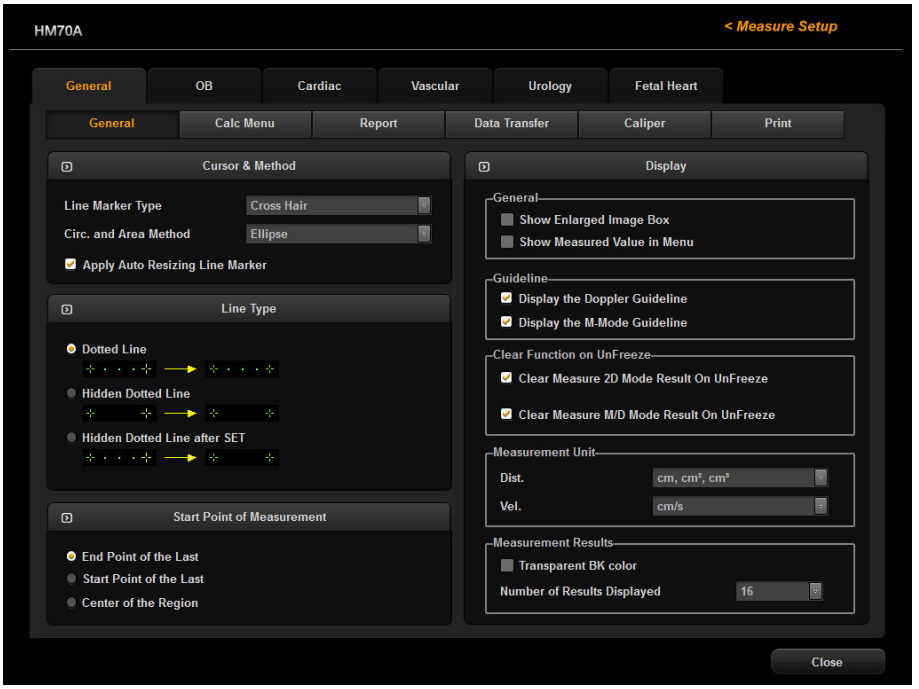
- Dist: Select either a cm or mm scale for the unit of distance, area and volume.
- Vel: Selects the units of velocity – cm/s or m/s.

NOTE: Changing the measurement unit erases all measurements that may have been taken.

Measurement Results

- Transparent BK color: Sets a transparent background.
- Number of Measure Results Displayed: Specify the number of lines for measurement results that are displayed on the screen. This is applied to the basic measurement results for all applications except for obstetrics, cardiac, vascular, urology, and fetal heart.

NOTE: Use the setting tab of each application to set the Number of Measure Results Displayed for obstetrics, cardiac, vascular, urology, and fetal heart.



[Figure 3.18 Measure Setup - General - General]

Calc Menu

Select the sub-tab **Calc Menu** under the **General** tab. From this tab, you can customize the calculation menu.

NOTE:

- You can create up to 4 new menu tabs.
- Default tab menus cannot be deleted or changed.

Menu Customize

Press the **Menu Customize** button. The Menu Customize screen consists of the following:

Select Calc Package

Calculation packages are shown in the dropdown list. Select the calculation package that you wish to edit.

Check Calc Tabs

Displays the menu tabs of the calculation package that was selected under **Select Calc Package**.

Selecting a menu tab places an orange border around it.

Calc Menu Preview

Displays the calculations that are currently available on the menu tab that was selected under **Check Calc**. Click + to display any sub-measurement items.

Available Menu List

Displays all calculations that are supported by the selected calculation package. Click + to display any sub-measurement items.

Configure the calculation menu as follows:

1. Select an application under **Select Calc Package**.
2. Select a menu tab under **Check Calc Tabs**. A yellow border is placed around the selected menu tab. The selected menu tab's content is shown in **Calc Menu Preview**.
3. Configure the menu tab.
   - ▶ Changing Menu Tab Order: Select a menu tab and change the order by using the  or  buttons to the right of the list.
   - ▶ Show/Hide Menu Tab: Select the check boxes of the menu tabs you wish to use. You must select at least one menu tab.
   - ▶ New Menu Tab: To create a copy of the selected menu tab, click **Copy**. To create a new menu tab, click **New**.
   - ▶ Rename Menu Tab: Click **Rename**.
   - ▶ Delete Menu Tab: Click **Delete**.
4. Configure calculations.
   - ▶ Changing Calculation Order: Click the  or  buttons on the right.
   - ▶ Add Calculation: Select a calculation from **Available Menu List** and click  .
   - ▶ Delete Calculation: Select a calculation item and click  .

Tips!

Selecting a calculation from **Available Menu List** that has the '+' symbol also selects all sub-calculations belonging to that calculation. However, you cannot add whole calculation packages.

Package Order

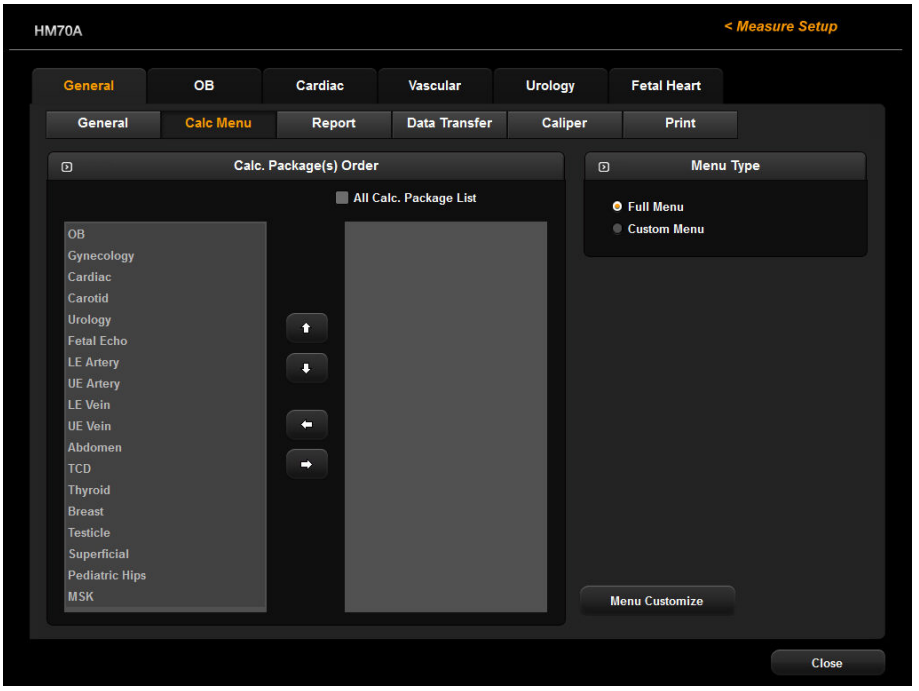
Press the **Package Order** button. The Package Order screen consists of the following:

Calc. Package(s) Order

- All Calc. Package List: Select the check mark to select all calculation package lists.
- Select Calculation Item: Select a calculation item and click ⬅.
- Deselect Calculation Item: Select a calculation item and click ➡.
- Changing Calculation Order: Click the ⬆ or ⬇ buttons on the right.

Menu Type

- Full Menu: Select the entire menu. The **Menu Customize** button will not be enabled.
- Custom Menu: Select the user-customized menu.



[Figure 3.19 Measure Setup - General - Calc Menu]

Report

Select the **Report** tab under the **General** tab. Here you can set items related to the measurement report and printing.

Report Header

Specify header options for reports. You can specify multiple items, which will appear in all measurement reports.

Patient Info.

This is information about the patient.

Hospital Info.

This is information about the hospital in which the product is installed.

Others

This is the information about miscellaneous comments (Description) and Accession #.

OB / FH Header Layout

Specify item(s) to display under the header of obstetrics or fetal echo measurement reports. You can select multiple items.

Save Action

Save All Report Pages

Save all pages.

Save Current Page

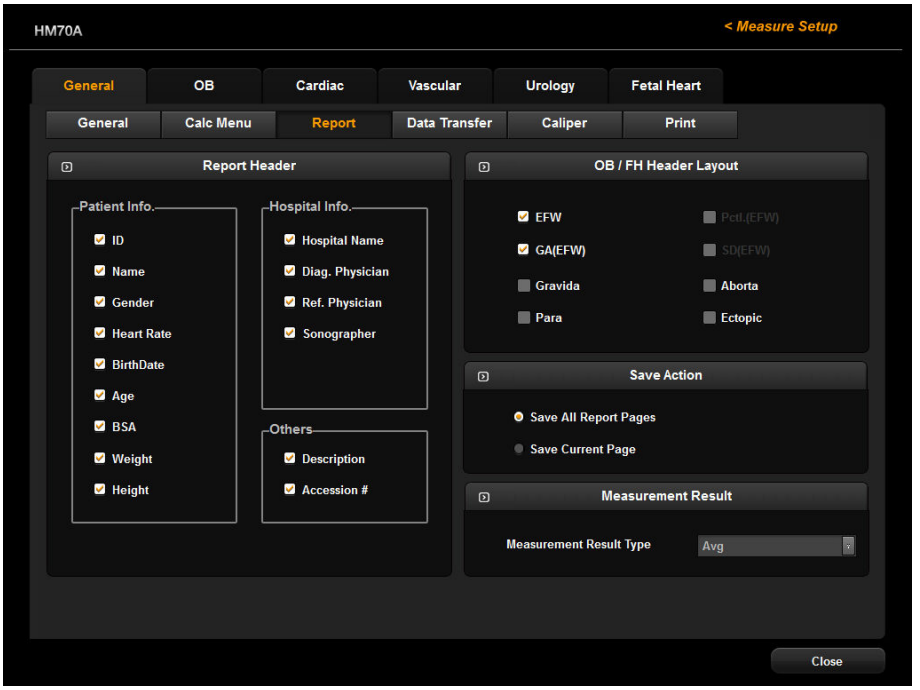
Save the current page.

Measurement Result

Measurement Result Type

Used to specify the method of calculating measurement values in the reports.

- Average: Produces the average value of the three most recent measurements.
- Last: Shows the value measured last.
- Max: Shows the largest measurement value.
- Min: Shows the smallest measurement value.



[Figure 3.20 Measure Setup - General - Report]

Data Transfer

Select the sub-tab **Data Transfer** under the **General** tab. Here you can set the data transfer method, etc.

Serial Transfer

Specify the format in which data will be transferred. Select **Text Format** or **XML Format**.

This product uses an RS-232C USB serial cable to transfer data. Select XML format to transfer data with reporting tools such as Sonoultra or ViewPoint.

User Table Backup and Restore

Back up a table created by the user, or save a backed up table to the system. Click **BackUp** or specify your desired options.

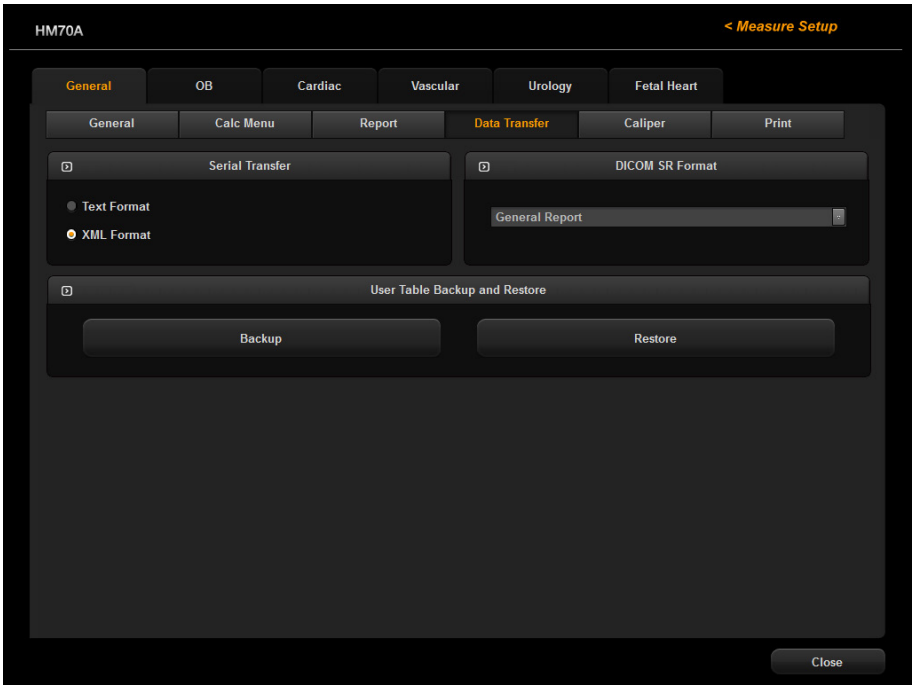
DICOM SR Format

General Report

This is the default data format.

ViewPoint

This is the ViewPoint data format.



[Figure 3.21 Measure Setup - General - Data Transfer]

Caliper

Select the **Caliper** sub-tab under the **General** tab.

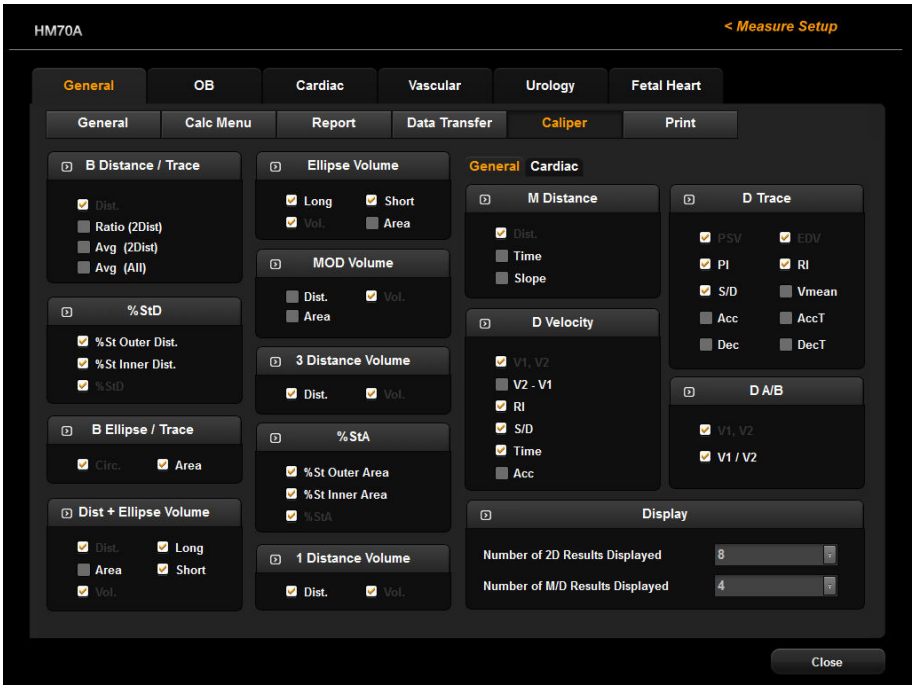
Specify whether additional information will be shown along with the basic measurement values when basic measurements are taken by pressing the Caliper button. If this option is selected, the additional information will also be saved and output along with the measurement results.

If **Application** is set to **Cardiac**, the **D Velocity**, **D A/B**, **D Trace** items are changed.

NOTE: The 'Cardiac' setting can be used only when the probe preset is Cardiac or Pediatric Cardiology.

Display

Used to specify the number of lines to use for displaying measurement results on screen when basic measurements are taken in 2D, M, or D mode.



[Figure 3.22 Measure Setup - General - Caliper]

Print

Select the sub-tab **Print** under the **General** tab.

Print Action

Print All Report Pages

Prints all pages.

Print Current Page

Prints the current page.

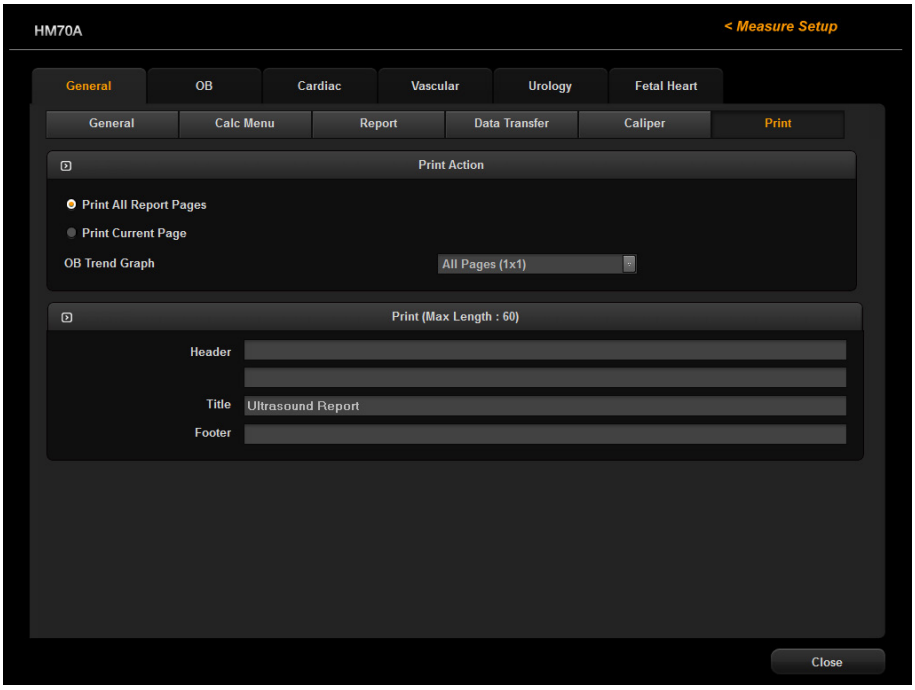
OB Trend Graph

Prints the OB Trend Graph.

- ▶ Only Current Page: Prints the current page.
- ▶ All pages(1x1): The selected graph is printed in a 1 x 1 format.
- ▶ All pages(3x2): The selected graph is printed in a 3 x 2 format.
- ▶ Screenshot: Capture the screen to print the graph.

Print

Enter additional information for the header, title, and footer to be displayed when the measurements are printed.



[Figure 3.23 Measure Setup - General - Print]

OB

Select the **OB** tab in the *Measure Setup* screen. Here you can set items related to obstetrics measurement.

General

Select the sub-tab **General** under the **OB** tab. You can specify basic OB measurement options.

Percentile Information

Show Percentile Information

Select the check box if you wish to use percentile information.

Percentile Criteria

Select a value that will be used for percentile calculation.

- GA by LMP: The GA is calculated based on the maternal LMP.
- Estab. Due Date: The GA is calculated based on the Estab. Due Date under *Patient Information*.
- AUA: The GA is calculated using the average values (Average US GA) of several ultrasound measurements.

Rank Information Method

Specify how the growth range information will be displayed. The growth range information can be used to observe fetal development and abnormality.

- Standard Deviation: International standard deviation is used to indicate the fetal development. Fetal development and abnormality are observed on the basis of SD = 0 indicating the standard development.
- Pctl.: Fetal development is indicated in percentile. Fetal development and abnormality are observed on the basis of 50%, which indicates the standard development.
- Bar(Graph): The percentile is shown in a bar graph. This option is available with OB reports only. The green color indicates normal development range, while the red color indicates abnormal development range.

Fetal Weight Unit

Specify the units for fetal weight measurement. You can select the primary unit and the secondary unit to display measurement results. The primary unit can be either Grams **g** or lb + oz on the left. The secondary unit can be selected on the right. A unit already specified as the primary unit cannot be used.

'lb + oz' is a unit combining pounds and ounces, and 'None' indicates that no units are used.

OB Doppler Results

Specify which Doppler measurement results to display when the OB measurement is taken in Doppler mode. Use the check boxes to select the OB items you want. PSV and EDV, however, cannot be unselected.

Clear Function on UnFreeze

This function is applied to obstetrics only.

Clear Measure 2D Mode Result On UnFreeze

Choose whether or not to delete the results of 2D mode when you use the checkbox to unfreeze.

Clear Measure M/D Mode Result On UnFreeze

Check the checkbox to delete M or D mode results when UnFreeze is selected after measurement.

OB Measurement Result

Measurement Result Type

Used to specify the measurement result type. Select the average (Avg), the last measurement taken (Last), the maximum (Max), or the minimum (Min).

Number of Results Displayed

Specify the number of lines for OB measurement results that are displayed on the screen.

EDD

Selecting the checkbox will display EDD when measuring an OB item.

MVP Caliper

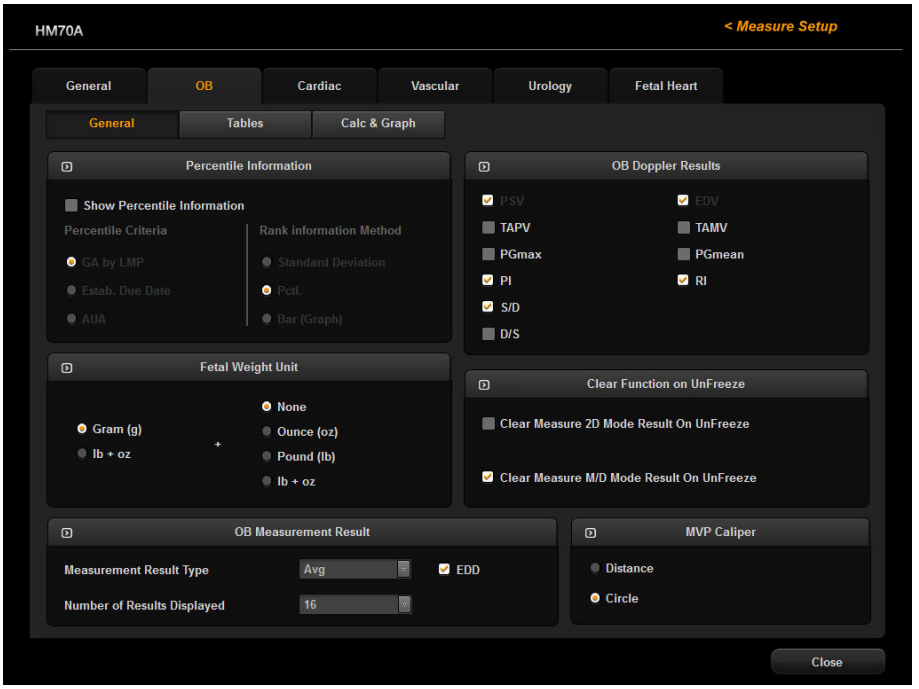
Select the Maximum Vertical Pocket (MVP) Caliper method.

Distance

Measure the MVP by using the straight linear distance.

Circle

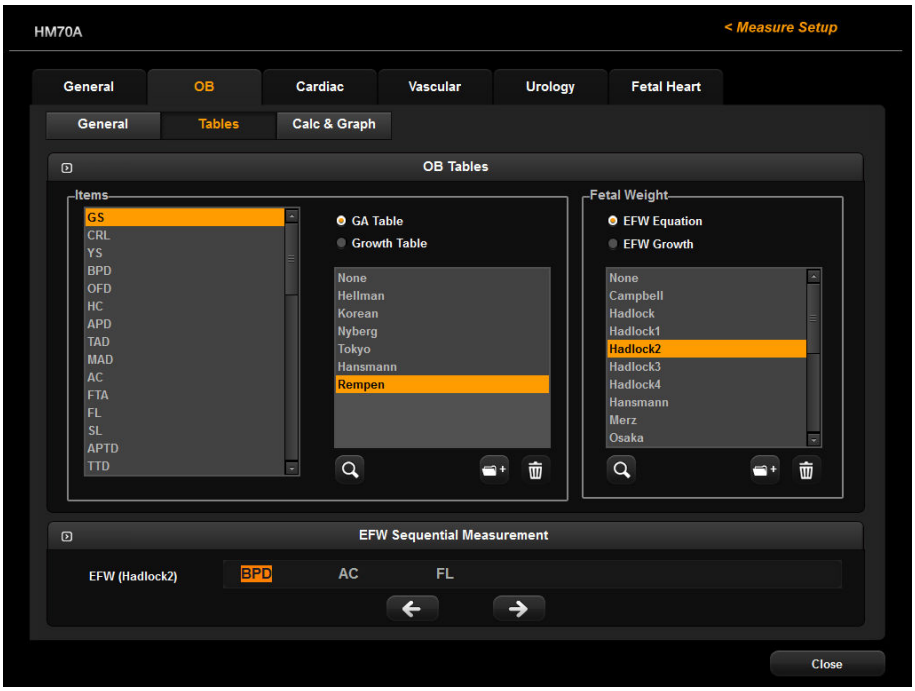
Measure the MVP by selecting Circle.



[Figure 3.24 Measure Setup - OB - General]

Tables

Select the sub-tab **Tables** under the **OB** tab. You can specify references such as reference tables and equations that will be used by each measurement item.



[Figure 3.25 Measure Setup - OB - Tables]

Items

This setting is intended for the measurement of the gestational age (GA) and the fetal size (Growth). Select items in the following order:

1. Select measurement items from the list on the left.
2. Select whether to use either the GA table or the Growth table.
3. Select a reference from the list on the right.

Fetal Weight

This setting is intended for the measurement of the estimated fetal weight (EFW). Select items in the following order:

1. Select the EFW measurement method from EFW equation and EFW growth.
2. Select a reference from the list.

Add a Reference

NOTE: Observe the following directions when adding a table reference. If these conditions are not met, a warning message appears and the reference is not saved.

- Input at least three types of data.
- If there are no Min and Max values, select **Value Only** for **Table Type**.

1. Click . The *User reference* window will appear.
2. Enter a name and description for a new reference.
3. Specify the reference type as Table or Equation.

NOTE: EFW Equation can only set Equation, and EFW Growth can only set Table as the reference type.

4. Click **OK** to go to the next step. The Editor screen will appear. Click **Cancel** to cancel.
5. Enter a reference.
6. Click **Save** to save the information. Click **Cancel** to cancel.
7. Click **OK** to finish. Click **Cancel** to cancel.

Tips!

Add Reference Table

Clicking the Question Mark button shows the sources of the references. Clicking the question mark button a second time hides the sources again.

Unit Information

The unit of the selected reference, such as Input, Output, SD, etc., is displayed.

Table type

Select the table type for the selected reference. For the Growth Table, SD (Standard Deviation) is displayed.

- Range Type: Set the Min. and Max. values of the selected reference and display them in a table. The SD value varies according to the range selected by the user.
- Value Type: Only the measurement values entered by the user are displayed, regardless of the range of Min., Max., and SD.

Other

- Show In Days: When the checkbox is selected, the table unit is changed from wd (week-day) to d (day).
- Cursor Movement for **Enter** key: Specify the direction of cursor movement when the **Enter** key on the keyboard is pressed while a table is being edited. Select from Right, Down and Edit.

Adding Reference Equation

If a reference appears in an equation, the following should be entered:

Equation

Enter a reference equation. Use the measurement calculator shown in the lower right corner.

Input Value Ranges

Enter the minimum (Low) and maximum (High) ranges for the selected reference.

Tolerance Information

Select the tolerance from w or d.

View & Modify References

1. Under Selection, select a preset to delete.
2. Click  and the *Editor* screen will appear.
3. View or edit the references.

EFW Sequential Measurement

NOTE: This setting is necessary when you set **EFW Measure** for **User Key** in **Utility** > **Setup** > **User Defined key** > **User Key Setup**. Settings are applied when EFW is measured by pressing the **User** button.

Configure the order of EFW measurements to be taken when the User button is pressed. Select a measurement by using the trackball and the **Set** button, and change its position by using the arrows.

Calc & Graph

Select the sub-tab **Calc & Graph** under the **OB** tab. You can specify settings for calculation and graphs.

Auto calculations

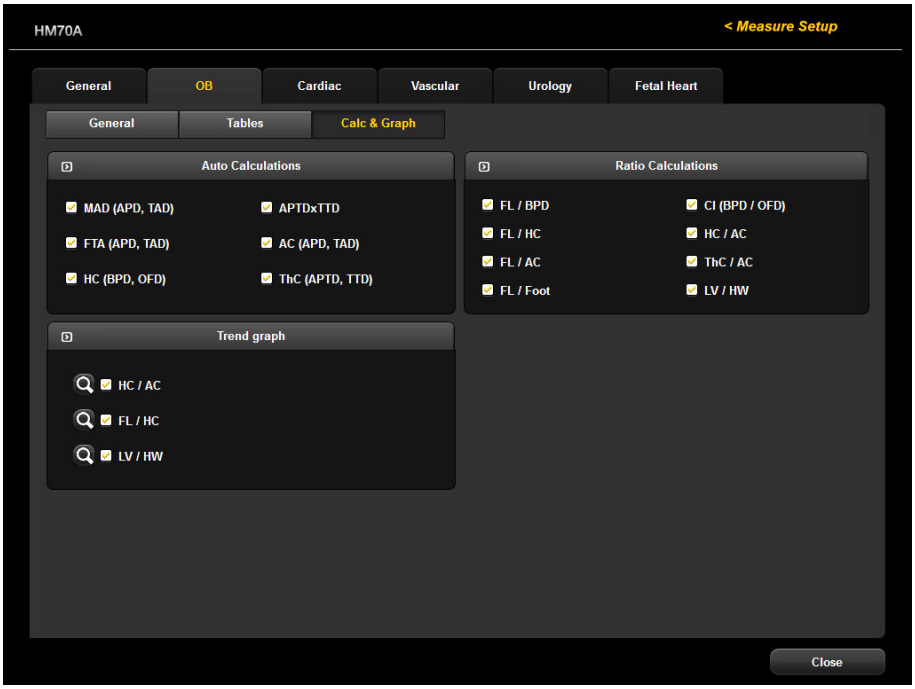
Specify an item that will be calculated automatically. For example, if the MAD checkbox is selected, when APD and TAD are measured, the measurements are used to calculate MAD automatically and display the result on the screen. The results of automatic calculation may affect GA and EDD information.

Ratio calculations

Specify a measurement item for which a ratio will be calculated. For example, if the FL/BPD checkbox is selected, when FL and BPD are measured, the ratio between them is calculated and displayed on the screen. This ratio also appears in a report.

Trend graph

Specify whether to include a graph for a certain item or ratio in an obstetrics report. Click  and the Editor screen for the selected graph will appear.



[Figure 3.26 Measure Setup - Calc & Graph]

Cardiac

Select the **Cardiac** tab from the *Measure Setup* screen, and then configure cardiac measurement-related settings.

Cursor & Method

Circ. and Area method

Choose the method for measuring the circumference and area of a 2D image of the heart. Either Ellipse or Trace can be selected.

LV Volume Method

Select Teichholz, Cubed, or Gibson as the method of measuring the volume of the left ventricle. For more information on calculation formulae, please refer to the reference manual.

Cardiac Measurement Result

Measurement Result Type

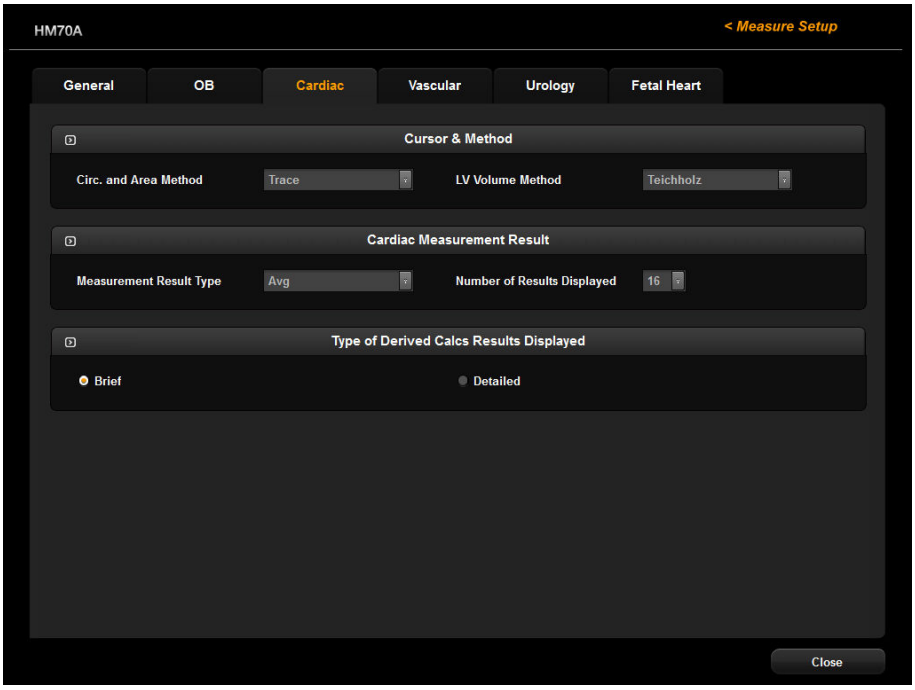
Used to specify the measurement result type. Select the average (Avg), the last measurement taken (Last), the maximum (Max), or the minimum (Min).

Number of Results Displayed

Specify the number of lines for measurement results that are displayed on the screen.

Type of Derived Calc Results Displayed

Used to specify the measurement result display method. Select **Brief** for a brief display and **Detailed** for a detailed display.



[Figure 3.27 Measure Setup - Cardiac]

Vascular

Select the **Vascular** tab on the *Measure Setup* screen. You can specify settings for vascular measurement.

A/B Ratio

Specify each individual peak velocity for which a ratio between A and B will be calculated.

Vascular Measurement Result

Measurement Result Type

Specify the measurement method. Select the average (Avg), the last measurement taken (Last), the maximum (Max), or the minimum (Min).

Number of Results Displayed

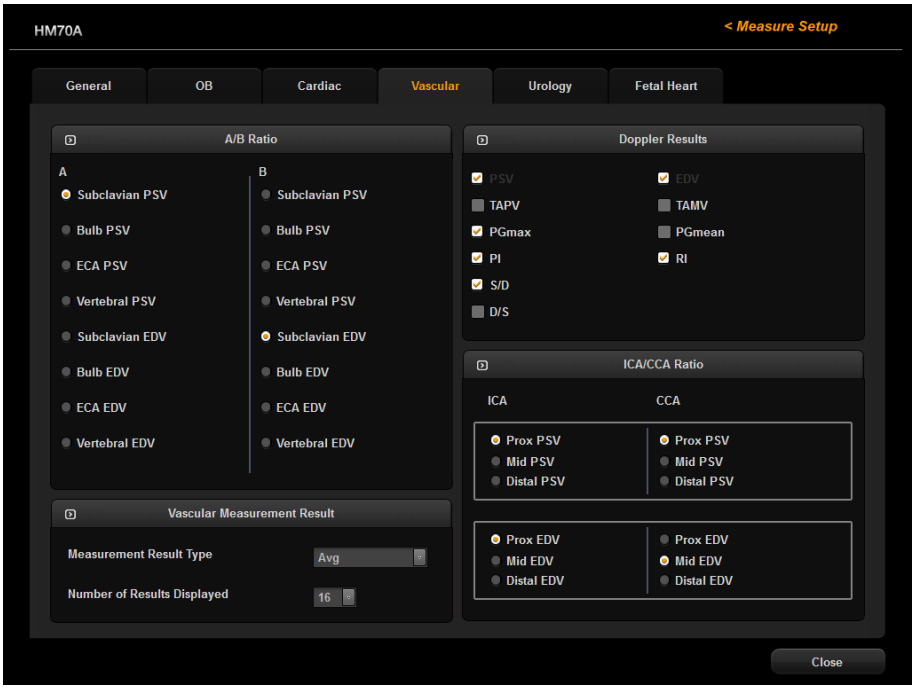
Specify the number of lines for measurement results that are displayed on the screen.

Doppler Results

Set the Doppler measurement items that will be displayed with the measurement results.

ICA/CCA Ratio

Configure each measurement item that will be used for the ICA/CCA ratio.



[Figure 3.28 Measure Setup - Vascular]

Urology

Select the **Urology** tab on the *Measure Setup* screen. You can specify settings for urology measurement.

Volume Method

Specify an equation that will be used for volume calculation.

3 Distance

The volume is calculated by using three diameters in the longitudinal and transverse planes. (4 / 3 x π x A/2 x B/2 x C/2)

3 Distance x Factor

The volume is calculated by using three diameters in the longitudinal and transversal planes and a factor (F) value entered by the user. (A x B x C x Factor)

Ellipsoid

The volume is calculated by using the length of the Main and Beside axes. (4 / 3 x π x Main / 2 x (Beside / 2)^2)

Sum of 20 Disks

The volume is calculated by adding together the areas in the 20 parallel planes. (d / 20 x (A1 + A2 + ... A20), d: the sum of the distances between disks)

NOTE: 3 Distances: A = 1st Dia., B = 2nd Dia., C = 3rd Dia.
Factor is set to '0.523' by default. When the value needs to be changed, a value between 0 and 1 (0 < factor <= 1) is recommended.

Predicted PSA correction factor

Specify the predicted Prostate Specific Antigen (PSA) correction factor for the measurement of WG and T-Zone volumes. The default value is 0.12.

Urology Measurement Result

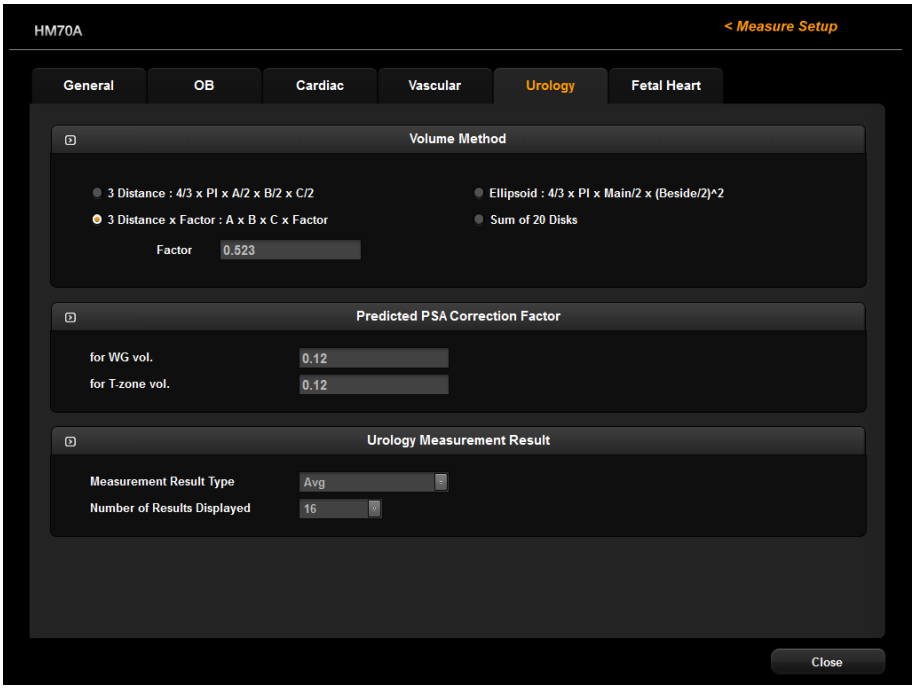
Measurement Result Type

Specify the measurement method. Select the average (Avg), the last measurement taken (Last), the maximum (Max), or the minimum (Min).

Number of Measure Results Displayed

Number of Results Displayed

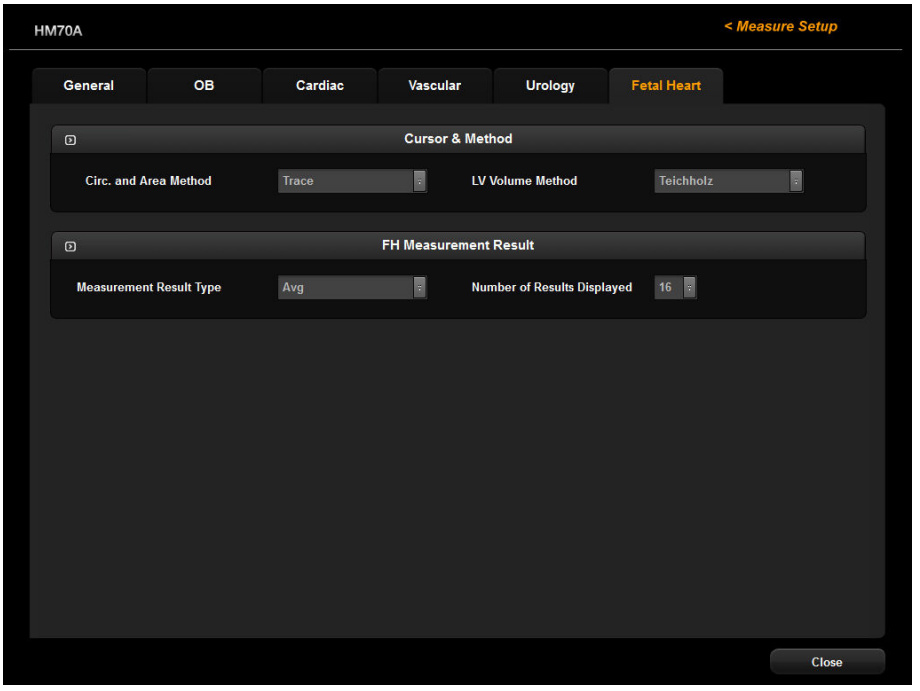
Set the number of lines in which to display the urology measurement results on the screen.



[Figure 3.29 Measure Setup - Urology]

Fetal Heart

Select the **Fetal Heart** tab on the *Measure Setup* screen. Here you can set items related to fetal heart measurement.



[Figure 3.30 Measure Setup - Fetal Heart]

Cursor & Method

Circ. And area method

Specify how a circumference and area is measured in a 2D fetal cardiac image. Either Ellipse or Trace can be selected.

LV Volume Method

Specify how the volume of the left ventricle is measured. For more information on calculation formulae, please refer to the reference manual.

FH Measurement Result

Measurement Result Type

Specify the measurement method. Select the average (Avg), the last measurement taken (Last), the maximum (Max), or the minimum (Min).

Number of Measure Results Displayed

Number of Results Displayed

Specify the number of lines for measurement results that are displayed on the screen.

EZ Exam Setup

Click **EZ Exam** Setup in the Utility menu. The *EZ Exam Setup* window is then shown on the monitor screen.

EZ Exam Setup allows you to specify exam items and their order. This feature streamlines the diagnosis process.

Application List

A list of available applications is shown. If previously configured EZ Exams are available, they will be shown in the EZ Exam List when an application is selected.

Default

Reset the exam of the selected application. All exams contained in the EZ Exam List's User List are removed.

EZ Exam List

Displays the EZ Exam list.

Default List

Displays basic EZ Exams supported by the product. Available only for Gynecology, Vascular, and Small Parts.

You cannot delete or rename EZ Exams in the Default List. You cannot add new EZ Exams to the Default List, either.

User List

Displays a list of user-defined EZ Exams.

You are free to rename, delete, and copy the EZ Exams in the User List; you may also add new EZ Exams to this list.

Add EZ Exam

Click **New** on the monitor screen. Once the *New Tap* window appears, enter a name and click **OK**. Click **Cancel** to cancel.

Copy EZ Exam

Select the EZ Exam you wish to copy and click **Copy** on the monitor screen. Once the *Copy Tap* window appears, enter a name and click **OK**. Click **Cancel** to cancel.

Rename EZ Exam

Select the EZ Exam that you wish to rename, and click **Rename** on the monitor screen. Once the *Copy Tap* window appears, enter a name and click **OK**. Click **Cancel** to cancel.

Delete EZ Exam

Select the EZ Exam you wish to delete and click **Delete** on the monitor screen. When the *Warning* window appears, click **OK**. Click **Cancel** to cancel.

Reorder EZ Exam

Select the EZ Exam that you wish to reorder and then click  or  on the monitor screen.

EZ Exam Preview

Displays the selected EZ Exam's group and details. Groups associated with the EZ Exam are displayed as  . To view the group's details, click  .

Add Group

Add a new group. Click the  button on the monitor screen. When the *New Group* window appears, enter a name and click **OK**. Click **Cancel** to cancel.

NOTE: You can add groups to EZ Exams included in the User List only.

Edit Setting

This is used to change the properties of items selected in the Action List's Misc. tab.

- Text: Used to select the text that you wish to enter on the screen. Select Text and click **Edit Settings** to display the *Text* window. Enter text and click **OK**. Click **Cancel** to cancel.
- Caliper: Used to set up the basic measurements to use. Select Caliper and click **Edit Setting**, and the *Caliper Selection* screen will be displayed. Select the items you wish to use and click **OK**. Click **Cancel** to cancel.

▶ Mode Change: Used to select the diagnosis mode to use. Select Mode Change and click **Edit Setting**, and the *Mode Selection* screen will be displayed. Select the items you wish to use and click **OK**. Click **Cancel** to cancel.

■ Edit Name

Change a group's name. Select a group and click **Edit Name**. When the Edit *MacroName* window is displayed, enter a name and click **OK**. Click **Cancel** to cancel.

■ Reorder

Select the group or item you wish to reorder, and click  or  on the monitor screen.

Action List

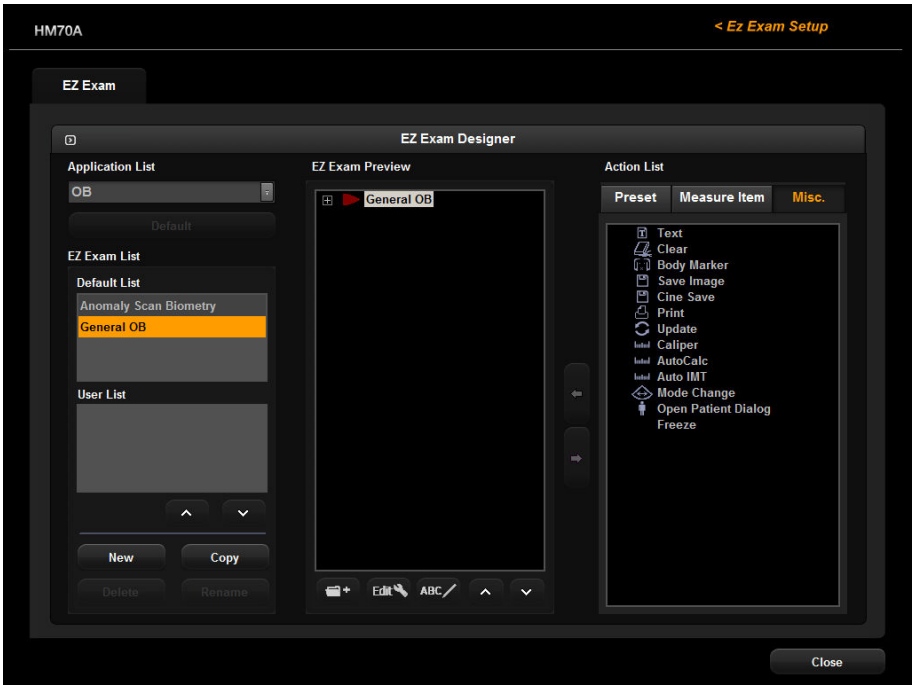
Displays the items that you can add to the selected EZ Exam. Select the tab you want, and then select items. To view the items, click  .

■ Add

Select items in the Action List, and click  . The selected item is added to the EZ Exam and shown in the EZ Exam Preview. Up to 40 items can be added to a single group.

■ Remove

Select an item in the EZ Exam Preview and click  . The selected item is removed from the EZ Exam.



[Figure 3.31 EZ Exam Setup]

Storage Manager

Select **Storage Manager** from the utility menu. All disk drives mounted in the system will be shown. The drive type, available space, and total space for each drive are displayed.

Storage Manager is a program that lets you manage various storage devices connected to the system. You can remove, format or update a drive, if you check the checkbox in front of the drive's symbol.

NOTE: You may not remove, format or update a drive mounted within the system itself.

Click **Exit** on the screen or press **Exit** on the control panel to exit Storage Manager.

Refresh

Updates the display on the touch screen to show the drives currently connected to the system.

NOTE: When using Storage Manager, you should click **Refresh** to update the information.

Eject / Remove

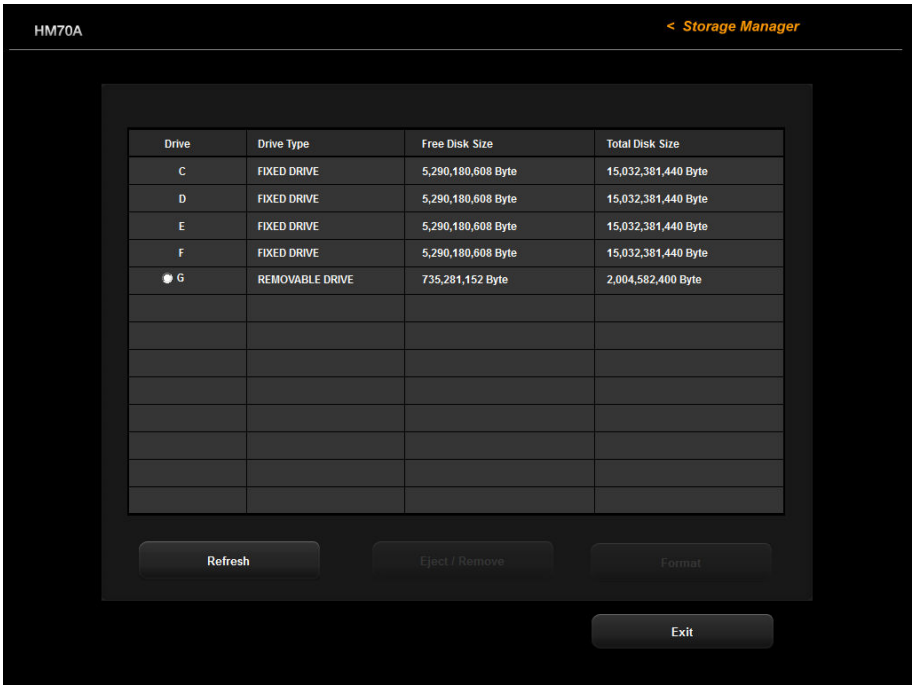
Disconnects the selected drive.

NOTE: Before unplugging a USB Flash memory drive, make sure to disconnect it by using the Eject/ Remove button.

Format

Initializes the selected drive. Under the Format window, you can initialize various settings. Press **Start** to start initialization. Press **Close** to cancel.

NOTE: In the case of DVD+RW or DVD-RW, its free space can be displayed as '0 bytes' after formatting. This is an error in Windows™, and does not mean that the currently inserted media cannot be used.



[Figure 3.32 Storage Manager]

Userset Manager

Select **Userset Manager** from the Utility menu.

The item will only be visible if you have created a Userset by pressing the Probe button. The Probe, Application, Preset, Userset Name, and Date saved by the user will be displayed.

For more information on creating a Userset, refer to 'Chapter 6. Starting Diagnosis'.

Select Probe

The probes supported by the product will be displayed.

Multi Select

You can select multiple items by placing check marks on them.

Import

Click **Import** on the monitor screen. The *Userset Import* window will be displayed; select a drive and click **Import** to import.

Export

Click **Export** on the monitor screen. The *Userset Export* window will be displayed; select a drive and click **Export** to export.

Refresh

Click **Refresh** on the monitor screen to refresh the screen.

Delete

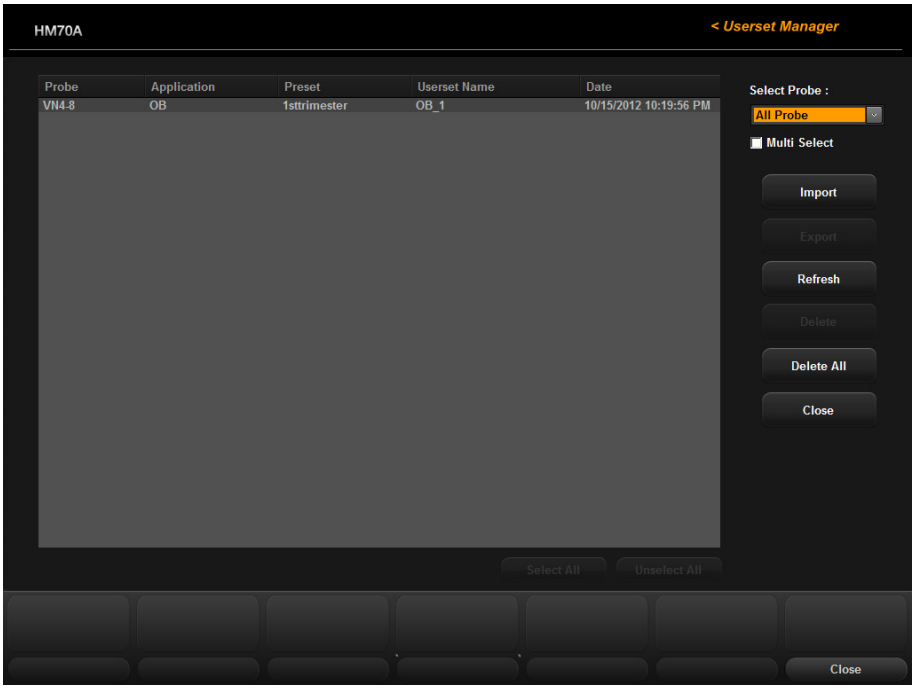
Click **Delete** on the monitor screen to delete the selected item.

Delete All

Click **Delete All** on the monitor screen to delete all items.

Close

Click **Close** on the monitor screen to exit Userset Manager.



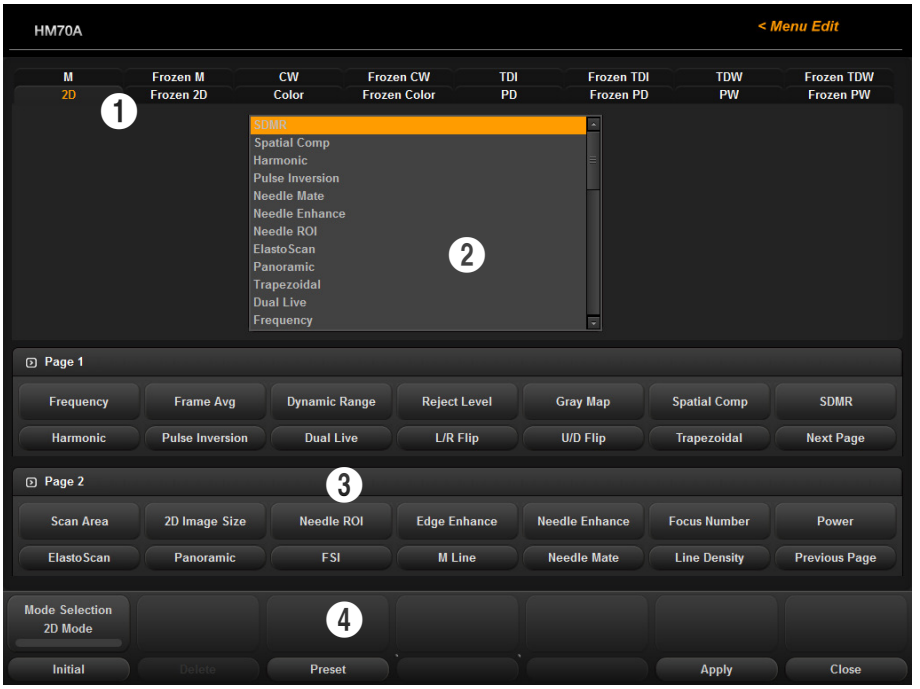
[Figure 3.33 Userset Manager]

Menu Edit

Select **Menu Edit** from the Utility menu. The *Menu Edit* screen will be displayed. From this screen, you can configure the soft menu layout for each mode.

Menu Edit Screen

The *Menu Edit* screen consists of the following:



[Figure 3.34 Menu Edit]

❶ Mode Tab: Configurable modes are displayed in tab format. Select the tab you wish to configure by using the trackball and the **Set** button on the control panel. The selected tab is highlighted in yellow.

❷ Menu Item List: Displays menu options that are available in the selected mode. Use the trackball and the **Set** button to select an item from the list. The selected item is highlighted in yellow. Following items can be selected for each mode.

Mode	Item		
2D	DMR+ Spatial Comp Harmonic Pulse Inversion Needle Mate NM Enhance NM Clipping Depth ElastoScan Panoramic Trapezoidal Dual Live Preset Frequency	Dynamic Range Frame Avg Reject Level Gray Map M Line U/D Flip L/R Flip Focus Number Change Window Top-Bottom Dual View Angle 2D Image Size Line Density Scan Area	FSI Edge Enhance Power Tissue Gamma Chroma Map 2D Image Size Rotation Post Curve Active Mode Next Page Previous Page
Frozen 2D	Cine Save Cine Play Trim First Trim Last Cine Speed Auto IMT U/D Flip	L/R Flip Change Window Edge Enhance Gray Map Frame Rate Post Curve DMR+	Needle Mate Needle Enhance Needle ROI Active Mode Next Page Previous Page
Color	TDI Color Invert Dual Live Freqeuncy Filter Scale Baseline Display Mode Color Hide	M Line Change Window Color Mode Balance Line Density Color Map Sensitivity Frame Avg Preset	Alpha Blending Blending Level Dynamic Range Smooth Power Active Mode Next Page Previous Page
Frozen Color	Color Invert Dual Live Cine Save Cine Play Trim First Trim Last	Cine Speed Baseline Display Mode Color Hide Balance Color Map	Alpha Blending Blending Level Active Mode Next Page Previous Page
PD	TDI Color Invert Dual Live Steer Frequency Filter Scale Baseline Display Mode Color Hide	Baseline Display Mode Color Hide M Line Change Window PD Mode Balance Line Density Color Map Sensitivity	Frame Avg Preset Alpha Blending Blending Level Dynamic Range Smooth Power Active Mode Next Page Previous Page

Mode	Item		
Frozen PD	TDI Color Invert Dual Live Steer Frequency Filter	Scale Baseline Display Mode Color Hide Change Window Balance	Color Map Alpha Blending Blending Level Active Mode Next Page Previous Page
TDI	TDI Color Invert Dual Live Steer Frequency Filter Scale Baseline Display Mode	Color Hide M Line Change Mode Color Mode Balance Line Density Color Map Sensitivity Frame Avg	Alpha Blending Blending Level Dynamic Range Smooth Power Active Mode Next Page Previous Page
Frozen TDI	TDI Color Invert Dual Live Cine Save Cine Play Trim First Trim Last	Cine Speed Baseline Display Mode Color Hide Change Window Balance Color Map	Alpha Blending Blending Level Active Mode Next Page Previous Page
PW	TDW Doppler Invert Simultaneous Mean Trace AutoCalc Sweep Speed Steer AutoCalc Direction Angle SV Size	Frequency Filter Scale Baseline Gray Map Change Window Spectrum Enh. Spectrum Type Chroma Map	Display Mode Loop Size Dynamic Range Power Active Mode Next Page Previous Page
Frozen PW	TDW Doppler Invert Mean Trace AutoCalc Cine/Loop Cine Save Cine Play	Trim First Trim Last Cine Speed AutoCalc Direction Baseline Change Window Sweep Speed	Display Mode Loop Size Chroma Map Gray Map Active Mode Next Page Previous Page

Mode	Item		
CW	TDW Doppler Invert Simultaneous Mean Trace AutoCalc Sweep Speed Steer AutoCalc Direction Angle	SV Size Filter Scale Baseline Gray Map Change Window Spectrum Enh. Spectrum Type	Display Mode Loop Size Dynamic Range Power Active Mode Next Page Previous Page
Frozen CW	TDW Doppler Invert Mean Trace AutoCalc Cine / Loop Cine Save Cine Play Trim First Trim Last	Cine Speed AutoCalc Direction Baseline Change Window Sweep Speed Chroma Map Gray Map Spectrum Enh. Spectrum Type	Display Mode Loop Size Dynamic Range Power Active Mode Next Page Previous Page
TDW	TDW Doppler Invert Simultaneous Mean Trace AutoCalc Sweep Speed Steer AutoCalc Direction SV Size	Frequency Filter Scale Baseline Gray Map Change Window Spectrum Enh. Spectrum Type	Loop Size Display Mode Dynamic Range Power Active Mode Next Page Previous Page
Frozen TDW	TDW Doppler Invert Mean Trace AutoCalc Cine / Loop Cine Save Cine Play	Trim First Trim Last Cine Speed AutoCalc Direction Baseline Change Window Sweep Speed	Loop Size Display Mode Chroma Map Gray Map Active Mode Next Page Previous Page
M	Anatomical M Sweep Speed Frequency Dynamic Range Reject Level	Gray Map Negative Chroma Map Display Mode Loop Size	M Edge Enhance Power Active Mode Next Page Previous Page
Frozen M	Cine / Loop Cine Save Cine Play Trim First Trim Last	Cine Speed Negative Change Window Sweep Speed Display Mode	Loop Size Chroma Map Gray Map Active Mode Next Page Previous Page

❸ Edit and Preview Area: Used to position the item that was selected from the menu item list. Select a button or dial that becomes activated upon its selection.

❹ Soft Menu

- **Mode Selection**: Used to change the mode tab. Select a mode by rotating the Soft Menu dial-button **1**.
- **Initial**: Press the Soft Menu dial-button **1** to restore default settings.
- **Delete**: Press the Soft Menu dial-button **2** to delete the selected item. Available only when a button or dial from the edit and preview area is selected.
- **Apply**: Press the Soft Menu dial-button **6** to apply the configured menu to the system. To finalize the settings, the system needs to reboot.
- **Preset**: Press the soft menu dial-button **3**, and the Usersets List will be displayed.
- **Close**: Press the Soft Menu dial-button **7** to exit *Menu Edit*.

NOTE: The user may back up or restore the current menu configured by the user.

Chapter 4

Maintenance

Operational Environment

When installing the product, please pay attention to the following:

CAUTION:

- Placing the system near generators, X-ray machines or broadcast cables may result in screen noise and abnormal visual images. Sharing the power source with other electrical devices may also cause noise.
- If an AC source is used to power the system, make sure to use a designated adapter only.

NOTE: It is recommended that an AC adapter is used to ensure a steady power supply.

- Avoid excess humidity.
- Avoid direct sunlight.
- Avoid excessive fluctuations in temperature.
- Optimal conditions for the system are temperatures of 10-35°C and humidity of 30-75%.
- Avoid installing the product near a heating appliance.
- Avoid dusty and/or poorly ventilated locations.
- Avoid locations that are subject to vibration.
- Avoid a location where chemical substances or harmful gases are present.

Product Maintenance

Cleaning and disinfecting

Using an inappropriate cleaning or sterilizing agent may damage the product. Pay attention to the following:

WARNING:

- Turn off the system and disconnect the power cord from the wall outlet before cleaning and disinfecting, Otherwise, there is a risk of electric shock or fire.
- Always use protective eyewear and gloves when cleaning and disinfecting the product.

Cleaning

CAUTION:

- Do not spray detergent directly onto the product's exterior. Doing so may discolor or crack the surface.
- Do not use chemical substances such as wax, benzene, alcohol, paint thinner, insecticide, aerosol deodorant, lubricant.

Console

Use a soft cloth lightly dampened with a mild soap to clean the exterior surfaces of the system.

Cleaning Monitor

Gently wipe the LCD surface with a soft, dry cloth.

NOTE: For information on cleaning and disinfecting probes and the biopsy kit, please refer to 'Chapter 5. Probes' in this manual.

Disinfecting

CAUTION: When disinfecting the surface, be sure to use disinfectants recommended by Samsung Medison.

A disinfectant certified by the FDA 510(k) process is recommended. For more information, please refer to the information about detergents, disinfectants, and ultrasound gels in 'Chapter 5. Probes'.

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Mix the disinfectant solution that is compatible with your system to the solution strength specified on the instruction label.
3. Clean the exterior surface of the product in compliance with the instructions provided with the disinfectant.
4. Air dry or towel dry the surface with a sterile cloth according to the instructions on the disinfectant label.

Accuracy Checks

NOTE: The user must ensure that safety inspections are performed every 2 years according to the requirements of safety standard EN60601-1. Only trained personnel are allowed to perform these safety inspections.

The product's maintenance status may affect the measurements obtained when using the product. The product should be maintained in an optimal state to ensure reliable measurements.

To ensure optimal operation of the product, perform an accuracy check every year. The equations and table related to measurement accuracy are included in 'Chapter 8. Measurements and Calculations' in this manual.

Battery Pack Management

The battery pack is a consumable, and will lose performance over time. If the battery life becomes less than half of what it was when first purchased, it is time for a replacement.

CAUTION:

- The warranty period for battery packs is six months.
- Samsung Medison recommends that you replace the battery pack once a year.

NOTE: For battery pack purchase inquiries, please contact Samsung Medison's service department.

Replacing the Battery Pack

Battery Pack Removal

Remove the battery pack as follows:

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Unlock the battery locking device at the bottom of the product and remove the battery pack.

WARNING: Remove the battery pack if you are not planning to use the product. Leaving the product unused and not plugged into a power outlet for an extended period of time may deplete the battery pack completely, making it impossible to recharge the batteries. In addition, allowing the battery pack to become completely depleted may cause communication problems for the product.

Connecting a Battery Pack

Connect the battery pack as follows:

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Unlock the battery locking device at the bottom of the product and insert the battery pack.

CAUTION: Make sure not to mix up the battery terminals.

3. Once the battery pack has been inserted, wait ten seconds before powering on the system.

Recharging the Battery Pack

Connecting the AC adapter automatically begins charging the battery pack. The battery pack will be charged faster if HM70A is powered off or in power saving mode.

WARNING:

- If the low battery message appears while you are using the product, immediately save the diagnosis information and connect the AC adapter.
- Before connecting the AC adapter, make sure it's the right way up. Forcing the adapter into the product in the wrong way can damage the product.
- Do not recharge the battery pack using a method other than that described in this manual. Doing so may lead to a fire or an explosion.

The battery pack must be charged and discharged within the following temperature ranges:

State	Ambient Temperature
Charge	0 ~ 45°C
Discharge	-10 ~ 50°C

CAUTION: The ideal charging temperature is between 0°C and 40°C. The battery pack can overheat if the ambient temperature is too high, or can take much longer than normal to recharge if the temperature is too low.

NOTE: If using the battery pack as the power source, check the battery icon shown on the screen to find out how much battery charge is left. For more information on battery icons, refer to the 'Battery' section of 'Chapter 2. Introduction'.

Storing the Battery Pack

If you are not planning on using your HM70A, remove the battery pack from the unit and store it separately. Storage temperature ranges are as follows:

Duration of Storage	Ambient Temperature
Less than 1 month	-10 ~ 60°C
1 – 3 months	-10 ~ 45°C
4 – 12 months	-10 ~ 30°C

For more information on storing and using the battery pack, refer to the 'Operational Environment' section in this chapter.

CAUTION: If you are using your battery pack for the first time, or using a battery pack that has not been used for more than three months, completely charge and discharge the battery pack a few times before using it.

Tips!

Complete Charge and Discharge

1. Insert a fully charged battery pack into HM70A and wait until the batteries completely discharge and shut down the system.
   - ▶ A fully charged battery pack will take about half an hour to fully discharge.
   - ▶ The battery status indicator will turn from green to orange as the battery pack discharges.
2. Connect the AC adapter and fully recharge the battery pack. Once fully recharged, the battery status indicator will turn green.
   - ▶ It takes approximately two hours to fully recharge a fully discharged battery pack. (It takes approximately three hours if the system is in use while the battery pack is being recharged.)
3. Discharge the battery pack once more until the system shuts down.

Disposing of the Battery Pack

A service representative of Samsung Medison or an authorized dealer must replace and dispose of the battery pack.

WARNING: Do not dispose of the battery pack yourself. Do not incinerate the battery pack, as this may cause an explosion or a fire.

Extended Battery Management

The Extended Battery is a consumable, and will gradually lose its maximum energy capacity over time. If you find that the system runs only half as long or less on the battery than when it was first purchased, replace it with a new Extended Battery.

CAUTION:

- The general warranty for an Extended Battery is valid for 6 months.
- Samsung Medison recommends that you replace the Extended Battery once a year.

NOTE:

- The Extended Battery is an optional feature of this product.
- To purchase an Extended Battery, please contact Samsung Medison's service department.

Replacing the Extended Battery

Disconnecting the Extended Battery

Disconnect the Extended Battery following these steps.

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Press the Power button on the Extended Battery to turn it off, and then disconnect the Extended Battery.

WARNING: Remove the Extended Battery if you are not planning to use the product. Leaving the product unused and not plugged in to a power outlet for an extended period of time may deplete the battery completely, making it impossible to recharge the batteries. In addition, allowing the battery to become completely depleted may cause communication problems for the product.

Connecting the Extended Battery

Connect the Extended Battery following these steps.

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Connect the Extended Battery to the product, and then turn on the power on the battery.

CAUTION: Before connecting the Extended Battery, make sure that the connecting parts are aligned correctly. Forcing the battery into the product in the wrong way can damage the product.

3. Wait 10 seconds after connecting the Extended Battery before powering on the product.

Charging the Extended Battery

Connecting the AC adapter automatically begins the charging of the Extended Battery. The Extended Battery will be recharged faster if HM70A is turned off or in power saving mode.

WARNING:

- If you see one blinking LED on the Extended Battery, connect the AC Adapter.
- Before connecting the AC Adapter, make sure that the connecting parts are aligned correctly. Forcing the adapter into the product in the wrong way can damage the product.
- Do not recharge the Extended Battery using a method other than the one described in this manual. Doing so may lead to a fire or an explosion.

The Extended Battery must be charged and discharged within the following temperature ranges:

State	Ambient Temperature
Charging	0 ~ 45°C
Discharging	-10 ~ 45°C

CAUTION: The ideal charging temperature is between 0°C and 40°C. Charging the Extended Battery in an excessively hot environment may cause the battery to overheat; charging the battery in an excessively cold environment may increase the amount of time needed for recharging.

NOTE: When using the Extended Battery as the power source, use the battery icons to check the remaining battery level. For more information on battery icons, Refer to the 'Battery' section in 'Chapter 2. Introduction'.

Storing the Extended Battery

If you are planning not to use HM70A for longer than a month, remove the Extended Battery from the system and store it separately. Storage temperature ranges are as follows:

Duration of Storage	Ambient Temperature
Up to 1 month	-20 ~ 50°C
1 to 3 months	-20 ~ 45°C
4 to 12 months	-20 ~ 25°C

For more information on storage and usage environments, refer to the 'Operational Environment' section in this chapter.

CAUTION:

- If you are planning to not use the Extended Battery for a long period of time, remove the Extended Battery from the system and store it separately.
- If you disconnect the Extended Battery for storage, it needs to be recharged at least once every 3 months.

Disposing of the Extended Battery

A service representative of Samsung Medison or an authorized dealer must replace and dispose of the battery.

WARNING: Do not dispose of the Extended Battery yourself. Do not incinerate the battery, as this may cause an explosion or a fire.

Information Maintenance

CAUTION: You may lose user settings or patient information files because of physical shocks to the product or internal errors. Therefore, you should back up this information on a regular basis.

Backing Up User Setting

Always keep a backup copy of all information related to the user settings in case of data loss. Clients cannot back up the user settings of the product. Please contact the servicing department to obtain support for backup. However, clients can back up user settings of the GA table used in OB measurements. For a more detailed description, refer to 'Chapter 3. Utilities', and 'Measure Setup > General > Data Transfer' in particular.

Backing Up Patient Information

You can back up patients' basic information and scanned images. You can save the backup manually; backups can only be saved externally, either to USB device or DVD. For more information, please refer to 'Chapter 6. Starting Diagnosis'. If you need to reinstall the system because of a problem with the product, a member of the Samsung Medison service staff will restore the basic information and images of patients you have saved.

Software

The software may be changed to improve the product's performance. You cannot modify the software on your own; a service representative will help you with any software modifications.

CAUTION: Minor software updates may be carried out without prior notice from the manufacturer.

If errors occur in the operating system (Windows™), or you wish to upgrade the operating system, please follow the instructions provided by the operating system manufacturer.

NOTE: This product uses the Windows firewall to prevent any hacker or malicious software from accessing the system through the internet or network.

Chapter 5

Probes

Probes

The probe is a device that sends and receives ultrasound for acquiring image data. It is also called a transducer or scanhead.

The system limits patient contact temperature to 43 degrees Celsius, and acoustic output values to their respective U.S. FDA limits. A power protection fuse circuit protects against over-current conditions. If the power monitor protection circuit senses an over-current condition, then the drive current to the probe is shut off immediately, preventing the probe surfaces from overheating and limiting acoustic output.

Probe List

The ultrasound image scanner uses probes to obtain graphic data of the human body, and then displays it on the screen. Always use application-specific probes in order to obtain the best quality images. It is also important to configure the preset with the best settings for the particular organ being scanned.

Probe Applications and Presets

Probes, applications and presets available for this product are as follows:

Probes	Application	Preset
C2-6	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd Trimester, 3rd Trimester, Fetal Heart
	Gynecology	General, Adnexa
CF4-9	Pediatric	Abdomen, NeoHead
	Vascular	Carotid, Arterial, Venous
SC1-6	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd Trimester, 3rd Trimester, Fetal Heart
	Gynecology	General, Adnexa
CA1-7AD	Abdomen	General, Aorta, Renal, Penetration
	OB	1st Trimester, 2nd Trimester, 3rd Trimester, Fetal Heart
	Gynecology	General, Adnexa

Probes	Application	Preset
CA2-8AD	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd Trimester, 3rd Trimester, Fetal Heart
	Gynecology	General, Adnexa
L4-7	Small Parts	Bowel, Breast, Testicle, Thyroid
	Vascular	Carotid, Arterial, Venous
	MSK	General
	Abdomen	General
L5-13	Small Parts	Bowel, Breast, Testicle, Thyroid
	Vascular	Carotid, Arterial, Venous
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, MSK-FAR, MSK-NEAR
L7-16	Small Parts	Breast, Testicle, Thyroid
	Vascular	Carotid, Superficial
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Penetration, MSK-Enhanced
LA3-16AD	Small Parts	Bowel, Breast, Testicle, Thyroid
	Vascular	Carotid, Arterial, Venous
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Penetration, Anesthesia
LA5-18B	Small Parts	Breast, Testicle, Thyroid
	Vascular	Carotid, Superficial
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist
PE2-4	Abdomen	General, Aorta, Renal
	Cardiac	Aortic Arch, Adult Echo, Ped Echo
	TCD	General
P3-8	Abdomen	General, Aorta, Renal
	Cardiac	Aortic Arch, Adult Echo, Ped Echo
EVN4-9	OB	1st Trimester
	Gynecology	Uterus, Adnexa
	Urology	Prostate

Probes	Application	Preset
VN4-8	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd Trimester, 3rd Trimester, Fetal Heart
	Gynecology	General, Adnexa
CW2.0	Cardiac	Adult Echo
CW4.0	Cardiac	Adult Echo, Ped Echo
DP2B	Cardiac	Adult Echo

NOTE:

- In addition to the settings optimized by the system, you may save your preferred settings as User Set.
- For information on presets, refer to 'Chapter 6. Starting Diagnosis'.

Function list

The functions you can use on HM70A for each probe and application are as follows:

Probes	Application	HAR	PI	SCI	SDMR	Q-SCAN	ECG	Biopsy
C2-6	Abdomen	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
CF4-9	Pediatric	X	X	X	O	O	X	X
	Vascular	X	X	X	O	O	O	X
SC1-6	Abdomen	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
CA1-7AD	Abdomen	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
CA2-8AD	Abdomen	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
L4-7	Small Parts	O	X	O	O	O	O	O
	Vascular	O	X	O	O	O	O	O
	MSK	O	X	O	O	O	O	O
	Abdomen	O	X	O	O	O	O	O
L5-13	Small Parts	O	X	O	O	O	O	O
	Vascular	O	X	O	O	O	O	O
	MSK	O	X	O	O	O	O	O
L7-16	Small Parts	O	X	O	O	O	O	O
	Vascular	O	X	O	O	O	O	O
	MSK	O	X	O	O	O	O	O

Probes	Application	HAR	PI	SCI	SDMR	Q-SCAN	ECG	Biopsy
LA3-16AD	Small Parts	O	X	O	O	O	O	O
	Vascular	O	X	O	O	O	O	O
	MSK	O	X	O	O	O	O	O
LA5-18B	Small Parts	O	X	O	O	O	O	O
	Vascular	O	X	O	O	O	O	O
	MSK	O	X	O	O	O	O	O
PE2-4	Abdomen	O	O	X	O	O	X	X
	Cardiac	O	O	X	O	O	O	X
	TCD	O	O	X	O	O	X	X
P3-8	Abdomen	O	O	X	O	O	X	X
	Cardiac	O	O	X	O	O	O	X
EVN4-9	OB	O	X	O	O	O	X	O
	Gynecology	O	X	O	O	O	X	O
	Urology	O	X	O	O	O	X	O
VN4-8	Abdomen	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
CW2.0	Cardiac	X	X	X	X	O	O	X
CW4.0	Cardiac	X	X	X	X	O	O	X
DP2B	Cardiac	X	X	X	X	O	O	X

Probes	Application	Elasto Scan	CM	TDI	PD	S-Flow	TDW	CW	3D/4D
C2-6	Abdomen	X	X	X	O	O	X	X	X
	OB	X	O**	X	X**	O	X	X	X
	Gynecology	X	X	X	O	O	X	X	X
CF4-9	Pediatric	X	X	X	O	O	X	X	X
	Vascular	X	X	X	O	O	X	X	X
SC1-6	Abdomen	X	X	X	O	O	X	X	X
	OB	X	O**	X	X**	O	X	X	X
	Gynecology	X	X	X	O	O	X	X	X
CA1-7AD	Abdomen	X	X	X	O	O	X	X	X
	OB	X	O**	X	X**	O	X	X	X
	Gynecology	X	X	X	O	O	X	X	X
CA2-8AD	Abdomen	X	X	X	O	O	X	X	X
	OB	X	O**	X	X**	O	X	X	X
	Gynecology	X	X	X	O	O	X	X	X
L4-7	Small Parts	X	X	X	O	O	X	X	X
	Vascular	X	X	X	O	O	X	X	X
	MSK	X	X	X	O	O	X	X	X
	Abdomen	X	X	X	O	O	X	X	X
L5-13	Small Parts	O*	X	X	O	O	X	X	X
	Vascular	X	X	X	O	O	X	X	X
	MSK	X	X	X	O	O	X	X	X
L7-16	Small Parts	X	X	X	O	O	X	X	X
	Vascular	X	X	X	O	O	X	X	X
	MSK	X	X	X	O	O	X	X	X
LA3-16AD	Small Parts	O*	X	X	O	O	X	X	X
	Vascular	X	X	X	O	O	X	X	X
	MSK	X	X	X	O	O	X	X	X

Probes	Application	Elasto Scan	CM	TDI	PD	S-Flow	TDW	CW	3D/4D
LA5-18B	Small Parts	X	X	X	O	O	X	X	X
	Vascular	X	X	X	O	O	X	X	X
	MSK	X	X	X	O	O	X	X	X
PE2-4	Abdomen	X	X	X	O	O	X	O	X
	Cardiac	X	O	O	X	X	O	O	X
	TCD	X	X	X	O	O	X	O	X
P3-8	Abdomen	X	X	X	O	O	X	O	X
	Cardiac	X	O	O	X	X	O	O	X
EVN4-9	OB	X	X	X	O	O	X	X	X
	Gynecology	O	X	X	O	O	X	X	X
	Urology	O	X	X	O	O	X	X	X
VN4-8	Abdomen	X	X	X	O	O	X	X	O
	OB	X	O**	X	O	O	X	X	O
	Gynecology	X	X	X	O	O	X	X	O
CW2.0	Cardiac	X	X	X	X	X	X	O	X
CW4.0	Cardiac	X	X	X	X	X	X	O	X
DP2B	Cardiac	X	X	X	X	X	X	O	X

NOTE:

Legend

- Har: Harmonic imaging
- PI: Pulse Inversion
- SCI: Spatial Compound Imaging
- Q Scan: Quick Scan
- ECG: Electro Cardio Graph Imaging
- CM: Color M
- TDI: Tissue Doppler
- PD: Power Doppler
- S-Flow: Directional Power Doppler Imaging
- TDW: Tissue Doppler Wave
- CW: Continuous Wave
- *: Only Breast
- **: Only Fetal Heart

Thermal Index (TI) Tables

TI values displayed on the screen title bar can change depending on probes and applications. Depending on body parts, thermal indices are categorized as soft tissue thermal index (TIs), bone thermal index (TIb), and cranial bone thermal index (TIc). This product automatically displays an appropriate thermal index for the current probe and application. Refer to the following table:

Probes	Application	Preset	Thermal Index
C2-6	Abdomen	General, Aorta, Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester	TIb
		Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs
CF4-9	Pediatric	Abdomen	TIs
		NeoHead	TIc
	Vascular	Carotid, Arterial, Venous	TIs
SC1-6	Abdomen	General, Aorta, Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester	TIb
		Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs
CA1-7AD	Abdomen	General, Aorta, Renal, Penetration	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester	TIb
		Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs

Probes	Application	Preset	Thermal Index
CA2-8AD	Abdomen	General, Aorta, Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester	TIb
		Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs
L4-7	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Vascular	Carotid, Arterial, Venous	TIs
	MSK	General	TIs
	Abdomen	General	TIs
L5-13	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, MSK-FAR, MSK-NEAR	TIs
L7-16	Small Parts	Breast, Testicle, Thyroid	TIs
	Vascular	Carotid, Superficial	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Penetration, MSK-Enhanced	TIs
LA3-16AD	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Penetration, Anesthesia	TIs
LA5-18B	Small Parts	Breast, Testicle, Thyroid	TIs
	Vascular	Carotid, Superficial	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist,	TIs
PE2-4	Abdomen	General, Aorta, Renal	TIs
	Cardiac	Aortic Arch, Adult Echo, Ped Echo	TIs
	TCD	General	TIc

Probes	Application	Preset	Thermal Index
P3-8	Abdomen	General, Aorta, Renal	TIs
	Cardiac	Aortic Arch, Adult Echo, Ped Echo	TIs
EVN4-9	OB	1st Trimester	TIs
	Gynecology	Uterus, Adnexa	TIs
	Urology	Prostate	TIs
VN4-8	Abdomen	General, Aorta, Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester, Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs
CW2.0	Cardiac	Adult Echo	TIs
CW4.0	Cardiac	Adult Echo, Ped Echo	TIs
DP2B	Cardiac	Adult Echo	TIs

NOTE:

- The default thermal index may vary by preset.
- You may change the thermal index at Setup > Display > Display > TI Display.

Ultrasound transmission Gel

For proper transmission of the acoustic beam, only use ultrasound transmission gel approved by Samsung Medison.

WARNING:

- The use of inappropriate ultrasound gels could result in damages in the probe. Using damaged probe could cause injuries such as electric shock in users or patients.
- Do not use ultrasound gels or contact media that contain the following contents.
  - Oils such as mineral oil, cooking oil, gasoline, solvents, rust inhibitors, lanolin, paraffin-based grease, ester and excessive silicon-based release agent.
  - Alcohols such as acetone, methanol, plasticizer (dioctylphtalate) or denatured alcohols.
  - Glacial acetic acid and iodine.
  - All types of lotions or gels that contain aromatic substances

Using Sheaths

Sheaths are recommended for clinical applications of an invasive nature, including intraoperative, transrectal, transvaginal, and biopsy procedures. Using a sheath also prevents contamination from blood or other bodily fluids during operations or biopsy.

Samsung Medison does not supply sheaths, so appropriate sheaths should be purchased independently.

WARNING:

- Always keep sheaths in a sterile state.
- Sheaths are disposable. Do not reuse them.
- If sheaths are torn or soiled after use, clean and disinfect the probe.
- In neurosurgical applications, a disinfected probe must be used with sterile gel and a sterile pyrogen-free sheath.
- If the sterile sheath becomes compromised during neurosurgical applications involving a patient with Creutzfeldt-Jakob disease, the probe cannot be successfully sterilized by any disinfection method.
- Some sheaths contain natural rubber latex and talc, which can cause allergic reactions in some individuals. Please refer to the FDA Medical Alert released on March 29, 1991.

NOTE: Probes for this system are not indicated for intraoperative and neurosurgical use.

Installing the Sheath

1. Put on sterile gloves. Unpack the sheath and fill it with ultrasound gel.
2. Insert the probe into the sheath and pull the latex tip to cover the probe completely. If possible, cover the probe cable as well.
3. Ensure that there are no air bubbles trapped within the ultrasound gel. If necessary, secure the sheath to the probe and the probe cable.
4. Dispose of the sheath after use.

Probe Safety Precautions

CAUTION:

- Do not apply mechanical shock to the probe.
- Do not place the probe cable on the floor where the cable can be run over by equipment wheels, etc. Do not apply excessive force to bend or pull the cable.
- Do not immerse the probe into any inappropriate substances such as alcohol, bleach, ammonium chloride, and hydrogen peroxide.
- Do not expose the probe to temperatures of +50°C or higher.

The probe can easily be damaged by improper use or by coming into contact with certain chemical substances. Always follow the instructions in the user manual to inspect the probe cable, case and lens before and after each use.

Check the probe for cracks, broken parts, leaks, and sharp edges. If there is any damage, stop using the probe immediately and contact the Samsung Medison Customer Support Department. Using damaged probes may result in electric shocks and other hazards to the patients and/or users.

Use and Infection Control of the Probe

WARNING: No neurosurgical treatments or examinations should be carried out on a patient with Creutzfeldt-Jakob disease (a critical brain disease caused by a virus). If the probe has been used on such a patient, it cannot be sterilized by any method whatsoever.

CAUTION: Sufficient washing and disinfecting must be carried out to prevent infection. This is the responsibility of the user who manages and maintains the disinfection procedures for the equipment. Always use legally approved detergents and sheaths.

The ultrasonographic image scanner uses ultrasound, and makes direct contact with the patient when in use. Depending on the types of examinations, such contact can be made to a wide variety of locations, including the ordinary skin or the location of blood transfusion during a surgical procedure.

The most effective method of preventing infection among patients is to use each probe only once. However, probes may need to be reused, as they are complex in design and expensive. Accordingly, use sheaths and other protective items and follow all safety instructions in order to minimize the risk of infection among patients.

Electric Shocks

The probe uses electrical energy. If it touches conductive materials, there are risks of electric shocks to the patient or the user.

WARNING:

- The equipment should regularly be checked for electrical leakage by the Samsung Medison service department.
- Do not immerse the probe into liquid.
- Do not drop the probe or apply mechanical shocks.
- Inspect the housing, strain relief, lens, and seal for damage, and check for any functional problem before and after each use.
- Do not apply excessive force to twist, pull or bend the probe cable.
- The power protection fuse protects the probe and the product from excess current. If the power monitoring protection circuit detects excess current, it immediately shuts off the current to the probe in order to prevent the probe surface from overheating and to restrict the ultrasound power output.
- The temperature of the product for making contact with patients is limited to below 43°C. The ultrasound power output (AP&I) is in compliance with US FDA standards.

Cleaning and Disinfecting the Probe

Using an inappropriate cleaning or sterilizing agent may damage the product.

WARNING:

- Always use protective eyewear and gloves when cleaning and disinfecting probes.
- Inspect the housing, strain relief, lens and seal for damage, and check for any functional problem after cleaning and disinfecting the probe.

NOTE: Only use the disinfect and disinfectants approved by the country's government in Canada.

Information of Detergent, Disinfectant, and Ultrasound Gel

An appropriate detergent, disinfectant or ultrasound gel should be selected based on the following tables. All probes are tested in accordance with IPX 7 Criteria.

Names	Disinfectants																
	T-Spray II	T-Spray	Sani-Cloth HB	Sani-Cloth Plus	Sani-Cloth Active	Septiwipes	Cleanisept Wipes	Ster-Bac Blu	Transeptic Spray	Incidin Foam	Super Sani-Cloth	Sani-Cloth Germicidal	Asepti-Wipes	Asepti-Wipes II	CaviWipes[7]	MetriWipes	Cidex 2%
Type	S	S	W	W	W	W	W	L	S	S	W	W	W	W	W	W	L
Active Ingredient	Quaternary Ammonium (N-Alkyl)								IPA								Glutaraldehyde
C2-6	●	●	●														
CF4-9	◆	◆	◎					▣	▲								▣
SC1-6		●															●

Names	Disinfectants																
	T-Spray II	T-Spray	Sani-Cloth HB	Sani-Cloth Plus	Sani-Cloth Active	Septiwipes	Cleanisept Wipes	Ster-Bac Blu	Transeptic Spray	Incidin Foam	Super Sani-Cloth	Sani-Cloth Germicidal	Asepti-Wipes	Asepti-Wipes II	CaviWipes [7]	MetriWipes	Cidex 2%
Type	S	S	W	W	W	W	W	L	S	S	W	W	W	W	W	W	L
Active Ingredient	Quaternary Ammonium (N-Alkyl)								IPA								Glutaraldehyde
CA1-7AD	●		●														●
CA2-8AD	●		●														●
L4-7	◆	◆	◎					▣	▲								▣
L5-13		●							●		●						
L7-16		●							●		●						
LA3-16AD	●		●														●
LA5-18B																	●
PE2-4	●	●	●	●													●
P3-8	●	●	●	●													●
EVN4-9		●	●														●
VN4-8		●	●														
CW2.0	●	●	●														
CW4.0																	●
DP2B	◆	◆	◎					▣	▲								▣

Names	Disinfectants															
	Cide X OPA [2), 3), 6), 7)]	Cidex Plus [2), 7)]	Metricide [2), 7)]	Omnicide (28)	Omnicide 14NS	Omnicide - FG2	Nuclean	Wavicide-01 [3)]	Sekusept Extra	Salvanios pH 7	Salvanios pH10	Steranios 2%	Surfaces Hautes	Sekusept Plus	Milton	Bleach 5.25%
Type	L	L	L	L	L	L	L	L	L	L	L	L	S	L	L	L
Active Ingredient	Ortho-phthalaldehyde	Glutaraldehyde												Nonionic surfactant	Sodium Hypochlorite	
C2-6	★	●	●	●				●	●						★	
CF4-9	▲	◇	▣					▣								
SC1-6	●	●													●	
CA1-7AD	●	●				●	●								●	
CA2-8AD	●	●				x	●								●	
L4-7	▲	◇	▣					▣								
L5-13	●	●													●	
L7-16	●	●													●	
LA3-16AD	●	●				●	●								●	
LA5-18B	●										●					
PE2-4	●	●	●	●	●			●			●	●			●	
P3-8	●	●	●	●	●			●			●	●			●	
EVN4-9	●	●				●	●								●	
VN4-8	●	●				●		●							●	
CW2.0	★	●						●							●	
CW4.0	●									●		●				
DP2B	▲	◇	▣					▣								

Names	Disinfectants								Cleaner					
	Virkon	Sporox	Sporox II	Gigasept	Gigasept AF [3]	Gigasept FF	Hibitane	PeraSafe	Enzol	Alkazyme	Cidezyme	Klenzyme	Isopropyl alcohol(70%)	Isopropyl alcohol(80%)
Type	L	L	L	L	L	L	L	P			L	L	L	L
Active Ingredient	N/A	Hydrogen Peroxide		Succindialdehyde, formaldehyde		Bersteinsaure	Chlorhexidine gluconate solution	Peracetic Acid	Dodecylphenolethoxylate, Sodium Xylene Sulfonate	N/A	Proteolytic Enzymes		Alcohol	
C2-6	x		x		x	★			●			●	x	
CF4-9					◎	◎	◎	▲						
SC1-6			●										●	
CA1-7AD		●									●	●	●	
CA2-8AD		●									●	●	●	
L4-7					◎	◎	◎	▲						
L5-13	●		●											
L7-16	●		●											
LA3-16AD		x									●	●	●	
LA5-18B										●	●	●		
PE2-4									●			●	●	
P3-8									●			●	●	
EVN4-9											●	●	●	
VN4-8			●								●	●	●	
CW2.0	●		x		x	●			●			●	x	
CW4.0										●		●		
DP2B					◎	◎	◎	▲						

Names	Cleaner			Gel							
	Ethanol 75%	Metrizyme	McKesson	Natural Image	Aquasonics 100 [3]	GE Ultrasound Contact Gel	Clear Image	Kendall	Scan	Wavelength	Sonogel
Type	L	L	L	G	G	G	G	G	G	G	G
Active Ingredient	Alcohol	Propylene Glycol	PCMX (Chloroxylenol)	Ammonium Chlorides	N/A						
C2-6		●			●						
CF4-9					●				●		●
SC1-6		●			●						
CA1-7AD		●	●		●						
CA2-8AD		●	●		●						
L4-7					●				●		●
L5-13					●						
L7-16					●						
LA3-16AD		●	●		●						
LA5-18B											
PE2-4		●			●						
P3-8		●			●						
EVN4-9		●	●		●						
VN4-8		●	●								
CW2.0		●			●						
CW4.0					●						
DP2B					●				●		●

Tips!

Symbols

Legend

(1)	Compatible, but no EPA Registration
(2)	FDA 510(k) cleared
(3)	Has CE mark
(4)	Discontinued
(5)	Under Development
(6)	ANVISA Registered
(7)	Health Canada Approved; CaviWipes (DIN: 02242209), Cidex OPA (DIN: 02239732), Cidex Plus (DIN: 02158396), Metricide (DIN: 01963996)
S	Spray
W	Wipe
L	Liquid
P	Powder
G	Gel
X	Not compatible (DO NOT USE)
●	Compatible
★	Staining may occur on housing parts; however, the acoustic performance and image quality are not affected.
■	Must not be used for longer than 5 minutes.
◐	Must not be used for longer than 10 minutes.
▲	Must not be used for longer than 15 minutes.
◆	Must not be used for longer than 20 minutes.
◇	Must not be used for longer than 25 minutes.
◎	Must not be used for longer than 30 minutes.
▣	Must not be used for longer than 50 minutes.
Blank	Untested (DO NOT USE)

The following is information about the manufacturers (or Distributors) of detergents, disinfectants, and ultrasound gels.

Product	Manufacturer or Distributor	Telephone number
Aquasonics	Parker Co.	+1-800-631-8888(USA)
Cidex	CIVCO Co.	+1-800-445-6741 (USA) +1-319-656-4447 (Worldwide)
Enzol	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447 (Worldwide)
GIgasept AF	S&M(Schulke&Mayr) Co.	+44-114-254-3500 (UK)
Gigasept FF	S&M(Schulke&Mayr) Co.	+44-114-254-3500 (UK)
Isoproppyl alcohol (70%)	Local drugstore	None
Klenzyme	Steris Co.	+1-800-548-4873(USA)
Metricide	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447 (Worldwide)
Metrizyme	Metrex Research Corp.	+1-800-841-1428(USA)
Milton	Procter & Gamble Australia Pty. Ltd.	+61-1800-028-280(Australia)
Nuclean	National Diagnostics Co.	+1-800-526-3867(USA) +44(0)-148-264-6020(UK)
Omnicide	Cottrell Ltd.	+1-800-843-3343(USA)
Sani-cloth	PDI/Nice-Pak Products Co.	+1-914-365-1602(USA)
Sekusept Extra	Henkel Hygiene GmbH.	+49-0211-797-0(Germany)
Sporox II	Sultan Chemist Inc.	+1-800-637-8582(USA)
T-Spray	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447 (Worldwide)
Virkon	Antec International LTD.	+1-403-286-1771(USA)
Wavicide	Wave Energy System Inc.	+1-800-252-1125(USA)

Cleaning

Cleaning is an important procedure that is carried out before disinfecting the probe. The probe must be cleaned after each use.

CAUTION:

- Do not use a surgical brush when cleaning probes. Even the use of soft brushes can damage the probe.
- During cleaning and disinfection, keep the parts of the probe that must remain dry higher than the other parts during wetting, until all parts are dry.

1. Disconnect the probe from the system.
2. Remove any biopsy adapters or biopsy needle guides. (Biopsy adapters are re-usable and can be disinfected).
3. Remove the sheath. (Sheaths are single-use items.)
4. Wipe foreign material off the probe with a soft cloth soaked with soap or cleansing fluid.
5. To remove remaining particulates, rinse with water up to the immersion point.
6. Wipe moisture off with a dry cloth.
7. If necessary, wipe first with a water-dampened cloth to remove soap residue, and wipe again with a dry cloth.

Disinfecting

A 10^{-6} reduction in pathogens should be reached following the disinfection procedures in this manual and using the following Samsung Medison recommended solutions. The disinfection method applies to the vaginal and rectal probes only.

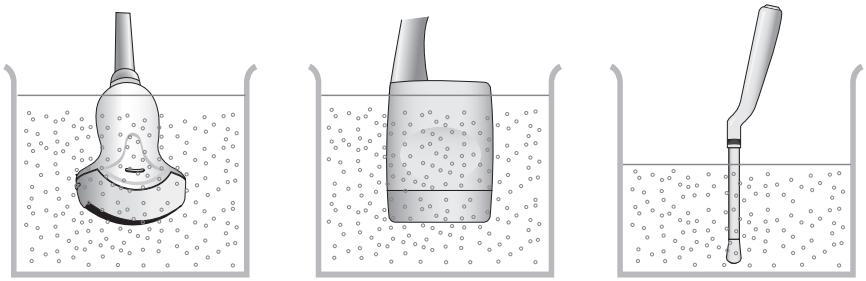
WARNING:

- If a pre-mixed solution is used, be sure to observe the solution expiration date.
- The type of tissue it will contact during use dictates the level of disinfection required for a device. Ensure that the solution strength and duration of contact are appropriate for disinfection.

CAUTION:

- Using a non-recommended disinfectant or not following the recommended disinfection method can damage and/or discolor the probe. This could also void the probe warranty.
- Do not immerse probes for longer than one hour, unless they are sterilizable.
- Only use liquid solutions to sterilize probes. Avoid using autoclave, gas (EtO), or other non-Samsung Medison-approved methods.

1. Please refer to the user instructions of the disinfectant for details of proper storage, use, and disposal of the disinfectant.
2. Mix the disinfectant compatible with your probe according to label instructions for solution strength.
3. Immerse the probe into the disinfectant as shown in the illustration below.
4. Follow the instructions on the disinfectant to complete the immersion procedure of the probe, and rinse the probe afterwards.
5. Air dry the probe or towel it dry with a clean cloth.



[Figure 5.1 Disinfecting a Probe]

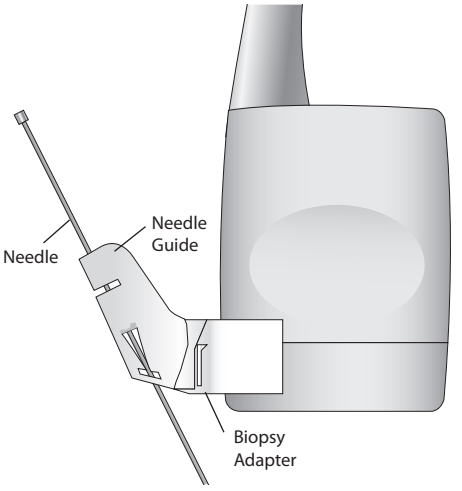
Biopsy

A biopsy is an examination method that surgically extracts tissue from the patient for examination. The probe and the biopsy kit are used together when conducting a biopsy with the ultrasonographic image scanner.

The ultrasound system shows the needle, which penetrates through the skin surface and veins, along with the examination location, minimizing the risk to the patient.

Biopsy Kit Components

The biopsy kit consists of the adapter, needle guide and needle. The components vary depending on the probe type.



[Figure 5.2 Biopsy Kit Components]

- Adapter: Secures the needle guide to the probe tightly.
- Needle Guide: Guides the angle (direction) of the needle so that it can reach the examination location accurately. It also secures the needle so that the needle is not loose.
- Needle: This is the needle that is inserted into the patient's body. Biopsy kits supplied by Samsung Medison do not include needles.
- Sheath: Prevents the probe and adapter from getting soiled by any unwanted substances during the examination (blood and other bodily fluids).
- Gel: The space between the probe and the sheath is filled with the ultrasound gel to obtain images of the best quality.

Using the Biopsy Kit

WARNING:

- Only use the needles approved by the country's government.
- Verify the condition of the biopsy needle before use. Do not use a bent biopsy needle.
- The biopsy needle may bend during tissue penetration. The precise location of the needle must be checked by monitoring the echo generated from the needle.
- Never use the biopsy kit to biopsy prostate tissue.

Preparations Before Using the Biopsy Kit

Ultrasonographic scanning using the biopsy kit must be conducted by medical doctors or experienced medical staff with appropriate qualifications. Always, without fail, verify all safety procedures and disinfection.

Other brands of biopsy kit may not properly fit Samsung Medison probes. Use only Samsung Medison-approved biopsy kits. Improper installation may adversely affect the patient.

Inspect all components. Ensure that the biopsy kit you are using is the correct one for the probe, the system, and the system software.

WARNING:

- Do not attempt to use the biopsy kit until you have read the instructions for installing the sheath and verifying alignment of the needle guide.
- Always ensure that the probe and the needle guide are secured on both the left and the right.
- Do not use in IVF, CVS, or PUBS procedures.

Biopsy Procedure

The system generates a needle guideline though the displayed real-time ultrasound images to indicate the anticipated path of the needle. You can use this guideline to ensure that the needle or instrument is following the correct path.

1. Ready the patient according to the procedure appropriate for the examination objectives.
2. Install the sheath and the biopsy kit.
3. Set the system controls for the biopsy procedure. If necessary, apply acoustic gel to the patient.
4. Scan the patient. Adjust the patient so that the location for examination fits into the needle guideline on the screen.
5. Insert the needle into the needle guide. Insert the needle until it reaches the examination site. To keep the needle securely in the needle guide, press down on the top of the biopsy adapter with your index finger.
6. When the examination location is reached, take the needle out of the needle guide.
7. Detach the needle guide, adapter and sheath from the probe.
8. Discard all disposable items following use.

Needle Guide Alignment

Alignment of the needle guide displayed on the system is for the purpose of verifying whether the needle and the needle guide are properly installed. This must be done prior to the biopsy examination. If the needle fails to follow the accurate path while verifying the alignment of needle guide, stop using the product and contact the Samsung Medison Customer Support Department.

Reverberation or other tissue artifacts may produce false needle images, which can cause confusion. Ensure that the needle path is along the guideline, and that you are not using a false needle image to locate the needle.

WARNING:

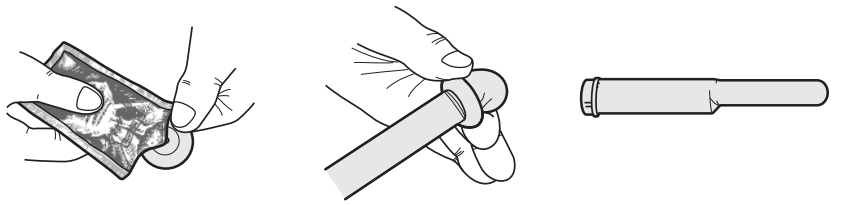
- The needle used for this alignment verification must not be used for the actual procedure. Always use a new, sterile needle for each biopsy procedure.
- To assist in accurate projection of the needle, use a straight, new needle for each alignment procedure.

1. Attach the biopsy kit.
2. Set the system depth for the procedure to be performed and select the Biopsy menu.
3. Immerse the probe into the water bath, and insert the needle into the needle guide.
4. Confirm that the needle image is on the needle guidelines. If so, the needle guide is properly aligned.
5. If the needle image is out of the needle guideline, check the needle guide or the probe adapter.

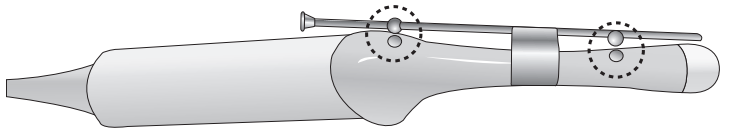
Assembling the Biopsy Kit

Disposable Biopsy KIT

1. Place a sheath up to the top of the probe's handle.



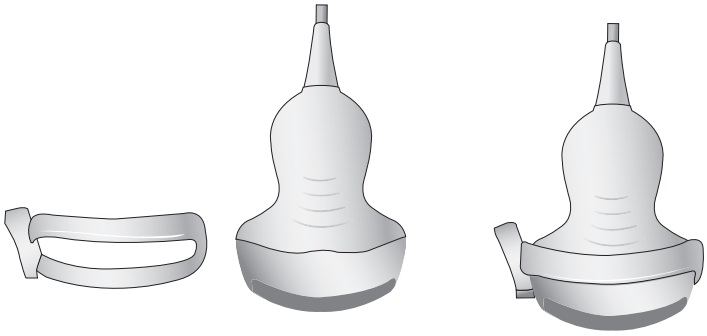
2. Mount the biopsy adapter onto the probe. If the surface of probe is fluted, mount the adapter in accordance with it.



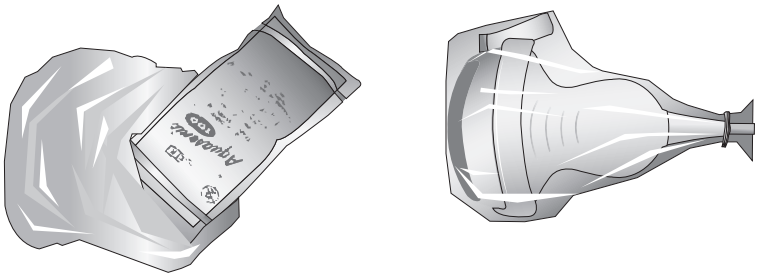
3. Insert the needle into the needle guide and start the exam.

Reusable Biopsy KIT

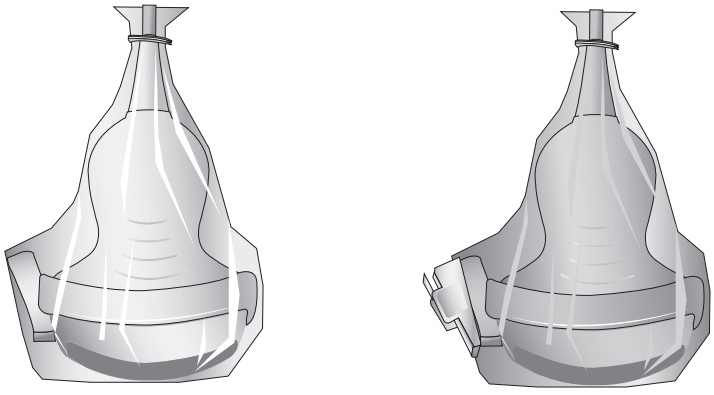
1. Mount the adapter on the probe.



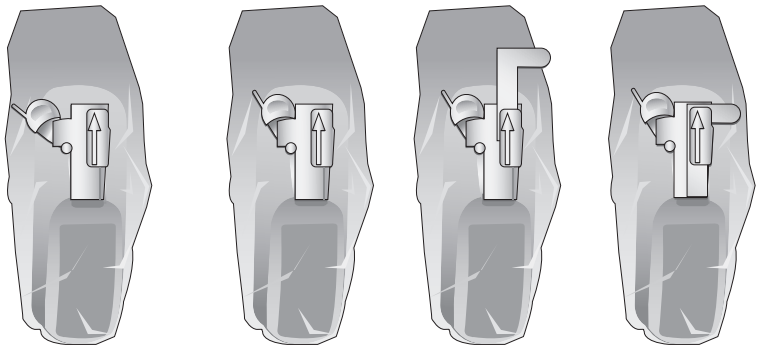
2. Cover the adaptor and probe completely with the sheath.



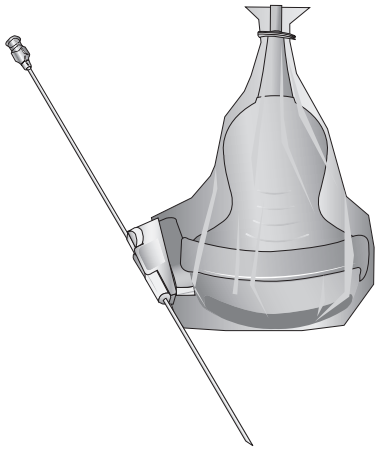
3. Install the needle guide onto the adapter.



4. Installing the Needle Guide Clip if it is included in the components.



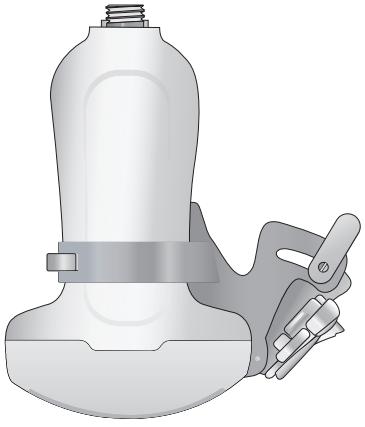
5. Insert the needle into the needle guide and start the exam.



Tips!

Using Multi Angle

Use the angle adjuster.



Biopsy Kit Specifications

Probe	Biopsy					
	Model	Component	Material of adapter	Reusable / Disposable	Needle Gauge	Multi Angle Depth
C2-6	BP-KIT-009	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23G, 8.5FR	NA
		Needle Guide		Disposable		
CA1-7AD	BP-KIT-058	Biopsy Adapter	Acetal Copolymer	Reusable	14, 16, 18, 20, 22, 25G	1.969, 3.937, 5.906, 7.874 (in)
		Needle Guide		Disposable		
CA2-8AD	BP-KIT-054	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 22, 25G	2.362, 3.150, 3.937 (in)
		Needle Guide		Disposable		
SC1-6	BP-KIT-052	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 22, 25G	1.575, 2.362, 3.150 (in)
		Needle Guide		Disposable		
L4-7	BP-KIT-043	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23G, 8.5FR	0.591, 0.984, 1.575 (in)
		Needle Guide		Disposable		
L5-13 L7-16	BP-KIT-012	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23G, 8.5FR	1.5, 2.5, 4 (cm)
		Needle Guide		Disposable		
LA3-16AD	BP-KIT-055	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 20, 22G	0.591, 0.984, 1.575 (in)
		Needle Guide		Disposable		
LA5-18B	BP-KIT-040-1	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 22G	0.984 (in)
		Needle Guide		Disposable		
EVN4-9	BP-KIT-024	Needle guide	Stainless	Reusable	16G	NA
	BP-KIT-046	Needle guide	LEXAN	Disposable	16G	NA
VN4-8	BP-KIT-049	Biopsy Adapter	Acetal Copolymer	Reusable	20, 21, 22, 25G	1.181, 1.969, 3.150, 3.937, 4.724 (in)
		Needle guide		Disposable		

Cleaning and Disinfecting the Biopsy Kit

Wash and disinfect the biopsy kit to reduce pathogens to the level of 10^{-6}. Some components of the biopsy kit may be disposable. Please read the biopsy kit user manual carefully before use.

WARNING: Always use protective eyewear and gloves when cleaning and disinfecting biopsy kit.

Cleaning and Disinfection of Stainless Steel Biopsy Kit

Cleaning

1. After use, remove the biopsy kit from the probe.
2. Disassemble the biopsy kit into its component parts, if applicable.
3. Using a small brush and water, scrub each part to remove trapped material from the biopsy kit.
4. Rinse with water to remove remaining particulates.

Disinfecting

1. Disinfect the adapter by autoclaving (Steam) or using gas (Ethylene Oxide).
2. After disinfection, follow the proper post-disinfection procedure for the disinfection method used. (Please refer to the disinfection user manual, etc.)
3. Inspect the components for damage such as cracks, rust or breakage. If damage is discovered, contact Samsung Medison's service department.

Cleaning and Disinfecting of Plastic Biopsy Kit

Cleaning

1. After use, remove the biopsy kit from the probe.
2. Disassemble the biopsy kit into its component parts, if applicable. Discard the single-use parts. These parts cannot be disinfected.
3. Using a small brush and water, scrub each part to remove trapped material from the reusable components.
4. Rinse with water to remove remaining particulates.

Disinfecting

CAUTION: Plastic biopsy kits can only be disinfected by using a chemically compatible cold-disinfectant. Disinfection by autoclaving, or by using gas or radiation, will cause damage to these parts.

Please refer to the user instructions of the disinfectant for details of proper storage, use, and disposal of the disinfectant.

1. Check the disinfection duration (generally 10 hours) and temperature of the disinfectant.
2. After disinfection, follow the proper post-disinfection procedure for the disinfection method used.
3. Inspect the components for damage such as cracks, rust or breakage. If damage is discovered, contact Samsung Medison's service department.

Sterilization

CAUTION:

- If the material of the biopsy needle guide is plastic, only single use is possible.
- Do not gas sterilize or autoclave biopsy adapter.

Plastic biopsy adapter is reusable. Refer to the user instructions of the biopsy kit for details of sterilization.